

RAJKOT MUNICIPAL CORPORATION

INVITATION FORBIDS

Rajkot Municipal Corporation, East Zone (Construction Branch), Bhavnagr Road, Opp. Moti Pura Oil Mill, Rajkot, Gujarat 360003 (Gujarat), invites e-Tenders with two bid system from the experienced contractors registered in **Class "A" Category** and **Special Category-II Building** or equivalent for any state Government, R&B Division or central Government" for following work:.

Sr. No.	Name of Work	a) Estimated Cost b) Amount of EMD c) E-Tender fee d) Time limit for completion of work
1	Contract for Design, Supply, Installation, Testing and Commissioning of Electric and gas based cremation furnace System with related comprehensive Electrical, Mechanical and Civil Work including all necessary equipment with 5 (five) years Comprehensive O&M at Kothariya in Rajkot.	a) 4,00,00,000.00/- b) 4,00,000.00/- c) 7,500/- d) 12 Months

:: Milestone dates of e-Tendering ::		
1	Downloading of e-Tender documents	25/08/2023 To 15/09/2023 up to 18.00 hrs.
2	Pre-bid Meeting at Rajkot Municipal Corporation, Rajkot Municipal Corporation Manohar Pura, Rajkot, Gujarat 360003	01/09/2023 at 12.00 hrs.
3	Online submission of e-Tender	15/08/2023 up to 18.00 hrs.
4	Submission of EMD, Tender fee, Documents required for pre-qualification and other necessary documents for verification by Regd AD / Speed Post only.	20/09/2023 up to 18.00 hrs.
5	Verification of submitted documents (EMD, Tender fee, Documents required for pre-qualification and other necessary documents)	22/09/2023 at 11.00 hrs onwards (if possible)
6	Opening of online Primary (Technical) Bid (if Possible)	23/09/2023 at 11.00 hrs onwards (if possible)
7	Opening of online Commercial Bid (Price Bid) for technically qualified bidders only (if Possible)	25/09/2023 at 10.30 hrs. onwards (if possible)
8	Bid Validity	One Twenty (120) calendar days

For further particulars, visit us on www.rmc.nprocure.com

- 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 favour 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 submission of required documents shall have to be done at the below mentioned address:

Office of City Engineer,
Rajkot Municipal Corporation
East Zone, (Construction Branch),

Rajkot Municipal Corporation,
Manohar Pura, Rajkot, Gujarat 360003

- The e-Tender fee will be accepted in form of Demand Draft only, in favour of "Rajkot Municipal Corporation", Rajkot, from any Nationalized Bank or Scheduled bank (except Co-operative Bank) in India and must be delivered to above address.
- **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.**
- **The Pre-Qualification requirement is as under: -**
 - (A) 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 **"A" Class registration with Special Building Category- I.**
 4. Bank Solvency should not be less than Rs. 75.00 lacs.
 - (B) Experience Criteria:**

Experience of having successfully completed similar works during last 7 years should be either of the following In Civil and Furnace Work.

 - i) **Three** similar works costing not less than the amount equal to **30%** each of the estimated cost.
OR
 - ii) **Two** similar completed works costing not less than the amount equal to **40%** each of the estimated cost.
OR
 - iii) **One** similar completed work costing not less than the amount equal to **60%** of the estimated cost.
 - (C) Definition of similar works:**

Special Structure like Sports Complex, Exhibition and Convection Centres (Auditorium), Large Institutional Building works consisting of RCC Frame Structures including water supply, sanitary, General Electrification etc. for any of Government, Semi-Government. The experience of construction for Private Builders / Societies will not be considered.
 - (D) Eligible Criteria:**

The contractor should have executed Gas/Electric based cremation furnace in project of Government / Semi-Government. The contractor should submit required experience certification (Form No.3A) issued by the Government / Semi-Government.

Note:

1. Enhancement factor at 10 % per year for last seven years will be applicable to arrive average annual turnover and finalize the magnitude of work done in last seven years.
2. Available Bid Capacity-ABC will be finding out by the following method.

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

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

B = Value at 31-12-2021, Price level of existing commitments and on-going 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.

3. Joint-Venture will be permitted.
4. The bidder must submit the copy of Memorandum of Association or Partnership Deed, as the case may be.
5. Either Prime contractor or agency executing the electrical works under the prime contractor must have Electrical Contractor License (MoU on Rs.300/- Stamp Paper with agency executing the electrical works and its Electrical Contractor License must be submitted by the Prime contractor during the physical submission of technical document).
6. Either Prime contractor or MOU agency must have executed the Furnace works in Gov./Semi Government work. Prime contractor must have to submit MoU on Rs.300/- Stamp Paper and Form No.3A of MOU agency during the physical submission of technical document.
7. Firm should not be with Black listing History with Govt., Semi Govt., Boards and Corporations. Notarized Affidavit in this regard should be submitted on **Rs.300/- Stamp Paper/Required amount stamp paper as per prevailing law.**
8. 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.
9. 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.
10. The firm must give an affidavit through its directors/Partners/Prop. Stating that all the credentials/Documents submitted are true and genuine and if

found false at any stage of the project, they are liable for all the financial or legal consequences on this account.

11. After opening of online Technical Bid, the procedure for the pre-qualification shall be adopted and the e-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.
12. The Tender of those bidder(s) those who fail to submit the required documents physically within the stipulated date and time will be treated as non-responsive and their e-Price Bid will not be opened.
13. Conditional Tenders will be out rightly rejected.
14. PMC's Fee 0.90% Of Project Cost Will Be Deduct in Contractor's Running Bill.
15. The bidder must be registered as an Electrical contractor with any state government or central government.
 - a. The bidder must submit the copy of PAN registration.
 - b. The bidder must submit the fresh "NO BLACK LIST" Affidavit on duly notarized Rs. 300/- Stamp Paper stating that the bidder is never black listed in any of the Govt. or Semi Govt. departments of any state or India.
 - c. The bidder must submit the copy of the valid GST registration.
 - d. The bidder must submit the copy of the valid PF registration.
 - e. The bidder must submit the copy of Memorandum of Association or Partnership Deed, as the case may be.
 - f. Conditional tender shall not be accepted and will be rejected.
 - g. Acceptance of the tenders will rest with The commissioner, RAJKOT MUNICIPAL CORPORATION, Rajkot, who does not bind himself to accept the lowest tender and reserves the right to reject any or all tenders without assigning any reason thereof.
 - h. For any legal matter/disputes the jurisdiction will be Rajkot.
 - i. All the Tender documents/ bid documents/ Amendments/ Corrigendum/ Addenda / copies must be self certified/ signed with stamp at every page by the bidder.
 - j. Documents to be submitted with the Techno-commercial Bid: - The bidder shall submit supporting documents for the product offered by him in the bid as per following list.
 1. Datasheets for electrical and mechanical properties indicating all the parameters specified in the detailed Scope of Work.
 2. All IEC certificates and other certificate(s) as applicable.
Required by RMC
16. 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



TENDER DOCUMENTS

FOR

Contract for Design, Supply, Installation, Testing and Commissioning of Electric and gas based cremation furnace System with related comprehensive Electrical, Mechanical and Civil Work including all necessary equipment with 5 (five) years Comprehensive O&M at Kothariya in Rajkot.

VOLUME – I

TECHNICAL BID

Municipal Commissioner

**Rajkot Municipal Corporation, Bhavnagr Road, Opp. Moti Pura Oil Mill, Rajkot, Gujarat
360003**

ANNEXURE Notice Inviting On-Line Tender

Department Name	Rajkot Municipal Corporation Bhavnagr Road, Opp. Moti Pura Oil Mill, Rajkot, Gujarat 360003
Name of Project	Contract for Design, Supply, Installation, Testing and Commissioning of Electric and gas based cremation furnace System with related comprehensive Electrical, Mechanical and Civil Work including all necessary equipment with 5 (five) years Comprehensive O&M at Kothariya in Rajkot.
Estimated Contract Value (INR)	Rs. 4,00,00,000.00/-
Period of Completion (in Months)	12 Months
Approved Govt. Registered Class	"A" & Special Category Building -II 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. 7,500.00/-
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. 4,00,000.00/-
Bid Security / EMD in favour of	Rajkot Municipal Corporation in Terms of F.D.R./DD

Tender Dates

Bid Document Downloading Start Date	25/08/2023 at 17.00 hrs
Pre-Bid Meeting in West Zone Office	01/09/2023 at 12.00 hrs
Bid Document Downloading End Date	15/09/2023 up to 17.00 hrs.
Last Date & Time for Receipt (Submission) of Bids	15/09/2023 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, East Zone,

	(Construction Branch), Bhavnagr Road, Opp. Moti Pura Oil Mill, Rajkot, Gujarat 360003 before date: 20/09/2023 up to 18.00 hrs.
Price Bid Opening Date	25/09/2023 at 10.30 hrs. onwards (if Possible)

Other Details

Officer Inviting Bids	Commissioner, RMC
Bid Opening Authority	Commissioner, RMC
Address	Rajkot Municipal Corporation Bhavnagr Road, Opp. Moti Pura Oil Mill, Rajkot, Gujarat 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

- (1) Name of the work : Contract for Design, Supply, Installation, Testing and Commissioning of Electric and gas based cremation furnace System with related comprehensive Electrical, Mechanical and Civil Work including all necessary equipment with 5 (five) years Comprehensive O&M at Kothariya in Rajkot.
- (2) Estimated Cost : Rs. 4,00,00,000.00/-
- (3) Earnest Money : Rs. 4,00,000.00/-
- (3) Validity period of : 120 days from the date of opening of price bid tender offered
- (4) 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
- (5) 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.
 - Joint venture will be permitted with maximum up to 2 (two) members as a partner, however all the fees, guarantee amount etc will be in the name of lead partner.
 - In Joint Venture, the lead partner as well as any other partner should

have experience of similar nature of work, minimum 51% of the estimated cost.

- Experience and Financial criteria will be applicable as per share in JV.
- All Partners of JV are responsible for the execution of the work.
- Other Partner must have not less than 20% financial share in the JV.

Bids submitted by a joint venture of two or three firms as partners shall comply with the following requirements.

- i. Tender fee, Earnest Money Deposit, Security Deposit and other financial details will be in the name of the lead partner.
- ii. All the partners shall have to enter into the Joint venture agreement and original agreement duly notarized shall have to be submitted along with tender documents.
- iii. The bid, and in case of a successful bid, the Form of Contract Agreement, shall be signed so as to be legally binding on all partners.
- iv. One of the partners shall be authorized to be in charge, and his authorization shall be evidenced by submitting a power of attorney by legally authorized signatory's of all the partners.
- v. The partner in charge shall be authorized to incur liabilities, receive payments and receive instructions for and on behalf of any or all partners of the joint venture and the entire execution of the Contract.
- vi. All partners of the joint venture shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms, and relevant statement to this effect shall be included in the authorization mentioned under (iv) above as well as in the Bid Form and the Form of Contract Agreement (in case of successful bid); and
- vii. Permissible Joint venture partners shall be restricted to three numbers.

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.23,500/-.

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 (Ele. 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. 4,00,000.00/- 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-Tender document 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 quarry 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 or e-Tenders will be made during the Tender validity period. Schedule-B (Price Schedule) is given for Various work. The Contractors are requested to quote their price offer in % below or above on the given price schedule for Various work 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 annul to 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

A. e-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 (Spl)

**Add Asst Engineer
Roshni Dept.**

**Dy. Ex. Engineer
Roshni Dept.**

**Add City Engineer (i/c)
Roshni Dept.**

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 their submitted 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 in itialed 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 allowed for 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.
19. Bidder has to submit the List of Project where they have installed and running successfully the Gas/Electric Based Furnace and if RMC official wish to visit the Site then Bidder has to line up all the activity like permission and approval

**Add Asst Engineer
Civil Dept.**

**Dy. Ex. Engineer
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City Engineer (Spl)

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Roshni Dept.**

Rajkot Municipal Corporation

Signature of Contractor

Scope of work

- 1 **OBJECTIVE AND SITE DESCRIPTION: -**
RAJKOT MUNICIPAL CORPORATION is proposing to set up environmental friendly fuel(Gas/Electric) fired cremation furnace in premises of Rajkot Municipal Corporation, there by reducing use of wood and help to reduce environmental impact of pollution
- 2 Civil work is in scope of agency, Detail drawings is submitted by OEM of the furnace and as well as chimney foundation and all other required foundation.
- 3 Design, supply and erection of chimney for each furnace for smooth operation.
- 4 For fuel fired furnace the design capable of 7 to 8 cremations per day, and cremations times around 90 minutes fully achievable.
- 5 Supply, installation and commissioning of all earthing and lightning protection equipment as per technical specifications in this tender documents.
- 6 Supply and installation of operation and control equipment, temperature control, fresh air control with different stage,
- 7 Successful commissioning of self-supported chimney with minimum heights of minimum 30 mtr. As per tender specification and pollution control board rules and regulation
- 8 Provide necessary manpower for initial maintenance as well as training to the RAJKOT MUNICIPAL CORPORATION (RMC) staff.
- 9 Contractor has to submit periodical maintenance schedule for Furnace with required spares.

WARRANTY :- The mechanical structures, electrical works including electric cable/ wires meters / digital meters/ switchgear/bricks / heating elements /motors /pumps / etc. and overall workmanship of the furnace plants/ systems must be warranted against any manufacturing/ design/ installation defects for a minimum period of 05 years after completed SITC.

Special Condition of Electric Work :-

- 1 Provide in-house training in operation, testing, monitoring and maintenance of the crematorium furnace. And submit operation and maintenance manuals.
- 2 Supply, Installation testing and commissioning of gas/Electric based cremation furnace with 5 (FIVE) year comprehensive maintenance.
- 3 Details of all the technical personnel whom the bidder shall engage for this work include their resume providing name, qualification, nature of work (field or office), mode of employment; previous experience shall be provided by bidder.
- 4 A bidder shall produce, original documents for cross verification as and when requested by RMC.
- 5 The contractor (Furnace OEM) arrange to visit at site when civil work is in progress and check furnace, chimney and all other required civil work foundation and rectify it if any deviation in work by civil contractor (Chimney foundation design submitted by OEM with approved by structural engineer) If civil work has not build up as per drg. Totally responsibility of the contractor (Furnace OEM)
- 6 A third party inspection (TPI/Project Management consultancy(PMC)/PMS Agency will be deployed by RAJKOT MUNICIPAL CORPORATION. Work has been executed in approval and presence of PMC/PMS authorized person.
- 7 **Payment:-The payments to the successful bidder will be made as per following.**
 1. 50 % after supply of all plant, equipment's, furnace structure, all type of bricks, chimney and etc. at site in good condition and
 2. 30 % after successful completion of Installation, Testing and commissioning of all work, after on submission of report for the same from TPI/PMC Agency (if deployed) or by EIC.
 3. 10% After first Trail Run. Result of trail run will be as per the technical requirement mentioned in technical specification of Gas Furnace.
 4. 10 % of amount will considered as performance check guarantee, and will be released after 50(Fifty) successful Cremation or After 30days from the handing over of Site to RMC(Certified date of Completion).

Special Condition for Contractor

1. The site for the proposed Contract for Design, Supply, Installation, Testing and Commissioning of Electric and gas based cremation furnace System with related comprehensive Electrical, Mechanical and Civil Work including all necessary equipment with 5 (five) years Comprehensive O&M at Kothariya in Rajkot. Contractor is expected to have visited the site and gets to know about the existing structures in and around the Site.

2. 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, 1.5 Ton AC, 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) Room for Office space of 3mx3m for other RMC/PMC staff with facility of 1.5 ton AC, vitrified tile flooring, painting, door windows etc complete including four tables and 8 Chairs, separate Sintex water tanks for toilet and drinking water with sufficient capacity.
 - c) Internet:- LAN connectivity with each computer with broadband internet connection.
 - d) Printer:-1 nos. colour laser printer with scanner & copier
 - e) Fax. 1.No (All in One : Printer, Copier, Scanner & Fax)
 - f) Telephone: EPABX system 3 x 8 extension with telephone wiring & necessary instruments
 - g) 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.

3. 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.

4. 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.

5. 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 10 years' Experience of Q.C. / lab operation.)

6. 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.
7. 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.
8. The contractor has to barricade the premises with steel pipes and steel sheets within week from the commencement of work.
9. The contractor should be given one soil investigation Report to RMC
10. The Contractor Should be paid Proof Checking Fees of Structure design. Proof checking Fees is 0.50 % of Estimated Project cost (Rs. 4,00,00,000.00/-) Will be Direct Pay to Proof checking Consultant Either Deducted in Three Equal Part From 1st, 2nd & 3rd R.A. Bill from Stage Wise. Proof checking Consultant is approved by engineer in charge.
11. The Agency Has to Carry out the maintenance of same Building Civil, Interior, Electrical, Plumbing, Contract for Design, Supply, Installation, Testing and Commissioning of Electric and gas based cremation furnace System with related comprehensive Electrical, Mechanical and Civil Work including all necessary equipment with 5 (five) years Comprehensive O&M at Kothariya in Rajkot. work for the **period of Two Years**.
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.

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 shop drawings, 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
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Rajkot Municipal Corporation

Signature of Contractor

Free maintenance Guarantee period

Scope of work for Civil & Electrical work, CCTV system, audio and video system

Design, Supply, Installation, Testing, Commissioning and comprehensive maintenance of all electric work, CCTV system, and video audio system. The agency has to repair / replace all the equipment within 72 hours after receipt of the complaint, Failing which penalty will be imposed as per tender terms and condition, This is comprehensive maintenance period for **two years**, hence the agency has to perform all civil, electrical and mechanical activities including labour and martial during the performance period without any extra charge

It is comprehensive maintenance so all the equipment's guaranty must be without any terms and condition and in any fault any defect raise in the all electrical live parts, The agency must be repaired / replace with supply, installation, transport, taxes, loading and unloading work

The contractor shall have to give two years free maintenance guarantee period from the certified date of completion. During this period Agency shall have to repair/ replaced the damaged/ installed portion of AC, Interior, Electrical Work, Plumbing & Fire-Fighting System, of the specially Items under guaranty period at his risk and cost as per direction of the Engineer-in-charge. Five percent of total project cost shall be withheld and will be released after the free maintenance guarantee period (i.e. two years) is over.

Electrical work Maintenance during defects liability period

1. Complaint

The contractor shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 12 hours of receiving the complaints and shall take steps to immediately correct any deficiency that may exist.

2. Repairs

All equipment that requires repairing shall be immediately serviced and repaired. Since the period of Mechanical maintenance runs for two years concurrently with the defects liability period, all replacement parts and labour and consumables shall be supplied promptly free of charge to the owner.

3. Uptime Guarantee

The contractor shall guarantee for the installed system an uptime of 99 %. In case of shortfall in any month during the defects liability period, the defects liability period shall be get extended by a month for every month having shortfall. In case of

shortfall beyond the defects liability period, the contract for operation and maintenance shall get extended by a month for every month having shortfall and no reimbursement shall be made for the extended period.

The contractor shall provide log in the form of diskettes and bound printed comprehensive log book containing tables for daily record of all temperatures, pressures, power consumption, starting and stopping times for various equipment, daily services rendered for the system alarms, maintenance and record of unusual observations etc. contractor shall also submit preventive maintenance schedule.

Each tenderer shall submit along with the tender a detailed operation assistance proposal for the owners site representatives / consultants review. This shall include the type of service planned to be offered during defects liability period and beyond

4. Penalty

(1) Penalty for Late Maintenance:-

The contractor shall receive calls for any and all problems of the system under this contract, attend to these calls within 12 hours of receiving the complaints and shall take steps to immediately correct any deficiency that may exist. If The Contractor does not responding in above timeline than Penalty Charge For Late maintenance should be cut from his security deposit as 500 Rs/day till the responding. If The Contractor does not able to do repairing work in given time line than in that case the client has to authority to do maintenance with other agency and give his fee from the contractor's security deposit and additional 2 times the fee as penalty charge.

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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

Here upto 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-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 pertain 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.

1.14The "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.

1.15The "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.

1.16The "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.

1.17The "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.

1.19The "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 have 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 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 whatsoever 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.

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.

GC-23 COMPENSATION FOR ALTERATION IN OR RESTRICTION IN WORK:

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 ensue 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 leading 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 Abandon the work, or 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 Contractor s 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 deem 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 DELETED:

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 item 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 chocked 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 go downs 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 SPECIFICATIONS 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 or 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 TAXES, DUTIES, ETC. :

- 1 Contractor agrees to and does hereby accept full and exclusive liability for the payment of any and all taxes including Sales 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 here in after 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 and 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 harmless 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 provide sanitary 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 gas, safety, fire permits. The Contractor shall also be held liable and responsible for all lapses 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.

Barricade sand hazardous areas adjacent to but not located in normal routes of travel shall be marked with red lantern at night.

4.0 Scaffolding:

4.1 Suitable scaffolding shall be provided for work man for all works 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 as 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 ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to be 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 gang way 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 ladder 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 ladder 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 precaution 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 cause danger or inconvenience to any person or public. The Contractor shall also provide all necessary all necessary fencing and lights to protect the worker and staff from accidents, and shall be bound to bear the expenses of defence of every suit action or other proceeding at law that may be brought by any persons for injury sustained owing to neglect of the above precaution and to pay damages and costs which may be awarded in any such suit or action or proceedings to any such person, or which, maybe 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. Ladder 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 sloped back to give suitable slope, or securely held by timber bracing, so as to avoid the danger of sides 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. Cutting shall be done from top to bottom. Under no circumstances, undermining or undercutting bed one.

6.0 Demolition:

Before any demolition work is commenced and also during the progress of the work all road and open area adjacent to the work site shall either be closed or suitably protected. No electric cable or apparatus which is liable to be a source of danger shall remain electricity charged. All practical steps shall be taken to prevent danger to person employed from risk of fire or explosion or flooding. No floor or other part of the building shall be so overloaded with debris or material at least or 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 maintained in a 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 lime 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 equipment shall be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first-aid treatment to fall injuries likely to be sustained during the course of the work.

9.0 Hoisting Equipment:

- 9.1 Use of hoisting machine 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 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 safe guards, hoisting appliances should be provided with such means when 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 pastoral suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel such as gloves, and booths 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 here in 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 representatives.

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. Civil Dept.**

City Engineer (Spl)

**Add Asst Engineer
Roshni Dept.**

**Dy. Ex. Engineer
Roshni Dept.**

**Add City Engineer (i/c)
Roshni 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-Mail add. (s.).	
6.	Place of incorporation/registration	Year of incorporation/ registration

Nationality of owners		
	Name	Nationality
1.		
2.		
3.		
4.		
5.		

Application Form (1A)

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

13	Whether willing to work Anywhere in India or mention the places where you are willing to work	
14	i) Detailed description and value of works done / orders executed for the last Seven (7) years.	
	ii) Works in progress	
15	Specify the maximum value of work executed and in which year.	
16	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	
17	Details PF Organisation, Rajkot. Enclose relevant certificate copies	
18	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 here in after 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 dates 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 eo till the Employer certifies that the termsandconditionsandaccordinglydischargestheguarantee.Unlessademandorclaim under the is guarantee is made on using writing on or before the..... we shall be discharged from ally ability under this guarantee thereafter.

In Witness Where of, the above bounded90 parties have executed this instrument under their several seals on the date indicated above the name and corporate seal each corporate partly being here to affixed and the se 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 bycorporate Seal

Title

For and on behalf of the Employer

APPENDIX-1

LIST OF ALL WORK ALREADY COMPLETED BY THE MAIN TENDERER

Sr. No.	Name of Work	Name & address of client with contact number	Cost on Completion	Time taken in months to complete the work	Date of award	Whether Project Under Litigation (Yes / No.) & reasons thereof
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

Proj. No. As per Appendix-1	Repeat Name of Work	Repeat Name & address of client with contact number	Civil Work Detail	Electrical Work Detail	H.V.A.C. Work Detail
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

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

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

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DATE SEAL

APPENDIX-2 (a)

NAME, EXPERIENCE AND DETAILS OF CAPACITY OF SUBCONTRACTOR

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

Sr. No.	Plant or Machinery	Location	Age of Machinery	Make	Capacity	Approximate Value	Remark
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.

Sr.No.	Name of the Consortium Member	Role of the Member	Equity Stake in Project.

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 ongoing projects

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

FINANCIAL INFORMATION

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

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

Year	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	2021-22
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 31-12-2021, 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

DATE SEAL

APPENDIX – 8

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

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

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

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

Sr. No.	Period From To	Organization	Status

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.)

Team Designation Incl. Reliever	Name of person & Photograph	Qualification	Experience in Years (In Required status)

APPENDIX – 10(a)

List of Machinery / Plants Available for Work

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

SIGNATURE OF CONTRACTOR

DATE SEAL

APPENDIX – 11
Financial Criteria

Sr. No.	Description	Main Bidders	Total
1	Basic Capital		
2	Total Asset		
3	Total Liabilities		
4	Current Assets		
5	Profit (Before Taxation)		
6	Loss		
7	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

LISTOF BUILDING PROJECT WORKS
COMPLETED DURING THE LAST SEVEN YEARS.

Sr. No.	Year of Construct- ion 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 31-12-2021

Sr. No	Name of project	Value of remaining work on 10-10-2018 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.

Sr. No.	Component	
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



TENDER DOCUMENTS

FOR

Contract for Design, Supply, Installation, Testing and Commissioning of Electric and gas based cremation furnace System with related comprehensive Electrical, Mechanical and Civil Work including all necessary equipment with 5 (five) years Comprehensive O&M at Kothariya in Rajkot.

VOLUME – II

TECHNICAL SPECIFICATIONS

Municipal Commissioner

Rajkot Municipal Corporation Manohar Pura, Rajkot, Gujarat 360003

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

GENERAL STANDARD 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 sieve	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/mm² to 10 N/mm² 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. The¹ 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 ± 1.2 mm. In Nominal height ± 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, looking 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 ± 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 planet 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 of best quality free from any defects. "The particle boards shall be made with phenolmaldehyde adhesive The particle boards shall conform I S 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 styroper 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 I S 3144-1965 shall be followed

42.3. Insulation wool blanks 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, copper oxidized 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 or 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 30 mm on accounts of chisel dressing of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be ± 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 gram 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 shad 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 of flaws

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

52.3. AH 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 015 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 rnrn. 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 Nahni trap 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 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 ± 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:

Clearing and grubbing land including uprooting rank vegetation grass bushes, shrubs, sapling and trees girth up to 300 mm removal of stumps of trees cut earlier and disposal of unserviceable materials (D) by mechanical means in area of thorny jungle

As per item BOQ

The rate will be paid for a unit of one Hector.

Item No.2, 3, 4, 5,6,7,8,9:

Excavation for foundation up to 1.50M, 1.50 to3.00 M., 3.00to4.50 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 direction 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 labourers, 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.: 10

Filling of plinth with using excavated useful 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 fillings 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 fillings shall be kept to shape intended to be given to floor.

1.5. In case of 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.: 11

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 siliceous 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 1st 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 20 cms. 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 labour required for filling in trenches and plinth.

3.3. The rate shall be for a unit of one cubic meter

Item No.: 12

Rolling work with Roller 8-10 Ton capacity over metallingmurrum 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.13

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, animals and 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 rear enough rates 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.: 14

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.: 15,16

It. No.15: 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 16: 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 rammed with heavy iron rammers and rapidly to get the required compaction and to allow ail 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 then 7 days form 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.: 17,18,19,20,21,22,23,24,25,26,27,28,29,30,31

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 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.18: providing and laying Ready Mix cement concrete M-250 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.19: 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.20: providing and laying Ready Mix cement concrete M-250 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.21: Providing and laying Ready Mix cement concrete M-250 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.22: Providing and laying Ready Mix cement concrete M-250 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.23: 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 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.24 Providing and laying Ready Mix cement concrete M-250 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 25: 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 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.26: Providing and laying Ready Mix cement concrete M-250 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.27: 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 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.28: Providing and laying Ready Mix cement concrete M-250 and finishing smooth with curing etc. complete including cost of form work and excluding the cost of reinforcement for RCC STAIR CASE for all floors all heights all cross section area including scaffolding etc complete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including labour and material etc.

It.No.29: 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.30: 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.

It.No.31: Cement concrete work for COPPING in proportion of 1:2:4 including form work finishing curing without reinforcement etc complete

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

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 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 ration 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 tests 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 property 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 spelling, 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 termite 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 pipes, 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 pounded 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 bas and shall not impair the concrete finish in any matter. 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 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.

2.13.2 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 Contactor 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, flatting and toweling 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 40oC 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, grunting 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 loses. 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 part sand	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 i) Weight increase ii) Weight decrease iii) Dimensions change	28 days 0.40% maximum 0.30% maximum ±1 %

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 performed 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 is 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.: 32

Cement concrete flooring (IPS) 50 mm thick in proportion of 1:2:4 with a floating coat of neat cement finishing curing etc. complete.

1.0. Materials:

1.1 Water shall conform to M-I. Cement shall conform to M-3. Sand shall conform to M-6. Stone Aggregate 20mm. nominal sizes shall conform to M-12. Cement concrete 1:2:4 proportion measured by volume shall conform to relevant specification or ordinary grade 1:2:4 concrete.

2.0. Workmanship:

2.1. The cement concrete flooring of 50mm thick (Average) is to be laid as per the site condition. The concrete shall be mixed in a mechanical mixer at the work. Hand mixed may however be allowed for smaller quantities of work and in case of failure of machines or as permitted by the Engineer-in-charge. It shall carry out on a watertight platform and care shall be taken. To ensure that mixing is continued until the mass is uniform in color and consistency. However in such cases 10% more cement than otherwise required shall have to be used without any extra cost the mechanical mixing shall be done for a period of 1/2 to 2 minutes. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the purpose. Flooring of specified thickness shall be laid in accordance with approved pattern or as directed. Finishing operation shall start shortly after the cessation of beating and shall be spread over a period one to six hours depending upon the temperature and atmospheric conditions. The surface shall be left for sometimes till moisture disappears from it. Fresh quantity of cement shall be mixed with water to form thick slurry and spread over the surface while the concrete is still green. Use of dry cement or cement and sand mixtures sprinkled on this surface to stiffen the concrete or absorb excessive moisture shall not be permitted. The cement slurry shall then be properly pressed twice by means of iron floats, once, when the slurry is applied and these condition time when cement starts setting and finished smooth. The surface shall be marked with string or B.R.C. fabric jail to make the surface non-slippery as and when directed. The junction of floors with wall plaster, dado or skirting shall be rounded off where so required up to 25mm radius flooring in lavatories and bathrooms shall be laid after fixing of water closet and squatting pans and floor traps which shall be plugged while laying the floors and opened after the floors are completed. Any damage, done to water supply or sanitary fittings during execution of work shall be made good.

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

2.3. The formwork shall be provided if necessary as directed by the Engineer-in-charge. Concreting shall be done as per alternate bay method with necessary centering either by mastic or cement mortar as directed.

3.0. Mode of measurements & payment:

3.1. The rate shall include the cost of all materials and labour involved in all the operations described above. No deduction shall be made or extra paid for any opening up to 0.1sq.mt. In area in the floor, nothing extra shall be paid for laying the floor at different levels in the same room or the courtyard.

3.2 The rate shall be for unit of one sq. meter.

Item No.: 33

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 nor 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 transmit the full stresses of bar so the ends of the bars that are joined by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than the normal cross-section of the bar. Threads shall be standard threads: Steel for coupling shall conform to I:S.226 (Latest edition)

2.8. When permitted or specified on the drawing's joints of reinforcement bars shall butt-welded so as to transmit their full stresses. Welded joints shall preferably be located at points when steel will not be 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.: 34

Foundation filling with Rubble Cement Mortar in proportion of 1:6 Cement: Mortar

1.0 Materials

Stones for the works shall be of the specified varieties which are hard, durable, fine grained and uniform in color (for superstructure work) free from veins, flaws and other defects. Quality and work shall conform to the requirements specified in IS: 1597 (Part-I) (Latest Edition). The percentage of water absorption shall not exceed 5 percent as per test conducted in accordance with IS: 1124 (Latest Edition). The Contractor shall supply sample stones to the RMC for approval. Stones shall be laid with its grains horizontal so that the load transmitted is always perpendicular to the natural bed.

Cement-sand mortar for stone masonry works shall be in the proportion of 1:6. Materials and preparation of mortar shall be as specified below:

For preparing cement mortar, the ingredients shall first be mixed thoroughly in dry condition. Water shall then be added and mixing continued to give a uniform mix of required consistency. Mixing shall be done thoroughly in a mechanical mixer, unless hand mixing is specifically permitted by the RMC. The mortar thus mixed shall be used as soon as possible, preferably within 30 minutes from the time water is added to cement. In case, the mortar has stiffened due to evaporation of water, this may be re-tempered by adding water as required to restore consistency, but this will be permitted only up to 30 minutes from the time of initial mixing of water to cement. Any mortar which is partially set shall be rejected and shall be removed forthwith from the site. Droppings of mortar shall not be re-used under any circumstances. The Contractor shall arrange for test on mortar samples if so directed by the RMC.

2.0 Workmanship

For All Works below ground level the masonry shall be random rubble uncoursed with ordinary quarry dressed stones for the hearting and selected quarrydressed stones for the facing.

For all works above ground level and in superstructure the masonry shall be random rubble uncoursed, well bonded, faced with hammer dressed stones with squared quoins at corners. The bushings on the face shall not be more than 40 mm on an exposed face and on the face to be plastered it shall not project by more than 12 mm nor shall it have depressions more than 10 mm from the average wall surface.

Face stones shall extend back sufficiently and bond well with the masonry. The depth of stone from the face of the wall inwards shall not be less than the height or breadth at the face. The length of the stone shall not exceed three times the height and the breadth on base shall not be greater than three-fourths the thickness of wall nor less than 150 mm. The height of stone may be up to a maximum of 300 mm. Face stones or hearting stones shall not be less than 150 mm in any direction.

Chips and spalls shall be used wherever necessary to avoid thick mortar joints and to ensure that no hollow spaces are left in the masonry. The use of chips and spalls in the hearting shall not exceed 20 percent of the quantity of stone masonry. Spalls and chips shall not be used on the face of the wall and below hearting stones to bring them to the level of face stones.

The maximum thickness of joints shall not exceed 20 mm. All joints shall be completely filled with mortar. When plastering or pointing is not required to be done, the joints shall be struck flush and finished as the work proceeds. Otherwise, the joints shall be raked to a minimum depth of 20 mm by a raking tool during the progress of the work while the mortar is still green.

Through or bond stones shall be provided in walls up to 600 mm thick and in case of walls above 600 mm thickness, a set of two or more bond stones overlapping each other by at least 150 mm shall be provided in a line from face to back. In case of highly absorbent types of stones (porous lime stone and sand stone, etc.) the bond stone shall extend about two-thirds into the wall and a set of two or more bond stones overlapping each other by at least 150 mm shall be provided. Each bond stone or a set of bond stones shall be provided for every 0.5 sq.m of wall surface.

All stones shall be sufficiently wetted before laying to prevent absorption of water from the mortar. All connected walls in a structure shall be normally raised uniformly and regularly. However if any part of the masonry is required to be left behind, the wall shall be raked back (and not saw toothed) at an angle not exceeding 45 deg. Masonry work shall not be raised by more than one meter per day.

Green work shall be protected from rain by suitable covering

3.0. Mode of measurements & payment:

3.1. All work shall be measured on the basis of finished dimensions and measured net except where otherwise specified. Only specified dimensions shall be allowed.

Anything extra shall be ignored. The masonry work in foundation and plinth shall be measured under this item. No deduction shall be made not extra payment make for the following:

3.2. The rate shall be for a unit of one cubic meter.

Item No.: 35

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. Its inside face shall be flushed with mortar before the next brick is laid and pressed against it. On completion of course the vertical joints shall be fully filled from the top with mortar.

The 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.

ItemNo.: 36

Brick Masonry Partition Wall incement mortar 1:4(3.5 to 4.5 inch thick) for all floors all heights including curing scaffolding complete.

1. Materials

Bricks shall conform to M-15. Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Cement mortar shall conform to M-11.

2. Workmanship

The relevant specifications be followed for bricks, wetting, laying of bricks, joints, curing, shall conform to Item No. 6.19 (A) expect that the bricks to be used shall be conventional bricks instead of modular bricks.

Cement mortar used in masonry work shall be in proportion of 1 part of cement and 4 parts of sand by volume. All bricks shall be laid stretcher wise, breaking joints with those in the upper and lower courses. The wall shall be taken truly plumb. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. The bricks shall be laid with frogs up wards. A set of masons tools shall be maintained on work as required for frequent checking.

3. Mode of measurements and payment

The limiting dimensions shall not exceed those shown in the plan or as directed. Any work done extra over specified dimensions shall be ignored. The rate shall be for a unit of one square meter.

Item No.:37

Water Proof Plaster 20mm thick using water proofing compound and the ratio of 1:3 with necessary finishing as directed by EIC/consultant.

Material:

Water shall confirm to M-1.

Cement Mortar shall confirm to M-11

Water Proofing Chemical of approved brand

Workmanship:

20 mm thick cement plaster in single coating CM 1:3 (1-cement: 3-and) with approved brand water proofing chemical.

Scaffolding:

Wooden bullies, bamboos, planks, treadles 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. This kind of Plaster is normally for interior side or as specified location by Consultant to be applied as above normal cement plaster and the surface shall be rubbed smooth after coating it with a thick coat of pure Portland cements slurry while the base coat is still fresh.

Mode of Measurement & Payment:

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 .groove r open joints in brick work, stone work etc. or space between laths. Thickness of plaster shall be average thickness with minimum 10mm 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. Soffit of stair shall be measured as plastering on ceilings. Eloigns soffits shall be measured separately. The rate shall be for a unit of square meter.

Item No.: 38

Cement lodhia work with neat cement slurry finishing.

For this work, cement lodhia is to be carried out with mixture prepared in C.M. 1:1 at the

Placed and size as per the instructions of engineer-in-charge. Curing for the work is to be done for five days. The rate shall be for a unit of one running meter.

Item No.:39

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 matting 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. Flying soffits shall be measured separately.

3.7. For jambs, soffits, sills 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 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 :

(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 face 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.: 40

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 properly examined before erection and use. Stage scaffolding shall be provided for ceiling plaster which shall be independent of the walls.

Preparation of background:

The surface shall be cleaned of all dust, loose mortar, droppings, traces of 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 surface shall be roughed by wire brushing and all the resulting dust and loose particles 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 an 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 areas shall be moistened again.

For external plaster, the plastering operation shall be started from top floor and carried downwards for internal plaster, the plastering operations may be started 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 then 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 sq.mt. each deduction shall be made for opening but Jamb, soffits and slits shall be measured.

The rate shall be for a unit of square meter.

Item No.: 41

Providing and laying Texture Plaster on exterior walls up to any height above ground level, in two layers, under layers, 12mm cement plaster 1:3(1 cement : 3 fine sand) in smooth finishing, top layer with 3mm styrene acrylic polymer based material as per approved pattern complete as per specification and direction by engineer in charge.

Material:

Water shall confirm to M-1.

Cement Mortar shall confirm to M-1.

Workmanship:

12mm thick cement plaster in 1:3(1 cement : 3 fine sand) in smooth finishing, top layer with 3mm styrene acrylic polymer based material as per approved pattern complete as per specification and direction by engineer in charge.

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.

Mode of Measurement & Payment:

The rate shall include the cost of all materials labour and scaffolding etc. involved in the operations described under workmanship.

The rate shall be for a unit of square meter.

Item No.: 42

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.: 43

Providing and Fixing 145 GSM Glass Fibre Net of approved make to R.C.C and masonry joints, electric and plumbing jari etc. before applying internal and external plastering work.

As per item BOQ

The rate will be paid for a unit of one Square meter.

Item No.: 44

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 warp age shall be $\pm 0.2\%$. Allowable square ness 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/cm² 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/m². 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.:45

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.:46

Supply & fixing of GVT Type Digital Vitrified Tiles Size of 0.8 X 1.6 m (1st Quality) for Floor/Skirting as per EIC.

GLAZED VITRIFIED TILE

- The tiles shall be of approved make and shall generally conform to IS 15622. They shall be flat, and true to shape and free from blisters crazing, chips, welts, crawling or other imperfections detracting from their appearance. The tiles shall be tested as per IS 13630. Classification and Characteristics of GLAZED VITRIFIED TILE shall be as per IS 13712.
- The tiles shall be square or rectangular of nominal size. Table 1,3,5, and 7 of IS 15622 give the modular preferred sizes and table 2,4,6 and 8 give the most common non modular sizes.
- Thickness shall not be less than 8mm. It includes the profiles on the visible face and on the rear side.
- Manufacturer/supplier and party shall choose the work size of tiles in order to allow a nominal joint width up to 2mm for unrectified floor tiles and up to 1mm for

rectified floor tiles. The joint in case of spacer lug tile shall be as per spacer. The tiles shall conform to table 10 of IS 15622 with water absorption 3 to 6% (Group BII).

- The top surface of the tiles shall be glazed. Glaze shall be either glossy or matt as directed by Engineer-in-charge. The underside of the tiles shall not have glaze on more than 5% of the area in order that the tile may adhere properly to the base. The edges of the tiles shall be preferably free from glaze.
- However, any glaze if unavoidable, shall be permissible on only up to 50 per cent of the surface area of the edges.

Coloured Tiles

Only the glaze shall be coloured as specified.

Decorative Tiles

The type and size of the decorative tiles shall be as follows:

(i) Decorated white back ground tiles

The size of these tiles shall be as per IS 15622.

(ii) Decorated and having coloured back-ground

The sizes of the tiles shall be as per IS 15622.

Preparation of Surface and Laying

- Base concrete or the RCC slab on which the tiles are to be laid shall be cleaned, wetted and mopped. The bedding for the tile shall be with cement mortar 1:6 (1 cement : 6 coarse sand) or as specified. The average thickness of the bedding shall be 20 mm or as specified while the thickness under any portion of the tiles shall not be less than 10 mm.
- Mortar shall be spread, tamped and corrected to proper levels and allowed to harden sufficiently to offer a fairly rigid cushion for the tiles to be set and to enable the mason to place on wooden plank across and squat on it.
- Over this mortar bedding neat grey cement slurry of honey like consistency shall be spread at the rate of 3.3 kg of cement per square meter over an area up to one square metre. Tiles shall be soaked in water washed clean and shall be fixed in this grout one after another, each tile gently being tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern.
- The surface of the flooring during laying shall be frequently checked with a straightedge about 2 m long, so as to obtain a true surface with the required slope. In bath, toilet W.C. kitchen and balcony/verandah flooring, suitable tile drop or as shown in drawing will be given in addition to required slope to avoid spread of water. Further tile drop will also be provided near floor trap.
- Where full size tiles cannot be fixed these shall be cut (sawn) to the required size, and their edge rubbed smooth to ensure straight and true joints. Tiles which are fixed in the floor adjoining the wall shall enter not less than 10 mm under the plaster, skirting or dado. 11.15.4.6 After tiles have been laid surplus cement slurry shall be cleaned off.

Pointing and Finishing

The joints shall be cleaned off the color cement grout with wire/coir brush or trowel to a depth of 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be flush pointed with colour cement added with pigment if required to match the colour of tiles. Where spacer lug tiles are provided, the half the depth of joint shall be filled with poly sulphide or as specified on top with under filling with cement grout without the lugs remaining exposed. The floor shall then be kept wet for 7 days. After curing, the surface shall be washed and finished clean. The finished floor shall not sound hollow when tapped with a wooden mallet.

Measurements

Length and breadth shall be measured correct to a cm before laying skirting, dado or wall plaster and the area calculated in square meter correct to two places of decimal. Where coves are used at the junctions, the length and breadth shall be measured between the lower edges of the coves. No deduction shall be made nor extra paid for voids not exceeding 0.20 square meter. Deductions for ends of dissimilar materials or other articles embedded shall not be made for areas not exceeding 0.10 square meter.

Rate

The rate for flooring shall include the cost of all materials and labour involved in all the operations described above, For tiles of sizes up to 0.16 sqm. unless otherwise specified in the description of the item. Nothing extra shall be paid for the use of cut (sawn) tiles in the work.

Rate shall be for a unit of one Sq.mt.

Item No.:47

Grouting the joints of flooring tiles having joints of 3 mm width, using epoxy grout mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg), including filling / grouting and finishing complete as per direction of Engineer-in-charge

As per item BOQ

The rate will be paid for a unit of Sq.mt..

Item No.:48

Prividing & Fixing Wooden Flooring With 18 mm Solid Wooden Planks in Size of 1.5mt x 0.15mt in Interlocking Pattern With pu Polishing (wall nut shade) Fixing to Floor with one Layer of Plastic Sheet one Layer of 'U' From Sheet Leaving Space on Wall For Expansion Joint, Fixing Transporting Cleaning, Wastage, etc. Complete.

Seasoning and Preservation

All timber used for timber floors shall be thoroughly seasoned in accordance with IS 1141.

After

seasoning the timber shall be treated with preservative in accordance with IS 401.

Seasoning and preservative treatment shall be paid for separately unless otherwise specifically included in the description of the item of flooring.

1 Supporting Joists

Main beams and joists of the class of wood sections specified in the description of the item for beams and joists, or as instructed by the Engineer-in-Charge shall be fixed in position

to dead levels. The width of the joints shall not be less than 50 mm. The arrangement and spacing of beams joists etc. shall be as per design furnished.

2 Boards

It shall be of the class of timber and thickness specified in the description of the item. The timber shall be as specified in para 9.1. Only selected boards of uniform width shall be used. Unless otherwise specified or shown in the drawings, the width of boards selected shall not be less than 100 mm nor more than 150 mm. The same width of boards shall not be maintained

throughout except where the width of the room is not an exact multiple of the boards. In the latter case, the difference shall be equally adjusted between the two end boards (adjacent to walls). The length of the boards shall not exceed 3 metre anywhere. Ordinarily, the minimum length of boards shall be such that the boards shall rest at least on three supports, except where otherwise required bby the pattern specified in the drawings or as directed by the Engineer-in-Charge. The boards shall be planed true on the top face only unless otherwise specified in the description of the item. Where the bottom face is exposed and it is also equired to be planed, then such planning shall be paid for extra. Unless otherwise described in the item, the longitudinal joints of planks shall be tongued and grooved to a minimum depth of 12 mm while the heading joints shall be of the square butt type and shall occur over the centre line of the supporting joists. Heading joists in adjacent boards shall be placed over the same joists.

3 Iron Screws

Iron screws shall be of the slotted counter sunk head type, of length not less than the thickness

of planks plus 25 mm, subject to a minimum of 40 mm, and of designation No. 9 conforming to IS 451.

4 Fixing

The joists on which the planks shall be fixed shall be checked and corrected to levels. The end boards shall be accurately fixed with the sides parallel and close to the walls. Each adjoining board shall be carefully jointed and shall be tightened in position and screwed. For fixing the boards to the joists, two screws shall be used at each end of the boards and one screw at each of the intermediate joists in a zig zag manner. The screws shall be countersunk and screw holes filled with approved stopping. The junction between timber flooring and adjacent flooring shall be formed by inserting a metal strip (brass or aluminum)

at the junction. The metal strip shall be fixed to the end of the planks by screws. The strips shall be paid for extra. The flooring shall be truly level and plane. The joints shall be truly parallel and or perpendicular to the walls, unless otherwise specified. The floor shall be planned in both directions and made perfectly even, true and smooth.

Note: No wood of any kind shall be placed within 60 cm of any fire place or flue. Provision shall be made for ventilation in the space below the floor in case of ground floor and between floor and top of ceiling in the case of upper floors. Such arrangements shall be paid for separately.

5 Finishing

The surface of the floor shall be bees waxed or finished otherwise as directed by the Engineer-in-Charge. The lower face shall be painted or treated with wood preservative as directed. The finishing shall be paid for separately unless specifically included in description of the flooring item.

6 Measurements

Length and breadth of superficial area of the finished work shall be measured correct to a cm.

The area shall be calculated in square metre correct to two places of decimal. No deduction shall be made nor extra paid for voids not exceeding 0.20 square metre. Deductions for ends of dissimilar materials or other articles embedded shall not be made for areas not exceeding 0.10 square metre.

7 Rate

The rate shall include the cost of the labour and materials involved in all the operations described above, with the exceptions noted in the relevant sub-paras.

Rate shall be for a unit of Sq.mt.

Item No.:49

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.:50

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.: 51

Providing and laying 18 mm thick polished granite stone machine cut in flooring, tread of steps over 20 mm (avg.) thick base of Cement Mortar 1:6 (1 Cement : 6 Coarse sand) and

jointed with grey cement slurry with matching pigment incl. rubbing and polishing half rounding edge etc. complete colour and shed as approved by architect engineer in charge.

The work of supply, fixing and polishing for granite flooring work 18mm thick shall have carried out as required by engineer in charge, with 20 mm (avg.) base of lime mortar in proportion of 1:2. The workmanship, under layer mixing of materials, laying, grinding and curing etc shall also be carried out and complete the whole work as per the instructions of engineer in charge.

The payment will be made on square meter basis.

Item No.: 52

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.: 53

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.: 54

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 diamond 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 sides 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.: 55

Supply & Fixing of Polished on both sides of Granite Stone in thickness of 20-25 mm to fix as Urinal Curtain and as per instruction machine cut should be done on this Granite in all three sides

Specification for this item shall conform to item no.14.44 of General Technical Specifications for building works of R & B. Except that the whole work is to be carried out by fixing Mirror polished granite stone 18mm thick For Urinal Curtain in Single Piece only. Rate including Full round moulding of edges as directed by engineer incharge.

Rate shall be for a unit of one Square Meter.

Item No.:56

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 vendor 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 times 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.:57

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 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 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.:58

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 targe 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.:59

Enemal 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 blue fish 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 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 manufacture 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, overlaps 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.:60

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 compeny 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 61.85 x 31.75 mm x 1.30 mm shall be used. The aluminum section of frame Colour anodized 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.: 61

Providing and fixing standard extruded section of size 63 mm x 38.10 mm x 1.20 mm (Jindal section no- 2434 w wt. .643 kg/Rmt.) with Colour Anodized Aluminum frame for VENTILATION 5 mm thick frosted glass as detail etc. complete for ventilations.

1.0 MATERIALS:-

1.1 Aluminum alloy used in the manufactured by the extruded section for Ventilator shall confirm to IS design at ion HFP- WP of IS 733-1973 and also IS designation HFP- WP of IS 1285-1973 aluminum section of approved weight as above mention shall be procured of site. Fabrication shall be done as per drawing or as directed.

Detail of the colour anodized section to be used as under:

1.1 Frame: 48 x 24 x 1.35 mm of approved shade (Should be of having Standard weight per Rmt). Louver shall be of heavy duty and Easy operating as Instructed or fixed as Instructed on site as per Requirement Al – binary or equivalent make, Aluminum Handle: 1 No

2.1 Glaze: 5 MM Thick Plain or Frosted or Obstructed one side GLASS with all require rubber gasket including all required materials

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

2.2 Necessary fixtures shall be of approved quality.

2.3 Approved glazing patty if any required shall be used and fixed

3. MODE OF MEASUREMENT AND PAYMENT:-

3.1 Measurement shall be recorded on Smt. Basis in length and breadth or height for clear visible area.

3.2 Payment shall be made for a unit of one Sqmt.

Item No.: 62

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 core 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 core 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 core type flush door shall be as under:

In Nominal thickness ± 0.5 mm & Nominal height ± 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 scrapping 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.: 63

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.:64

Grill work for doors - windows etc. as per design on site with fitting & fixing.

Item No.:65

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.:66

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.:67

Supply & Fixing of Stair Hand Railing S.S. Pipe 50mm Dia. Only Single Pipe With fitting comp. as directed by EIC.

Providing and fixing in position S.S. hand rail in main stair case, landing, and balconies etc. in 2" (50mm) dia S.S. pipe 1.5mm thk. 304 grade resting on 1" (25 mm) S.S. pipe 1.5mm thk. 304 grade size S.S. 304 grade square bars 10mm, of clear height 90cms placed at 30 cm c/c including g making necessary hold fast fixture (10 mm square bars 22 cm long) embedded in staircase concrete for resting the S.S 304 grade . vertical square bars with holding etc. as per approved design and as required for the work including bending hand rail pipe to proper shape in curves with specials etc. complete (Approved Makes Tata/SAIL/Jindal /Essar/Bhushan Steel /Arecelor Mittal). Railing height is 1 M. Instruction of Engineer in charge has applicable

The rate shall be for a unit of one running meter.

Item No.: 68

Providing corrugated G.I. sheet of class-3 roofing fixed with galvanized iron J or L Hooks, Bolts and nuts 8mm diameter with bitumen and G.I. limpet washer or G.I. limpet washer. filled with white lead complete excluding the cost of purlins, Rafters and Trusses.(1) 0.80 mm thick sheet. (upto 10 ton)

12.1.1 C.G.S. Sheets

These shall be of the thickness specified in the description of the item and shall conform to IS 277.

The sheets shall be of 275 grade of coating (See Appendix-A) unless otherwise specified in the description of item.

The sheets shall be free from cracks, split edges, twists, surface flaws etc. They shall be clean, bright and smooth. The galvanising shall be non-injured and in perfect condition. The sheets shall not show signs of rust or white powdery deposits on the surface. The corrugations shall be uniform in depth and pitch and parallel with the side.

12.1.2 Purlins

Purlins of the specified material or M.S. rolled sections of requisite size shall be fixed over the principal rafters. These shall not be spaced at more than the following distances. (Table 12.1)

TABLE 12.1

Thickness of C.G.S. sheet Maximum spacing of purlins

1.00 mm 2.00 metre

0.80 mm 1.80 metre

0.63 mm 1.60 metre

The top surfaces of the purlins shall be uniform and plane. They shall be painted before fixing on top. Embedded portions of wooden purlins shall be coal tarred with two coats.

12.1.3 Slope

Roof shall not be pitched at a flatter slope than 1 vertical to 5 horizontal. The normal pitch adopted shall usually be 1 vertical to 3 horizontal.

12.1.4 Laying and Fixing

12.1.4.1 The sheets shall be laid and fixed in the manner described below, unless otherwise shown in the working drawings or directed by the Engineer-in-Charge.

12.1.4.2 The sheets shall be laid on the purlins to a true plane, with the lines of corrugations parallel or normal to the sides of the area to be covered unless otherwise required as in special shaped roofs.

12.1.4.3 The sheets shall be laid with a minimum lap of 15 cm at the ends and 2 ridges of corrugations at each side. The above minimum end lap of 15 cm shall apply to slopes of 1 vertical to 2 horizontal and steeper slopes. For flatter slopes the minimum permissible end lap shall be 20 cm. The minimum lap of sheets with ridge, hip and valley shall be 20 cm measured at right angles to the line of the ridge, hip and valley respectively. These sheets shall be cut to suit the dimensions or shapes of the roof, either along their length or their width or in a slant across their lines of corrugations at hips and valleys. They shall be cut carefully with a straight edge chisel to give a smooth and straight finish.

12.1.4.4 Lapping in C.G.S. sheets shall be painted with a coat of approved steel primer and two coats of painting with approved paint suitable for G.S. sheet, before the sheets are fixed in place.

12.1.4.5 Sheets shall not generally be fixed into gables and parapets. They shall be bent up along their side edges close to the wall and the junction shall be protected by suitable flashing or by a projecting drip course, the latter to cover the junction by at least 7.5 cm.

12.1.4.6 The laying operation shall include all scaffolding work involved.

12.1.4.7 Sheets shall be fixed to the purlins or other roof members such as hip or valley rafters etc. with galvanized J or L hook bolts and nuts, 8 mm diameter, with bitumen and G.I. limpet washers or with a limpet washer filled with white lead as directed by the Engineer-in-Charge. While J hooks are used for fixing sheets on angle iron purlins, and L hooks are used for fixing the sheet to R.S. joists, timber or precast concrete purlins. The length of the hook bolt shall be varied to suit the particular requirements. The bolts shall be sufficiently long so that after fixing they project above the top of the nuts by not less than 10 mm. The grip of J or L hook bolt on the side of the purlin shall not be less than 25 mm. There shall be a minimum of three hook bolts placed at the ridges of corrugations in each sheet on every purlin and their spacing shall not exceed 30 cm. Coach screws shall not be used for fixing sheets to purlins.

12.1.4.8 The galvanized coating on J or L hooks, and bolts shall be continuous and free from defects such as blisters, flux stains, drops, excessive projections or other imperfections which would impair serviceability.

The galvanized coating should conform to IS 1367 (Pt. XIII) The mass of coating per square meter of the surface shall be as under:

12.1.4.9 Where slopes of roofs are less than 21.5 degrees (1 vertical to 2.5 horizontal) sheets shall be joined together at the side laps by galvanized iron bolts and nuts 25 × 6 mm size, each bolt provided with a bitumen and a G.I. limpet washer or a G.I. limpet washer filled with white lead. As the overlap at the sides extends to two corrugations, these bolts shall be placed zig-zag over the two overlapping corrugations, so that the ends of the overlapping sheets shall be drawn tightly to each other. The spacing of these seam bolts shall not exceed 60 cm along each of the staggered rows. Holes for all bolts shall be drilled and not punched in the ridges of the corrugations from the underside, while the sheets are on the ground.

12.1.5 Wind Tie

Wind ties shall be of 40 x 6 mm flat iron section or of other size as specified. These shall be fixed at the eaves of the sheets. The fixing shall be done with the same hook bolts which

secure the sheets to the purlins. The ties shall be paid for separately unless described in the item of roofing.

12.1.6 Finish

The roof when completed shall be true to lines, and slopes and shall be leak proof.

12.1.7 Measurements

12.1.7.1 The length and breadth shall be measured correct to a cm. Area shall be worked out in sqm correct to two places of decimal.

12.1.7.2 The superficial area of roof covering shall be measured on the flat without allowance for laps and corrugations. Portion of roof covering overlapping the ridge or hip etc. shall be included in the measurements of the roof.

12.1.7.3 Roof with curved sheets shall be measured and paid for separately. Measurements shall be taken on the flat and not girthed.

12.1.7.4 No deduction in measurement shall be made for opening upto 0.4 sqm and nothing extra shall be allowed for forming such openings. For any opening exceeding 0.4 sqm in area, deduction in measurements for the full opening shall be made and in such cases the labour involved in making these openings shall be paid for separately. Cutting across corrugation shall be measured on the flat and not girthed. No additions shall be made for laps cut through.

12.1.8 Rate

The rate shall include the cost of all the materials and labour involved in all the operations described above including a coat of approved steel primer and two coats of approved steel paint on overlapping of C.G.S. sheets. This includes the cost of roof sheets, galvanised iron J or L hooks, bolts and nuts, galvanised iron seam bolts and nuts, bituminous and galvanised iron limpet washers etc.

Mode of measurement & Payment.

The rate will be paid for only Covered Surface area in unit of one Sq.mt.

Item No.: 69

Steel work, riveted in built up sections framed work including cutting, hoisting, fixing in position and applying a priming coat of red lead paint. (A) In beams and joists, channels angles Tees, flats, with connecting plates or angle cleats as in main and cross beams. Hip and jack rafters, purlins connected to common rafters and the like.

1.0 MATERIALS:

1.1 Structural Steel:

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

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

2.0 WORKMANSHIP:

The M. S. structural steel shall be prepared as per the drawings etc. complete.

2.1 The structural steel shall be fabricated to the designs and patterns shown in the drawings and the weight shall be as directed and the joints shall be riveted or welded as shown in the plan or as directed. The structural steel so formed shall be fixed etc. Complete, before they are erected in position. The structural steel shall be fixed to the frame with number of bolts and nuts of screws viz. bolt nut/screw per 30 cm. Of the length of outer strip subject to a minimum of 2 nos. on each side of the frame or as indicated in the drawings or as directed.

2.2 The bolts and nuts or screws shall be counter sunk and shall be fixed with the top of their heads flush with the face of frame strips.

3.0 MODE OF MEASUREMENT AND PAYMENT:

3.1 No payment shall be made for weight of screws, bolts, nuts etc. Only weight of structural steel shall be paid.

3.2 The rate shall be for unit of one Kg.

Item No.:70

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 confirming 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 confirming 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 confirming 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 confirming 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.:71

Supply and Planting Trees Like Kadamb,

Peltophorum, Neem tree, Mango tree, Milingtonia, Saptparani etc. as detail in the drawing as directed by EIC/ consultant.

Detail specification for this item shall be as per manufacturer's specification & shall be fixed as directed by Engineer - in - charge.

Rate shall be for a unit of one number.

Item No.:72

Supply and Planting Palms Like Oyal bottle palm, Traveler palm, Fishtail palm as detail in the drawing as directed by EIC/ consultant.

Detail specification for this item shall be as per manufacturer's specification & shall be fixed as directed by Engineer - in - charge.

Rate shall be for a unit of one number.

Item No.:73

Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm centre to centre, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm centre to centre, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25mm long dry wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5 x 25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recommended jointing compound, jointing tapes, finishing with jointing compound in 3 layers covering upto 150 mm on both sides of joint and two coats of primer suitable for board, all as per manufacturer's specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed, all complete as per drawings, specification and direction of the Engineer in Charge but excluding the cost of painting with:

Fully Perforated Gypsum Plaster Board of size 1200 x 2400x12.5 mm having approx. 15 % perforated area with perforation size and pattern as approved by the Engineer-in-charge and as per manufacturer's specification, with all 4 side tapered and backed by acoustical tissue with NRC value not less than 0.60

As per item BOQ

The rate will be paid for a unit of one sq meter.

Item No.:74

Providing and fixing single layer waterproof gypsum board 12.5 mm thick of the make Newgood Group Co. Ltd. or equivalent & Newgood Group Co. Ltd. company sections using waterproof board of size 1220 mm x 1830 mm x 12.5 mm suspended by G.I suapender of size 25 mm x 3 mm with intermediate channel of size 18 mm x 40 mm x 0.80 mm at 1220 mm center to center ceiling section of size 40 mm x 35 mm x 0.55 mm at 457 mm center to center and perimetrechanel A of size 20 mm x 27 mm x 30 mm x 0.50 mm at edges & drops including paper tap sand sofit cleat, anchor fastener, scoch bolt connecting cleat joining compound top coat on ceiling including making necessary opening for light fitting, diffuser etc. complete as per detail drawing as directed.

As per item BOQ

The rate will be paid for a unit of one sq meter.

Item No.:75

Providing & Fixing PVC Plain colour false ceiling with grid type with alluminium frame consisting of 600 mm x 600 mm 3 mm thick plain PVC sheet used as panel insert in a frame sizes 1 " x 1" (25 x 25 mm, 19 guade or 1 mm thick) in alluminium frame work is supported from the ceiling with the help of G.I. hook and G.I. wire/6 mm M.S. rods of required sizes to maintain proper level etc. the aluminium frame work is supported to on side wall with the use of alluminium "L" Section of size 1" x 1" (25 x 25 mm) angle etc. completed as per direction of engineer in charge manufacture, specification & drawing.

As per item BOQ

The rate will be paid for a unit of one sq meter.

Item No.: 76

Supplying and fixing 12mm toughened glass including cost of necessary fitting, alluminium frame C type size 32x32mm with anodized coating and labour etc. complete.

As per item BOQ and architecture design etc..

The rate will be paid for a unit of one sq meter.

Item No.: 77

Supplying and fixing 12mm toughened glass Door (including cost of necessary fitting, as per instruction of PMC/ Engineer in charge etc complete.

As per item BOQ and architecture design etc..

The rate will be paid for a unit of one sq meter.

Item No.: 78

Applying Acid Frosting design work on toughened Glass with all complete. (including cost of necessary design as per instruction of PMC/ Engineer in charge etc)

As per item BOQ and architecture design etc..
The rate will be paid for a unit of one sq meter.

Item No.:79

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.: 80

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.:81

Providing and placing and position suitable PVC water stops conforming to IS:12200 for construction/expansion joints between two RCC members and fixed to the reinforcement with binding wire before pouring concrete etc complete a) Serrated central bulb(225mm wide, 8-11mm thick)

As per BOQ Specification

1.0 MODE OF MEASUREMENT AND PAYMENT:

1.1 Only plan area should be measured for payment. The rate shall be for unit of one meter.

Item No.:82

Labour work for making of holes/Core Cutting in CC of size 15x15 cm and up to depth of 15cm.

Mode of Measurement and Payments:

The rate shall include the cost of labour involved in all the operations described above.

The rate shall be for a unit of No.

Item No.: 83**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.: 84

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.

Item No.: 85

Providing and Fixing Natural Stone tiles on Exterior/interior walls with required adhesives up to any height above ground level with approx. 28 to 40mm thick and 4.00 to 5.00 kg /sqft weight of Natural stone tiles of approved brand and approved pattern and color and as per directed by engineer-in-charge.

Material:

Natural Stone tiles for Exterior and Interior wall is approved by Engineer-in-Charge/ Consultant.

Workmanship:

12mm thick cement plaster in 1:3(1 cement : 3 fine sand) in smooth finishing, top layer with Natural Stone tiles as per approved pattern complete as per specification and direction by engineer in charge.

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.

Mode of Measurement & Payment:

The rate shall include the cost of all materials labour and scaffolding etc. involved in the operations described under workmanship.

The rate shall be for a unit of square meter.

Item No.: 86

Providing and Fixing Approved Laser cut design made out of 3mm thick M.S plate with Approved colour of powder coating with scaffolding and Labour with all necessary fitting etc. includes.

As per BOQ Specification.

1.0 MODE OF MEASUREMENT AND PAYMENT:

1.1 Only plan area should be measured for payment. The rate shall be for unit of one Square meter.

Item No.: 87

Making a Wall art including concept labour and framing with installation With necessary Paint and tools and all as per instruction by EIC

As per BOQ Specification and architecture design etc.

1.0 MODE OF MEASUREMENT AND PAYMENT:

1.1 Only plan area should be measured for payment. The rate shall be for unit of square meter.

Item No.:88

Supplying and fixing Name Plate of 3mm thick acrylic sheet including required accessories, labour, scaffolding etc with including all and as per drawing and as per directed by engineer in charge.

As per BOQ Specification and architecture design etc.

1.0 MODE OF MEASUREMENT AND PAYMENT:

1.1 Only plan area should be measured for payment. The rate shall be for unit of square meter.

Item No.:89

Providing & fixing Arabian type window curtains cotton + polisher clothes(300-350) GSM with back side (250-300 GSM) astar and top 1.25" inch aluminum curtain track including of approved colour& design etc. with all necessary fittings etc. complete as per Architect/ Site engineer's instructions.

As per BOQ Specification and architecture design etc.

1.0 MODE OF MEASUREMENT AND PAYMENT:

1.1 Only plan area should be measured for payment. The rate shall be for unit of square meter.

Item No.:90

Supplying and Placing PVC Door Mat of approved Colour and Pattern etc as per Direction by Engineer In Charge

As per BOQ Specification and architecture design etc.

1.0 MODE OF MEASUREMENT AND PAYMENT:

1.1 Only plan area should be measured for payment. The rate shall be for unit of square meter.

Item No.:91

Providing Digital Takti as per Instructed in charge

As per item BOQ

The rate will be paid for a unit of Per Job.

Item No.:92

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 colour of solid plastic seat and cover with chromiumplated 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 15 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 (1 cement: 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.:93

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.:94**White porcelain wash basin 560/410mm Indian make c.i. bracket with fitting chromium plated top 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 flow arrangements. All internal angles shall be designed so as to facilitate cleaning. Wash basin shall have single tap hole or two holes as specified. Each basin shall have a circular waste hole which is either 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.:95**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 labour, 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.:96

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.:97

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, ofsheetall brand or approved quality, size is to be supplied and fixed as per therequirement. The whole work is to be carried out as per the instructions and to thesatisfaction of engineer in charge.

Mode of measurements & payment

The rate shall be paid for a unit of one number basis.

Item No.:98,99,100

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 bemeasured with white or red lead and around with a Few turns of finespun yarn round the screwed end of the pipe. The bib cock shall be then screwedand fixed to water tight position.

3.0. Mode of measurements and payment

3.1. The rate includes cost of all labour, 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.: 101,102,103,104,105

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) 50 mm (B) 40 mm (C) 32 mm (D) 25 mm (E)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 walls 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 unavoidable. 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 mortar 1:3 (1 cement:3 coarse sand) and the other tightened round the pipes to hold it securely. These clamps shall be spaced at regular intervals in straight length 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 mortar 1:3 (1 cement: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 inspected under working conditions of pressure and flow. Any joint found leaking shall be redone, and all leaking pipes removed and replaced without extra cost.

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 labour 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 centre 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 0.01 meter,
- (ii) Area shall be worked out to the nearest 0.01 sq. 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 sand plugs unions etc.) and fixing complete with clamping wall-hooks, wooden Plugs etc. and also cutting, screwing and waste and for making forged (or handmad) 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 lube arclobe 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.: 106,107,108

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) 110mm dia.(B)75 mm (c)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 unpronated 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.:109,110

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.:111

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 aggregate 40 mm nominal size) foundation. 650 square and 100 mm. thick the depth 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 as described in item No. 24.1 (A)

2.3. Brick masonry chamber After fixing and testing gully and branch drain, a brick masonry 300x 330mm. inside with bricks in CM 1:5 (1 cement : 5 sand) shall be built with a 100mm. 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 gully trap.

3.0. Mode of measurements & payment

3.1. The rate includes cost of all labour, 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.:112

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. scribed 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.:113,114

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 and gradients, great care shall be taken to prevent them 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 inside 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 yarn soaked in neat cement slurry shall first be placed around these pipe gaskets to each pipe and these pipe gaskets 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 extraneous materials shall be removed from the inside of the joints with a suitable scraper or "badger". The newly made joints shall be protected, until set, from the sun, dry winds, rain or frost, sacking or other suitable materials which shall be used for the purpose.

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 takesocket, 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.:115

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 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 test 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 labour 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.:116

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 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 item24.2(A) shall be followed.

2.2.The rate shall be for a unit of one running meter.

Item No.:117

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 concreteetc (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-3Coarse 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-14M.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 asunder:

2.2.The excavation shall be done true to dimensions and level shown in one the plans oras directed.

2.3.Bed concrete shallbe15.Cms, thickC.C.1:5:10(1cement:5Coarse sand: 10 graded brick bat aggregates.The projection of bed concrete beyond the masonry walls shall be7.5cms.

2.4.Masonry walls and plaster work shall carried out.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.:118

Constructing Manhole with R.C.C. top slab in 1:2:4 mix (1-cement :2-coarse sand : 4-graded stone aggregate 20mm nominal size) foundation concrete 1:3:6 mix (1-cement : 3-coarse sand :6-Brick bats 40 + 50mm size) inside plastering 15mm thick with Cement Mortar 1:5 (1-Cement : 5-coarse sand) finished with a floating coat of neat cement and making channels in cement concrete 1:2:4 mix (1-Cement :2-Coarse sand :4-stone aggregate 20mm nominal size) finished smooth complete including curing and testing (i) Inside size 900mm x 1200mm and 1.5M. deep including C.I. cover with frame size 560mm diameter total weight of cover and frame to be not less than 128 kgs. (Wt. of cover 64 Kg. and Wt. of frame 64 Kg.)(A) With 230mm thick walls of brick masonry using brick having

crushing strength not less than 35Kg. / Sq.cm. in Cement Mortar 1:5 (1- Cement: 5-Coarse sand) (2) B type depth 1.5 Meter for 150mm diameter sewer.

A type depth 0.90 meter for 150mm.sewer

B type depth 1.50 meter for 150mm.sewer

C type depth 2.25 meter for 150mm.sewer

D type depth 3.15 meter for 150mm.sewer

1.0.Materials: Water shall conform to M-1.Cement shall conform to M-3. Burnt bricks shall conform to M-15.Brick bats of 40 to 50mm. size shall conform to M-14. Stone coarse aggregate of 20mm. nominal size shall conform to M-12. Grit shall conform to M-8. Cement mortar of specified proportion shall conform to M-11. The cast iron manhole covers of 560 mm. dia. with frame shall conform to I.S.1726-1966.

2.0.Workmanship

2.1. The man holes of different type sand sizes as specified shall be constructed in sewer line at such place sand to such levels and dimension as shown in drawings of as directed.

2.2. The manholes shall be built on a bed of cement concrete 1:3:6 (1 cement: 3 coarse sand: 6 brick bats) (40 to 50mm. nominal size) to the thickness of the bed concrete shall be 15cms. For Manhole up to 1.M.depth and 20cms. for manholes over meter and up to over meter and up to 2 meters, depth and 30cms. for manhole so greater depth.

2.2.2. Projection of bed concrete beyond the masonry wall shall be 15cms.

2.3.Walls

2.3.1. The wall so man hole shall be carried out with burnt bricks using having bricks. Crushing strength not less than 35Kg/Cms in C.M.2 in C.M.1:5 (1 cement: 5 coarse sand). The thickness of brick masonry wall shall be 230mm. The jointing face of such. Brick shall be well buttered with cement mortar before lying so as to ensure a full joint.

2.4. Plaster

2.4.1. The inside of wall shall be plastered 15mm thick with C.M.1:5 (1 cement: 5 coarse sand) and finished with Floating coat of neat cement.

All angles shall be rounded to 7.50cms radius and all rendered internal surfaces shall have hard impervious finish obtained by using a steel trowel. The external joints of masonry shall be finished smooth.

2.5.Channels & Benching:

2.5.1. Channels shall be semicircular in the bottom half and of diameter equal to the sewer. Above the horizontal diameter, the sides shall be extended vertically to the same level as the crown of the outgoing pipe and the top edge shall be suitably rounded off.

The branch channels shall also be similarly constructed with respect to the benching but at their junction with the main channel an appropriate fall suitably rounded off in the direction of flow' the main channel shall be given.

2.5.2. The channel and benching shall be done in C.C.1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20mm. nominal size) rising at a sloping line from edges of channel. The

channels of the bottom of the chamber shall be plastered with C.M.1:2(1cement:2 coarse sand) and steel troweled smooth.

2.6. Cover slab:

2.6.1. The cover slab of R.C.C.1:2:4(1cement:2courses:4gradedstoneaggregate20mm.nominal size)15cms thick reinforced with 10mm bar sat15cms C/C bothways, surface and edges finished fair. Full in R.C.C. slab so that the top of the framer mains flush with the top of R.C.C. slab.

2.7. Testing:

2.7.1. Man hole shall be tested by filling with water to a depth not exceeding1.2M as directed.

2.7.2. After completion of work, man hole cover shall be sealed by means of thick grease.

3.0. Mode of measurements and payment

3.1. The depth of manholes shall be distance between the top of the manhole cover and the invert level of themaindrain. The rate includes all labours, materials, tools, and plant etc. required for satisfactory completion of this item as directed above.

3.2. The rate shall be for a unit of the one number.

Item No.:119

Providing erecting and fixing double coated syntax equivalent PVC (ISI) mark water tank of required capacity each with all necessary fittings and connectionetc comp. on terrace

MATERIALSANDWORKMANSHIP:

Overhead water tanks "Reno" of" Syntax "or equivalent of cylindrical vertical tanks with closed top with of self-supported type having approved grade of polyethylene, molded to seamless sand 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.:120

Providing and fixing 600 mm. x 450 mm. beveled edge minor of superiorglass 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. The600mmx450mmsize mirrors will be of superior glass with edge rounded offer beveled as specified. Itshall be free from flaws specks, or bubble sand its thickness shall to 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 load 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 6mmthick 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 ofthis item. The rate shall be for a unit of one number.

Item No.:121

Providing and fixing PTMT liquid soap container 109mm wide, 125mm high and 112mm distance from wallof 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.:122,123

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 confirm to IS –12592 / 2002or 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 and20 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 theframe& the cover shall be 5mm. The minimum thickness of HD, MD & LDCovers 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 (Scraper 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.

Item No.:124

Supplying & erecting approved make motor control cubical panel (Direct - on - line) made from 16 G. CRCA sheet duly epoxy powder painted inside and outside with hinged doors and locking, arrangement consisting of suitable size of ON- OFF isolator (AC - 3/23duty) main fuses, single phasing preventer, indicating lamps for R- Y - B phases, overload relay, Automatic water level controller, Ammeter, Voltmeter each with two way selector switch incoming, wires duly socket crimped, main contactor & overload relay, start - stop push buttons, to be erected on angle iron frame grouted on wall as directed. The isolator, overload relay & contactors will be of L & T, Siemens or BCH make only. (a) DOL up to 5.0 H.P.

As per item BOQ

The rate will be paid for a unit of Each.

Item No.:125

Providing & erecting open well horizontal mono block pump set with cast iron body, complete for three phase submersible motor having[D] For 5 HP 3 phase open well horizontal mono block pump set suitable for 1350 LPM to 310 LPM @ 10 to 42 Mtr head suitable for 50/65 mm dia delivery pipe Cat.II

As per item BOQ

The rate will be paid for a unit of Each.

Item No.:126

Providing and erecting ISI marked PVC insulated PVC Sheathed Flat flexible Submersible copper cable approved make of following Size. (e) 3 Core x 10 Sq. mm.

As per item BOQ

The rate will be paid for a unit of Running Meter.

Item No.:127

Providing Water proof straight Joint in PVC insulated flat flexible copper cable by using insulating material, water proofing material, & making the joint complete. (A) Up to 10Sq. mm

As per item BOQ

The rate will be paid for a unit of Each.

**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 though 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 in stalled in residential and non-residential buildings shall be rated at 60 watt & 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 know 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 Clause 9.2.1.3.

- 9.2.1.3 The insulation resistance in Me ohms measured as above shall not be less than 50Me ohms divided by the number of 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 witch 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 envelops 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 socket. 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 land 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 so r bushing of adopted to receives 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 A 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 complete lyen 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 at the front between the switch gear mounting on the door.
- 11.8 Equipment's which are 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 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 - hydroscopic, no- 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 the 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 a two 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 shall be welded. All wires passing through the metal board shall be bunched.

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 shall apply.

Note: Such type of boards are particularly suitable for large switch board for mounting large number of switch gears or higher capacity metal clad switch gears or both.

13.6 Arrangement of Apparatus:

- a) Equipment which is on the front of a switch board shall be so arranged that inadvertently 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.

Alternating Current	Direct Current
Three-phase-red, Yellow, & blue,	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 leach 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 off 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 other than insulating material.

13.10.5 If required, a pilot lamp shall be fixed and connected through an 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 space 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 form a "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 modular 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 pvc conduit conforming to IS: 9537 specification for Rigid pvc conduits of Electrical wiring.
- (c) Insulated conductors while passing through floors shall be protected from mechanical injury by means of rigid PVC conduit

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 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) Carrying not more than 15 amperes may be of tumbler type which shall be 'CN' when the handle is down.

17.0 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.

17.1 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 ²		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 so 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 cares 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 1.0mm^2 With copper and 1.5mm^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 modular switch board.

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 interchangeable in each installation.

25.0 Conduit Wiring System:

25.1 Conduit Wiring System with Rigid Non-Metallic Conduits:

Rigid Non-Metallic conduits are used for surface, recessed and concealed conduit wiring.

25.1.1 **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).

25.1.2 **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		Size of conduit (mm)					
Nominal	No. Diameter in	16	20	25	32	40	50
Cross sectional mm ²	mm of wires				(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 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 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 top revert the entry of insects etc. as far as possible.

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.

tract of the Wiring

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 far fans, lighting paints bells, clacks sockets, etc. including fixing of lighting fixtures and fans etc. and miscellaneous paints.
- (b) Conduit and wiring system' far 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) Conduit's 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 inter changeable 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:

- i) The system of wiring shall consist of ISI marked single core, PVC insulated, FRLS, 1100 volt grade, stranded, flexible copper conductor wires as per IS : 694 amended up to date.
- ii) The Conduit and accessories shall be of Rigid PVC Type. The wall thickness of conduits shall be 16 SWG for 20, 25 and 32 mm dia conduits and 14 SWG for 40 and 50 mm dia conduits. OR, ISI marked (IS: IS:9537-III, 3419 & 2509) heavy duty Rigid PVC. The wall thickness shall be 2 mm. (As mentioned in the respective BOQ)
- iii) CONDUCTOR SIZE:- Wiring shall be carried out with following sizes of wires –
 - a. Light/fan/call bell/ exhaust fan point - 1.5 sq mm.
 - b. 5 amp plug points - 1.5 sq mm.
 - c. 15amp plug point – 2.5 sq mm.
 - d. Light circuit - 1.5 sq mm.
 - e. Power point - 4.0 sq mm.
 - f. Power point for AC – 2.5.0 sq mm. (UP TO 2TON)

- iv) 1.5 Size of Earth wires shall be as per following table –

Size of point/ circuit / sub-main wires	Earth wire
2x1.5 sqmm. -	1x1.5 sqmm.
2x2.5 sqmm. -	1x1.5 sqmm.
2x4 sqmm. -	1x2.5 sqmm.
2x6 sqmm. -	1x2.5 sqmm.
2x10 sqmm. -	1x4 sqmm.
2x16 sqmm. -	1x4 sqmm.
4x6 sqmm. -	1x6 sqmm.
4x10 sqmm. -	1x10 sqmm.
4x16 sqmm. -	1x16 sqmm.

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 berust-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 work man ship and neat finished appearance are the prerequisites for complying with the clauses of these specifications. With a view' to ensure fine work man ship the tenderers shall employ licensed 'wiremen, with an experience of not less than 5years in the type of work' they a

reengaged. The work should be done under supervisions of licensed Electrical Supervisors with good educational qualifications and considerable experience.

1.7.2 Tenderers shall furnish the names of Supervisor and their wire men 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 chaises 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 other 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 Performa In Appendix-III, at the time of taking over the installation by the Department. The installation shall be guaranteed for period of 60 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 400-440V 50 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 intermediate 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 button 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 a cross-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 any connected load of 800 watts whichever is greater. The allowable 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 conducts 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. conductor 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.

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 200 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 SPECIFICATION FOR POWER CONTROL AND TELEPHONE CABLES:

I. SCOPE:

- i. The specifications covert 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 safely. 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 joins. 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.

2.5 DISTRIBUTION BOARDS AND PANELS:

General Requirements:

- 2.5.1 All distribution panels shall comply with I.E.E. Rules 60-61. A clear distance of 0.91 m meter in front of the switch board shall be kept. Where bare connection so attachments are provided at 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 0.299m. All wiring connection shall be made neatly and securely.
- 2.5.2 For circuits 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.
- 2.5.3 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:
- 2.5.4 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.

2.5.5 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.

2.5.6 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 alter 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.

2.6 Instrumentation:

The instruments and meters wherever necessary shall be housed in special sheet steel box located between switch fuses units and bus busbar 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.

2.7 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 in co-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.

Earthing

I GENERAL:

All non-live metal parts of the electrical system and equipment shall be earthed with suitable size of earth conductors. 2 distinct earthing shall be provided for all 3-phase equipment. Earthing shall be in conforming with IS 3043 and Lightning protection shall be with IS 2309. Earth resistance of individual earth station shall not exceed 5 Ohm and overall resistance shall be less than 1 Ohm at all times. Earth resistance shall be taken with earth meggers for all earth points. All earth points shall be located 2.0mtrs away from the building and there will be

a minimum distance of 3.0 meters between 2 earth points. All earth stations shall be identified with number and using painted board.

II EARTH STATION:

Pipe Electrode Earthing: 50 mm dia. Class B GI Pipe 3.0 mtrs long tapered at bottom and 12mm dia holes at 75mm c/c on all sides for bottom 2.0mtrs with top watering arrangement shall form earth electrode. The electrode has to be buried vertical in ground.

In case of rocky strata, Bore earthing stations with 150mm bore and 100mm class B GI pipe shall be done. Depth of bore earthing shall be 6.0 mtr minimum. Soil resistivity test shall be done for deciding depth if necessary.

Bentonite or earth powder slurry shall be put along with pipe in the bore.

III MAINTENANCE FREE EARTHING:

Generally pipe-in-pipe technology shall be used with inner pipe and outer pipe of different sizes and lengths as mentioned below. These pipe electrodes shall be hot dip galvanized to enhance life.

The annular space between these pipes & inner pipe shall be filled with adequate special crystalline compound material which shall resists the corrosion of inner pipe electrode. Area surrounding outer pipe shall be filled with back fill compound mixed with the soil. Depth & size of pit shall suit to the electrode length. Soil resistivity test shall be done if necessary for deciding depth.

	Pipe Electrode Details.			Galvanizing (Micron)min
Category	Inner pipe dia (min)	Outer pipe dia (min)	Length	
T39	40mm dia	80mm dia	3000 mm or as specified	80 – 100
T19	25mm dia	50mm dia	3000 mm or as specified	80 - 100

IV MASONRY CHAMBER:

Brick masonry chamber of size 450 x 450 x 450mm minimum (internal clear Dimensions) with cast iron cover / rcc cover and frame with top finished at ground level shall be provided for watering and test link access.

V ARTIFICIAL TREATMENT:

In case of rocky soil, hard murum soil resistance is very high. For getting proper earthing alternate layers of charcoal and salt are to be provided, for entire height of earth electrode with 300mm over all cover. Black cotton soil can be used for refilling the earth points in rocky strata.

VI EARTHING CONDUCTORS:

Earthing conductor size shall depend on the loads and defined fault conditions.

The earthing conductors shall be connected with either riveted or bolted joints with at least 2 rivets/bolts. The joints shall be painted with bitumen paint.

Earthing strips for lightning protection shall be run on parapet walls of outer periphery of building and outer periphery of highest structure for horizontal runs and on unapproachable vertical walls up to disconnecting box fixed at 1.0 mtr height above ground level. Lightning conductor shall be connected to earth station directly and separate 25x6 mm strip from earth station is to be connected to grid earthing. The lightning conductor/s shall be fixed at appropriate highest location on the building / structure. Separate earth pit shall be provided for each lightning conductor.

LOW VOLTAGE SWITCHGEAR

Scope

This Section covers the detailed requirements of medium voltage switch Panel for 433V, 3 phase 50 Hz 4 wire system. These shall be branded and/or assembled/fabricated from a factory of repute. All switchgears shall be fully rated at an ambient of 50° C.

Type of Panel

The medium voltage switch board panel shall comprise of any one of the following types of switchgears or combination thereof as specified.

Air Circuit breakers draw out or fixed type, Switch Disconnecter Fuse Units fixed type, MCCBs of suitable Ics ratings. MCCBs shall invariably be Current Limiting type. Features like Double Break, Positive Isolation functions shall be preferred.

The Panel shall be indoor type having incoming sectionalization and outgoing switchgears as specified. The design shall be cubical type. The degree of enclosure protection shall be IP 42 as per IS: 13947 (Part-I).

LT Panel

General Construction

- a) The switchboard shall be floor mounted free standing totally enclosed and extensible type of uniform height not more than 2400mm. The switch board shall be dust & vermin proof and shall be suitable for the climate conditions as specified. The design shall include all provisions for safety of operation and maintenance personnel. The general construction shall conform to IS: 8623/1993 for factory assembled switch board.
- b) LT Panels shall be provided with a metal sill frame made of structural steel channel section properly drilled for mounting the Switchgear along with necessary mounting hardware. Hardware shall be zinc plated and passivated, Provided with cable entry facilities at top/bottom as per layout requirement with 3mm thick removable gland plates on breaker panels and 2 mm thick removable gland plates on other panels with necessary cable glands.
- c) Switchgear shall be provided with gaskets all round the perimeter of adjacent panels, panel and base frame, removable covers and doors,
- d) Provided with busbars running at the top, as required, all along the length of the switchgear in a separate sheet steel enclosure.

Cubical Type Panels

Cubical type panels shall be fabricated out of sheet steel not less than 2.0 mm thick. Wherever necessary, such sheet steel members shall be stiffened by angle iron frame work. General construction shall employ the principle of compartmentalization and segregation for each circuit. Unless otherwise approved, incomer and bus section panels or sections shall be separate and independent and shall not be mixed with sections required for feeders. Each section of the rear accessible type panel shall have hinged access doors at the rear. Overall height of the panel shall not exceed 2.4 meters. Operating levers, handle etc. of highest unit shall not be higher than 1.7 meters. Multi-tier mounting of feeder is permissible. The general arrangement for multi tier construction shall be such that the horizontal tiers formed present a pleasing and aesthetic look. The general arrangement shall be approved before fabrication. Cable entries for various feeders shall be either from top or bottom. Through cable alleys located in between two circuit sections, either in the rear or in the front of the panel. All cable terminations shall be through gland plates. There shall be separate gland plate for each cable entry so that there will not be dislocation of already wired circuits when new feeders are added. Cable entry plates shall therefore be sectionalized. The construction shall include necessary cable supports for clamping the cable in the cable alley or rear cable chamber.

Cubicle panels with more than 1000 Amps BUS shall be made of tested structural modular sections.

Bus Bar and Connections

The bus bars shall be of Copper of high conductivity electrolytic quality and of adequate section. Current density shall not exceed 1.6 amps for Copper /sq. mm. The bus bar system may comprise of a system of main horizontal bus bars and ancillary vertical bus bars run in bus bar alleys on either side of which the circuit could be arranged with front access cable entries. In the case of rear access, horizontal bus system shall run suitably either at the top or bottom. All connections to individual circuits from the bus bar shall preferably be solid connections; however flexible connections shall also be permitted as per recommendations of the Panel Manufacturer. All bus bars and connections shall be suitably sleeved / insulated with heat shrinkable PVC with approved manner.

The insulation shall be non-inflammable and self-extinguishing and in fast colours to indicate phases. The joints shall be insulated in such a way as to provide for accessibility of contact bolts for maintenance. Joints shall be covered with removable moulded shrouds made out of fibreglass-reinforced polyester.

Incomer Termination

Incomer termination shall be suitable for receiving bus trunking /underground cables. Cable terminations shall invariably be through terminal blocks (Polyamide or superior) or brought out solid terminals.

Instruments

All voltmeters and ammeters shall be flush mounted of size minimum 96 mm conforming to class 1,5 of IS: 1248 for accuracy. All voltmeters shall be protected with MCB. They shall be suitable for semi-flush with only flanges projecting on vertical panels.

Indicating Lamps

On all the incomers of M.V panels, ON/OFF indicating LED lamps shall be provided and shall be suitable for operation on AC supply. Phase indicating LED lamps shall be associated with necessary ON/OFF toggle switch.

Small Wiring

All small wiring for Controls, Indication etc, shall be of with suitable FRLS/HFFR (halogen free fire retardant) copper conductor cables. Wiring shall be suitably protected within switch board. Runs of wires shall be neatly bunched, suitably supported and clamped. Means shall be provided for easy identifications of the wires. Where wires are drawn through steel conduits, the works shall conform to CPWD General Specifications for Electrical works (Part I- Internal) - 2005 and IS:732 as the case may be. Identification ferrules shall be used at both ends of the wires. All control wiring meant for external connections are to be brought out of terminal board.

Operational Requirements

The indoor type LT panel shall conform to the following: -

The panel shall comprise of incomers, outgoing feeders and bus coupler as specified. The incomer shall be either a double break / contact repulsion MCCB or an Air Circuit Breaker. The bus coupler shall be either a circuit breaker or a double break / contact repulsion MCCB, ACB, switch disconnecter fuse unit as specified. The outgoing feeders shall be circuit breakers/MCCBs as specified.

Bus bars for phase and neutral shall have a rating as specified in SLD and BOQ.

The entire switch panel shall be cubical type generally conforming to 18:8623/1993 for factory assembled switch board.

The incomer panel shall be suitable for receiving bus trunking or LT cable of size specified either from top or from bottom.

All incoming AIR CIRCUIT BREAKER / MCCB shall have suitable adjustable tripping current and the time delay settings. The entire panel shall have a common earth bar of size as specified with two terminals for earth connections.

Rating and Requirements

MCCB/ MCB etc:

MCCBs : All MCCBs shall be current limiting type with features of load line reversibility and suitable for Horizontal/Vertical mounting without any derating. Beyond 300 Amps capacity MCCBs shall have positive isolation and preferably double break / contact repulsion & double insulation features. The MCCBs shall invariably be used with terminal spreaders.

- a) The MCCBs shall conform to the latest applicable standards (IS: 13947).
- b) MCCBs in AC circuits shall be of TP/TPN/FP construction arranged for simultaneous manual closing and opening. Operating mechanism shall be quick-make, quick-break and trip-free type. The ON, OFF and TRIP positions of the MCCB shall be clearly indicated and visible to the operator. Operating handle for operating MCCBs from door of board shall be provided.
- c) The instantaneous short circuit release shall be so chosen by the CONTRACTOR as to operate at a current in excess of the peak motor inrush current and a range of settings shall be provided for the EMPLOYER 'S / ENGINEER'S selection.
- d) MCCB terminals shall be shrouded and designed to receive cable lugs for cable sizes relevant to circuit ratings.
- e) Minimum no. of additional auxiliary contacts (for purchaser's use) shall be provided.
- f) MCCBs shall incorporate time delay devices to ensure that it will tolerate harmless transient overload unless this is well in excess of 25% of its rated value for a sustained period.

MCBs: Miniature circuit breakers for use on motor space heater control circuits shall comply with the requirements of applicable standards, unless otherwise mentioned in Data Sheet.

CONTACTORS: Motor starter contactor shall be of the electromagnetic type rated for uninterrupted duty as defined in applicable standards.

Main contacts of motor-starter contactors shall be of silver plated copper.

Contactors shall be of the double break, non-gravity type.

Direct-on-Line Starters/Star Delta Starters : Starters shall be suitable for Class AC 3 utilization category as specified in applicable standards.

Lightning and Surge Voltage Protection

Scope

This specification describes the electrical and mechanical requirements for a high energy Transient Voltage Surge Suppressor (TVSS).The specified TVSS/SPD system shall be connected in parallel to the facility's electrical all main incoming panels. It shall provide effective high energy surge current diversion, and shall be suitable for application in ANSI/IEEE C62.41 Category A, B and C environments or IEC 61643-1 Class I, II and III

Codes & Standards

The specified system shall be designed, manufactured, tested and installed in compliance with the following codes and standards:

IEC 61643-1: Surge Protective Devices connected to low voltage power distribution systems.

Underwriters Laboratories: (UL 1449, 2nd edition) Standard for Transient Voltage Surge Suppressors. International Standards Organization (ISO) Company certified ISO9001 for manufacturing, design and service and the applicable portions of the American National Standards Institute and Institute of Electrical and Electronic Engineers standards (ANSI/IEEE 1100 ,C62.11, C62.41, C62.45)

Electrical Requirements

a) Nominal system operating voltage

The single phase TVSS system shall be suitable for installations operating between 220VAC and 240VAC.

The three phase TVSS system shall be suitable for installations operating between 380VAC to 415VAC, Star (Y) Configuration: 3 Phase 4 Wire Plus Ground or Delta Configuration: 3 phase 4 wire including Ground.

b) Maximum Continuous Operating Voltage (MCOV):

The maximum continuous operating voltage of the complete TVSS, as well as all components in the suppression path shall be greater than 125% of the nominal system operating voltage to ensure the ability of the system to withstand temporary RMS over voltages (swell conditions).

c) Operation Frequency:

The operating frequency range of the system shall be 50 or 60 Hz.

d) Protection Modes:

Note: L = Line, G = Ground, N = Neutral

The SPD shall provide protection in all modes (L-N or L-L, L-G and N-G where applicable)

a) Wiring And Accessories

Cubicles shall be completely wired upto equipment / terminal block. Interpanel and inter-cubicle looping of control and cubicle space heating supplies to be carried out by CONTRACTOR. Wiring to be carried out with 650V grade single core PVC insulated stranded copper conductor of following sizes :

- All circuits except CT circuit :1.5 sq.mm.
- CT circuit :2.5 sq.mm.

Longitudinal troughs extending throughout the full length of the panels to be provided for interpanel wiring, AC-DC supplies, PT circuits, annunciator circuits, etc. Ferrules for wire termination to be provided. Wire connected to trip circuit will have red coloured ferrule.

Terminal Blocks

a) Terminals blocks for CT and PT secondary leads shall be provided with test links and isolating facilities.

b) All spare contacts and terminals of the panel mounted equipment and devices shall be wired to terminal blocks. At least 10% spare terminals shall be provided.

c) Terminal blocks to be suitable for connecting the following conductors of the PURCHASER's cables on each side:

All circuits except CT circuit	Minimum of two 1.5 mm ² copper
CT Circuits	Minimum of four 2.5 mm ² copper

Cable Terminations

- a) Power and control cable glands and crimping type lugs shall be supplied to suit the cable sizes.
- b) Glands shall be heavy duty, double compression type made of brass and plated.

Control Supply

230/110V AC supply be provided for the switchgear. Suitable control transformer shall be provided to derive 110V AC control supply voltage. All inter panel wiring required shall be included in the scope.

Tests To Be Conducted

- a) Functional test, temperature rise test, high voltage test, limits of operation test, insulation test. PURCHASER will have the option to witness the tests at the MANUFACTURER'S work before dispatch.

1.1 KV GRADE CABLES AND CABLE TRAYS

Standards Of Codes

This chapter covers the specifications for supply and laying of Medium Voltage XLPE insulated PVC sheathed FRLS cables for 1100 volts.

All equipments, components, materials and entire work shall be carried out in conformity with applicable and relevant Bureau of Indian Standards and Codes of Practice, as amended upto date. In addition, relevant clauses of the Indian Electricity Act 1910 and Indian Electricity Rules 1956 as amended upto date shall also apply. Wherever appropriate Indian Standards are not available, relevant British and /or IEC Standards shall be applicable.

Cables

Medium voltage cables shall be aluminium/copper conductor XLPE insulated, FRLS PVC sheathed, armoured conforming to latest IS. Cables shall be rated for 1100 Volts.

All Conductor cables shall be as per BOQ.

Conductors shall be insulated with high quality XLPE base compound. A common covering (bedding) shall be applied over the laid up cores by extruded sheath of un vulcanised compound. Armouring shall be applied below outer sheath of PVC sheathing. The outer sheath shall bear the manufacturer's name and trade mark at every meter length. Cores shall be provided with following colour scheme of PVC insulation.

- 1 Core : Red/Black/Yellow/Blue
- 2 Core : Red and Black

3 Core : Red, Yellow and Blue
3 ½ /4 Core : Red, Yellow, Blue and Black

LAYING

Cables shall be laid as per the specifications given below :

Duct system

Wherever specified such as road crossing, entry to building or in paved area etc. cables shall be laid in underground ducts. The duct system shall consist of a required number of stone ware pipes, GI, CI or spun reinforced concrete pipe with simplex joints and all the jointing work shall be done according to the CPWD building specifications or as per the instructions of the Engineer-In-Charge as the case may be. The size of the pipe shall not be less than 100mm in diameter for a single cable and shall not be less than 150mm for more than one cable and so on. The pipe shall be laid directly in ground without making any special bed but wherever asbestos cement pipes are used, the pipes shall be encased in concrete of 75mm thick. The ducts shall be properly anchored to prevent any movement. The top surface of the cable ducts shall not be less than 60 cm. below the ground level. The ducts shall be laid a gradient of at least 1:300. The duct shall be provided manholes of adequate size at regular intervals for drawing the cables. The manhole cover and frame shall be of cast iron and machine finished to ensure a perfect joint. The manhole covers shall be installed flush with the ground or paved surfaces. The duct entry to the manholes shall be made leak proof with lead-wool joints. The ducts shall be properly plugged at the ends to prevent entry of water, rodents, etc. Suitable duct markers shall be placed along the run of the cable ducts. The duct markers shall at least be 15 cm. square embedded in concrete, indicating duct. Suitable cable supports made of angle iron shall be provided in the manholes for supporting the cables. Proper identification tags shall be provided for each cable in the manholes.

Cables in outdoor trenches

Cable shall be laid in outdoor trenches wherever called for. The depth of the trenches shall not be less than 75cm from the final ground level. The width of the trenches shall not be less than 45 cm. However, where more than one cable is laid, an axial distance of not less than 15 cm. shall be allowed between the cables. The trenches shall be excavated in reasonably straight line with vertical side walls and with uniform depth. Wherever there is a change in direction suitable curvature shall be provided complying with the requirements. Suitable shoring and propping may be done to avoid caving in of trench walls. The bottom of the trench shall be level and free from stone brick bats etc. The trench shall then be provided with a layer of clean, dry sand cushion of not less than 8 cm. in depth.

The cable shall be pulled over rollers in the trench steadily and uniformly without jerks and strains. The entire cable length shall as far as possible be paved of in one stretch. However where this is not possible the remainder of the cable may be removed by "Flaking" i.e. by making one long loop in the reverse direction. After the cable has been uncoiled and laid into the trench over the rollers, the cable shall be lifted slightly over the rollers beginning from one end by helpers standing about 10 mtrs. apart and drawn straight. The cable should then be taken off the rollers by additional helpers lifting the cable and then laid in a reasonably straight line.

For short cut runs and sizes upto 50 sq.mm of cables upto 1.1 KV grade any other suitable method of direct handling and laying can be adopted with the prior approval of the Engineer-in-charge.

When the cable has been properly straightened, the cores are tested for continuity and insulation resistance and the cable length then measured. The ends of all cables shall be sealed immediately. In case of PVC cables suitable moisture seal tape shall be used for this purpose.

Cable laid in trenches in a single tier formation shall have a covering of clean, dry sand of not less 17 cms above the base cushion of sand before the protective cover is laid. In the case of vertical multi tier formation after the first cable has been laid, a sand cushion of 30 cms shall be provided over the initial bed before the second tier is laid. If additional tiers are formed, each of the subsequent tiers also shall have a sand cushion of 30 cms as stated above. The top most cable shall have final sand covering not less than 17 cms before the protective cover is laid.

Unless otherwise specified, the cables shall be protected by the second class bricks of not less 20 cms x 10 cms x 10 cms (nominal size) protection covers placed on top of the sand (bricks to be laid breadth wise) for the full length of the cable. Where more than one cable is to be laid in the same trench, this protective covering shall cover all the cables and project at 5 cm. over the sides of the end cables. The trenches shall be taken back filled with excavated earth free from stones or other sharp edge debris and shall be rammed and watered, if necessary, in successive layers not exceeding 30 cm, unless otherwise specified.

Route Marker

Cable route marker marked "Cable" shall be provided alongwith the route of the cable and location of loops. The route markers shall be of tapered concrete slab of 60 x 60cm at bottom and 50 x 50cm at top having a thickness of 10cm. Cable marker shall be mounted parallel to and 50cm away from the edge of the trench.

Cables in indoor trenches

Cables shall be laid in indoor trenches wherever specified. The trench shall be made of brick masonry with smooth cement mortar finish with suitable removable covers (i.e. precasted slabs or chequered plates). The dimensions of the trenches shall be determined depending upon the maximum number of cables that is expected to be accommodated and can be conveniently laid. Cables shall be arranged in tier formation in trenches and if necessary, cables may be fixed with clamps. Suitable clamps, hooks and saddles shall be used for securing the cables in position. Spacing between the cables shall not be less than 15 cm centre to centre. Wherever specified, trenches shall be filled with fine sand and covered with RCC or steel chequered trench covers.

Cable on Trays/Racks

Cable shall be laid on cable trays/racks wherever specified. Cable racks/trays shall be of ladder or perforated type, trough or channel design suitable for the purpose. The nominal depth of the trays/racks shall be 150 mm. The width of the trays shall be made of steel or aluminium. The trays/racks shall be completed with end plates, tees, elbows, risers, and all necessary hardware, entire steel trays/ racks shall be hot dip galvanized or powder coated including widths & accessories. Cable trays shall be erected properly to present a neat and clean appearance. Suitable cleats or saddles made of aluminium strips with PVC covering shall be used for securing the cables to the cable trays. The cable trays shall comply with the following requirements :

The tray shall have suitable strength and rigidity to provide adequate support for all contained cables.

- a) It shall not present sharp edges, burrs or projections injurious to the insulation of wiring/cables.
- b) If made of metal, it shall be adequately protected against corrosion or shall be made of corrosion-resistant material.
- c) It shall have side rails or equivalent structural members.
- d) It shall include fittings or other suitable means for changes in direction and elevation of runs.

Installation

Cable trays shall be installed as a complete system. Trays shall be supported properly from the building structure. The entire cable tray system shall be rigid.

Each run of the cable tray shall be completed before the installation of cables.

In portions where additional protection is required, non combustible covers/enclosures shall be used.

Cable trays shall be exposed and accessible.

Where cables of different system are installed on the same cable tray, non combustible, solid barriers shall be used for segregating the cables.

Cable trays shall be grounded by two nos, earth continuity wires. Cable trays shall not be used as equipment grounding conductors.

At no place the cable tray / rack / ladder running horizontally should rest on any building partition like Brick wall, RCC beams etc. but instead proper MS supports/ hangers to be provided at minimum of 1500 mm intervals and at every Turning Angles.

Jointing and termination's

Cable jointing shall be done as per the recommendations of the cable manufacturer. All jointing work shall be done only by qualified/licensed cable jointer.

All jointing pits shall be of sufficient dimensions as to allow easy and comfortable working.

Jointing materials and accessories like conductor, ferrules, solder, flex, insulating and protective tapes, filling compound, jointing box etc. of right quality and correct sizes, confirming to relevant Indian Standards.

Each termination's shall be carried out using brass compression glands and cable sockets. Hydraulic crimping tool shall be used for making the end termination's. Cable gland shall be bonded to the earth by using suitable size copper wire/tape.

Specific Requirements - Power Cables

The cables shall be 1100V grade, single / multicore, stranded XLPE insulated aluminium/copper conductor and FRLS PVC sheathed. The cables for emergency services shall be with additional FRLS properties. The cables shall conform to IS-1554 - Part - I (1988). For multicore cables, fillers used to fill in the space between the phases shall be non-hygroscopic, chemically inert and non-putrescent.

Cables laid outside the building, either buried or in trench shall be of armoured type.

Specific Requirements - Control Cables

1100V grade multicore, 1.5 / 2.5 sq.mm stranded copper conductor, PVC insulated and extruded PVC inner sheathed and extruded FRLS PVC outer sheathed of PVC. FRLS cables, which have outer sheath of specially formulated FRLS PVC cable, shall be used for cables connected to Emergency services. The cables shall conform to IS 1554 Part- I (1985) / IEC 502 (1983) in all other respects.

Cables laid outside the building, either buried or in trench shall be of armoured type.

Design Criteria For Cable Sizing

Power cables shall be selected on the following basis:

- a) Power cable shall carry the full load current of the circuit continuously under site conditions considering the various derating factors like ambient air temperature (50 deg C), grouping, laying methods etc.
- b) Power cables shall be sized to restrict the voltage drop to 5% and a voltage dip of 10% for motors.
- c) Power cable shall withstand the fault current of the circuit for the duration not less than the maximum time taken by the primary protective system to isolate the fault.

Testing of Cables

Cables shall be tested at works for all routine tests as per IS including the following tests before being dispatched to site by the project team.

Insulation Resistance Test.

Continuity resistance test.

Sheathing continuity test.

Earth test.(in armoured cables)

Hi Pot Test.

Test shall also be conducted at site for insulation between phases and between phase and earth for each length of cable, before and after jointing. On completion of cable laying work, the following tests shall be conducted in the presence of the Owner's site representative.

Insulation Resistance Test (Sectional and overall)

Continuity resistance test.

Sheathing continuity test.

Earth test.

All tests shall be carried out in accordance with relevant Standard Code of Practice and Electricity Rules. The Contractor shall provide necessary instruments, equipment and labour for conducting the above tests and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the Engineer In charge/ his representative, results will be noted and signed by all present and record be maintained. All the test certificate shall be submitted by contractor.

Octagonal Pole of 4 Mtr Length

The octagonal poles must be made from CR sheet steel. The pole should be made as per IS and shall be coated with hot dip galvanizing as per IS 2629/4759 and must be with required base plate suitable to sustain local wind speed.

- Material: CR Sheet Steel, BSEN 10025
- Length of the pole: 4 Mtr
- Top Dia (A/F): 70mm
- Bottom Dia (A/F): 130mm – 135mm
- Sheet Thickness: 3mm
- Base Plate Dimension (L X B X T): 200mm X 200mm X 12mm
- J – Bolt : 4Nos M16, Length 450MM
- Hot Dip Galvanizing: As per IS 2629/4659
- Min. Thickness of Galvanization: 65 microns

The integral JB of octagonal pole must be fitted with required size of 6mm thick hylam sheet bolted on the JB support plate. This hylam sheet must be housed with necessary size of DIN rail with mounting of 32A, 4 way copper connector fitted with necessary bolting. The design and material of the products must be approved by EIC before the work.

Each JB must have Earth Link to connect the LEDs earth wire and such earth link must be connected with pole earth terminal with 4 Sqmm flexible wire.

The design and drawing must be approved by EIC prior to erection of the pole at site. Test certificates must be provided on demand.

Radium Stickers should be placed on pole indicating “Ward No./Pole No” or as per instruction of EIC.

Pole Foundation Civil Work

Pole foundation cement concreting civil work as per 1:1.5:3 (M20) including excavation, digging, leveling, caging, curing, watering, muffing, smooth surface finishing etc. using two nos. of 32mm cable entry PVC pipe of required length and related all civil works using 53 grade cement (Ambuja, Ultratech, Hathi, Siddhi, Sanghi, Binani) at site with supplied foundation bolts.

The cost of the foundation bolts and TMT Steel bar is not covered in this item. The measurement will made on the basis of outer dimensions of RCC foundation work. The foundation must be done in accordance of the design of the pole manufacturer considering the central median width of the road. This design must be approved by EIC before the commencement of the work.

TECHNICAL SPECIFICATIONS

ELECTRICAL CREMATOR

Description: Electrically heated (resistance type) Cremation furnace (Double Chamber) along with Charging machine and latest Control unit.

Scope: Design, manufacturing, supply, Erection & commissioning and provision of The equipment,,s/ furnace according to its design parameters and capacity

Leading particulars:

Type: Electrically operated Cremation Furnace along with Charging M/C and latest Control System.

Duty: Cremation of human body maintaining the norms of pollution Control Board.

Normal Working Temperature: Primary chamber temperature: Min 600°C Max 1100°C

Secondary chamber temperature: Design 650°C Max 1100°C

Mode of Charging: Manually operated charging Machine.

Residence time of flue gas in Secondary Chamber: 1 Sec at 650°C

Charging Door Operation: Electro mechanically operated rise and fall type with provision for Manual operation. The operation of door will be provided with limit switches.

Control Philosophy: The heating power to be controlled from the control panel. The furnace Pressure to be controlled through manually operated Damper.

The Advanced Technical Features of the Electrical Cremator include

Excellent Environmental Performance – emissions conforming to current Standards.

- Robust Hearth bricks providing the main support on which body/coffin is placed.
- Twin incineration chambers – One primary chamber and a secondary chamber with Heating elements embedded in it .
- Shaped Refractories - including over 40% or more Alumina in areas of heavy wear.
- Robust construction – a design capable of 8 to 10 cremations per day, and Cremations times around 45 to 60 minutes fully achievable.
- High Performance Cyclonic/Vane/Ventury type Wet Scrubber – which cleans the smoke and ensures almost pollution free discharge through the chimney.
- Automatic temperature control of both primary and post combustion zones.
- Automatic fail safe against over temperature.
- Compact design, enabling easy installation.

➤ The design of this cremator includes a secondary chamber which is capable of maintaining the flue gases combustion temperature at 650 deg C for a residence time of greater than 1 second during operation.

Cremator General Description

The basic cremator will consist of:

- Cremator Furnace
- Combustion Air supply system
- Wet Scrubber (Vane type)
- Stack (Self supported)
- Control Panel.
- Chimney
- Manual "Dead Body" charging systems and trolley

Principle of Operation:

The cremator comprises a primary chamber of generous proportions into which the coffin /Dead Body are inserted and within which the primary combustion takes place. The Dead body/ coffin are placed on the hearth bricks, so as to keep the Body suspended in centre of the Primary chamber. The cremation of the body takes place due to Superheated Air introduced into the primary chamber and the heat transfer is mainly from the energy stored in the refractory mass. The temperature in this zone during the process of cremation can reach a maximum of 1000°C. The volatile product of combustion produced from this phase exits the primary chamber via the gaps between the hearth bricks descending below into the secondary combustion zone in which the combustion of gaseous phase takes place. The gases entering this zone then undergo complete combustion due to the heating elements in the secondary zone and this process is assisted by the introduction of additional air. The flue gases make numerous passes within the secondary combustion zone, where the flue gas temperature is maintained at the required combustion temperature of 600-620°C.

Main Combustion Chamber

The primary chamber is equipped with 2 banks of 80-20 Ni – Cr heating elements embedded in the side wall of the FURNACE and independently controlled air supply passes along the side wall of the cremator slightly above the hearth bricks and another passes below the grate brick. At the far end of the Hearth, through-port is provided to allow the Neutralized ashes to fall/manually scrapped through to the pivot grate and finally in the ash tray.

Secondary Combustion Zone

The cremator benefits from a specially designed secondary combustion zone, and is sufficiently sized to ensure a flue gas residence time of 1 second during operation.

The Cremator is designed with a secondary combustion zone comprising a series of passes below, a single bank of 80-20 Ni – Cr heating elements within this

zone ensures that the temperature requirements are maintained while adequate supplies of secondary air in the flue path ensure complete combustion.

The post combustion of the flue gases is completed within these high intensity areas, eliminating all smells. The design of the post combustion chambers ensures a lengthy, complex passage through the cremator prior to the flue gas entering the scrubber system.

The secondary combustion chamber is specifically designed to ensure a flue gas residence time of 1 second at a flue gas temperature of 650 °C.

Control Valves and Instrumentation

The controlled addition of combustion air to the combustion process is effected by 2 modulating control valves, for the control of the individual supplies to the primary and secondary chambers. The primary chamber and secondary chamber temperatures are measured by type K thermocouples, temperatures all independently displayed on temperature instruments

Combustion Air System

The cremator installation is supplied with combustion air by a fan, with a design duty capable of providing the air pressure and flow requirements of the Cremator. The fan is located within / near the cremator.

6.18 Pollution Control device (As per pollution control board rules and regulation)

Induced Draft Fan and Ducting

A suitable designed ID fan pull out the flue gases from the furnace and release it to the chimney. Before coming to the chimney it passes through the ventury packed wet scrubber, separator etc. Suitable ducting is provided in the system along with valves to carry and control the flow of the flue gas.

Scrubber

Dust laden gases enter into cyclone - ventury inlet from where gases mixed with water jet entered tangentially through nozzles. In separator further scrubbing takes place through cyclonic effect. Further mist eliminator is provided to reduce the water droplets enter into the blower casing. The inlet and outlet ducting is made out of SS 304 and blower is dynamically balanced and fixed on top of the scrubber. It will suck the flue from the furnace through ventury scrubbing system and through to the outlet connected to the chimney.

Material of construction: S.S. AISI – 304

Position of water spray: from top

Water circuit: closed.

Efficiency: 95%

Nozzle: specially designed Brass made nozzle.

Concentration of particles: 150 mg/Ng (nominal cu. Mtr.) in exhaust air.

Velocity of exhaust air: 1M/ sec.

Fume discharge: 1500 cu. m. per hour.

Rating of re-circulation: 0.5 H.P. pump or as per standard design

Water Circulation System

Clean water is required for spraying in the scrubber mechanism and the return dirty water is also to be stored in another tank. One recirculation tank comprises three

chambers and recirculation water pump with necessary pipe fittings are considered to

feed clean water from the third chamber for spraying from the top scrubber mechanism

and the return dirty water is stored in the first chamber. The process of sedimentation

of water and particles is done with the help of three chamber system. In this process of

sedimentation the particles are mostly sediment in the first two chambers and the clean water after sedimentation is collected in the third chamber. The sediment liquid

from the bottom of first chamber is drained out by means of operating valve to Soak Pit

with filter bed arrangement made of with different size granules. The sedimentation tank is cleaned every week or after cremation of 60 numbers body whichever is earlier.

Provisions are also being kept to supply fresh water from alternate source of supply into third chamber.

Note: - **The induced draft fan should be in SS 304 and all ducting should be SS 304.**

Chimney (For Both Furnaces)

The chimney is self supporting MS construction having 30 mtr ht 620 mm dia at bottom , 350 mm dia top shall be supplied along with its foundation bolts. The chimney

shall be provided with copper lighting Arrestor and provision to check the emission level of the flue gas at height of 10 mtr.

The chimney shall be protected with heat resistance aluminum paint, withstanding capacity 400 Deg. C. (Separate chimney for individual furnace) Each furnace have individual chimney

Furnace Control Panel:

The cremator is supplied with a dedicated control panel through which the operations and process parameters are controlled. The panel is fitted with digital temperature controllers for controlling primary and secondary chamber temperatures. Pressure gauge located on the panel helps the operator understand the chamber pressure. Energy meter provided helps in analyzing the total energy consumption. The operator by means of indicating lamps knows display of each Control valve position the control enclosure is located on the side of the cremator. Within the enclosure, all the Equipment is located to minimize the effects of heat, and is adequately ventilated so ensuring Trouble free operation.

The control system is capable of the total control of the cremator and all its functions in order to complete the cremation of the human body once the cremation chamber has been charged, and so simplifies the day-to-day operation of the cremator.

Note: - Main control panel with Digital A- meters, v meters KW meters and frequency with suitable CT PT rating

Cremator Process Control – Safety Features

The blind temperature controller is provided in case of failure of any of the digital temperature controller. Safety features must be provide for temperatures, air presser and other parts

Cremator Construction Description

Casing and Framework The casing and framework of the cremator is fabricated from steel plate and sectional steel construction.

Refractory Lining

Refractories are of high quality, comprising firebrick, semi-insulating refractory and lightweight insulating refractory materials, backed by Hysil blocks insulation at the furnace casing. The firebrick used as the hot-face material for the primary and secondary chamber is a 40% alumina firebrick with a maximum working temperature of 1100°C.

In the areas of high wear, e.g. the main combustion area, hearth bricks is used which has high Resistance to abrasion and thermal shock, and also a maximum working temperature of 1100°C.

Charge Door

The ceramic fiber lined charge door is situated at the front of the cremator and is counterbalanced and suspended on sprocket chains for easy operation. Operation is by means of a geared electric motor controlled by push buttons situated in the control panel and interlocked to prevent charging as previously stated. MS heavy duty, high thickness (Min 12 MM) TATA / ZINDAL Make must be used

Alternatively Door can be Made up of 6MM SS Plate(SS 304). Before installing the door contractor has to take approval from EIC/PMC for MS Door or SS Door and for that they have to submit technical comparison for the same.

Ash Removal (For Both furnaces)

Access for raking is through the ash door. At the end of the cremation the door is opened manually and the ash then may be raked and removed directly via the pivot grate, into the ash container, which positioned below the ash door. Therefore both loading of coffins/body, and de-ashing of remains are carried out at different ends of the cremator.

Access for Maintenance (For Both furnace)

Access for raking is through the ash door. At the end of the cremation the door is opened manually and the ash then may be raked and removed directly via the pivot grate, into the ash container, which is positioned below the ash door. Therefore both loading of coffins/body, and de-ashing of remains are carried out at different ends of the cremator.

External Finish (For Both furnace)

Externally, the cremators main casing is painted with good quality heat resistant aluminum paint for thermal insulation and aesthetics.

Drives

1. Charging Door :- 0.5 HP/10 rpm geared motor, 415 V, 3 Ph. F class Insulation motor.
2. Re-circulation Water Pump; - 0.5 HP, 2800 rpm, 220 V, 1 Ph sq. cage, F class insulation motor.
3. Induced Draught Fan motor - 5 HP, 2800 rpm, 415 V, 3 Ph sq. cage F class Insulation motor.
4. Combustion Air Motor 1 HP, 2800 rpm, 415 V, 3 Ph sq. cage F class insulation motor.
Make; - ISI Standard

Cremation Capacity (for furnace)

This design of cremator is robust, and will perform up to 7 to 8 cremations per day, and cremations times around 90 minutes fully achievable for fuel fired furnace. however; it is fully capable of operating for extended periods beyond "normal working hours", as required.

Earthing System (For Both furnace)

The whole system must be made earthed by bore type electrode earthing as per IS: 3043 (1987). Earthing Electrode consisting Flat-in- Pipe technology made of corrosion free B Class G.I.Pipe having outer pipe dia. Of 76-80mm with 90-120 micron galvanizing and inner GI strip of 50mm X 5mm with 90-120 micron galvanizing including boring, installation and fitment of RCC earth pit with cover with all related civil work in at site including all labour and material and making site neat and clean after the work.The connection terminal of the electrode must be connected to the earth terminal of the feeder pillar with suitable connectors, nuts, bolts, lugs etc. The whole installation must be covered with highly conductive back filling compound of 50kg. All the materials must be approved by EIC before utilization at site.

Length of electrode	3 Meter
Diameter of the electrode	76 - 80 mm
Back filing compound	50 kg
Depth and size of the bore	As required
Earth Pit with Cover	RCC Earth pit with cover as required

Note :- separate earthing for main control panel, furnace, chimney and lighting arrestor

Painting (For furnace & Chimney)

The painting works, unless otherwise stated elsewhere, shall be applicable for the following items as follows. Various equipments inclusive of electric motors, pumps, panels, control desks and accessories All pipe work including supports, hangers All metallic duct work such as exhaust ducts including supports and hangers and other metallic works if any. All metal surfaces, after preparation of surface, shall be painted with two primer coats and two finish coats. All surfaces shall be cleaned of loose substances and foreign materials, such as dirt, rust, scale, oil, grease, welding fluxes etc in order that the primary coat is rigidly anchored to the virgin metal surfaces. The prime coat shall be applied as soon as possible after the surface preparation is complete. The

procedure for surface preparation shall be solvent cleaning, hand tool cleaning, power tool cleaning, flame cleaning, blast cleaning, pickling or combination thereof as applicable. The primer coating shall be Red lead or zinc chromate. Finish paint shall generally be applied by brushing except that spraying may be used for finish coat only where brushing may damage the prime coat. Proper brushes shall be selected for specific work pieces. The brush marks shall not be left in the applied paint as far as practicable. Each coat of paint shall be allowed to dry sufficiently before application of the next coat to avoid damage such as lifting or loss of adhesion.

Painting to be done @ every 18month interval and hence during maintenance guaranty period contactor has to do painting 3 times in the span of 5year.

Gas cremator (Single Unit Compact Design Structure)

Supply, installation and commissioning of GAS cremator (PNG/LPG) complete air pollution control system basis with comprehensive maintenance for five years

Double Direction Corpse Carrier having fixed frame without visible wires or track Double direction stainless steel (SS304) caterpillar both auto and manualcontrol should be available.

Steel Structure should be of High quality mild steel, Arc weld; with suction device for escaped tail gas. The Gas Cremator should be with burner, operation door, ash opening, ash urn, electric key board, label, etc. After the operation, the ash should be manually removable into ash urn or vessel from ash opening from main chamber.

Main Chamber Furnace

Chamber should have 2 burners (Baltur, Ecoflametlian make only) and it must be multi fired PNG / LPG ; High quality refractory clay brick, brickwork joint should be less than 3mm; High quality refractory material and insulation materials (support 1200oC); Work Pressure (pa):-10~-40Pa ; Work Temperature : 600oC ~900oC; Main Chamber should consist of furnace bed, furnace door, fire opening (air supply), burner mounting plate should be casting, operation door opening and ash opening inside the main chamber. The main burner should be with 45° ~ 60 ° angle to horizon and the angle should be manually adjustable. Gas consumption should be minimum.

Secondary Chamber With secondary burner, Fuel Type: PNG / LPG ; High quality refractory clay brick, brickwork joint should be less than 3mm; High quality refractorycartable material and insulation materials (support 1200oC)

Furnace Door

Lifting should be of High quality steel frame, good speed reducer; Both auto and

manual control should be available; The furnace door lifting device should have motor, speed reducer, door support shaft, door plate, and electronic control components for automatically opening and closing furnace door. The door plate should be made of lightweight fireproof plate and stainless steel frame of minimum 6mm thick or 12mm MS Plate as specified by EIC at the time of installation.

Combustion System

The main chamber burner has a maximum rating of 358 kW and this enables normal operating temperature in the range of 800°C to be achieved in the main chamber. (The maximum allowable operating temperature is 1100°C to 1150°C).

The secondary combustion zone burner has a maximum rating of 358 kW which will enable temperatures of 850°C to be achieved in the secondary chamber as required by the local Environmental Regulations.

The burners are mounted at the rear of the cremator facilitating access for maintenance and repair.

Gas burners are configured for On/Off control, are ignited automatically and the burners system is protected against flame failure, thereby complying with the gas regulations. NATURAL GAS fired burners, High/Low fire or fully modulating burners are optional.

Control Valves and Instrumentation

The controlled addition of combustion air to the combustion process is effected by 2 modulating control ball valves, for the control of the individual supplies to the main and secondary chambers. Each burner is fitted with its own air supply fan and individual combustion air pressure switches to prove supply to each burner. The main chamber and secondary chamber temperatures are measured by type K thermocouples, temperatures all independently displayed on temperature Instruments.

Combustion Air System

The cremator installation is supplied with combustion air by a fan, with a design duty capable of providing the air pressure and flow requirements of the AWL Cremator. The fan is located within an integrated enclosure within the cremator's decorative paneling, which is acoustically lined.

Air Ejector / Induced Draft Blower (I.D.Fan)

Air Ejector / Induced Draft Blower (I.D.Fan) with Work efficiency: Power: 5 to 7.5 HP; With shock absorption device with Induced Draft & positive ejection of the gases through the ducting and chimney. The ID Fan blower should be provided with manual damper for controlling the gas flow. Adequate SS304 Scrubber system with pumps and pipes as required and water recirculation storage tank of

Droplet separator the induced draft fan should be in SS 304 and all ducting should be SS 304.

PLC Based Cremator Process Control

- 1.1.1 The cremator can be supplied with a dedicated Programmable Logic Controller; this controller supervises the operation of the cremator and the combustion process.
- 1.1.2 Crematorium's control panel design is based upon a modern "compact design" PLC, complete with 24 digital inputs and 16 digital outputs in standard configuration. The programmable logic controller is supplied, preloaded with our control software programmed.
- 1.1.3 The cremator is provided with a Human - Machine Interface to enable the cremator operator to communicate with the cremator. The graphical interface is made via a Liquid Crystal Alpha Numeric Display. This display comprises a backlit Liquid Crystal Display (LCD) which gives rise to a semi graphic display to control the cremator operation.
- 1.1.4 The H.M.I display is complete with screen and membrane buttons, this display unit is mounted on the control enclosure.
- 1.1.5 The control enclosure, including the Programmable Logic Controller system is located on the side of the cremator. Within the enclosure, all the equipment is located to minimise the effects of heat, and is adequately ventilated so ensuring trouble free operation.
- 1.1.6 The PLC based control system is capable of the total control of the cremator and all its functions in order to complete the cremation of the human cadaver once the cremation chamber has been charged, and so simplifies the day to day operation of the cremator.
- 1.1.7 The PLC control system automatically varies the combustion programme according to combustion conditions and controls the cremator at its optimum performance to operate quickly and without smoke whilst also controlling the emissions. Should the need arise, provision is also made for manual override. Manual control of the cremator is logged by the control system.

Cremator Process Control – Safety Features

The burner flame failure and burner safety systems are housed separately from the burner. They comprise flame failure safety relays connected to a flame

rectification type probe, to monitor "start" flame and "main" flame, so as to automatically shut off gas and air supply valves in the event of flame failure of the main burner or afterburner, and to prevent burner ignition if the safety circuits are not energized.

Electrical interlocks also prevent the charging door being opened for the introduction of a "Dead Body" unless the temperature in the main chamber is below the set charging level.

Construction Descriptions

Casing and Framework

The casing and framework of the cremator is fabricated from steel plate and sectional steel construction, the whole braced for rigidity, so as to properly support the refractory and insulating materials with which the casing is lined.

Refractory Lining

Refractories are of high quality, comprising fire-brick, semi-insulating refractory and lightweight insulating refractory materials, backed by calcium silicate insulation at the furnace casing. Ceramic fiber is used for lining the front ashing door and the charge door. The firebrick used as the hot-face material for the main and bottom chamber is a 42% alumina firebrick with a maximum working Temperature of 1400°C.

In the areas of high wear, e.g. the main hearth areas, a 63% alumina tile is used which has high resistance to abrasion and thermal shock, and also a maximum working temperature of 1600°C. Calcium Silicate Insulation is used in areas around the casing between the refractories and the steel casing and this has a maximum working temperature of 1000°C.

The quality and thickness of the insulation is such that the cremator casing is kept at a safe temperature for the Operators.

Ash Removal

Access for raking is through the charge door. At the end of the cremation the door is opened by pushbutton operation to a safe, partially open position, which protects the operator from the radiated heat of the chamber.

The ash then may be raked and removed directly via the external ash chute, into the ash container, which is positioned below the charge door. Therefore both loading of Dead-body/coffins, and de-ashing of remains are carried out at one and the same end of the cremator.

Access for Maintenance

The need for access for maintenance has been carefully considered in the

cremator design, and facilities have been provided for the cleaning out of accumulations of ash in any of the chambers and flue passages, access ports being provided for this purpose.

External Finish

Externally, the AWL crematorium's main casing is clad with pre-finished painted panels before leaving our Works. Consequently, no additional finishing of these items is required.

As well as giving the cremator a pleasing appearance, these panels ensure operator safety, by preventing any hot surfaces from being touched. The external cladding panels ensure a gap of air between the hot cremator casing, and the external surfaces, which can be touched. This greatly reduces the external surface temperatures experienced.

Cremator Loading Door

The loading door fitted to the main chamber opens to the full dimensions of the main chamber thus allowing for maximum coffin size. This door is ceramic fiber lined to minimize outer surface temperature.

HEAT RECOVERY & SCRUBBING SYSTEM

Heat exchanger is provided at the outlet of the secondary chamber to extract the heat from the flue gases and pre heat combustion air to be introduced in primary and secondary chamber. Due to this preheated combustion air, considerable energy is saved to heat the air from ambient to preheat temperature.

The flue gas coming out of combustion chamber passes through the heat exchanger where the flue gas cools to a temperature of 300 Deg. C. These hot dust laden gases are conveyed in to the vane scrubber, which provide consistent, effective gas cleaning. Hot dust gases enter through gas inlet & scrubbing liquid is introduced on the wall through nozzles. The gas with the entrained solids and liquids then passes in to a mist separator where liquid & collected solid flow downwards to re circulation tank. The clean gas exit through a top gas outlet from where they are escaped to atmosphere through ID fan and thirty meter height self supporting chimney

Cremator Process Data

Sr. No.	Description	Requirements
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1	Main chamber temperature	Min 700°C Max 1050°C Varies with progress of cremation
2	Secondary chamber temperature	Design 850°C Max 1150°C
3	Static under pressure main chamber	-1 to -7 mm water column
4	Flue gas volume ex post combustion chamber	1540 m ³ N/ h
5	Flue Gas Condition Content of Carbon Monoxide Typical content over the cremation	<50 mg/Nm ³ (using natural gas)
6	Flue Gas Particulate Content (typically)	<100mg/Nm ³

Note :- All above figures are given at reference conditions of 273.15K, 1.013Bar, dry, 11 % Oxygen on a volume basis

TECHNICAL SPECIFICATION

Sr. No.	Item	Description
01	High Alumina Refractories	63% alumina content refractory tile is used for the main hearth and floor of the adjacent off take flue. This material has a high resistance to abrasion and thermal shock, a maximum service temperature of 1600°C, bulk density 2.25 g/cm ³ , and thermal conductivity of 2.0 W/m.K. The thickness of this tile is 100 mm. 42% alumina content refractory is used in the side walls of the cremator. This material has a high resistance to abrasion and thermal shock, a maximum service temperature of 1400°C, bulk density 2.25 g/cm ³ , and thermal conductivity of 1.9 W/m.K.
02	Calcium Silicate Insulation	This material is used in the areas around the casing between the refractories and the steel casing. It has a maximum service temperature of 1050°C, a bulk density of 0.20 g/cm ³ , and a thermal conductivity of 0.10 W/m.K. The thickness of this insulating material is 100 mm.

03	Castable Refractories	Lintels, burner blocks and the flue gas outlet are all cast in a dense, medium alumina, high strength, high abrasion resistant castable refractory. This castable has an alumina content of 50% , maximum service temperature of 1600°C, and bulk density of 2.37 g/cm ³ .
04	Secondary Combustion Chamber	<ol style="list-style-type: none"> 1. Secondary combustion chamber volume 1.5 m³ 2. Residence time in Post combustion chamber > 1 second 3. A series of passages are made within the refractory lining of the cremator, to the side of the fabrication and under the main chamber hearth. The post combustion chamber is specifically designed to ensure a flue gas residence time of 1 second at a flue gas temperature of 850 °C and an oxygen content of 6%
05	Burners 1. Main chamber burner 2. Secondary chamber burner	<ol style="list-style-type: none"> 1. 358 kW Max fire 2. 358 kW Max fire Natural gas or FUEL
06	Burner control mode	On/Off in Main chamber & high/ low as required in Secondary chamber.
07	Make and standard	Manufacturer Baltur, Ecoflame, Oxilion or Continental Spark gas 35PW/W Flame detector Ionization probe
08	Burner Gas Valves	Main Burner On / Off 240V Solenoid Gas Safety valve. Afterburner High/Low 240V Solenoid Gas Safety valve.
09	Utility / Consumption	Typical gas consumption of the cremator 20 m ³ of Natural Gas per cremation (Based upon five cremations per day, 5 days per week operation). Typical Electrical consumption 5.0 kWh

Cremator Control/Instruments

Sr. No.	Item	Description	Remarks
1	Thermocouples		
	Main chamber No 1 Secondary chamber No1	Type K Ni / Cr Element Type K Ni / Cr Element	Each of the above temperature probes is connected to a Temperature Indicator mounted on the control panel for visual indication of all process temperatures.
2	Cremator Air Valve Motors		
	Manufacturer	Any reputed make	
	Type	3 stage	
3	Programmable Logic Controller		The PLC software program processes the input information so that it can give output control signals for combustion air levels, burner operation, loading door enabling and various other functions. The software also monitors for combustion and component faults, taking appropriate action as required and transmitting the alarms to the operator display system as necessary. In this configuration the supplied PLC has 24 digital inputs, and 16 digital outputs, as well as 2 analogue inputs. AWL utilize the Scheidner PLC and associated AWL-PED computer software for process control of the AWL cremator.
	Manufacturer	Schneider	
	Base unit Type	TWD- LMDA 4T DTK or Equivalent	
	Additional Input Module	TWD ALM 3LT or Equivalent	
4	Operator Control Interface (H.M.I.)		
	HMI Manufacturer	Schneider	
	Model	XBT N400, Magelis or Equivalent	

Penalty clause for maintenance work

Sr.no.	Nature Of Defect Or Deficiency	Time Limit For Repair/Rectification	Penalty (perDay)
1	Change heating elements / Buner System	2 Days	Rs. 500/-
2	Change any type of bricks	5 Days	Rs. 1000/-
3	Scrubber system with ID fan	1 Days	Rs. 500/-
4	Fault in panel board	1 Days	Rs. 500/-
5	Fault in charge door, trolley, ash removal door	2 Days	Rs. 700/-
6	Work in any type of motor, pump, valve, piping	2 Days	Rs. 500/-
7	Cleaning of all necessary equipment with furnace structure	5 Days	Rs. 1000/-
8	Scrubber to chimney maintenance	1 Days	Rs. 500/-
9	Oiling and grassing	1 Days	Rs. 500/-
10	Any type of minor fault	1 Days	Rs. 500/-
11	Cleaning and oil and greasing of all system in every 30 days	1 Day	Rs. 1000/-
12	Cremation furnace is not in working condition due to not attend the fault	1 Day	Rs. 1000/-
13	Furnace Control Panel(All Electrical Component other then PLC)	1Day	Rs. 1000/-
14	PLC panel fault (fuel fired) PLC cards	10 Days	Rs. 1000/-

Scope of work for Comprehensive maintenance

- *In maintenance work of every 30 days, the electrical panel, scrubber system, furnace mechanism, piping & plumbing, and cleaning, wiring, repairing, lubrication, oiling, burner cleaning, general service of furnace,*
- *All types of fabrication of Stainless Steel (SS-304) material and all its machining process and completing the work with necessary installation*
- *All types of fabrication work for shafting (EN-8) to be completed at site including installation*
- ***All types of fabrication work of M S material and its all related machining process and completing the work with necessary installation***
- ***Fixing of Insulation material like; Thermotech cement, castable, Equisite-50, ceramic fiber blanket (Glass wool) etc. with material, to be fixed in the furnace at site as per requirement.***

- ***The work related to any type of motor / pump rewinding - servicing, bushing, bearing and necessary overhauling (1.0 HP up to 5.0 HP)***
- ***Removing of bad/damaged bricks of furnace and replacing with new bricks with all types of insulation materials and chemical etc.***
- ***Repairing Hydraulic system of Dead body Trolley and carrying out all works to make it operative***
- ***Repairing /remove/replacement parts like motor, pump, burner, electric component, cable piping, valve, heating bricks, heating elements, PLC control, relay, all type of meters, wire and cables, etc in furnace, scrubber system and electric control panel with PLC programming***
- ***Agency must be arrangement for emergency call for breakdown***
- ***Agency must be depute technical person at Rajkot city area***
- ***Agency do routine maintenance work for healthy system and change /remove damage and faulty parts***

- Removal of leakage of all types of piping network
- Agency must keep required spares parts in stock at Rajkot
- To be maintained standard air pressure in both furnace chamber, For it regularlycleaning of all air channel
- regularly cleaning of gas burner as per instruction of OEM
- Any maintenance instruct by site engineer giving to agency, Agency must befollow it
- Labour work for balancing, bushing, alignment and through work regarding coupling / shafting of pump / motor with sundry material as required (1.0 HP to 5.0 HP).
- Replacement of fused/damaged heating element by supply, installation and testing (SIT) of new Heating Element/Coil as per the specification of furnace including all necessary civil work and required insulation material, porcelain pipe covering, end termination with gland-lugs, castables, thermotech cementetc.
Heating element must be as per design and specifications of furnace chamber having necessary mix of 80:20 Nichrome (Canthal).
- Replacement/Removal of damaged or broken Wall Bricks and Supply, Installation and Testing (SIT) of new Wall Bricks of furnace chamber as per the specification of furnace including all necessary civil work with required insulationmaterial, castables, thermotech cement, glass wool etc.

- Replacement/Removal of damaged or broken Bed Bricks and Supply, Installation and Testing (SIT) of new Bed Bricks of furnace chamber as per the specification
of furnace including all necessary civil work with required insulation material, castables, thermotech cement, glass wool etc.
- Providing insulation work on all surface of cremation chamber as and when required including all necessary civil work with required insulation materials like castables, thermotech cement, glass wool, paint coat, aquisit-50 etc.
- Overhauling and rewinding of Electrical Motor and Water Pump with all necessary material, servicing, bushing, bearing etc with dismantling and re- installing at site with all loading, unloading and transportation. (1 HP to 5 HP).
- Repairing of Hydraulic system of Dead body Trolley and Furnace Gate including its alignment, repairing of lifting and pulling chain mechanism and to carry all other works to make it operative with necessary materials.
- Dismantling and cleaning of complete scrubber system as and when required using water and other cleaning agents and re-installation of the same.
- Painting Works for Furnace and chimney and all the other equipment installed at site will be done on interval of 18 month.

1 st :- At the Time of Installation	2 nd :- After 18 Month of Operation
3 rd :- After 36 Month of Operation	4 th :- After 48 Month of Operation

Painting works will be as per the specification mentioned in technical specification.

**GENERAL TECHNICAL SPECIFICATIONS FOR
FURNITURE WORKS WITH ASSOCIATED CIVIL
AND OTHER MISCELLANEOUS WORKS**

TECHNICAL SPECIFICATIONS FOR INTERIOR DECORATION WORKS WITH ASSOCIATED CIVIL AND OTHER MISCELLANEOUS WORKS

NOTE: Product with ISI stamps has to be provided where available in case on non-availability of such stamping for a particular product. Architects/Employer's decision as per list of material or otherwise shall be final and binding.

WOOD WORK Teak Wood

Teak wood shall be of the best quality available in India It should be well seasoned and free from sap, knots, wraps, cracks and other defects. All woodwork shall be planned neatly and truly finished to the exact dimension. All joints shall be neat and strong, truly and accurately fitted and glued before being fitted together.

Veneers and Plywood

The veneers and the ply wood shall conform to the IS: 851 and IS: 710 respectively. It shall be resin bonded suitable for intended use. The Contractor shall submit approved samples at the Architect/Owner site office.

Phenol Bonded Ply Wood

Commercial plywood, decorative plywood conforming to IS: 303/1975 bonded with phenol formaldehyde synthetic resin of B.W.P. type as specified in IS: 710 of approved make should be used.

Phenol Bonded Block Board

Commercial block board conforming of IS: 1659/1979 bonded with phenol formaldehyde synthetic resin of IS: 840/1974 of approved make should be used.

Phenol Bonded Teak Particle Board

Commercial particleboard conforming to IS: 3097-1980 exterior grade bonded with B.W.P. type phenol formaldehyde synthetic resin. All edges of the particle board to be painted with one coat of chlorinated paint of approved shade, made and quality. The particleboard should be of approved make.

Phenol Bonded Pre-laminated Particle Board

Pre-laminated particle board should be 3 layered melamine faced conforming to IS:12823 of latest edition. This should also conforms to DIN: 68765 NEMA LD-3 and BIS license IS:3087 for plain particle board. All edges of the board to be painted with one coat of chlorinated paint of approved shade, make and quality. The pre-laminated particle board should be approved make with ISI mark.

Decorative Laminates

Laminate sheets shall be 1 mm or 1.5 mm (as per design requirements) or as specified in the respective items) thick with + 0.127 mm tolerance and obtained from any of the following

approved manufacturers e.g. Formica, Decolam, Merino and Greenlam & samples should have approval of the Architects/Employer.

Wooden Flush Shutters

(Solid Core Type): Solid core flush shutters shall be commercial or teak veneered type as specified in the item of approved manufacturer registers with ISI and shutter shall bear ISI mark. An approved sample shall be deposited in the office of the Owner/Architects at site for reference. The shutter will be provided with lapping. Finished thickness of the shutter shall be as mentioned in the item. Shutter should be hot pressed and phenol formaldehyde should be used as glue.

Hardware Fittings.

All hardware fittings shall be of brass as specified in the schedule of quantities. These hardware fittings shall be obtained from approved manufactures and shall bear ISI mark wherever available. The samples for the fittings shall be submitted to the Owner/Architects for their approval. Hardware fittings for door shutters shall be paid in door shutter item as given in schedule of quantities. No separate payment shall be made for hardware fittings if not mentioned otherwise in the schedule of quantities. The rate for hardware fittings shall include for supplying, fitting and fixing the fittings with necessary cadmium plated screws, washers, bolts, nuts, etc. as required. All locks shall be provided with keys in duplicate and rate shall include for the same.

Approved samples of hardware fittings shall be deposited with Owner/Architects for reference.

Workmanship

The workmanship shall be first class and to the approval of the Owner/Architects. Scantlings and board shall be accurately sawn and shall be of required width and thickness. All carpenter's work shall be wrought except where otherwise described. The workmanship and joinery shall be accurately set out in strict conformity according to the drawings and shall be framed together and securely fixed in approved manner and with properly made joints. All work is to be properly tenoned shouldered, wedged, pinned, braced etc. and properly glued with approved quality glue to the satisfaction of Owner/Architect.

Screws: Unless otherwise specified all screws to be used in woodwork and joinery shall be of cadmium plated and of approved quality. The size (diameter and length) should conform to those specified in hardware schedule.

Tolerance: 1.5 mm will be allowed for each wrought face to sizes specified except where described as finished in which case they shall hold to the full dimensions.

Protection: All edges of timber frames etc. shall be protected from being damaged during construction by providing rough timber casing securely fixed and other adequate protective measures. If it is decided by the Owner to provide antitermite treatment, the building contractor shall co-ordinate his work suitably as directed by the Owner/Architects.

Door/Window frames shall have cut rebate. Planted rebates shall not be permitted.

Where door frames are fixed flush with plaster to wall, teak wood cover mould 40 x 12mm as per drawings shall be provided all round and shall be painted or polish finished to match with finished shutters. This will be paid as a separate item as described in Schedule of Quantities.

Rates to include:

Apart from other factors mentioned elsewhere in this contract the rate for item of work and joinery shall include for the following.

A) Item of scantling:

All labour, materials and equipment's for fixing frame work as per drawing excluding the cost of holdfasts, Rawl Plugs or other fasteners etc.

B) Items of shutters:

All labour, materials, hardware fittings and equipments for carrying out the work as per drawing.

Labour for fixing the shutters in position (excluding cost of fittings) as per drawing.

Mode of Measurement

All measurements shall be as per relevant section of IS: 1200 of latest edition.

i) Scantling shall be measured in cum. The sectional area shall be the area of the least square, or rectangles from which the scantling may be cut. The length shall be actual length of timber required for the purposes including the extra portion required for jointing.

ii) Shuttering shall be measured in square meter for closed-door shutters area i.e. rebate to rebate without extra measurement for rebates and/or splayed meeting styles of door.

PLASTIC EMULSION PAINT Material

The emulsion paint and primers in general shall be of approved quality colour and shade of approved manufactures.

Scaffolding

This shall be double or single as required and directed. If ladders are used, pieces of gunny bags or cloth bags shall be tied on this tops to avoid damage or scratches to the plastered surfaces etc. proper stage scaffolding shall be erected when painting the ceiling.

Preparation of the surface

The surface to be painted shall be cleaned and all cracks, holes and surface defects shall be repaired with plaster of Paris for spot filling, and with filler prepared with whiting, water and a little quantity paint for filling and levelling the wider areas.

Cement Putty

After cleaning 2 coat of approved cement putty should be apply on walls to be painted. Mild watering should be done before applying each coat of cement putty. Surface should be make finished by rubbing hemmari paper.

Priming Coat

The priming coat of cement primer of approved quality, make shall be applied over the completely dry surface in the manner as recommended by the paint manufacturers.

Application of Emulsion Paint.

The recommendation of approved paint manufacturer whose product is used, shall be followed regarding the preparation of the surface and the application of the priming and finishing coats.

The contractor shall arrange for technical assistance and supervision from the paint manufacturer, during the execution of the painting work. After the priming coat has been applied and perfectly dried all holes scratches, if any, shall be repaired as mentioned in 'preparation of surface' and then the second coat of approved shades and manufacture shall be evenly applied and allowed to dry.

The third coat shall be carefully applied to achieve smooth and even surface after the previous coat has dried up. Minimum 3 coats of paint shall be applied inclusive of primer coat. If a proper and even surface is not obtained to the satisfaction of the Owner/Architects in 3 coats, Contractor shall carry out additional coats of painting to approval at contractor's expenses. Care shall be taken that dust or other foreign materials do not settle or disfigure the various coats.

Rates to include

Apart from other factors mentioned elsewhere in this contract, the rates for the item of plastic emulsion paint shall include for the following: -

- All labour, materials and equipment necessary to carry out the work.
- Supplying the approved emulsion paint for priming and finishing coats.
- Preparing the surface for receiving the primer and finishing coats. Scaffolding including its erections and dismantling.
- Application of one primer coat and minimum two coats of finishing.
- If a proper and even surface is not obtained to the satisfaction of Owner/Architects in 3 coats mentioned above, the contractor shall carry out additional coats of painting to approval at contractor's expense.
- Protection to painted surface till dried and handed over.
- Expense if any, for supervision and technical assistance supplied by the approved paint manufacturers.

Mode of Measurement

The measurement shall be in square meter. The mode of measurement shall be as per relevant section of IS: 1200 of latest edition.

PAINTING & FRENCH POLISHING Painting

Material: Ready mixed oil paints and primer, in general, shall be of approved quality, color and of approved manufacturer. These materials shall be in sealed tin and shall be opened in the presence of the Owner/Architects. Preparation of Surface

I) Iron and Steel works: Surface to be painted shall be thoroughly cleaned, sand papered and / or rubbed with emery cloth. If necessary to remove grease, mortar or any other foreign materials. In case of rusted surface, it shall be first cleaned with wire brushes till the corroded rust is removed. The prepared surface shall be shiny and free from brush marks, patches, blisters and other irregularities. The surface thus finished shall be got approved for painting.

II) Wood work: All surfaces to be painted shall be thoroughly cleaned, sand papered and removed of all foreign materials. In case of surfaces having knot and nail holes, this shall be filled with knotting and stopping materials. The knotting materials shall consist of pure shellac dissolved in methylated spirit. Stopping materials shall consist of putty. The surface thus treated shall be allowed to dry and then sand papered smooth.

Application: After preparing the surface, a primer coat shall be applied. The primer coat shall be ready mix of approved make and manufacturer. After the primer coat is applied and perfectly dried, all holes cracks etc. which shall remain shall be filled in with putty and the surface sand papered smooth. Then a second coat of paint of approved shade and manufacturers shall be evenly applied and allowed to dry.

The third coat shall be carefully applied to achieve smooth and even surface after the previous coat has dried up. Minimum 3 coats of paint shall be applied inclusive of all primer coats. If a proper and even surface is not obtained to the satisfaction of the Owner/Architects in 3 coats, contractor shall carry out additional coats of painting to approval, at contractor's expenses. Care shall be taken that dust or other foreign materials do not settle or otherwise disfigure the various coats.

Rates to include: Apart from other factors mentioned elsewhere in this contract, the rate for the item of painting shall include for the following:

- All labour, materials equipment necessary to carry out the work.
- Supplying and approved paint for priming and finishing coats.
- Preparing the surface including knotting and stopping for receiving the priming and finishing coats.
- Scaffolding including its erection and dismantling.
- Application of at least one primer and two coats of finishing for wood work and at least two finishing coats for steel work unless otherwise specified.

- If a proper and even surface is not obtained to the satisfaction of Owner/Architects, contractor shall carry out additional coat of painting to approval at contractor's expense.
- Protection to painted surface till dried and handed over.

Mode of Measurement:

Painting to wood work and steel shall be measured separately as per I:S: 1200 (PartXV) of latest edition.

French Polishing

French polish to be used shall comply with I:S: 348 of latest edition in the requirements of quality.

Before French polish is applied , the surface of wood work shall be prepared in the same manner as for painting. The wood to be polished should be first painted with filler composed of 1 part of whiting mixed with 0.53 part of methylated spirit. After drying, it should be finely sand papered. On the woodwork thus treated, a thin coat of fresh polish shall be applied and allowed to dry. After drying, the surface shall be lightly rubbed with fine sandpaper prior to the second and third coat. The surface shall show an even polished surface and be approved by the Owner /Architects.

Rates of include: Similar to that of painting

Mode of measurement: Similar to that of painting.

MELAMINE COATING

The materials shall be of approved brand for wood finish. The application has to be made using sprayer and as per manufacturer's specification.

The surface to be used shall be sand papered using Emery Paper No.180 or any suitable grade along the grains. After brushing the surface free of loose dust, wood filler shall be applied. Excess filter shall be removed immediately. Allow a gap of 1 hour. If second coat is required. On drying of the filler, after 8 hrs. The surface is to be sand papered again with Emery paper no. 180/220 and the surface is brushed free of loose dust. Sealer coat as per manufactures specification is then applied in two coats and then sand papered with emery paper no.240 & finally with emery paper no.400 & clean thoroughly. Final finish coat is then applied on the finished surface after mixing the base and hardner in a container and allowing the mix to stand for 30 minutes and then applied

Rates to include: Similar to that of painting including cost for applying by spray machine.

N.C.LACQUER

N.C. Lacquer should be of approved brand & quality, approval of Architects is obligatory.

Before application of N.C.lacquer, the surface is to be polished using white lac only. The surface should be highly polished as per desired shade. Fillers used during polish should be N.C.putty only. N.C.;acqier sja;; be applied under spraying machines using 1:1 (N.C.lacquer to N.C.thinner) on dust free surface and shall be allowed to dry for minimum 12 hours in fair weather condition. The drying time may have to be increased in moist atmospheric condition. After drying, the lacquered surface should be rubbed with muslin cloth. No other treatment on the lacquered surface should be made once it is completed.

Rates to include: Similar to that of painting.

Mode of Measurement: Similar to that of painting.

GLASS

Glass used shall be clean and/or tinted float or toughened as mentioned in the Schedule of Quantities and of the best quality approved by Architect/Employer without any scratches, bubbles, specks, waviness, undulations or any other defects, unless otherwise specified, all glass shall be as shown on the drawings. The glass used shall be toughened glass with beveled edges etchings etc. as per requirement and indicated in the drawings and BOQ and is to be got approved by Architect/Employer. Glass shall be well protected from any damage during transportation, storage and progress of work. Any glass, which in the opinion of Architect/Employer is not suitable for work, shall be rejected and the contractor shall replace the glass with an approved one.

LOOSE FURNITURE

The contractor shall make one sample of each furniture item as per drawing and specification provided by the Architect for the final approval of the Architects/Employer. The bulk production can be taken in hand as soon as the sample is approved and finalized. No extra charges shall be payable for any alternation/modification done in the sample furniture item and also for rejected samples. All upholstery work is to be done in the best workmanship manner to the entire satisfaction of the Employer/Architects. The decision taken by the Architects for the approval of the sample shall be final and binding on the contractor. Brass or aluminum cushion vents to be installed at the back seat or underside of seat cushion as per direction of the Employer/Architects and contractors, quoted rates should include the same.

CHAIRS

All cantilevered chairs have slightly reinforced tubular structure to resist static and impact loads inflicted on the same in day to day use. The tubular frame work is to be made strong and resilient to ensure that the same does not lose its shape after prolonged use of it often happens in case of cheaper chairs of other make. The above is to be achieved by using 25mm steel tubing of 1.6mm thickness. Additional tubes of slightly lower diameter and the same thickness are used as inserts for providing reinforcement at all 4 bends of the chair. Wooden seats, brackets armrests, plastic canes and cushions, 100% inspection of wood components should be arranged to ensure that the quality of the wood used is as per the specifications.

CARPET

Supply and laying carpet of different quality as per BOQ and drawing i.e.woolen synthetic/acrylic, type designed or plain carpet fixing to floor as per location and type as directed in the drawing and specification of Bill of Quantities with manufacturer's specification complete with necessary work. Prior to fixing sample and manufacturer shall be approved by Architect/Employer. The fixing should be made as per manufacturer's specification. Rate should be inclusive of labour, materials inclusive of backing cushion materials if specified end stitching and all other associated works as per direction, complete in all respect. Payment should be made on as per actual floor area. No payment shall be made against any sorts of wastage.

STANDARD SPECIFICATIONS

Unless otherwise specified elsewhere in this contract, all work under this contract shall be carried out in accordance with the technical specification and the latest issue of the Indian Standard Specification applicable to the particular class of work, the relevant British Standard Specification shall apply. Relevant issue of I.S. specifications applicable to the particular work have been described along with the specification for the respective works. In case of any confusion or dispute regarding the meaning and interpretation of any specification for the respective works, the decision of the Owner/Architects shall be final and binding on the contractor.

PARTITIONS Frame Work

Modular Partitions will have a thickness of 40mm and the width and height will be as drawing & Specifications. The vertical members will be made from 40x20x1.2 mm M.S. pipes.

Low height partition will be free standing and self-supporting. In full height partitions the vertical members will be jacked under tension to the main ceiling/beam bottom (as the case may be) Both, low height and full height partition will be provided with leveling systems to adjust the partitions to unevenness and differences in floor and ceiling levels.

Skirting

Low Height Partitions will be provided with a box type skirting raceways for wire management, either along the base and/ or at table height as per drawings. The skirting will have a height of 130mm and thickness of 40mm and will be fabricated out of 20 SWG M.S.Sheet. There will be an openable cover on one side for easy access to carry out electrical installations and maintenance.

In full height partitions, the skirting cover will have a height of 130 mm and a thickness of 40mm . The skirting will be approachable from both sides and will have channels for adjustment for floors. Box type raceway can be provided at table height.

Doors

The vertical members as well as the top horizontal members will be made of 40 x40x1.2 mm M.S. pipes. The bottom horizontal member will be of 40 x 20 x 1.2 mm M.S. pipes with skirting

and telescopic "C" channel for adjustments up to 20mm to flooring and carpet levels. The doors will be fixed on pivots and will have door closers and locking arrangement.

Finishes

Partition and Doors are available within fill panels in the following finishes.

- P.F. bonded exterior grade Pre-laminated board of 8 mm thickness (on both sides)
- Fabric clad soft board of 12mm thickness (on both sides)
- Glass of 6 mm thickness in clear or tinted, as specified.
- Wood veneer of 3.5mm thickness, as specified.
- Various combinations of the above finishes on all the sides can be provided as specified by the Architects/Employer.
- All the in-fill panels in doors and partitions are fitted by using aluminum profiles and PVC extrusions are used as trimmings.
- Phenol formaldehyde bonded exterior grade pre-laminated boards shall be of any shade as per drawing and direction. All metal sections, fabricated M.S. components and aluminum profiles are finished in epoxy powder coating of a thickness 50 microns.
- The standard shades are Grey, Black and Brown or as specified by Architect/ Employer.

RAJKOT MUNICIPAL CORPORATION

BANDHKAM SHAKHA

ABSTRACT FORM

NAME OF WORK :- CONSTRUCTION OF CREMATORIUM CENTER AT KOTHARIYA, RAJKOT.

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
CIVIL WORK					
Excavation work					
1	Clearing and grubbing land including uprooting rank vegetation grass bushes, shrubs, sapling and trees girth up to 300 mm removal of stumps of trees cut earlier and disposal of unserviceable materials(D) By mechanical means in area of thorny jungle	0.21	Hectare	₹ 38,448.00	₹ 8,074.08
2	Excavation of foundation in soft morrum, soil of sand from 0.0 mtr. To 1.50 mtr. Depth including lifting and laying in designated place as instructed.	98.88	cu.mt.	₹ 96.60	₹ 9,551.81
3	Excavation of foundation in hard moram from 0.0 mtr. To 1.50 mtr. Depth including lifting and laying in designated place as instructed.	148.32	cu.mt.	₹ 103.50	₹ 15,351.12
4	Excavation of foundation in hard moram from 1.51 mtr. To 3.00 mtr. Depth including lifting and laying in designated place as instructed.	98.88	cu.mt.	₹ 117.30	₹ 11,598.62
5	Excavation of foundation in soft rock from 1.51 mtr. To 3.00 mtr. Depth including lifting and laying in designated place as instructed.	98.88	cu.mt.	₹ 255.30	₹ 25,244.06
6	Excavation of foundation in hard rock from 1.51 mtr. To 3.00 mtr. Depth including lifting and laying in designated place as instructed.	49.44	cu.mt.	₹ 531.30	₹ 26,267.47
7	Excavation of Foundation in Hard Murrum from 3.01 mtr. to 4.50 mtr depth including lifting and laying in designated place as instructed.	49.44	cu.mt.	₹ 138.00	₹ 6,822.72
8	Excavation of Foundation in Soft Rock from 3.01 mtr. to 4.50 mtr depth including lifting and laying in designated place as instructed.	49.44	cu.mt.	₹ 310.50	₹ 15,351.12
9	Excavation of foundation in hard rock from 3.01 mtr. To 4.50 mtr. Depth including lifting and laying in designated place as instructed.	49.44	cu.mt.	₹ 552.00	₹ 27,290.88
10	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.	296.64	cu.mt.	₹ 147.00	₹ 43,606.08
11	Filling of Plinth in layers of 0.23 m thick including murrum and sprinkling of water, compaction etc. complete	1239.65	cu.mt.	₹ 279.00	₹ 345,862.35
12	Rolling work with Roller 8-10 Ton capacity over metalling murrum for soling or single layer arriving proper compaction (with watering)	2060.00	Sqm	₹ 7.50	₹ 15,450.00
13	Removal of Excavated Stuff and laying within RMC limit as directed by Engineer-in-Charge	346.08	cu.mt.	₹ 171.00	₹ 59,179.68
14	Supply & Laying of Machine crushed agregate of size 25-38 mm	157.47	cu.mt.	₹ 971.00	₹ 152,903.37
Concreting work					
15	Foundation filling with CC work in proportion of 1:2:4 using 1.5 cm to 2.0 cm aggregate including Raming, Curing etc.	13.84	cu.mt.	₹ 3,913.20	₹ 54,158.69
16	Foundation filling with CC work in proportion of 1:3:6 using 1.5 cm to 2.0 cm aggregate including Raming, Curing etc.	8.18	cu.mt.	₹ 3,360.00	₹ 27,484.80

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
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 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.	171.24	cu mt	₹ 6,127.00	₹ 1,049,187.48
18	providing and laying Ready Mix cement concrete M-250 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.	55.62	cu mt	₹ 5,569.00	₹ 309,747.78
19	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.	190.80	cu mt	₹ 7,402.00	₹ 1,412,301.60
20	providing and laying Ready Mix cement concrete M-250 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.	26.66	cu mt	₹ 7,102.00	₹ 189,339.32
21	Providing and laying Ready Mix cement concrete M-250 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.	51.62	cu mt	₹ 6,096.00	₹ 314,675.52
22	Providing and laying Ready Mix cement concrete M-250 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.	49.04	cu mt	₹ 5,556.00	₹ 272,466.24
23	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 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.	2.14	cu mt	₹ 6,715.00	₹ 14,370.10
24	Providing and laying Ready Mix cement concrete M-250 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.	49.04	cu mt	₹ 6,156.00	₹ 301,890.24

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
25	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 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.	18.03	cu mt	₹ 6,434.00	₹ 116,005.02
26	Providing and laying Ready Mix cement concrete M-250 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.	121.26	cu mt	₹ 5,875.00	₹ 712,402.50
27	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 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.	121.26	cu mt	₹ 4,946.00	₹ 599,751.96
28	Providing and laying Ready Mix cement concrete M-250 and finishing smooth with curing etc. complete including cost of form work and excluding the cost of reinforcement for RCC STAIR CASE for all floors all heights all cross section area including scaffolding etc complete including providing & mixing plasticiser and Water Proofing Chemical in cement concrete including labour and material etc.	1.11	cu mt	₹ 5,886.00	₹ 6,533.46
29	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.	12.67	cu mt	₹ 5,538.00	₹ 70,166.46
30	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.	2.78	cu mt	₹ 5,723.00	₹ 15,909.94
31	Cement concrete work for COPPING in proportion of 1:2:4 including form work finishing curing without reinforcement etc complete	4.51	cu mt	₹ 4,144.00	₹ 18,689.44
32	Cement concrete flooring (IPS) 50 mm thick in propotion of 1:2:4 with a floating coat of neat cement finishing including providing & mixing Water Proofing Chemical in cement concrete and curing etc. complete.	17.22	sq mt	₹ 283.00	₹ 4,873.26
Reinforcement work					
33	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.	87449.16	Kg	₹ 59.00	₹ 5,159,500.44
Masonry work					
34	Foundation filling with Rubble Cement Mortar in proportion of 1:6 Cement : Mortar	24.10	cu mt	₹ 1,493.00	₹ 35,981.30
35	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)	321.74	cu mt	₹ 4,196.00	₹ 1,350,021.04

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
36	Brick Masonary Partition Wall in cement mortar 1:4(3.5 to 4.5 inch thick) for all floors all heights including curing scaffolding complete.	32.96	sq mt	₹ 411.00	₹ 13,546.56
	Plaster work				
37	Water Proof Plaster 20mm thick using water proofing compound and the ratio of 1:3 with necessary finishing as directed by EIC/ consultant.	82.40	sq mt	₹ 203.00	₹ 16,727.20
38	Cement lodhiya work with neat cement slurry finishing.	111.00	R mt	₹ 24.00	₹ 2,664.00
39	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.	1645.43	sq mt	₹ 168.00	₹ 276,432.24
40	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)	792.03	sq mt	₹ 217.00	₹ 171,870.51
41	Providing and laying Texture Plaster on exterior walls up to any height above ground level, in two layers, under layers, 12mm cement plaster 1:3(1 cement : 3 fine sand) in smooth finishing, top layer with 3mm styrene acrylic polimer based material as per approved pattern complete as per specification and direction by engineer in charge.	389.34	sq mt	₹ 445.00	₹ 173,256.30
42	Decorative Groove Work in Cement Plaster	223.00	R mt	₹ 33.00	₹ 7,359.00
43	Providing and Fixing 145 GSM Glass Fibre Net of approved made to R.C.C and masonary joints,electric and plumbing jari etc.before applying internal and external plastering work.	133.51	Sqm	₹ 51.00	₹ 6,809.01
	Flooring work				
44	Supply & fixing of Vitrified flooring work (1st quality)	88.07	Sqm	₹ 564.00	₹ 49,671.48
45	Supply & fixing of Vitrified for skirting work (1st quality) width upto 10 cm.	162.00	R.mt.	₹ 83.00	₹ 13,446.00
46	Supply & fixing of GVT Type Digital Vitrified Tiles Size of 0.8 X 1.6 m (1st Quality) for Floor/Skirting as per EIC.	489.25	Sqm	₹ 1,710.00	₹ 836,617.50
47	Grouting the joints of flooring tiles having joints of 3 mm width, using epoxy grout mix of 0.70 kg of organic coated filler of desired shade (0.10 kg of hardener and 0.20 kg of resin per kg), including filling / grouting and finishing complete as per direction of Engineer-in-charge	489.25	Sqm	₹ 146.60	₹ 71,724.05
48	Priving & Fixing Wooden Flooring With 18 mm Solid Wooden Planks in Size of 1.5mt x 0.15mt in Interlocking Pattern With pu Polishing (wall nut shade) Fixing to Floor with one Layer of Plastic Sheet one Layer of 'U' From Sheet Leving Space on Wall For Expansion Joint, Fixing Transporting Cleaning, Wastage, etc. Complete.	6.18	Sqm	₹ 2,800.10	₹ 17,304.62
49	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.	16.05	Sq mt	₹ 638.00	₹ 10,239.90
50	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	58.39	Sq mt	₹ 426.00	₹ 24,874.14
51	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.	112.48	sq mt	₹ 2,743.00	₹ 308,532.64

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
52	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	52.32	sq mt	₹ 2,502.00	₹ 130,904.64
53	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	24.72	sq mt	₹ 932.00	₹ 23,039.04
54	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	4.12	sq mt	₹ 878.00	₹ 3,617.36
55	Supply & Fixing of Polished on both sides of Granite Stone in thickness of 20-25 mm to fix as Urinal Curtain and as per instruction machine cut should be done on this Granite in all three sides	0.93	sq mt	₹ 1,893.00	₹ 1,760.49
Painting work					
56	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.	1631.33	sq mt	₹ 47.40	₹ 77,325.04
57	Wall painting (two coats) with plastic emulsion paint of approved brand and manufacture on wall/ Ceiling surface to give an even shade including throughly brushing the surface free from mortar droppings and other foreign matter and sand papered smooth. (with two nos of Prime Coat)	1631.33	sq mt	₹ 126.00	₹ 205,547.58
58	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)	1042.32	sq mt	₹ 99.00	₹ 103,189.68
59	Enemal painting on door/window, iron door, iron grill or woodwork two coat with base Coat as directed by EIC/ consultant.	64.89	sq mt	₹ 113.00	₹ 7,332.57
Door-Window work					
60	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.	46.35	sq mt	₹ 4,088.00	₹ 189,478.80
61	Providing and fixing standard extruded section of size 63 mm x 38.10 mm x 1.20 mm(jindal section no- 2434 w wt. .643 kg/Rmt.) wth Colour Anodies Alluminium frame for VENTILATION 5 mm thick frosted glass as detail etc. complete for ventilations	0.42	sq mt	₹ 1,386.00	₹ 582.12
62	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)	17.80	sq mt	₹ 2,824.00	₹ 50,267.20

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
63	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 filled up with injected polyurethane foam done in situ alongwith embedded wooden pieces for stiffening & also taking hinges & finitures. 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.	2.47	sq mt	₹ 4,189.00	₹ 10,346.83
Fabrication work					
64	Grill work for doors - windows etc. as per design on site with fitting & fixing.	1390.50	kg	₹ 81.00	₹ 112,630.50
65	Iron work as per drawing and instruction including all	515.00	kg	₹ 86.00	₹ 44,290.00
66	CRS Pipe Work as per drawing and instruction including all as directed by EIC/ consultant.	927.00	kg	₹ 85.00	₹ 78,795.00
67	Supply & Fixing of Stair Hand Railing S.S. Pipe 50mm Dia. Only Single Pipe With fitting comp. as directed by EIC/ consultant.	4.00	R mt	₹ 1,185.00	₹ 4,740.00
68	Providing corrugated G.I. sheet of class-3 roofing fixed with galvanized iron J or L Hooks, Bolts and nuts 8mm diameter with bitumen and G.I. limpet washer or G.I. limpet washer. filled with white lead complete excluding the cost of purlins, Rafters and Trusses.(1) 0.80 mm thick sheet. (upto 10 ton)	129.00	Sq Mt	₹ 767.00	₹ 98,943.00
69	Steel work, riveted in builtup sections framed work including cutting, hoisting, fixing in position and applying a priming coat of read lead paint. (A) In beams and joists, channels angles Tees, flats, with connecting plates or angle cleats as in mainand cross beams. Hip and jack rafters, purlins conneted to common rafters and the like.	4373.60	Kg	₹ 59.68	₹ 261,016.45
Water-Proofing work					
70	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	762.20	sq mt	₹ 710.20	₹ 541,314.44

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
	(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.				
	Landscaping work				
71	Supply and Planting Trees Like Kadamb, Peltophorum, Neem tree, Mango tree, Milingtonia, Saptparani etc. as detail in the drawing as directed by EIC/ consultant.	20.00	Nos.	₹ 500.00	₹ 10,000.00
72	Supply and Planting Palms Like Oyal bottle palm, Traveler palm, Fishtail palm as detail in the drawing as directed by EIC/ consultant.	20.00	Nos.	₹ 200.00	₹ 4,000.00
	False Ceiling work				
73	Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm centre to centre, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm centre to centre, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25mm long dry wall screws @ 230 mm interval, including fixing of	399.64	Sqm	₹ 950.00	₹ 379,658.00
	Fully Perforated Gypsum Plaster Board of size 1200 x 2400x12.5 mm having approx. 15 % perforated area with perforation size and pattern as approved by the Engineerin-charge and as per manufacturer's specification, with all 4 side tapered and backed by acoustical tissue with NRC value not less than 0.60				
74	Providing and fixing single layer waterproof gypsum board 12.5 mm thick of the make Newgood Group Co. Ltd. or equivalent & Newgood Group Co. Ltd. company sections using waterproof board of size 1220 mm x 1830 mm x 12.5 mm suspended by G.I suapender of size 25 mm x 3 mm with intermediate channel of size 18 mm x 40 mm x 0.80 mm at 1220 mm center to center ceiling section of size 40 mm x 35 mm x 0.55 mm at 457 mm center to center and perimetre chanel A of size 20 mm x 27 mm x 30 mm x 0.50 mm at edges & drops including paper tap sand sofit cleat, anchor fastener, scoch bolt connecting cleat joining compound top coat on ceiling including making necessary opening for light fitting, diffuser etc. complete as per detail drawing as directed.	49.96	Sqm	₹ 704.00	₹ 35,171.84

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
75	Providing & Fixing PVC Plain colour false ceiling with grid type with alluminium frame consisting of 600 mm x 600 mm 3 mm thick plain PVC sheet used as panel insert in a frame sizes 1 " x 1" (25 x 25 mm, 19 guade or 1 mm thick) in alluminium frame work is supported from the ceiling with the help of G.I. hook and G.I. wire/6 mm M.S. rods of required sizes to maintain proper level etc. the aluminium frame work is supported to on side wall with the use of alluminium "L" Section of size 1" x 1" (25 x 25 mm) angle etc.compleated as per direction of engineer in charge manufacture, specification & drawing.	25.75	Sqm	₹ 814.00	₹ 20,960.50
Glass work					
76	Supplying and fixing 12mm toughned glass including cost of necessary fitting, alluminium frame C type size 32x32mm with anodized coating and labour etc. complete.	17.39	Sqm	₹ 3,401.00	₹ 59,143.39
77	Supplying and fixing 12mm toughned glass Door (including cost of necessary fitting, as per instruction of PMC/ Engineer in charge etc complete.	10.43	Sqm	₹ 7,940.00	₹ 82,814.20
78	Applying Acid Frosting design work on toughned Glass with all complete. (including cost of necessary design as per instruction of PMC/ Engineer in charge etc)	27.81	Sqm	₹ 1,850.72	₹ 51,468.52
Ancillary work					
79	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	787.31	sq mt	₹ 580.00	₹ 456,639.80
80	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.	26.00	Rmt	₹ 311.00	₹ 8,086.00
81	Providing and placing and position suitable PVC water stops conforming to IS:12200 for construction/expansion joints between two RCC members and fixed to the reinforcement with binding wire before pouring concrete etc complete a) Serrated central bulb(225mm wide, 8-11mm thick)	124.00	R mt	₹ 254.15	₹ 31,514.60
82	Labour work for making of holes/Core Cutting in CC of size 15x15 cm and up to depth of 15cm	10.00	Nos	₹ 93.00	₹ 930.00
83	Supply & Fixing of Steel characters	309.00	Sq.inch	₹ 69.00	₹ 21,321.00
84	Numbering on Building / Quarters (Painting work) including all material and labour charge	309.00	Character	₹ 10.00	₹ 3,090.00
Decorative work					
85	Providing and Fixing Nautral Stone tiles on Exterior/interior walls with required adhesives up to any height above ground level with approx 28 to 40mm thick and 4.00 to 5.00 kg /sq ft weight of Natural stone tiles of approved brand and approved pattern and colour and as per directed by engineer-in-charge.	27.81	sq mt	₹ 3,864.00	₹ 107,457.84
86	Providing and Fixing Approved Laser cut design made out of 3mm thick M.S plate with Approved colour of powder coating with scaffolding and Labour with all necessary fitting etc. includes.	24.72	sq mt	₹ 4,948.00	₹ 122,314.56
87	Making a Wall art including consecept labour and framing with installation With necessary Paint and tools and all as per instruction by EIC	15.45	Sqmt	₹ 5,000.00	₹ 77,250.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
88	Supplying and fixing Name Plate of 3mm thick acrylic sheet including required accessories, labour, scaffolding etc with including all and as per drawing and as per directed by engineer in charge.	15.45	Sqmt	₹ 7,226.00	₹ 111,641.70
89	Providing & fixing Arabian type window curtains cotton + polisher clothes(300-350) GSM with back side (250-300 GSM) astar and top 1.25" inch aluminum curtain track including of approved colour & design etc. with all necessary fittings etc. complete as per Architect/ Site engineer's instructions.	16.22	Sqmt	₹ 3,358.00	₹ 54,466.76
90	Supplying and Placing PVC Door Mate of approved Colour and Pattern etc as per Direction by Engineer In Charge	4.33	Sqmt	₹ 961.50	₹ 4,163.30
91	Providing Digital Takti as per Instructed in charge	1.00	Per Job	₹ 50,000.00	₹ 50,000.00
02. PLUMBING WORK					
92	Providing and fixing wash down water closet(european type WCpan) with sit cover including jet spray and stop cock	2.00	Nos.	₹ 2,230.00	₹ 4,460.00
93	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.	5.00	Nos.	₹ 1,212.00	₹ 6,060.00
94	White porcelain wash basin 560/410mm indian make c.i. bracket with fitting chromium plated topes 25cm plastic waste pipe and 12mm pillar cock with comp.	3.00	Nos.	₹ 1,397.00	₹ 4,191.00
95	Providing & Fixing Brass cock screw down bolt type 15mm dia. fitting with fixing.	3.00	Nos.	₹ 250.00	₹ 750.00
96	Providing and fixing pillar tap, capstan head, screw down high pressure with screws, shanks and back nuts. (i) 15mm dia.	3.00	Nos	₹ 356.00	₹ 1,068.00
97	flushing valve brass chromium plated push cock of handle type with flushing supply and fixing	7.00	Nos.	₹ 690.00	₹ 4,830.00
98	Brass wheel valve 50mm dia. fitting with fixing.	2.00	Nos.	₹ 1,570.00	₹ 3,140.00
99	Brass wheel valve 40mm dia. fitting with fixing.	2.00	Nos.	₹ 940.00	₹ 1,880.00
100	Brass wheel valve 25mm dia. fitting with fixing.	2.00	Nos.	₹ 640.00	₹ 1,280.00
101	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 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.	52.00	R mt	₹ 229.00	₹ 11,908.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
102	Providing laying and jointing in true line and level 40mm 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.	31.00	R mt	₹ 173.00	₹ 5,363.00
103	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.	26.00	R mt	₹ 139.00	₹ 3,614.00
104	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.	15.00	R mt	₹ 107.00	₹ 1,605.00
105	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.	15.00	R mt	₹ 84.90	₹ 1,273.50
106	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) 110mm dia.	124.00	R mt	₹ 221.10	₹ 27,416.40
107	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.	52.00	R mt	₹ 107.75	₹ 5,603.00
108	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.	15.00	R mt	₹ 50.75	₹ 761.25

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
109	suply and fixing 110 mm PVC cowel	12.00	Nos.	₹ 75.00	₹ 900.00
110	suply and fixing 75 mm PVC cowel	2.00	Nos.	₹ 58.00	₹ 116.00
111	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	4.00	Nos.	₹ 1,194.00	₹ 4,776.00
112	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.	8.00	Nos.	₹ 351.00	₹ 2,808.00
113	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	52.00	R mt	₹ 232.00	₹ 12,064.00
114	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	31.00	R mt	₹ 162.00	₹ 5,022.00
115	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	52.00	Rmt	₹ 150.00	₹ 7,800.00
116	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	31.00	R mt	₹ 89.10	₹ 2,762.10
117	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)455x610mm 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.	6.00	Nos.	₹ 3,245.00	₹ 19,470.00
118	Constructing Manhole with R.C.C. top slab in 1:2:4 mix (1-cement :2-coarse sand : 4-graded stone aggregate 20mm nominal size) foundation concrete 1:3:6 mix (1-cement : 3- coarse sand :6-Brick bats 40 + 50mm size) inside plastering 15mm thick with Cement Mortar 1:5 (1-Cement : 5-coarse sand) finished with a floating coat of neat cement and making channels in cement concrete 1:2:4 mix (1-Cement :2-Coarse sand :4-stone aggregate 20mm nominal size) finished smooth complete including curing and festing (i) Inside size 900mm x 1200mm and 1.5M. deep including C.I. cover with frame size 560mm diameter total weight of cover and frame to be not less than 128 kgs. (Wt. of cover 64 Kg. and Wt. of frame 64 Kg.)(A) With 230mm thick walls of brick msonry using brick having crushing strength not less than 35Kg. / Sq.cm. in Cement Mortar 1:5 (1- Cement: 5-Coarse sand) (2)B type depth 1.50 Metre for 150mm diameter sewer.	2.00	Nos.	₹ 16,186.00	₹ 32,372.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
119	Providing erecting and fixing double coated syntex equivalent PVC (ISI) mark water tank of required capacity each with all necessary fittings and connection etc comp. on terrace	5000.00	Ltrs	₹ 4.60	₹ 23,000.00
120	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	4.00	Nos.	₹ 582.00	₹ 2,328.00
121	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.	4.00	Nos.	₹ 137.85	₹ 551.40
122	RCC precast frame with supply, fitting, fixing with complete as per specification 10ton size 550/550/90mm.	8.00	Nos.	₹ 466.00	₹ 3,728.00
123	RCC precast cover with supply, fitting, fixing with complete as per specification 10ton size 550/550/90mm.	8.00	Nos.	₹ 891.00	₹ 7,128.00
124	Supplying & erecting approved make motor control cubical panel (Direct - on - line) made from 16 G. CRCA sheet duly epoxy powder painted inside and outside with hinged doors and locking, arrangement consisting of suitable size of ON- OFF isolator (AC - 3/23duty) main fuses, single phasing preventer, indicating lamps for R- Y - B phases, overload relay, Automatic water level controller, Ammeter, Voltmeter each with two way selector switch incoming, wires duly socket crimped, main contactor & overload relay, start - stop push buttons, to be erected on angle iron frame grouted on wall as directed. The isolator, overload relay & contactors will be of L & T, Siemens or BCH make only. (a) DOL up to 5.0 H.P.	1.00	Ea.	₹ 8,200.00	₹ 8,200.00
125	Providing & erecting open well horizontal mono block pump set with cast iron body, complete for three phase submersible motor having[D] For 5 HP 3 phase open well horizontal mono block pump set suitable for 1350 LPM to 310 LPM @ 10 to 42 Mtr head suitable for 50/65 mm dia delivery pipe Cat.II	1.00	Ea.	₹ 16,650.00	₹ 16,650.00
126	Providing and erecting ISI marked PVC insulated PVC Sheathed Flat flexible Submersible copper cable approved make of following Size.	0.00			
A	(e) 3 Core x 10 Sq. mm.	52.00	R mt	₹ 260.00	₹ 13,520.00
127	Providing Water proof straight Joint in PVC insulated flat flexible copper cable by using insulating material, water proofing material, & making the joint complete. (A) Up to 10Sq. mm	2.00	Ea.	₹ 220.00	₹ 440.00
ELECTRIC WORKS					
128	Point wiring for Light / Bell with 2-1.5 sq.mm & earthwire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of pipe to be erected concealed in/ on surface on wall/ceiling complete with 6A Modular type switch / bell push & accessories and earth continuity of following type, erected on PVC / Metallic box, single mounting base frame covered with textured/metallic front plate modules erected on / in wall / ceiling as per pipe erected, with necessary Lamp holder /ceiling rose / H.D.Connector as directed.(a) with medium class Rigid PVC pipe and accessories Cat. III	25.00	Pt	₹ 420.00	₹ 10,500.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
129	Point wiring for secondary light point with 2-1.5 sq.mm & earthwire of 1.5 sq.mm (green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of pipe to be erected concealed in / flushed on wall/ceiling, complete with earth continuity and necessary connection with primary light with accessories erected on Metal / PVC box covered with 3 mm thick PC(Polycarbonet) / Acrylic sheet for open / concealed wiring. with necessary Lamp holder / ceiling rose / H.D.Connector as directed.(a) with medium class Rigid PVC pipe and accessories	50.00	Pt	₹ 120.00	₹ 6,000.00
130	Point wiring for FAN with 2-1.5 sq.mm & earthwire of 1.5 sq.mm (Green) both are of .ISI marked 1.1 KV Grade FRLS PVC insulated multistrand copper wires, in following type of pipe to be erected concealed in / flushed on wall/ceiling complete with 6A Modular type switch and hum free EME four or more step type electronic fan regulator with separately mounted and accessories with earth continuity of following type erected on PVC / Metallic box, single mounting base frame covered with textured/metallic front plate modules erected on / in wall / ceiling as per pipe erected. with necessary ceiling rose / H.D.Connector as directed. (a) with medium class Rigid PVC pipe and accessories Cat. III	35.00	Pt	₹ 600.00	₹ 21,000.00
131	Point wiring for Individual Plug with & earthwire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of to be erected concealed in / on surface of wall / ceiling complete with Modular type switch & 5 pin Plug erected on PVC / Metallic box covered with appropriate front plate modules erected on / in wall / ceiling as per pipe erected with following type of accessories. [I] For 6A Plug with 2-1.5 sq.mm Cu. Wire (a) with medium class Rigid PVC pipe and accessories Cat. III	3.00	Pt	₹ 445.00	₹ 1,335.00
132	[II] For 16A Plug with 2-2.5 sq.mm Cu. Wire (a) with medium class Rigid PVC pipe and accessories Cat. III	3.00	Nos.	₹ 670.00	₹ 2,010.00
133	Point wiring for Looped Plug with 6A Modular type switch & 5 pin socket erected on PVC / Metallic box, single mounting base frame covered with textured / metallic front plate modules erected on / in wall / ceiling with following type accessories Cat. III	15.00	Nos.	₹ 240.00	₹ 3,600.00
134	Providing and erecting ISI mark Medium class RIGID PVC PIPES of following size complete to be erected on/in wall or ceiling erected with necessary PVC fittings & Junction boxes fixed with adhesive solution & Clamps with following dia of pipes, in approved manner as directed (b) 25 mm	103.00	Mtr.	₹ 32.00	₹ 3,296.00
135	Providing & erecting PVC Corrugated Flexible Conduit with required nos. of coupling, PVC bushes, Check-nuts etc. complete of following sizes.(2) 25 mm	10.00	Mtr.	₹ 20.00	₹ 200.00
136	Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected concealed in /flushed on wall/ceiling, with 1.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size (a) with medium class Rigid PVC pipe and accessories (a) 2 wire 1.5 sq. mm	515.00	Mtr.	₹ 60.00	₹ 30,900.00
137	(b) 2 wire 2.5 sq. mm	515.00	Mtr.	₹ 80.00	₹ 41,200.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
138	Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected in / on wall / ceiling with 2.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size (a) with medium class Rigid PVC pipe and accessories(a) 2 wire 4 sq. mm	31.00	Mtr.	₹ 110.00	₹ 3,410.00
139	(h) 4 wire 6 sq. mm	31.00	Mtr.	₹ 260.00	₹ 8,060.00
140	(i) 4 wire 10 sq. mm	10.00	Mtr.	₹ 425.00	₹ 4,250.00
	Supplying & erecting XLPE(IS:7098)(I)-88 ISI unarmoured copper cable 1.1 KV grade to be erected as directed of following size.				
141	(F) 3 core 4 Sq. mm	26.00	Mtr.	₹ 198.00	₹ 5,148.00
142	(E) 3 core 2.5 Sq. mm	26.00	Mtr.	₹ 144.00	₹ 3,744.00
	Providing and erecting XLPE(IS:7098)(I)-88 ISI armoured cable multistrand Copper conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe at road crossing or floor of following size of cables.				
143	(A) 3 1/2 core 25 Sq. mm (10 Sq. mm 1/2 core)	103.00	Mtr.	₹ 1,430.00	₹ 147,290.00
144	(D) 3 1/2 core 70 Sq. mm (35 Sq. mm 1/2 core)	103.00	Mtr.	₹ 3,795.00	₹ 390,885.00
145	Providing and, fixing heavy duty flange type brass cable gland with rubber ring for PVC insulated armoured cable complete with out going tails, insulating tape etc for following size of cables.				
(a)	2 to 4 core 2.5 Sq. mm	21.00	Nos	₹ 35.00	₹ 735.00
(b)	2 to 4 core 4 Sq. mm	6.00	Nos	₹ 35.00	₹ 210.00
(d)	2 to 4 core 10 Sq. mm	6.00	Nos	₹ 40.00	₹ 240.00
146	Providing and, fixing heavy duty flange type brass cable gland with rubber ring for PVC insulated armoured cable complete with out going tails, insulating tape etc for following size of cables.				
(A)	(A) 3 & 1/2 / 4 core 25 Sq. mm	4.00	Nos	₹ 70.00	₹ 280.00
(C)	(C) 3 & 1/2 core 70 Sq. mm	6.00	Nos	₹ 110.00	₹ 660.00
147	Solderless 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)	1.5/2.5 to 6 Sq.mm	31.00	Nos	₹ 8.00	₹ 248.00
(B)	10 Sq.mm	8.00	Nos	₹ 10.00	₹ 80.00
(D)	25 Sq.mm.	16.00	Nos	₹ 15.00	₹ 240.00
(F)	70 Sq.mm.	16.00	Nos	₹ 28.00	₹ 448.00
148	Supplying & erecting in earthpit of minimum bore dia. 225mm size approved make Safe 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 80 mm having 80-200 Micron galvanising, Inner pipe dia of 40 mm having 200-250 Micron galvanising, connection terminal dia of 14 mm 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 including value of earth resistane of installation. [B] For Electrical installation up to 11 KV located in other than normal soil i.e. Soft Rock, Marshy Soil etc. -Length of Pipe : 2 mtr -Back filling Compound :1 no. Bag of 25 Kg.	6.00	Nos	₹ 8,288.00	₹ 49,728.00
149	Providing and erecting Annealed bare Copper wire 8 to 16 SWG.	10.00	Kg.	₹ 710.00	₹ 7,100.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
150	Providing and erecting XLPE (IS:7098)(I)-88 ISI armoured cable multistrand / Solid Aluminium conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe of following size of cables (a) 4 core 4 Sq. mm	185.00	Nos.	₹ 117.00	₹ 21,645.00
151	Supplying and erecting LED indoor fittings with LEDs of wattage 0.2 Watt to 0.5 Watt assembled on single MCPCB, with housing used as a heat sink shall be made of thick sheet Steel conforming to IS: 513/CRCA/ aluminium die cast powder coated and high U.V. & corrosion resistance with diffuser with company mark/name 120 to 300 V, Power Factor more than 0.9, THD < 10 %, CCT 3000 K to 6500K, Luminaire efficacy > 85 lumens/watt, LED efficiency-110 lumens/watt LED driver efficiency > 85 % CREE / OSRAM / PHILIPS Lumileds / NICHIA / SEOUL/Bridgelux make LED used for luminaire. (fitting 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.) (d) 22-24 Watts, Surge - 2KV, IP-20, 4 feet Cat-III	62.00	Nos.	₹ 594.00	₹ 36,828.00
152	(B) LED Lamps Integral type, Cool White with PC diffuser Suitable for B22 LAMP holder (b) 5 to 8 Watts	15.00	Nos.	₹ 180.00	₹ 2,700.00
153	(C) Square/ Circular shaped Surface/Recessed Mount Downlight with provision for spring loaded mounting clips complete. IP20 (C) 22-24 watts, Surge-2 KV - CAT III	4.00	Nos.	₹ 1,216.00	₹ 4,864.00
154	(G) Spot Light 425 Lumens, Surge-2KV (a) 3 to 7 Watts Cat-III	5.00	Nos.	₹ 1,300.00	₹ 6,500.00
155	Supplying and erecting LED street light fittings with high power LEDs wattage of 1watt and above assembled on single MCPCB, efficiency more than 110lm/w and corrosion free high pressure die cast aluminum housing with smooth finish powder coated and heat sink extruded aluminium with diffuser and polycarbonate optics/lenses with company mark/name engraved or embossed 120 to 300V, power factor more than 0.95, THD<10%, CCT 5000K to 5700K, Uniformity ratio>0.45, Luminaire efficiency>85 lm/W. LED driver efficiency>85%. CREE/OSRAM/PHILIPS Lumileds/NICHIA/SEOUL/BridgeLux (U.S.A.) make LED used for Luminaire. (Each fittings required LM-79 & LM-80 certificates). (A) Street Light (IP-65), Surge-4KV. (d) Above 36-48 Watts. CAT III	8.00	Nos.	₹ 5,370.00	₹ 42,960.00
156	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) 7 Mtr. Long 70 mm Top X 135 mm bottom dia, 3 mm thickness with 225mmX225mmX16mm base plate, 4-M20 Bolts and 600mm long J-Bolt.	12.00	Nos.	₹ 13,332.00	₹ 159,984.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
157	Providing and erecting street light pole bracket comprising main B Class MS pipe of 4.2 cm/require outside dia. complete with suitable B Class M.S. 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	12.00	Nos.	₹ 655.00	₹ 7,860.00
158	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	185.00	Nos.	₹ 93.00	₹ 17,205.00
159	Supplying and erecting LED street light / Flood light fittings with High power White LEDs wattage of 1Watt and above assembled on single MCPCB, efficiency more than 110 lm/w and corrosion free High pressure die cast aluminum housing with smooth finish powder coated and heat sink extruded aluminium with diffuser and Polycarbonate optics/ lenses with company mark/name engraved or embossed 120 to 300 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 %.CREE / OSRAM / PHILIPS Lumileds / NICHIA / SEOUL/ BridgeLux (U.S.A.) make LED used for luminaire. (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.) (B) Flood Light (IP-65), Surge -4KV,Light must have 440VAC line supply protection. It should withstand 48 hours for 440VAC line supply (c) Above 60 watts to 90 watts CAT III	4.00	Nos.	₹ 9,800.00	₹ 39,200.00
160	Providing M-20 / 1:2:4 cement concrete foundation & 70 % PCC from bottom including excavation for the pole of size 45 x 45 x 100 cms. Deep in below ground level with plinth of 45 cms x 45 cms (or 45 cms dia x 45 cms) high upper ground level with necessary curing and finishing in approved manner.(for 5 mtr pole) including (Foundation bolt IS-1367 4 X 16 Dia. with Washer and Nut- 4 nos)	12.00	Nos.	₹ 1,255.00	₹ 15,060.00
161	RCC Spun Pipe as per IS Standard NP3 Class with standard length. Dia as per under. Price included with all the taxes, transportation, loading and unloading charges. Inspection at site with jointing and curing and complete installation at Site. 450MM Dia - NP 3 Class Spun Pipe(Hume Pipe)	103.00	R mt	₹ 1,546.00	₹ 159,238.00
162	Supply & laying of 63mm HDPE Pipe 6 kg/cm ² IS- 4984 mark including all with necessary Fittings etc. complete.	103.00	R mt	₹ 103.40	₹ 10,650.20
163	Providing and fixing approved make Perforated C type cable tray. Made from CR sheet steel. The cable tray should be single or double bended as per required and as per IS 2062/1079 and shall be coated with hot dip galvanizing as per IS 2629/4759. with coupler plate / Fish plate and GI hardware like nut - bolt and washers etc. erected on existing support as per Specification and as per instruction of engineer in charge.. (5) 300 X 50 X 1.5 mm Thick	46.00	R mt	₹ 655.00	₹ 30,130.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
164	Providing & erecting Approved make Power Saving Ceiling Fan of decorative type with double ball bearing ISI mark with Condenser 230 volt A.C. 50 Hz 1200 mm sweep complete having 3 blades with aluminium blades with , canopy & 30 cms. down rod erected with 24/ 0.2, 3 core flexible wire with earthing.(Make & Sample shall be approved by Engineer in charge)	36.00	Nos.	₹ 2,050.00	₹ 73,800.00
165	Supplying and erecting 19 / 20 mm. nominal bore Medium Class M.S. Pipe down rod erected duly painted for fan complete with necessary 24/ O.20, 3 core flexible wire with earthing.	36.00	Mtr.	₹ 125.00	₹ 4,500.00
166	Supplying & erecting fan hook box of 10 mm M.S. round bar bounded to the RCC bars up to 50mm length each side and pierced through a 16 Gauge M.S. box / Heavy Duty PVC box complete erected concealed in Ceiling with necessary finishing.	52.00	Nos.	₹ 125.00	₹ 6,500.00
167	Providing 2.5mm.thick laminated acrylic sheet to cover the fan hook or Fan box.	52.00	Nos.	₹ 20.00	₹ 1,040.00
168	Supplying & erecting approved make low noise decorative exhaust fan having size 200mm with 1350 RPM with square frame ABS body with inbuilt lowers & square frame.	4.00	Nos.	₹ 1,990.00	₹ 7,960.00
169	Providing recess in wall or window frame suitable for erection of Exhaust fan complete with plastering and colour washing to match the colour of the wall or window complete with expanded metal in order to render the fitting in accessible and the room water-proof.	4.00	Nos.	₹ 220.00	₹ 880.00
170	Providing and erecting Sheet Steel powder coated MCB distribution board - flush / surface mounted fitted with busbar, neutral link, earth bar and DIN rail, confirming to IS 13032 and BS 5486-1986 without MCB to house appropriate nos. of MCBs.(The DBs should be used of same company of MCB to be used) (N) Three phase 8 way SS Double door for horizontal single phase outgoing	2.00	Nos.	₹ 3,212.00	₹ 6,424.00
171	(H) Single phase 8 way SS Double door	2.00	Nos.	₹ 1,089.00	₹ 2,178.00
172	Miniature circuit breaker single pole 6A to 32A suitable to operate on 240 V A.C. system and having breaking capacity 10 KA to be erected in existing box. confirming to IS 8828/1996 with ISI Mark Cat.III	32.00	Nos.	₹ 115.00	₹ 3,680.00
173	Providing & erecting 240 V MCB double pole switch for lighting Load (B Curve) having 10 KA breaking capacity & confirms to IS : 8828 in existing box having following capacity (A) 6 to 32 Amp.	4.00	Nos.	₹ 285.00	₹ 1,140.00
174	Providing & erecting 415 V MCB Four Pole for Motor & Inductive Load (C Curve) having 10KA breaking capacity & confirms to IS :8828 in existing box having following capacity				
	(a) 6 to 32 Amp. Cat.III	4.00	Nos.	₹ 610.00	₹ 2,440.00
175	(b)40 Amp. Cat.III	2.00	Nos.	₹ 680.00	₹ 1,360.00
176	(c)63 Amp. Cat.III	2.00	Nos.	₹ 750.00	₹ 1,500.00
177	Providing and erecting Three pole MCB isolator A.C. 22 duty confirms to IS 13947-3 in existing box.				
	(a) for 40 Amp. Cat.III	3.00	Nos.	₹ 480.00	₹ 1,440.00
178	(b) for 63 Amp. Cat.III	3.00	Nos.	₹ 550.00	₹ 1,650.00
179	Approved make ELCBs / RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 6 KA and suitable for operation on 3 phase and neutral 415V. having characteristic of quick action & tripping with all advance feature & do not incorporate any electronic component for following Max. rating erected as directed.(iii) 63 Amps. FP	4.00	Nos.	₹ 3,550.00	₹ 14,200.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
180	Approved make ELCBs / RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 6 KA and suitable for operation on single phase 240 V. having characteristic of quick action & tripping with all advance feature & do not incorporate any electronic component. for following Max. rating erected as directed (i) 25 Amps.DP Cat. III	4.00	Nos.	₹ 2,300.00	₹ 9,200.00
181	Supplying and erecting approved make set of indicator lamps of LED type lamp, lens cover, Bakelite holder complete erected with necessary connections.	6.00	Nos.	₹ 125.00	₹ 750.00
182	Supplying & erecting approved make Four Pole 415V change over switch interior for panel mounting with operating mechanism A.C.23 duty confirming to IS for (E)320A Cat-III	1.00	Nos.	₹ 15,600.00	₹ 15,600.00
183	providing and erecting Approved make Four pole moulded case circuit breaker having breaking capacity ICU of 50 K.A. and above at 415 V having normal current rating up to 630A. with variable thermal & magnetic release suitable to work on A.C.supply 50 c/s. with all internal connections & complete erected in existing 16 G.M.S. housing ICS=100% of ICU only Cat III	1.00	Nos.	₹ 28,650.00	₹ 28,650.00
184	Approved make Four pole moulded case circuit breaker having breaking capacity ICU of 35 KA. at 415 V. having Normal current rating up to 200A.with variable Thermal & magnetic release suitable to work on A.C.supply 50 c/s. with all internal connections & complete erected in existing 16 G.M.S.housing ICS=100% of ICU only Cat III	3.00	Nos.	₹ 16,500.00	₹ 49,500.00
185	Approved make Four pole moulded case circuit breaker having breaking capacity ICU of 25 KA. at 415 V, having normal current rating up to 25 A to 100A. with Fixed thermal & magnetic release suitable to work on A.C. supply 50 c/s. with all internal connections & complete erected in existing 16 G.M.S. housing. ICS=100% of ICU only Cat III	2.00	Nos.	₹ 6,290.00	₹ 12,580.00
186	providing and erecting Approved make Earth fault Relay suitable to mount with inter connection suitable to following size of moulded case circuit breaker having CT ratio & MCCB rating as following along with shunt trip 220V AC. with all internal connections & complete erected in existing M.S.housing.. (4) 600 A -800 A , CT Ratio 1/800	1.00	Nos.	₹ 6,170.00	₹ 6,170.00
187	Supplying and erecting triple pole & neutral 440V / 500V panel mounting Copper Busbars with four equal Nos. of electrolyte bus having current density not more than 1.6 Amp. / sq.mm (Rated current / cross section area) duly wrapped with colour insulating tape for phase sequence of following current carrying capacity, erected with necessary bus bar supports /insulators, main cable socket to each bar, erected in existing cubical panel with necessary connections. (B) Suitable for 200 Amp. Capacity	8.00	Rn Mtr.	₹ 3,250.00	₹ 26,000.00
188	Supplying & erecting bank of all polypropylene condenser (APP type) with standard capacity of 2,3,5,7, 10,12.5 & 15 KVAR units of P.F. correction for operation on 3 phase 50 c/s, 400 /440V (+ / - 10%) with externally discharging resistance, earthing terminal & built on angle iron of channel iron frame work and provided with terminal cover box. Complete erected on provided iron bracket or on floor duly tested by license.	30.00	KVAR	₹ 680.00	₹ 20,400.00

Sr. No.	Item Description	Quantity	Unit	Rate	Estimated Cost
				in Rs.	In Rs.
189	Providing & erecting weather proof, dust & vermin proof, floor mounted front operated indoor type cubical panel board having IP-54 protection made from 14 SWG thick CRC M.S. sheet for outer body & doors, 16 SWG thick CRC M.S. sheet for internal partitions with necessary supporting angles, flats including cutting, bending, drilling, welding, riveting with internal partitions & cable alley as per requirements & instruction of engineer-in-charge with erection of				
	supplied switch gears, BUSBARS, with suitable size of inter connecting PVC copper wire / copper-aluminium strips, rubber grommets, rib, bakelite control fuses for measuring instruments, earth bus & earth bolts, foundation flange - bolts-base Plates, sufficient nos. of hinged doors, handles with locking arrangement and rubber gasket complete. The Panel shall be painted with epoxy powder coating.				
	(The rates excludes the cost of switchgears, bus bars, inter connecting mains & Copper Aluminium strips, meters, Fuses etc. The dimension shall be measured excluding base beams) The panel shall be supplied with following approved manufacturers with following size.				
	(A) The standard companies switch gear shall be used and only manufacturers at CPRI approved factory and shall be certified by that company whose switch gears are used after fabrication for beneficial use (i) with 350mm depth	6.00	SqMt	₹ 17,410.00	₹ 104,460.00
190	Mains with ISI marked, 1.5KV grade electrolyte multi stranded, annealed copper conductor with heat resistant PVC insulated conforms to IS 694, IEC - 227 erected in existing pipe of following size (Specifically for control panel, relays, power switchgears, motor starters & control wiring) with required size of copper lugs, nuts and bolts if required.(a) One wire 1.00 sq. mm	26.00	Mtr.	₹ 10.00	₹ 260.00
191	(b) One wire 1.50 sq. mm	26.00	Mtr.	₹ 15.00	₹ 390.00
192	(c) One wire 2.50 sq. mm	26.00	Mtr.	₹ 25.00	₹ 650.00
193	(d) One wire 4.00 sq. mm	26.00	Mtr.	₹ 35.00	₹ 910.00
194	(e) One wire 6.00 sq. mm	26.00	Mtr.	₹ 55.00	₹ 1,430.00
195	(f) One wire 10.00 sq. mm	15.00	Mtr.	₹ 90.00	₹ 1,350.00
196	Providing & erecting water cooler having storage capacity 150 Ltr. & cooling capacity 150 Ltr.per hour @ an ambient temp of 450 C. The outlet temp. of the water should drop by 150C within a hour, The water cooler should be comprising of hermetically sealed compressor, fan motor, condensing unit, water tank surrounded by evaporating, coil, thermostats, relay etc.complete with necessary inlet & outlet connection. The body of water cooler will be made from Stainless Steel.	1.00	Nos.	₹ 54,500.00	₹ 54,500.00
197	Supplying & erecting 5 stage single reverse osmosis water purification system with M.S. powder coated frame, prefilter housing with 'O' ring presediment filter GAC filter, carbon filter suitable buster DC pump capacity 80 psi, mention with 40 Osg inline type post carbon filter auto low & high pressure switches with following size of storage tank & LPH capacity & erected as directed with one year comprehensive maintenance guarantee. [A] 10 Ltr / Hr with 7 Ltr Plastic Pressure Tank	1.00	Nos.	₹ 8,250.00	₹ 8,250.00
	FURNACE WORK				
198	Design, supply, Installation, testing and commissioning of electrical based cremation furnace with 05 years Comprehensive Maintanance	1.00	Nos.	₹ 10,088,000.00	₹ 10,088,000.00
199	Design, supply, Installation, testing and commissioning of Gas based cremation furnace with 05 years Comprehensive Maintanance	1.00	Nos.	₹ 9,457,500.00	₹ 9,457,500.00
				Total Amount	₹ 39,999,999.70
				Say Amount	₹ 40,000,000.00

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(asSO4: (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: (asCaCo3) 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 Cm2/g for O.P.C				
		[d]	Compressive Strength, N/mm2 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 the purpose of the use. 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 pre season 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 than 20%
		[b]	Efflorescence		[b]	Moderate
		[c]	Compressive strength		[c]	Minimum range 35 Kg/Cm ² individual result may Fall below up to.
		[d]	Dimension		[d]	Length 452 to 468 cm Width 216 to 224 cm Depth 136 to 144 cm
						OR requirement as per IS 1077-1992

				AsperIS 1786-1985		
6	Reinforce ment	[a]	Ultimate tensile strength	Each set of test for each diameter of Bars for every 40 M.T. Or part there of.	[a]	42Kg/mm2 for M.S. bars and 49.50Kg/mm2 for Twisted &TMT bars
		[b]	Yield stress(Proof stress)		[b]	26Kg/mm2 for M.S. bars and 42.50Kg/mm2 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/cm2		
				[2]	Grade M150-150Kg/cm2		
				[3]	Grade M200-200Kg/cm2		
		Qty	No of	[4]	Grade M250-250Kg/cm2		
		Cumt	Sample	[5]	Grade M300-300Kg/cm2		
		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 ³ 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 ²) 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,Minimum
		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"mim.			

		[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/mm ²		2	Average12 for thickness<7.5mm average15 For thickness ≥7.5mm

3	Breaking Strength(N)		3	200 for ≤ 7.5 mm thickness, min 500 for > 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 to 100c		6	$9 \times 10^{-6} K^{-1}$,max
7	Thermal Shock resistance		7	10 cycles,min
8	Crazing resistance		8	4 cycles @ 7.5 bar,min
Chemical Properties			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,
Dimension and surface Quality				
[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]	$l \leq 12\text{cm}: \pm 0.5$ $l > 12\text{cm}: \pm 20 \pm 0.6 / -0.3$			
[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]	$l \leq 12\text{cm}: \pm 0.4 / -+0.2, l > 12\text{cm}: \pm 0.15 \pm 0.25$			
[ii]	Thickness the deviation in percent of the average thickness of each tile from the work size thickness						
[a]	<250cm ²			±3.0			
[b]	>250to500cm ²			±3.0			
[c]	>500to1000cm ²			±4.0			
[d]	>1000cm ²			±4.0			
[iii]	Straightness of side 2 (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	Ultratech Xtralite, 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
INSULATION	AEROLAM/ROCKWOOL
CONSTRUCTION CHEMICALS	
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
TILES	
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
PAINT	
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

WEATHER PROOF EXTERIOR EMULSION PAINT	ICI, Dulux, Asian, Nerolac, Burger, Jotun, Global
WALL TEXTURE	Jotun, Heritage, Global, Asian
ALUMINIUM	
ALUMINIUM SHEETS AND ACCESSORIES	Jindal, Hindalco, Banko, National
ALUMINIUM EXTRUDED DOOR/ WINDOW SECTION	Jindal, Hindalco, Banko, National
ALUMINIUM HARDWARE	Everite, Garnish, Crown Classic, Glider
FURNITURE / WOOD WORK	
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	SaintGobain Gyporc/ USG BORAL/ Asian Gypsum Industries Pvt. Ltd
Mieral Fibre Acoustical Suspended Ceing 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
SANITARY AND PLUMBING	
SANITARY WARE	Cera, Hindware, Parryware, Johnson, Somany
P.V.C. PIPES AND FITTING (UPVC/CPVC)	Finolex, Supreme, Kisan, Ashirwad, Astral, Dutron, Prince, Precision, Ajay
CHROMIUM PLATED WATER SUPPLY FITTINGS	Hindware, Jaquar, Aquel, Kohler, Essco, Grohe, Plumber, Cera, Somany
C.I. MANHOLE COVER	ISI approved make
PLUMBING FIXTURES	Hindware, Jaquar, Aquel, Kohler, Essco, Grohe, Plumber, Cera, Somany
PVC WATER TANK (100% VIRGIN PVC)	Syntex , Aqua
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 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.

LIST OF MATERIALS OF APPROVED BRAND/ MANUFACTURER (ONLY FIRST QUALITY TO BE USED (ELECTRICAL WORKS))

MAKE LIST FOR ELECTRICAL WORKS		
SR.NO.	ITEM	STANDARD MAKE
1	LT PANELS	CPRI / ERDA APPROVED PANEL BUILDER. 70KA SHORT CIRCUIT WITHSTANDS STRENGTH. ACCESSORIES AS PER MENTIONED IN MAKE LIST.SUBJECT TO CLIENT CONFIRMATION.
2	DISTRIBUTION BOARDS	LEGRAND / SCHNIEDER / HAGER / SIEMENS / ABB
3	LT CABLE	FINOLEX / APAR / RR / KEI
4	CABLE TRAY (ALL TYPE)	PROFAB / UNIVERSAL / JETCOTECH
5	LT MCCB	SIEMENS / SCHNEIDER / LEGRAND / ABB / HAGER
6	LT MCB, ELCB	LEGRAND / SIEMENS / SCHNEIDER / HAGER / ABB
7	APFC PANEL & CAPACITOR	SCHNEIDER / EPCOS / SUBODHAN / ABB / SIEMENS
8	LT CONTACTORS	SIEMENS / SCHNEIDER / ABB / LEGRAND / HAGER
9	CHANGE OVER SWITCH (Auto / Manual)	SCHNEIDER / ABB / SIEMENS / LEGRAND / HAGER
10	STARTER (STAR-DELTA /DOL)	SCHNEIDER / ABB / L&T / SIEMENS / LEGRAND
11	METERS (DIGITAL)	SCHNEIDER /L&T / SECURE / ABB / CONSERVE
12	INDICATING LAMP	SIEMENS / SCHNEIDER / ABB / KAPPA / ESBEE
13	ELECTRIC TIMER	SIEMENS / LEGRAND / L&T / HAGER
14	PUSH BUTTON AND PUSH BUTTON SET	SIEMENS / SCHNEIDER ELECTRIC / ESBEE/ BCH / ABB
15	LUGS	DOWELL'S / 3D / JAINSON / COMET / HMI
16	BIMETALLIC LUGS	ISMAL / HMI / DOWELLS
17	CABLE GLAND	JAINSON / 3D / COMET / HMI / MCI
18	PVC CONDUITS AND ACCESSORIES	PRECISION / NIHIR / POLYCAB / ASTRAL
19	CASING CAPING	PRECISION / NIHIR / POLYCAB
20	MODULAR SWITCHES, SOCKETS & OTHER ACCESSORIES	LEGRAND / HAVELLS / HAGER / L&T / ABB / SCHNEIDER
21	PVC TAPE	STEEL GRIP / ANCHOR
22	WIRES FOR INTERNAL WIRING	FINOLEX / APAR / RR / KEI / LAPP
23	CONNECTORS (COLOURS AS PER PHASE & NEUTRAL)	SALZER / ELEMEX / CONNECT WELL / PHOENIX
24	LED LIGHT FIXTURES	PHILIPS / WIPRO /Have'lls /CROMPTON/ BAJAJ AS PER MODEL SPECIFIED IN BOQ
25	CEILING FAN/ EXHAUSTFAN	CROMPTON / USHA / HAVELLS / ORIENT / BAJAJ AS PER MODEL SPECIFIED IN BOQ
39	OCTAGONAL POLE	BAJAJ / WELMONT / TRANSRAIL / JETCOTECH
26	CHEMICAL EARTHING (BORE TYPE)	ASHLOK / LPI / ABB / SARA / VASUDHA
27	DIGITAL MULTI FUNCTION METER	SECURE / SCHNEIDER / CONZERV/ENERCON / ABB / SIEMENS
28	LT CABLE LUGS	DOWELS / 3M / COMET
Special Note:-		
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/PMC 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	
8	Sample and items to be approved before supplying at site.	
	Modular Switches	Fan
	DB Box	Light and Fixture
	MCB	Cable and Wire

MAKE LIST FOR FURNACE ITEMS		
SR.NO.	ITEM	STANDARD MAKE
1	STEEL	JINDAL / AMNS/ TATA
2	MS/ SS STRUCTURE	JINDAL / AMNS/ TATA
3	CHIMNEY PIPES	JINDAL / AMNS/ TATA
4	BURNER	BALTUR / ECOFLAME / OXILION / CONTINENTAL
5	BRICKS (IS8 QUALITY)	TATA / NOBEL
1	INSULATION BRICKS	QUALITY COLD FACE
2	SCRUBBER PIPE	SS 304 - 3MM