

**STANDARD BIDDING  
DOCUMENT PROCUREMENT OF CIVIL  
WORKS**



<b>NAME OF WORK: -</b>	<b>BID DOCUMENT FOR CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA (YEAR: 2025-26) GRANT (SECOND ATTEMPT).</b>
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**THE CHIEF OFFICER  
KHAMBHAT NAGARPALIKA  
KHAMBHAT**

## **KHAMBHAT NAGARPALIKA KHAMBHAT**

**NAME OF WORK: CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA. ( YEAR: 2025-26) GRANT ( SECOND ATTEMPT).**

### **VOLUME –I – TECHNICAL BID**

<b>MILESTONE DATES</b>		
<b>Bid Documents Downloading Start Date</b>	<b>:</b>	<b>Date: 19/06/2026</b>
<b>Last Date for Submission of Online Tender</b>	<b>:</b>	<b>On Date : 29/07/2026 up to 18:00 Hrs.</b>
<b>Dates of Submitting the Tender Fee / E.M.D and relevant Documents of the Tender By RPAD Only.</b>	<b>:</b>	<b>Up to Date 06/08/2026 18:00 Hours At the Khambhat Nagarpalika Dist. Anand, Gujarat-India.</b>
<b>Openings Dates for online Tender Technical Bid Price Bid</b>	<b>:</b>	<b>Technical Bid on Date 07/08/2026 at 12:00 Hrs. Price Bid date to be intimated later. (If Possible)</b>
<b>Estimated Cost</b>	<b>:</b>	<b>Rs. 6,20,86000.00</b>
<b>EMD</b>	<b>:</b>	<b>Rs. 6,20,900.00</b>
<b>Tender Fee</b>	<b>:</b>	<b>Rs. 14,160.00</b>
<b>Class Of Contract</b>	<b>:</b>	<b>"A" Class and Above</b>
<b>Duration Of Work</b>	<b>:</b>	<b>18 months.</b>

**-: OFFICER INVITING BIDS: -**

**THE CHIEF OFFICER  
KHAMBHAT NAGARPALIKA  
KHAMBHAT**

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# **INVITATION FOR BID (IFB)**

**KHAMBHAT NAGARPALIKA KHAMBHAT**  
**INVITATION FOR BID**  
**NATIONAL COMPETITIVE BIDDING**

1. The **Chief Officer KHAMBHAT NAGARPALIKA KHAMBHAT** invites bids for the construction of works detailed in the table. The bidders may submit bids for any or all of the following works.

<b>Package No.</b>	--
<b>Name of work</b>	<b>CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA. (YEAR: 2025-26 GRANT (SECOND ATTEMPT))</b>
<b>Approximate Value of Works</b>	<b>Rs. 6,20,86,000.00</b>
<b>Bid Security (EMD)</b>	<b>Rs. 6,20,900.00</b>
<b>Cost of document (Tender Fee)</b>	<b>Rs. 14,160.00</b>
<b>Period of Completion</b>	<b>18 Months</b>
<b>Class of Registration / Category of Contractor if required</b>	<b>"A" Class and Above</b>

2. Prospective / Interested bidder may download the Bid Documents from website <https://www.tender.nprocure.com> free of cost till the Time and Date as mentioned on online NIT at website <https://www.nprocure.com>.
3. However, Bidder who is submitting the Bid Online will have to pay the Bid Document Fee / Tender Fee through Demand Draft only of any Schedule Bank payable at Khambhat and in favor of **CHIEF OFFICER KHAMBHAT NAGARPALIKA**. Once the Bid is received online, Bid Document / Tender Fee will not be refundable. as per GoG R&B Department's Circular No. PARACH/102/000/IB/221/(59)/C, Dtd. 24/01/2007.

The Demand Draft for Bid Document / Tender fee and FDR / ~~Bank Guarantee~~ against Bid Security / EMD shall be submitted in electronic format through online (by scanning) while uploading the bid, this submission shall mean that bid document / tender fee and Bid Security / EMD has been received. Accordingly, the offer of only those shall be opened whose Bid Document / Tender Fee and Bid Security / EMD have been received electronically. However, for the purpose of realization of prequalification Technical Bid Documents, Demand Draft in original, and FDR in original / ~~Bank Guarantee~~ bidder shall be received by the Employer at the address specified above not later than **06/08/2026** up to 18.00 Hrs. through registered post/ speed post only.

Penaltative action for not submitting Demand Draft / FDR / ~~Bank Guarantee~~ in original to Chief Officer / Tender Inviting Authority by bidder shall be initiated. (**WRD GR No. PRC-102014-1-MICell-K.1, Dtd. 29/10/2014**)

4. Bids received online, will be opened on the time, date and place as specified in the online NIT at website <https://www.nprocure.com> in the presence of the bidders or their authorized representatives, who wish to remain present. If the office happens to be closed on the day of opening of the bids as specified, the bids will be opened on the next working day at the same

time and venue.

~~5. A pre bid meeting will be held on .....at .....hrs. at the office of .....to clarify the issues and to answer questions on any Matter that .....may be raised at that stage as stated in clause 9.2 of 'instructions to Bidders' of the bidding documents.~~

6. Bid Security (EMD) is equal to 1% of Estimated Amount put to bid / tender and should be rounded off to the next thousand rupees.

7. Other Information is as under:

- a. Agencies can prepare and edit their offers a number of times before the end of the tender submission date and time. After the tender submission date and time, the bidder cannot modify / edit / withdraw their submitted offer in any case. No written or online request in this regard shall be granted.
- b. Offers in physical form will not be accepted in any case.
- c. Demand Draft purchased by the other than bidder and issued after the last date of submission of Bids, will not be considered or accepted.
- d. The cost incurred by the contractor for this offer for clarification or attending discussion, conferences or site visits will not be reimbursed by the Employer or Engineer-in-Charge.
- e. Conditional tender shall not be accepted.
- f. Any changes, addition, alternation made in the prescribed form attached with tender are liable to be rejected.
- g. Any change in format or conditional Bank Guarantee will not be accepted and the bidder will be considered non-responsive.
- h. All the bidders are instructed to fill in information strictly in accordance with the format given in the checklist /qualification document / tender document.
- i. It is mandatory for the bidders to supply each and every information as asked strictly in electronic format at appropriate places only.
- j. Blank / insufficient information shall be treated as nil information and shall result in disqualification.
- k. Even if the bidder has been qualified in a similar or larger size of project in the past, it shall not be deemed to be a ground / reason for not giving required information for this work / bid.
- l. Information supplied for earlier projects shall not be considered while evaluation of this bid. The Government will not ask for any other information, unless it is found absolutely necessary by the competent authority.
- m. If found necessary, the contractor will be intimated for negotiation,

## **BID EVALUATION / PRE-QUALIFICATION CRITERIA / ELIGIBILITY CRITERIA**

For the works costing up to Rs. 7.5 crore (WRD Works), Rs. 7.0 crore (ROAD/BRIDGE/ BUILDING WORKS), Rs. 0.5 Crore (Electrical Works) kindly refer to GoG NWRWS & K Department's Circular No. Paracha/1097/1397(11)/pa.fa./MICELL (k-1), dtd. 18/01/2018 and Dtd. 30/09/2022.

For the works costing under Rs. 7.5 crore for Construction work of Water Resources Department, Rs. 7.0 crore for Roads, Bridges and Building and Rs. 0.50 crore for Electrical work following documents shall be submitted in electronic format through online by scanning and also Technical Bid Documents, Demand Draft in original, and FDR in original / ~~Bank Guarantee~~ bidder shall be received by the Employer at the address specified above not later than **06/08/2026** up to 18.00 Hrs. through registered post/ speed post only.

Following Physical Document are compulsory to submit before the last date of submission of bid. Physical Document shall be sent through Register post R.P.A.D./Speed Post and Scan copy also must be submitted online along with tender. If any of the following documents is not attached with the technical bid and online tender, your tender shall not be considered valid.

1. Bid Document Fee / Tender Fee Original.  
Attach Required Tender Fee in Form of D.D in Original
2. Bid Security / EMD.  
Attach Required EMD in Form of D.D/F.D.R in Original
3. Registration Certificate of Appropriate Class.

**Registration:** Copy of Valid Registration of class **"A "Class and Above** With the Govt. of Gujarat, / Irrigation Dept./ Other state Govt./ Other Govt. bodies / GWSSB / Central Govt. having similar criteria as per magnitude of work also equivalent qualifying criteria to R&B Department of Gujarat State will have to be justified by the Bidder.

### **4. Work Experience,**

Experience of having successfully completed similar work of **(Building Work)** during last 7 years ending last day of the month previous to the one in which application are invited should be either of the following with Enhancement Value given in Enhancement Factor /Escalation factor Table (clause No.4.5.2) should be either of the Following.

- A. One similar completed work of **(Building Work)** costing not less than the amount equal to 80 % of the Estimated Cost. **i.e., Rs. 496.68 Lac.** (Only in Form 3-A Certificate from Government of Gujarat/ Semi Government Bodies only.)  
OR
- B. Two similar completed work of **(Building Work)** costing not less than the amount equal to 50 % of the Estimated cost. **i.e., Rs. 310.43 Lac.** (Only in Form 3-A Certificate from Government of Gujarat/ Semi Government Bodies only.)  
OR
- C. Three similar completed work of **(Building Work)** costing not less than the amount equal to 40% of the estimated cost. **i.e., Rs. 248.34 Lac.** (Only in Form 3-A Certificate from Government of Gujarat/ Semi Government Bodies only.)

The Khambhat Nagarpalika Khambhat may verify the above certificate/documents from respective department if deemed Necessary.

The experience certificate from private individuals / company from whom the works are Executed/ being executed, shall not be acceptable.

The experience of work carried out by bidder as a SUB CONTRACTOR to the other Agency will not be considered.

The above documents will be analyzed and after satisfaction, the price bid will be opened. Khambhat Nagarpalika Khambhat

May verify the documents, experience certificates from authority who have issued such certificates / details.

**Work Experience only for (Building Work) Attach Attested Copy of All Form 3A and Work Completed Related Documents.**

5. Average Annual Financial turnover during the last 3 years, ending 31st march of the previous financial year, should be at least **30% i.e., (Rs.186.25 Lakhs)** of the Estimated Cost. (The audited balance sheet/C.A. Certificate for turnover should be submitted in support of the same.)
6. Latest Bank Solvency Certificate of minimum 20% amount of Estimated Cost of this work, **i.e., Rs.124.17 Lacs**, for Current Calendar Year. Solvency Certificate from any Nationalized Bank / Schedule Bank / Co-operative Bank Ltd. As Per Attached G.R. of Government of Gujarat Finance Department of Dated: 11-04-2024.
7. Attach Attested Copy of PAN Card
8. Attach Attested Copy of Last Three Years Income Tax Return.
9. Attach Attested Copy of EPF Registration.
10. Attach Attested Copy of GST Registration.
11. Attach Attested - Site visit Certificate must be attached with tender Document with signature of Nagarpalika Engineer by Bidder (Format as per SBD-Section1 Clause 7.2).
12. Anti-Blacklisting Information as PER SBD-Section1 Qualification Information Page No.44
13. The Bidder/Contractor will have to Submit the Letter of Submission of Bid, Assurance Letter for Acceptance of Above terms and Condition Unconditionally and Signed by the Bidder and Attached the Same in Bidding Document. (As Per format given in SBD Section 8 Page No.527)

**Notes: -**

1. Above all documents must be attached online and same as in physical submission if the bidder fails to submit any one of the above documents, the bidder will be liable for disqualification.
2. The Bidder shall submit documentary evidences in support of all above Qualification criteria, failing in which the price bid shall not be opened. Chief Officer Khambhat Nagarpalika Khambhat also reserves the right to waive off the Qualifying criteria/ except or reject any or all Tender without assigning any reason thereof.



### **GENERAL IMPORTANT INSTRUCTION TO THE BIDDER**

1. Bidders have to carried out and submit following types of total station survey work.(1) Proposed/ existing road alignment survey & alignment demarcation on site.(2) Existing ground data survey work.(3) Earth Work / Embankment Qty (pre & post) survey with Reference to original ground data survey for earth work. Qty verification work. 4) Total Station works for land acquisition process if required by Khambhat Nagarpalika at Khambhat 5) Necessary Permission for Building Use, GPCB Board, Fire Safety Related Permission etc. will have to be Obtained by the Successful Bidder from Competent Authority as per the Estimate Given in Schedule-B at his Own Risk and Expanse, No Extra Expanse/Payment for the same will be Made by Khambhat Nagarpalika Khambhat regarding the same.
2. Bidders have to carry out various types of Pre and Post total station survey work in connection with stipulated quantities in Schedule-B for smooth running of project and site layout management.
3. Bidder/Contractor will have to Obtained Soil Bearing Capacity Report(From Government Approved Laboratory) at various locations for Deciding the Depth of Foundation and other criteria and also verified the Soil Strata etc. considering the same the Structure Design Should be Prepared and verified from competent Authority(Such as competent Authority(Register Structure Engineer)/Government Engineering Collage etc. For Approval of Such type of Design and Drawings) having as possible as Economical and Safe Provision as per provision considering Latest IS Code's and Standard etc. at his Own Expanses Khambhat Nagarpalika Khambhat will not pay any Extra Amount/Payment Regarding the same and also the Quantity, Item should be as far as possible in Limit and Connection to Uploaded Schedule-B/BOQ.
4. Foundation and Foundation Footing for Above Work are to be designed after obtaining Soil Bearing Capacity Report and considering the S.B.C Value Depth of Foundation Footing and Other Foundation depth should be Determined and taken with at most care and as far as possible economical and with respect to stipulated Quantity Given in Schedule B also Excess/Extra Quantity Should be avoided.
5. Construction Work should only be started after Approval of Structure Design from competent Authority and submission of the same to Khambhat Nagarpalika, Khambhat having Quantity Should be in limit and in connection with Quantity given in Schedule B with reference to Obtained Soil Bearing Capacity.

6. All Material Used for Construction will have to be tested before execution as Per Schedule of Testing of Road and Building Department Attached Herewith.
7. For Leveling and fixing Datum Level for as far as Flat Ground and Contour Level for the reference should also be Obtained and the Quantity of Cutting and Filling should be workout in such a manner that the Quantity for the Filling should be as far as possible minimized and also should be assured that water lodging doesn't (Avoided) take place in the Premises.
8. R.C.C. and T.M.T Steel are as Per the Government Norms (company make mentioned in tender) should use by the Successful Bidder and Structure Design for the same should be approved by competent Authority.
9. Construction Material Testing and Concrete Work Testing according to Concrete Strength Should be Conducted from Government Approved Laboratory and GERI(ગૅરી) as per norms Mentioned in R&B Resolution Letter SMR-1092-129-10-G Dated 24/10/1994,
10. Site Photographs Stage Wise, at Regular Interval and on Completion will have to be submitted by the Successful Bidder to Khambhat Nagarpalika at regular interval to notified the progress of work and Final Completion of the Work (The Photographs should contain Following Details Name of Work, Ward Name, Amount of Expanse etc.
11. Work should be commenced only after obtaining required Building Construction Permission from Local Spatial Authority (Local Urban Authority) for Building Construction Drawing.
12. After Completion of the Building required Building Use Permission (B.U. Permission) will have to be Obtained from Local Spatial Authority (Local Urban Authority) or Competent Government Department.
13. Any Additional Instruction from Regional Commissioner Municipality, Vadodara, Gujarat Municipal Finance Board, Government of Gujarat etc. will have to followed/ Obey.
14. Successful Bidder/Contractor will have to compulsory Place Holding/Big Permanent Granite Plate/Name Plate Mentioning necessary details such as Name of Work, Date of Starting of Work, Date of Completion, Name of Grant, Other Details required by Nagarpalika / Logo of Swarnim Gujarat/Amrut Mohotsav etc., Other Details Mentioned by Government of Gujarat etc. at his own expanse.

15. Bidders shall have to carry out Concrete MIX DESIGN for all Control Cement Concrete Works Items before Execution of works if required.
16. Bidders have to carry out all kinds of Tests For works as per various IS Code and Specification Listed in Material Section and Schedule of Material Testing.
17. Goods and Service Tax (GST) Amount as per Government Rules and Regulation will be Deducted from Contractors / Bidder Running Bill / Final Bill by Nagarpalika Stage / Bill Wise.
18. Consulting Engineer Service Charges as Approved with NAGARPALIKA (3.00 % + G.S.T) will Have to be considered while quoting rate, same will have to be bear by the Bidder.
19. Third Party Inspection Service Charges as Approved with Nagarpalika (1.15 %+ G.S.T) will have to be considered while quoting rate, same will have to be bear by the Bidder.
20. No objection Certificate and required permission after construction work of building for electrification work and fire safety work from component authority will have to obtain by bidder.
21. Overlap have to be done as per design specification no extra payment for the overlap will be done to the bidder. (as per resolution PDW/10-2017-01-C DATED 15-02-2017)
22. The bidder have to follow all instruction of Saheri vikas and Saheri Gruh-Nirman resolution No.SGY/102011/4144/Dated 23/08/2011.
23. All cost towards the testing shall be borne by the contractor.

**SECTION - 1**  
**INSTRUCTIONS TO BIDDERS**  
**(ITB)**

## Section 1: Instructions to Bidders

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## **A. GENERAL**

### **1. Scope of Bid**

- 1.1 The **Chief Officer Khambhat Nagarpalika Khambhat invites bids for the CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA.** Construction of works (as defined in these documents and referred to as ‘the works’’) detailed in the table given in IFB. The bidders may submit bids for any or all of the works detailed in the table given in IFB.
- 1.1 The successful bidder will be expected to complete the works by the intended completion date specified in the Contract data.
- 1.2 Throughout these bidding documents, the terms ‘bid’ and ‘tender’ and their derivatives (bidder/ tenderer, bid / tender, bidding/ tendering, etc.) are synonymous.

### **2. Source of Funds**

- 2.1 The expenditure on this project will be met from the budget of Govt. of Gujarat / Govt. of India for centrally sponsored projects.

### **3. Eligible Bidders**

- 3.1 This Invitation for Bids is open to all eligible bidders.
- 3.2 All bidders shall provide in Section 2, Forms of Bid and Qualification Information, a statement that the Bidder is neither associated, nor has been associated, directly or indirectly, with the consultant or any other entity that has prepared the design, specifications, and other documents for the Project or being proposed as Project Manager for the Contract. A firm that has been engaged by the Employer to provide consulting services for the preparation or supervision of the works, and any of its affiliates, shall not be eligible to bid.

### **4. Qualification of the Bidder**

- 4.1 All bidders shall provide in Section 2, Forms of Bid and Qualification Information, a preliminary description of the proposed work method and schedule, including drawings and charts, as necessary. The proposed methodology should include a program of construction backed with equipment planning and deployment duly supported with broad calculations and quality assurance procedures proposed to be adopted justifying their capability of execution and completion of work as per technical specifications, within stipulated period of completion.
- 4.2 Deleted
- 4.3 Deleted
- 4.4 Deleted

#### **#4.5 QUALIFICATION CRITERIA:**

##### **(Applicable for the works which require Post Qualification)**

- 4.5.1 Qualification will be based on Applicant’s meeting all the following minimum pass/fail criteria regarding the Applicant’s general and particular experience, personnel and equipment capabilities and financial positions, as demonstrated by the applicant’s responses in the forms attached to the letter of application (~~specified requirement for joint ventures are given under para 4.6 below~~) Subcontractors experience and

resources shall not be taken in to account in determining the applicants compliance with the qualifying criteria To qualify for more than one contract, the applicant must demonstrate having experience and resources sufficient to meet the aggregate of the qualification criteria for each contract given in paragraphs 4.5.4, 4.5.5 and 4.5.9 below

#### 4.5.2 Base year and Escalation

The base year shall be taken as Current financial year

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

Year	Financial Year	Enhancement Factor
Base (year of inviting tender)	2025-2026	1.00
-1	2024-2025	1.10
-2	2023-2024	1.21
-3	2022-2023	1.33
-4	2021-2022	1.46
-5	2020-2021	1.61
-6	2019-2020	1.77
-7	2018-2019	1.94

Applicant should indicate actual figures of costs and amount for the works executed by them without accounting for the above-mentioned factors.

In case the financial figures and value of completed works are in foreign currency the above enhanced multiplying factors will not be applied. Instead, the current market exchange rate (State Bank of India BC Selling rate as on the last date of submission of the bid) will be applied for the purpose of conversion of the amount in foreign currency into India rupees.

#### 4.5.3. General Experience.

The Applicant shall meet with the following minimum criteria:

- (a) Achieved a minimum annual financial turnover (defined as billing for works in progress and completed in all classes of civil engineering construction works only) in any one year, over the last five years of the annual value of contract / contracts applied for.
- (b) Experience in successfully completing work As per Bid Evaluation Criteria on page no.7 or substantially completing at least one contract of **(Building Work)** of at least 80 percent/ Two contract of **(Building Work)** of at least 50 percent/ Three contract of **(Building Work)** of at least 40 percent of the value of proposed contract within the Seven years.

The works may have been executed by the applicant as prime contractor or as a member of a joint venture or as a nominated sub-contractor. As subcontractor, he should have acquired the experience of execution of all major items of works under the proposed contract. In case a project has been executed by a joint venture, weight towards experience of the project would be given to each joint venture in proportion to their financial participation in the joint venture.

Substantially completed works means those works which are at least 90 % completed as on the date of submission (i.e. gross value of work done up to the last date of submission is 90 % or more of the original contract price) and continuing satisfactorily.

For these, a certificate from the employers shall be submitted along with the application incorporating clearly the name of the work, contract value, billing amount, date of commencement of works, satisfactory performance of the contractor and any other relevant information.

(The experience certificate should be signed by the officer not below the rank of EE)

#### 4.5.4. Personnel Capabilities.

The Bidder must have suitably qualified personnel to fill the following positions. The Bidder will supply information on a prime candidate and an alternate for each position, both of whom should meet the qualification and Experience requirements specified below:

Sr No.	Position	Qualification	No. of Personnel's required	Total experience ( Years )	In similar works ( Years )	In similar work in similar capacity ( Years )

#### 4.5.5. Equipment Capabilities

Based on the studies carried out by the Engineer, the minimum suggested major equipment to attain the completion of works in accordance with the prescribed construction schedule are shown in the Appendix.

The bidders should, however, undertake their own studies and furnish with their bid, a detailed construction planning and methodology supported with layout and necessary drawings and calculations to allow the employer to review their proposals. The numbers, types and capacities of each plant/equipment shall be shown in the proposals along with the cycle time for each operation for the given production capacity to match the requirements.

List of Plant & Equipment to be deployed on contract work.			
SL No.	Type of Equipment	Maximum Age on	
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

#### 4.5.6. Financial Position

The Applicant should give undertaking that he has access to, or has available, liquid assets (aggregate of working capital, cash in hand and uncommitted bank guarantees)



and / or credit facilities up to 25 percent of the value of the contract / contracts applied.

- 4.5.7.** The audited balance sheets for the last five years should be submitted, which must demonstrate the soundness of the applicant's financial position, showing long – term profitability including an estimated financial projection for the next two years. If necessary, the employer will make inquiries with the applicant's bankers.

**4.5.8. Litigation History**

The Applicant should provide accurate information on any litigation or arbitration resulting from contracts completed or under execution by him over the last five years. A consistent history of awards against the Applicant or any partner of a joint venture may result in failure of the applicant.

#### 4.5.9. Disqualification

Even though the applicants meet the above criteria, they are subject to be disqualified if they have:

Made misleading or false representation in the forms, statements submitted, and / or Record of poor performance such as abandoning the work, rescinding of contract for which the reasons are attributable to the non – performance of the contractor; consistent history of litigation awarded against the applicant or financial failure due to bankruptcy. The rescinding of contract of a joint venture on account of reasons other than non – performance, such as Most Experienced partner of joint venture pulling out, court directions leading to breaking up of a joint venture before the start of work, which are not attributable to the poor performance of the contractor will, however, not affect the qualification of the individual partners.

#### ~~#4.6 — JOINT VENTURE: (Maximum 3 Members i.e. 1 Lead & 2 others)- (Applicable only for estimated project cost of 50 Crore and above)~~

##### ~~4.6.1. — Joint ventures must comply with the following requirement:~~

~~(a) — Following are the minimum qualification requirements:~~

~~(i) The lead partner shall meet not less than 50 percent of all criteria given in para 4.5.3 & 4.5.6 above. The joint venture must collectively satisfy the criteria of para 4.5.3 & 4.5.6 above. The experience of the other joint venture partners shall be considered if it is not less than 30 percent of the qualifying criteria in para 4.5.3 & 4.5.6 Above.~~

~~(ii) — Individually each member must satisfy the requirements of para 4.5.7 & 4.5.8 above.~~

~~(b) — Bid shall be signed so as to legally bind all partners, jointly and severally, and shall be submitted with a copy of the joint venture agreement providing the joint and several liabilities with respect to the contract.~~

~~4.6.2. — Qualification of a joint venture does not necessarily qualify any of its partners individually or as a partner in any other joint venture. In case dissolution of a joint venture, each one of the constituent firms may qualify if they meet all the qualification requirements, subject to the written approval of the Employer.~~

#### 4.7. Bid Capacity.

Applicants who meet the minimum qualification criteria will be qualified only if their available bid capacity at the expected time of bidding is more than the total estimated cost of the works. The available bid capacity will be calculated asunder:

**Assessed Available Bid Capacity = (A\*N\*2-B), where**

A = Maximum value of work executed in any one year during the last five years (updated to the price level of the year indicated in appendix) taking into account the completed as well as works in Progress.

B = Value at current price level of the existing commitments and ongoing works to be completed during the next\_\_ ( period of completion of work for which bids are invited ); and

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

invited.

**Note: ~~In Case of joint venture, the available bid capacity will be applied for each partner to the extent of his proposed participation in the execution of the work.~~**

**4.8 Even though the bidders meet the above qualifying criteria, they are subject to be disqualified if they have:**

Made misleading or false representation in the form, statements submitted; and /or Records of poor performance such as abandoning the work, rescinding of contract for which the reasons are attributable to the non-performance of the contractor; consistent history of litigation awarded against the Bidder or financial failure due to bankruptcy. The rescinding of contract of a joint venture on account of reasons other than non-performance, such as most Experienced partner of joint venture pulling out, court directions leading to breaking up of a joint venture before the start of work, which are not attributable to the poor performance of the contractor will, however, not affect the qualification of the individual partners.

**5. One bid per bidder**

5.1. Each bidder shall submit only one bid for one package. A bidder who submits or participates in more than one bid (other than as a subcontractor or in cases of alternatives that have been permitted or requested) will cause all the proposals with the bidder's participation to be disqualified.

**6. Cost of Bidding**

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

**7. Site Visit**

- 7.1. The Bidder, at the Bidder's own responsibility and risk is encouraged to visit and examine the Site of work and its surrounding and obtain all information that may be necessary for preparing the Bid and entering into a contract for construction of the Works.

The costs of visiting the site shall be at the Bidder's own expense.

- 7.2 Letter of Confirmation of Site Visit.

**(ON COMPANY'S LETTER HEAD)**

To  
The Chief Officer  
KHAMBHAT NAGARPALIKA  
KHAMBHAT.

Dear Sir,

**SUB: BID DOCUMENT FOR CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA.**

1. With reference to the tender invited by you for the above mentioned work/s, I/We do hereby confirm that I/We have carried out site visit and understood the project requirements in detail.
2. I / We have satisfied ourselves as to the current site conditions as on date \_\_\_\_\_, and agree to execute the project in accordance with the tender requirements.
3. We agree that at your sole discretion and without assigning any reason whatsoever, you reserve the right to accept and/or reject any or all tenders. The Chief Officer **Khambhat Nagarpalika** does not bind itself to accept the lowest tender.

Signature of Engineer  
Khambhat Nagarpalika

Yours faithfully,

Date:

(Signature of the tenderer with the seal of the firm)

Witness:

## B. BIDDING DOCUMENTS

### 8. Content of Bidding Documents

- 8.1 The set of bidding documents comprises the documents listed below and addenda issued in accordance with Clause 10:

Section	Particulars	Volume No.
-	Invitation for Bids	I
1	Instructions to Bidders	
2	Qualification Information, and other forms	
3	Conditions of Contract	
4	Contract Data	
5	Technical Specifications	II
6	Form of Bid	III
7	Bill of Quantities	
8	Securities and other forms	
9	Drawings	IV
10	Documents to be furnished by bidder	V

- 8.2 Volumes I, II, III and IV are available online and documents to be furnished by the bidder in compliance to section 2 will be prepared by him and furnished as Volume- V in two parts (refer clause 12).
- 8.3 The bidder is expected to examine carefully all instructions, conditions of contract, contract data, forms, terms, and technical specifications, bill of quantities, forms, Annexes and drawings in the Bid Document. Failure to comply with the requirements of Bid Documents shall be at the bidder's own risk. **Pursuant to clause 26 hereof** bids which are not substantially responsive to the requirements of the Bid Documents shall be rejected.

### 9. Clarification Bidding Documents

- 9.1 A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing or through E-mail at the Employer's address indicated in the invitation to bid. The Employer will respond to any request for clarification which he received earlier than 15 days prior to the deadline for submission of bids. Employer's response will be published on website including a description of the enquiry but without identifying its source.

Intending bidders are advised to submit their queries in regards of the bidding documents through email np\_Khambhat@yahoo.co.in and replies of which will be given through return mail.

## **~~9.2. Pre-bid meeting~~**

~~9.2.1. The bidder or his official representative is invited to attend a pre-bid meeting which will take place at the address, venue, time and date as indicated in the appendix.~~

~~9.2.2. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.~~

~~9.2.3. The bidder shall be required to submit any questions in writing or e-mail to reach the Employer not later than 03 days before the meeting.~~

~~9.2.4. Minutes of the meeting, including the question raised (Without identifying the source of enquiry) and the responses given will be published without delay on the tender website i.e. [www.nprocure.com](http://www.nprocure.com). Any modification of the bidding documents listed in sub-Clause 8.1 which may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an Addendum pursuant to Clause 10 and not through the minutes of the pre-bid meeting.~~

~~9.2.5. Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.~~

## **10. Amendment of Bidding Documents**

10.1 Before the deadline for submission of bids, the Employer may modify the bidding documents by issuing addenda.

10.2 Any addendum thus issued shall be part of the bidding documents. The Employer will assume no responsibility for the same.

10.3 To give prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may, at his discretion, extend as necessary the deadline for submission of bids, in accordance with Sub-Clause 20.2 below.

## C. PREPARATION OF BIDS

### 11. Language of the Bid

11.1 All documents relating to the bid shall be in the English language.

### 12. Documents Comprising the Bid

12.1. The bid be submitted by the bidder as Volume V of the bid document (refer Clause 8.1) shall be in two separate parts:

**Part I shall be named “Technical Bid” and shall comprise**

- (i) Bid Security in the form specified in Section 8
- (ii) Qualification Information and supporting documents as specified in Section 2
- (iii) Certificates, undertakings, affidavits as specified in Section 2
- (iv) Any other information pursuant to Clause 4.5 of these instructions
- (v) Undertaking that the bid shall remain valid for the period specified in Clause 15.1

**Part II shall be named “Financial Bid” and shall comprise**

- (i) Form of Bid as specified in Section 6
  - (ii) Priced Bill of Quantities for items specified in Section 7
- 12.2. The Bidder shall submit the details / information pertaining to each part i.e. technical as well as financial and must be submitted online only.
- 12.3. Following documents will be deemed to be part of the bid.

Section	Particulars	Volume No.
<b>Invitation for Bids (IFB)</b>		
1	Instruction to Bidders	Volume I
3	Conditions of Contract	
4	Contract Data	
5	Specifications	Volume II
9	Drawings	Volume IV

### 13. Bid Prices

- 13.1 The Contract shall be for the whole works as described in Sub-Clause 1.1, based on the priced Bill of Quantities submitted by the Bidder.
- 13.2 The bidder shall fill in rates and prices and line item total (both in figures and words) for all items of the Works described in the Bill of Quantities along with total bid price

(Both in figures and words). Items for which no rate or price is entered by the bidder will not be paid for by the Bill of Quantities.

18. The rates to be quoted by the contractor are inclusive of sales GST & all other taxes. No extra payment on this account will be made to the contractor.

13.3 Deleted

**13.4** The rates and prices quoted by the bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of Clause 47 of the Condition of Contract **(Irrespective of the time limit and Bid Amount)**

#### **14. Currencies of Bid and Payment**

14.1 The unit rates and the prices quoted by the bidder shall be entirely in Indian Rupees. All payments shall be made in Indian Rupees.

#### **15. Bid Validity**

15.1 Bids shall remain valid for a period of not less than 120 days after the deadline date for bid submission specified in Clause 20.

15.2 In exceptional circumstances, prior to expiry of the original time limit, the Employer may request that the bidders may extend the period of validity for a specified period. A bidder may refuse the request without forfeiting his bid security. A bidder agreeing to the request will not be required or permitted to modify his bid, but will be required to extend the validity of his security for a period of the extension, and in compliance with Clause 16 in all respects.

#### **#16. Bid Security**

16.1. The Bidder shall furnish, as part of his Bid, a Bid security in the amount as shown in column 4 of the table of IFB for this particular work. This Bid security shall be in favor of **The Chief Officer Khambhat Nagarpalika** payable at **Khambhat** as named in Appendix and may be in one of the following forms;

- a. Bank Guarantee from any scheduled Indian bank, in the format given in Volume III. **(Bank Guarantee is applicable only for Bid Estimated Amount of 01 Crore and above)** and Bank Guarantee of Schedule and Private Banks shall be considered as per GoG Finance Department's Circular No. FD/MSM/e- file/4/2023/0057/D.M.O. Date 21/04/2023 or as per their latest amendment.
- b. Fixed Deposit Receipt issued by any Scheduled Indian Bank or a foreign Bank approved by the Reserve Bank of India.

**OR**

~~# A Valid Bid Security / EMD Exemption Certificate issued by (1) Road & Building Department or (2) Narmada Water Resources, Water Supply and Kalpsar Department of Govt of Gujarat. Exemption Certificate is applicable only when Registration Certificate of Appropriate Class and Category of Approved Contractors is required as eligible criteria of bidder.~~



- 16.2. Bank guarantees (and other instruments having fixed validity) issued as surety for the bid shall be valid for 45 days beyond the validity of the bid i.e. total validity of  $120+45 = 165$  Days.
- 16.3. Any bid not accompanied by an acceptable Bid Security and not secured as indicated in Sub-Clauses 16.1 and 16.2 above shall be rejected by the Employer as non-responsive.
- 16.4. The Bid Security of unsuccessful bidders will be returned within 28 days of the end of the bid validity period specified in Sub-Clause 15.1
- 16.5 The Bid Security of the successful bidder will be discharged when the bidder has signed the Agreement and furnished the required Performance Security.
- 16.6. The bid Security may be forfeited
  - (a) If the Bidder withdraws the bid after Bid opening during the period of Bid validity.
  - (b) If the Bidder does not accept the correction of the Bid Price, if any or
  - (c) In the case of a successful Bidders, if the Bidder fails the specified time limit to
    - (i) Sign the Agreement; or
    - (ii) Furnish the requirement Performance Security.
  - (d) #If found necessary, the bidder will be intimated for negotiation, He will be intimated maximum three times within the validity period for negotiation, If contractor does not respond in time, his Bid Security (EMD) will be forfeited and his tender will be rejected. Punitive action will be taken on such contractors. (As per GoG R&B Dept's Gr. No. S/22/2017/6369/D, Dt.08/06/2018)

## **17. Alternative Proposals by Bidders.**

- 17.1. Bidders shall submit offers that fully comply with the requirements of the bidding documents, including the conditions of contract (including mobilization advance or time for completion), basic technical design as indicated in the drawing and specifications. Conditional offers or alternative offers will not be considered further in the process of tender evaluation.

## **18. Format and Signing of Bid**

- 18.1. The Bidder shall prepare documents comprising the bid as described in Clause 12 of these Instructions to bidder as the "Technical Bid "and "Financial Bid" in separate parts to be uploaded.

## **D. SUBMISSION OF BIDS**

### **19. Deleted**

### **20. Deadline for Submission of the Bids**

20.1. Complete Bids must be received online by the Employer at the tender website specified above not later than the date indicated in appendix.

20.2. The Employer may extend the deadline for submission of bids by issuing an amendment in accordance with Clause 10, in which case all right and obligation of the Employer and the bidders previously subject to the original deadline will then be subject to the new deadline.

### **21. Late Bids**

21.1. Any Bid received by the Employer after the deadline prescribed in Clause 20 will be returned unopened to the bidder.

### **22. Modification and Withdrawal of Bids**

22.1. Bidders may modify or withdraw their bids online before the deadline prescribed in Clause 20 or pursuant to Clause 23.

22.2. Deleted

22.3. No bid shall be modified or withdrawn after the deadline for submission of Bid.

22.4. Withdrawal or modification of a bid between the deadline for submission of bids and the expiration of the original period of bid validity specified in Clause 15.1 above or as extended pursuant to Clause 15.2 may result in the forfeiture of the Bid security pursuant to Clause 16.

## **E. BID OPENING AND EVALUATION**

### **23. Bid Opening**

- 23.1 The Employer will open all the Bids received including modifications made pursuant to Clause 22, in the presence of the Bidders or their representatives who choose to attend at time, date and the place specified in Appendix in the manner specified in Clauses 20 and 23.3, In the event of the specified date of Bid opening being declared a holiday for the Employer, the Bids will be opened at the appointed time and location on the next working day.
- 23.2. Deleted.
- 23.3. The “Technical Bid” shall be opened. The amount, form and validity of the bid security furnished with each bid will be announced. If the bid security furnished does not conform to the amount and validity period as specified in the invitation for bid (ref. Column 4 and paragraph 3), and has not been furnished in the form specified in Clause 16, the technical bid will not be opened.
- 23.4. (i) Subject to confirmation of the bid security by the issuing Bank, the bids accompanied with valid bid security will be taken up for evaluation with respect to the Qualification information and other information furnished in part I of the bid pursuant to Clause 12.1.
- (ii) If required, the bidder will be asked in writing to clarify his Qualification Documents with respect to any required clarification.
- (iii) The bidders will respond in not more than 7 days of issue of the clarification letter.
- (iv) Immediately (usually within 3 or 4 days), on receipt of these clarification the Evaluation Committee will finalize the list of responsive bidders whose financial bids are eligible for consideration.
- 23.5. Deleted
- 23.6 At the time of opening of “Financial Bid”, the names of the bidders were found responsive in accordance with Clause 23.4(iv) will be announced. The bids of only these bidders will be opened. The responsive Bidders’ names, the Bid prices, the total amount of each bid, any discount and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening.
- 23.7 the time of opening of “Financial Bid”, the names of the bidders were found responsive in accordance with Clause 23.4(iv) will be announced. The bids of only these bidders will be opened. The responsive Bidders’ names, the Bid prices, the total amount of each bid, any discount, and such other details as the Employer may consider appropriate, will be announced by the Employer at the opening.
- 23.8 In case bids are invited for more than one package, the order for opening of the “Financial Bid” shall be in order of estimated amount of Bids from highest to lowest.
- 23.9 The Employer shall prepare minutes of the Bid opening, including the information disclosed to those present in accordance with Sub-Clause 23.6.

**24 Process to be Confidential**

- 241 Information relating to the examination, clarification, evaluation, and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process until the award to the successful Bidder has been announced. Any effort by Bidder to influence the Employer's processing of Bids or award decisions may result in the rejection of his Bid.

**25. Clarification of Financial Bids**

- 25.1. To assist in the examination, evaluation, and comparison of Bids, the Employer may, at his discretion, ask any Bidder for clarification of his Bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by e-mail, but no change in the price or substances of the Bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids.
- 25.2 Subject to sub-clause 25.1, no Bidder shall contact the Employer on any matter relating to his Bid opening to the contract is awarded. If the Bidder wishes to bring additional information to the notice of the Employer, it should do so in writing.
- 25.3. Any effort by the Bidder to influence the Employer in the Employer's bid evaluation, bid comparison or contract award decision may result in the rejection of the Bidders' bid.

**26. Examinations of Bids and Determination of Responsiveness**

- 261 During the detail evaluation of "Technical Bid", the Employer will determine whether each Bid (a) meets the eligibility criteria defined in Clause 3 and 4; (b) has been properly signed; (c) is accompanied by the required securities and; (d) is substantially responsive to the requirements of the Bidding document. During the detailed evaluation of the "Financial Bid", the responsiveness of the bids will be further determined with respect to the remaining bid conditions, i.e., priced bill of quantities, technical specifications, and drawings.
- 262 A substantially responsive "Financial Bid" is one which confirms all the terms, conditions and specifications of bidding documents, without material deviation or reservation. A material deviation or reservation is one (a) which affects in any substantial way the scope, quality, or performance of the Works; (b) which limits in any substantial way, inconsistent with the Bidding documents, the Employer's rights or the Bidder's obligations under the Contract; or (c) whose rectification would affect unfairly the competitive position of other Bidders presenting substantially responsive Bids.
- 263 If a "Financial Bid" is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation or reservation.

## **27. Correction of Errors**

27.1. "Financial Bids" determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:

- (a) Where there is a discrepancy between the rates in figures and in words, the rate in words will govern; and
- (b) Where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern.

27.2. The amount stated in the "Financial Bid" will be corrected by the Employer in accordance with the above procedure and the bid amount adjusted with the concurrence of the Bidder in the following manner:

- (a) If the Bid price increases as a result of these corrections, the amount as stated in the bid will be the 'bid price' and the increase will be treated as rebate;
- (b) If the bid price decreases as a result of the corrections, the decreased amount will be treated as the 'bid price'

Such adjusted bid price shall be considered as binding upon the Bidder. If the Bidder does not accept the corrected amount the Bid will be rejected, and the Bid security may be forfeited in accordance with Sub-Clause 16.6 (b).

## **28. Deleted**

## **29. Evaluation and Comparison of Financial Bids**

- 29.1. The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Sub-Clause 26.2.
- 29.2. Deleted.
- 29.3. The Employer reserves the right to accept or reject any variation or deviation. Variation and deviations and other factors, which are in excess of the requirements of the Bidding documents or otherwise result in unsolicited benefits for the Employer, shall not be taken in to account in Bid evaluation.
- 29.4. The estimated effect of the price adjustment conditions under Clause 47 of the Conditions of Contract, during the period of implementation of the Contract, will not be taken in to account in Bid evaluation.
- 29.5. If the Bid of the successful Bidder is seriously unbalanced in relation to the Engineer's estimate of the cost of work to be performed under the contract the Employer may require the Bidder to produce detailed consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the performance security set forth in Clause 34 be increased at the expense of the successful /bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful Bidder under the Contract.
- 29.6. A bid which contains several items in the bill of Quantities which are unrealistically priced low and which cannot be substantiated satisfactorily by the bidder may be rejected as non-responsive.

## **30. Deleted**

## **F. AWARD OF CONTRACT**

### **31. Award Criteria**

- 31.1. Subject to Clause 32, the Employer will award the contract to the Bidder whose Bid has been determined.
- (i) to be substantially responsive to the Bidding documents and who has offered the lowest evaluated Bid Price; and
  - (ii) to be within the available bid capacity adjusted to account for his bid price which is the lowest evaluation in any of the packages opened earlier than the one consideration.
- In no case, the contract shall be awarded to any bidder whose available bid capacity is less than the evaluated bid price, even if the said bid is the lowest evaluated bid. The contract will in such cases be awarded to the next lowest bidder at his evaluation bid price.

### **32. Employer's Right to accept any Bid and to reject any or all Bids**

- 32.1. Notwithstanding Clause 31, the Employer reserves the right to accept or reject any Bid, and to cancel the Bidding process and reject all Bids, at any time prior to the award of contract, without thereby incurring any liability to the affected bidder or Bidder or any obligation to inform the affected Bidder or Bidders of the grounds for the Employer's action.

### **33. Notification of Award and Signing of Agreement**

- 33.1. The Bidder whose Bid has been accepted will be notified of the award by the Employer prior to expiration of the Bid validity period by cable, telex or facsimile confirmed by registered letter. This letter (hereinafter and in the condition of contract called the "Letter of Acceptance") will state the sum that the Employer will pay the Contractor in consideration of the execution, completion, and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Contract called the "Contract Price").
- 33.2 The notification of award will constitute the formation of the contract, subject only to the furnishing of a performance security in accordance with the provisions of Clause.
- 33.3. The Agreement will incorporate all agreements between the Employer and the successful Bidder. It will be signed by the Employer and to the successful Bidder, within 28 days following the notification of award along with the Letter of Acceptance. Within 21 days of receipt, the successful Bidder will sign the Agreement and deliver it to the Employer.
- 33.4. Upon the furnishing by the successful Bidder of the Performance Security, the Employer will promptly notify the other Bidders that their Bids have been unsuccessful.

### **34. Performance Security**

- 34.1. (A) Within 10 (Ten) days of receipt of Letter of Acceptance, the successful Bidder shall furnish to the Employer an irrevocable and unconditional guarantee from a Bank in the form set forth in Section 8 (the "Performance Security") for an amount equal to 5% (five percent) of its Contract Price. In case of bids mentioned below, the successful Bidder, along with the Performance Security,

shall also furnish to the Authority an irrevocable and unconditional guarantee from a Bank in the same form given at Section 8 towards an Additional Performance Security (The "Additional Performance Security") for an amount calculated as under:

- (a) If the Contract Price offered by the Selected Bidder is lower than 10% but upto 20% of the Estimated Project Cost, then the Additional Performance Security shall be calculated @ 20% of the difference in the (i) Estimated Project Cost (as mentioned in Bid Document) - Minus 10% of the Estimated Project Cost and (ii) Contract Price offered by the selected Bidder.
  - (b) If the Contract Price offered by the Selected Bidder is lower than 20% of the Estimated Project Cost, then the Additional Performance Security shall be calculated @ 30% of the difference in the (i) Estimated Project Cost (as mentioned in Bid Document) - Minus 10% of the Estimated Project Cost and (ii) Contract Price offered by the selected Bidder.
  - (c) This Additional Performance Security shall be treated as part of the Performance Security.
- (B) The Performance Security shall be valid beyond 60(sixty) days of the Defects Liability Period and the Additional Performance Security shall be valid beyond 28 (twenty-eight) days of Project Completion Date.

- 34.2. If the performance security is provided by the successful Bidder in the form of a Bank Guarantee, it shall be issued either (a) at the Bidder's option, by a Nationalized/Scheduled Indian bank or (b) by a foreign bank located in India and acceptable to the Employer. As per GoG Finance Department's Circular No. FD/MSM/e-file/4/2023/0057/D.M.O. Date 21/04/2023 or as per their latest amendment.
- 34.3. Failure of the successful Bidder to comply with the requirement of Sub-Clause 34.1 shall constitute sufficient grounds for cancellation of the award and forfeiture of the Bid Security.

### **~~35 — Advance Payment and Security~~**

- ~~35.1 — The Employer will provide an Advance payment on the Contract Price as stipulated in the Conditions of Contract, subject to maximum amount, as stated in the Contract Data.~~

### **36. Dispute Review Expert**

The Employer proposes that [name of proposed Dispute Review Expert as indicated in Appendix] be appointed as Dispute Review Expert under the Contract, at a daily fee as indicated in Appendix plus reimbursable expenses. If the Bidder disagrees with this proposal, the Bidder should so state in the Bid. If in the Letter of Acceptance, the Employer has not agreed on the appointment of the Dispute Review Expert, the Dispute Review Expert shall be appointed by the Council of Indian Roads Congress at the request of either party.

### **37. Corrupt or Fraudulent Practices**

- 37.1 The Employer will reject a proposal if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices in completing for the contract in question and will declare the firm ineligible, either indefinitely or for a stated period of time, to be awarded a contract with National Highways Authority of India/ State PWD and any other agencies, if it at any time determines that the firm has engaged in corrupt or fraudulent practices in completing for the contractor, or in execution.
- 37.2 Furthermore, Bidders shall be aware of the provision stated in Sub- Clause 59.2 of the Conditions of Contract.

## APPENDIX TO ITB

### Clause Reference

### With respect to

### Section -I

1.	The Name of the Employer is The Chief Officer Khambhat Nagar Palika Khambhat.	[ Cl.1.1]
2.	The last five financial years.	
	2024 - 25	
	2023 - 24	
	2022 - 23	
	2021 - 22	
	2020 - 21	
3.	This Annual Financial Turnover Amount is Rs.....	[Cl.4.5.3(a)]
4.	Value of Work is Rs.	
5.	Deleted	
6.	The cost of electric work is Rs.....	
7.	The cost of water supply / sanitary works is Rs.	0
8.	Liquid assets and / or availability of credit facilities is Rs.....	[Cl. 4.5.6 ]
9.	Price level of the financial year 2024-25	[Cl. 4.5.2]
10.	The pre-bid meeting will take place at The Chief Officer Khambhat Nagarpalika Khambhat	[Cl. 9.2.1]
11.	The technical Bid will be opened through website <a href="https://tender.nprocure.com">https://tender.nprocure.com</a> on <b>dt 07/08/2026 at 12.00 AM/PM</b>	
12.	Address of the Employer: The Chief Officer Khambhat Nagarpalika Khambhat Three Darwaja, Khambhat -388620 ( di-Anand) Phone (o) 02698-221300	
13.	Deleted	
14.	The bid should be submitted latest by 29/07/2026 at 18.00 hrs. As stated on online NIT.	[Cl. 20.1 & 20.2]
15.	The bid will be opened at <a href="https://www.tender.nprocure.com">https://www.tender.nprocure.com</a> on 07/08/2026 at 12.00 Hrs ( time and date) As stated on online NIT	[Cl. 23.1 ]
16.	The Bank Draft in favor of The Chief Officer Khambhat Nagarpalika and Payable at Khambhat	
17.	Deleted	
18.	Escalation factors (for the cost of works executed and financial figure to a common base value) for works completed.	[Cl.4.5.2]

<b><u>Year</u></b>	<b><u>Financial Year</u></b>	<b><u>Multiplying factor</u></b>
Base year of inviting tender	2026-27	1.00
-1	2025-26	1.10
-2	2024-25	1.21
-3	2023-24	1.33
-4	2022-23	1.46
-5	2021-22	1.61



## #LIST OF KEY PLANT & EQUIPMENT TO BE DEPLOYED ON CONTRACT WORK

[Reference CL. 4.5.5]

The contractors shall also give a list of machineries in his possession and which they propose to use on the work.

Sr. No.	Plant or Machinery	Location	Age of Machinery (maximum m 15years)	Make	Capacity	Approximate Value	Remark
1	2(a)	2(b)	3	4	5	6	7

## **List of Key Personnel to be deployed on Contract Work**

### **(Reference Cl. 4.5.4)**

#### **# Employment of a qualified site Engineer by the Contractor.**

The Contractor shall employ full-time technically qualified staff during the execution of this work as under: -

1. Two graduate Civil Engineers and three diploma Civil Engineers when cost of the work to be executed is more than Rs.50 lakhs.
2. **One graduate & two Diploma, Civil Engineers when the cost of the work to be executed is more than Rs.15 lakhs but less than Rs.50 lakhs.**
3. Minimum one Diploma Civil Engineer when the cost of work is less than Rs.15 lakhs but more than Rs.5 lakhs.
4. Minimum two Diploma Civil Engineers for the work when the cost of work to be executed is less than Rs. 5 lakhs. The Engineer so employed for the Government work must have sufficient experience to handle the work independently. Such an Engineer shall have to stay at the site of work and he shall not be entrusted with other duty except this work.

In case the contractor or partner of the contractor firm is a Civil Graduate Engineer, Employment of a separate Engineer will not be necessary provided that the Engineer partner himself attends the execution of the work on the site.

Within 15 days of issue of work-order the Contractor will have to furnish to the Chief Officer -in-charge of the work the Name, Qualifications, copy of marksheet, Colour Photograph and the appointment order issued such engineers engaged for this contract work. If 15 days after issue of work order such designated Site Engineers do not resume or do not remain present on site of work, the recovery at the rate of Rs.15,000-00 per month per Engineer will be made from the bills/deposit/dues of the contractor. Such recovery shall be non-refundable.

**SECTION - 2**

**QUALIFICATION INFORMATION**

## **QUALIFICATION INFORMATION**

The information to be filled in by the Bidder in the following pages will be used for the purpose of post qualification as provided for in Clause 4 of the Instruction to Bidders. This information will not be incorporated in the Contract.

### **1. For Individual Bidders**

#### **1.1 Constitution or legal status of Bidder (Attach Copy)**

Place of registration \_\_\_\_\_

Principal place of business \_\_\_\_\_

Power of attorney of signatory of Bid

(Attach)

#### **1.2 Total value of Civil engineering constructions Work performed in the last five years (in Rs. Lakhs)**

2025-26

2024-25

2023-24

2022-23

2021-22

#### **1.3.1 Work performed as prime contractor, work performed in the past as a nominated sub-contractor will also be considered the sub-contract involved execution of all main items of work described in the bid documents, provided further that all other qualification criteria are satisfied (in the same name) on works of a similar nature over the last five years\*\* and in current year before the submission of the bid.**

Project Name	Name of the Employer	Description of work	Contract No.	Value of contract (Rs. Crore)	Date of issue of work order	Stipulated period of completion	Actual date of completion*	Remark explaining reasons for delay & work Completed

\* Attach certificate(s) from the Engineer(s)in-charge

\*\* Immediately preceding the financial year in which bids are received.

#1.3.2 Quantities of work executed as prime contractor, work performed, in the past as a nominated sub-contractor, will also be considered provided the sub-contract involved execution of all main items of work described in the bid document, provided, further that all other qualification criteria are called (in the same name and style) in the last five years\*\* and in current year before the submission of the bid.

Year	Name of the work	Name of the Employer	Quantity of work performed (Cum/MT)				Remarks* (indicate contract Ref)
			Cement Concrete (Including RCC & PCC)	Masonry	Earth Works	Bituminous Work	
2025-26							
2024-25							
2023-24							
2022-23							
2021-22							

1.4 Information on Bid Capacity (works for which bids have been submitted and works which are yet to be completed) as on the date of this bid.

(A) Existing commitments and on-going works:

Description of works	Place & State	Contract No.	Name & Address of Employer	Value Contract (Rs. Cr)	Stipulated Period of Completion	Value of Works* remaining to be completed (Rs. Cr)	Anticipated of completion
1	2	3	4	5	6	7	8

\*Attach certificate (s) from the Engineer(s) in-charge

\*\* Immediately preceding the financial year in which bids are received.

- 1.5 Availability of key items of Contractors Equipment for carrying out the works (Ref. Clause 4.5.5). The Bidder should list all the information requested below.

Item of Equipment	Requirement		Availability Proposals			Remarks (from whom to be purchased)
	NO	Capacity	Owned/ Leased to be procured	Nos/. Capacity	Age/ Conditions	

- 1.6 Qualifications and experience of key personnel required for administration and execution of the contract. Attach biographical data. Refer also to Sub Clause 9.1 of the Conditions of Contract.

<b>Position</b>	<b>Name</b>	<b>Qualification</b>	<b>Year of Experience (General)</b>	<b>Year of experience in the proposed position</b>

- 1.7 Proposed sub-contract and firms involved

<b>Sections of the works</b>	<b>Value of Sub-Contractor</b>	<b>Sub-Contractor (Name &amp; Address)</b>	<b>Experience in similar work</b>

- 1.8 Attach copies of certificates on possession of valid license for executing water supply/ sanitary work/ building electrification works.
- 1.9 Financial reports for the last five years: balance sheets, profit and loss statements, Auditors' reports (in case of companies/corporations), etc. List them below and attach copies.
- 1.10 Evidence of access to financial resources to meet the qualification requirements: Cash in hand, lines of credit, etc. List them below and attach copied documents.
- 1.11 Name, address, and telephone, telex, and fax numbers of the Bidders bankers who may provide references if contacted by the Employer.

1.12 Information on Litigation history in which the Bidder is involved.

Other Party (ies)	Employer		Cause of Dispute	Amount Involved	Remarks showing Present Status

1.12. Statement of compliance under the requirements of Sub Clause 3.2 of the instruction to Bidders. (Name of Consultant engaged for project preparations is \*.....)

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1.13 Proposed work method and schedule. The Bidder should attach descriptions, drawings and charts as necessary to comply with the requirements of the Bidding documents. (Refer ITB Clause 4.1)

1.14 Programme

**2. Deleted**

**3. Additional Requirements**

3.1 Bidders should provide any additional information required to fulfill the requirements of Clause 4 of the Instructions to the Bidders, if applicable.

- (i) Affidavit
- (ii) Undertaking

\* Fill the name of Consultant



**SAMPLE FORMAT FOR EVIDENCE OF ACCESS TO OR  
AVAILABILITY OF CREDIT FACILITIES**

(CLAUSE 4.5.6 OF ITB)

**BANK CERTIFICATE**

This is to certify that M/s. \_\_\_\_\_ is a reputed company with a good financial standing.

If the contract for the work, namely \_\_\_\_\_ is awarded to the above firm, we shall be able to provide overdraft/credit facilities to the extent of Rs. \_\_\_\_\_ to meet their working capital requirements for executing the above during the contract period.

\_\_\_\_\_

(Signature)

Name of Bank

Senior Bank Manager

Address of the Bank

## AFFIDAVIT

1. I, the undersigned, do hereby certify that all the statements made in the required attachments are true and correct.
2. The undersigned also hereby certifies that neither our firm M/s. \_\_\_\_\_  
\_\_\_\_\_ have not abandoned any work of Government of Gujarat/Government of India/any Board or Corporation under Government of Gujarat/Government of India nor any contract awarded to us for such works have been rescinded, during last five years prior to the date of this bid.
3. The undersigned hereby authorize(s) and request (s) any bank, person, firm or corporation to furnish pertinent information deemed necessary and requested by the Department to verify this statement or regarding any (our) competence and general reputation.
4. The Undersigned understands and agrees that further qualifying information may be requested, and agrees to furnish any such information at the request of the Department/ Project implementing agency.

\_\_\_\_\_

(Signed by an Authorized Officer of the Firm)

\_\_\_\_\_

Title of Officer

\_\_\_\_\_

Name of Firm

\_\_\_\_\_

Date

## UNDERTAKING

I, the undersigned do hereby undertake that our firm  
M/s.....would invest a minimum cash  
up to 25% of the value of the work during implementation of the contract.

\_\_\_\_\_  
(Signed by an Authorized officer of the firm)

\_\_\_\_\_  
Title of officer

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

\_\_\_\_\_  
DATE

**ANTI-BLACKLISTING INFORMATION**  
**(On Stamp Paper Rs. 300) Notarized.**

M/s \_\_\_\_\_ hereby certify and confirm that I or any of our Partner/ Promoter/s/director/s are not barred by Government of Gujarat (GOG)/any other entity of GOG or blacklisted by any State Government or Central Government/Department/Agency in India or from abroad from participating in Work/s, as individually/Partnership Firm as on Dt. \_\_\_\_\_ We further confirm that we are aware that our bid for the captioned tender would be liable for rejection in case any material misrepresentation is made or discovered about the requirements of this tender at any stage of the bidding process or thereafter during the agreement period. Dated this \_\_\_\_\_ day of, 2026.

Name of the Bidder:

Signature of the Authorized person:

Name of the Authorized Person:

**SECTION - 3**  
**CONDITIONS OF CONTRACT**

# Conditions of Contract

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## CONDITIONS OF CONTRACT

### A. GENERAL.

#### 1. Definitions

- 1.1 Terms which are defined in the Contract Data are not also defined in the Conditions of Contract but keep their defined meaning.

**Bill of Quantities** means the priced and completed Bill of Quantities forming part of the Bid

**Compensation Events** are those defined in Clause 44 hereunder

The **Completion Date** is the date of completion of the Works as certified by the Engineer in accordance with Sub Clause 55.1

The Contract is the contract between the Employer and Contractor to execute, complete and maintain the Works **till the completion of Defects Liability Period**. It consists of the documents listed in Clause 2.3 below.

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

The **Contractor** is a person or corporate body who's Bid to carry out the Work has been accepted by the Employer.

The **Contractor's Bid** is the completed Bidding document submitted by the Contractor to the Employer and includes Technical and Financial Bids.

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

**Days** are calendar days: **months** are calendar months.

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

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

**The Engineer** is the person named in the Contract Data (or any other competent person appointed and notified to the contractor to act in replacement of the Engineer) who is responsible for supervising the Contractor, administering the Contract, certifying payments due to the Contractor, issuing and valuing Variations to the Contract, awarding extensions of time, and valuing the Compensations Events.

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

The **Initial Contract Price** is the Contract Price listed in the Employer's Letter of Acceptance.



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

**Materials** are all supplies, including consumables, used by the contractor for incorporation in the works.

**Plant** is any integral part of the work which is to have mechanical, electrical, electronic or chemical or biological functions.

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

**Site Investigation Reports** are those which were included in the Bidding documents and are factual interpretive reports about the surface and subsurface conditions at the site.

**Specifications** means the Specifications of the works included in the Contract and any modification or addition made or approved by the Engineer.

The **Start Date** is given in the Contract Data. It is the date when the Contractor shall commence execution of the works. It does not necessarily coincide with any of the Site Possession Dates.

A **Subcontractor** is a person or corporate body who has a Contract with the Contractor to carry out a part of the work in the Contract which includes work on the Site.

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

A **Variation** is an instruction given by the Engineer, which varies the Works. The

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

## **2. Interpretation**

2.1 In interpreting these Conditions of Contract, singular also means plural, male also means female or neuter and the other way around. Heading have no significance. Words have their normal meaning under the language of the Contract unless specifically defined. The Engineer will provide instructions clarifying queries about Conditions of Contract.

2.2 If sectional completion is specified in the Contract Data, references in the Conditions of Contract to the Works, the Completion date, and Intended Completion Date apply to any Section of the Works (other than references to the Completion Date and Intended Completion date for the whole works)

2.3 The documents forming the Contract shall be interpreted in the following order of priority

- (1) Agreement
- (2) Letter of Acceptance, notice to proceed with works
- (3) Contractor's Bid

- (4) Contract Data
- (5) Conditions of Contract including Conditions of Contract
- (6) Specifications
- (7) Drawings
- (8) Bills of quantities and
- (9) Any other document listed in the Contract Data as forming part of the Contract.

### **3. Language and Law**

- 3.1 The language of the Contract and the law governing the Contract are stated in the Contract Data.

### **4. Engineers Decisions**

- 4.1 Except where otherwise specifically stated, the Engineer will decide contractual matters between the Employer and the Contractor in the role representing the Employer.

### **5. Delegation**

- 5.1 The Engineer may delegate any of his duties and responsibilities to other people after notifying the Contractor and may cancel any delegation after notifying the Contractor.

### **6. Communications**

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

### **7. Sub-Contracting**

- 7.1 The Contractor may subcontract any portion of work, up to a limit specified in contract data, with the approval of the engineer but may not assign the Contract without the approval of the Employer in writing. Subcontracting shall not alter the Contractor's obligations. **Sub-contracting of supply or specific items of work is not allowed.**
- 7.2 The sub-contractor must be registered in appropriate class and category for the part of work to be subcontracted.

### **8. Other Contractors**

- 8.1 The Contractor shall cooperate and share the Site with other contractors, public authorities, utilities and the Employer between the dates given in the Schedule of other Contractor. The Contractors shall as refer to in the Contract Data, also provide facilities and services for them as described in the Schedule. The employer may modify the schedule of other contractors and shall notify the contractor of any such modifications.

## **9. Personnel**

- 91 The Contractor shall employ the key personnel named in the Schedule of Key Personnel as referred to in the Contract Data to carry out the functions stated in the Schedule or other personnel approved by the Engineer. The Engineer will approve any proposed replacement of key personnel only if their qualifications, abilities, and relevant experience are substantially equal to or better than those of the personnel listed in the Schedule.
- 92 If the engineer asks the Contractor to remove a person who is a member of the Contractor Staff or his work force stating the reasons the Contractor shall ensure that the person leaves the Site within seven days and has no further connection with the work in the Contract.

## **10. Employer's and Contractors Risks**

- 10.1 The Employer carries the risk which these Contract states are Employer's risks, and the Contractor carries the risks which these Contracts states are Contractors risk.

## **11. Employer's Risks**

- 11.1 The employer is responsible for the excepted risks which are (a) in so far as they directly affect the execution of the Works, the risks of war, hostilities, invasion, act of foreign enemies, rebellion, revolution, insurrection or military or usurped power, civil war, riot commotion or disorder (unless restricted to the Contractor's employees), and contamination from any nuclear fuel or nuclear waste or radioactive toxic explosive.

## **12. Contractor's Risks**

- 12.1 All risks of loss of or damages to physical property and of personal injury and death which arise during and in consequence of the performance of the Contract other than the excepted risks are the responsibility of the Contractor.

## **13. Insurance**

- 13.1 The Contractor shall provide, in the joint names of the Employer and the Contractor, insurance cover from the Start date to the end of the Defects Liability Period, in the amounts and deductibles stated in the Contract data for the following events which are due to the Contractor's risks:
- (a) Loss of or damage to the works, Plant and materials,
  - (b) Loss of or damage to Equipment
  - (c) Loss of or damages of property (except the Works, Plant, Materials and Equipment) in connection with the Contract; and
  - (d) Personal injury or death.
- 13.2 Policies and certificates for insurance shall be delivered by the Contractor to the Engineer for the Engineer's approval before the Start Date. All such insurance shall provide for compensation to be payable in the types and proportions of currencies required to rectify the loss or damage incurred.

133 If the Contractor does not provide any of the policies and certificates required, the Employer may affect the insurance which the Contractor should have provided and recover the premiums the Employer has paid from payments otherwise due to the Contractor or, if no payment is due, the payment of the premiums shall be a debt due.

134 Alterations to the terms of an insurance shall not be made without the approval of the Engineer.

135 Both parties shall comply with any conditions of the insurance policies.

#### **14. Site Investigation Report**

14.1 The Contractor in preparing the Bid shall rely on any site Investigation reports referred to in the Contract Data, supplemented by any information available to the Bidder.

#### **15. Queries about the Contract data**

15.1 The engineer will clarify queries on the Contract Data

#### **16. Contractor to Construct the Works**

16.1 The Contractor shall construct and install the works in accordance with the specification and Drawings.

#### **17. The Works to be completed by the Intended Completion Date**

17.1 The Contractor may commence execution of the Works on the Start Date and shall carry out the Works in accordance with the programme submitted by the Contractor, as updated with the approval of the Engineer, and complete them by the Intended Completion date

#### **18. Approval by the Engineer**

18.1 The Contractor shall submit Specifications and Drawings showing the proposed Temporary works to the Engineer, who is to approve them if they comply with the Specifications and drawings.

18.2 The Contractor shall be responsible for design of temporary works.

18.3 The Engineer's approval shall not alter the contractor responsibility for design of the Temporary works.

18.4 The Contractor shall obtain approval of third parties to the design of the Temporary works where required.

18.5 All Drawings prepared by the Contractors for the execution of the temporary or permanent work are subject to prior approval by the Engineer before their use.

#### **19. Safety**

19.1 The Contractor shall be responsible for the safety of all activities on the Site.

## **20. Discoveries**

- 20.1 Anything of historical or other interest or of significant value unexpectedly discovered on the site is the property of the Employer. The contractor is to notify the engineer of such discoveries and carry out the Engineer's instructions for dealing with them.

## **21. Possession of the Site**

- 21.1 The Employer shall give possession of all parts of the site to the Contractor. If possession of a part is not given by the date stated in the Contract Data the Employer is deemed to have delayed the start of the relevant activities and this will be a Compensation Event.
- 21.2 If within 25% of the time limit of the project, 80% of possession of the site is not handed over to the Contractor, then contractor/ Employer may fore-close the contract. Contractor/Employer has to foreclose the work within 30 days after lapse of 25%-time limit and after 30 days foreclosure option will be closed.

## **22. Access to the Site**

- 22.1 The Contractor shall allow the Engineer and any person authorized by the Engineer access to the Site, to any place where work in connection with the Contract is being carried out or is intended to be carried out and to any place where materials or plants are being manufactured/ fabricated/ assembled for the works.

## **23. Instructions**

- 23.1 The Contractor shall carry out all instructions of the Engineer pertaining to works which comply with the applicable laws where the site is located.
- 23.2 The Contractor shall permit the Employer to inspect the Contractor's accounts and records relating to the performance of the Contractor and to have them audited by auditors appointed by the Employer, if so required by the Employer.

## **24. Disputes**

- 24.1 If the Contractor is of the view that a decision taken by the Engineer was either outside the authority given to the Engineer by the Contract or that the decision was wrongly taken, the decision shall be referred to **#Superintending Engineer** (Higher Authority) within 14 days of the notification of the Engineer's decision. If the issue is not resolved, any party can refer the matter for conciliation within 15 days from the decision given by the **#Superintending Engineer**.
- 24.2
- (a) For the work up to Rs.100 Cr., if any of the parties is not satisfied with the decision of the **#Superintending Engineer**, both the parties have to refer to the Chief Engineer concern for the conciliation process.
  - (b) For the work more than Rs.100 Cr., if any of the parties is not satisfied with the decision of the **#Superintending Engineer**, both the parties have to refer to the **#Secretary, Roads & Building Department, Government of Gujarat** for the conciliation process.

If the dispute is not resolved through the conciliation process, he may refer the dispute to Gujarat Public Works Contract Dispute Arbitration Tribunal. If the Contractor fails to refer a claim / dispute to the Higher Authority within 14 days of the notification of the Engineer's decision, the Contractor shall not be entitled to any additional payment/claim if he doesn't follow the above sequence in stipulated time and he should not stop the work.

**25. Procedure for Disputers**

25.1 The arbitration shall be conducted in accordance with the arbitration procedure stated in the Special Conditions of Contract.

**26. Deleted**

## **B. TIME CONTROL**

### **27. Programme**

- 27.1 Within the time stated in the Contract Data the Contractor shall submit to the Engineer for approval a Programme showing the general methods, arrangements orders, and timing for all the activities in the works along with monthly cash flow forecast.
- 27.2 An update of the Programme shall be a programme showing the actual progress achieved on each activity and the effect of the progress achieved on the timing of the remaining work including any changes to the sequence of the activities.
- 27.3 The Contractor shall submit to the Engineer, for approval an updated programme at intervals no longer than the period stated in the Contract data. If the Contractor does not submit an updated programme within this period, the Engineer may withhold the amount stated in the Contract data from the next payment after the date on which the overdue programme has been submitted.
- 27.4 The Engineer's approval of the programme shall not alter the Contractor's obligations. The Contractor may revise the programme and submit it to the Engineer again at any time. A revised programme is to show the effect of Variations and Compensations events.

### **28. Extension of the Intended Completion Date**

- 28.1 The Engineer shall extend the Intended Completion Date if a compensation Event occurs or a Variation is issued which makes it impossible for completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work and which would cause the Contractor to incur additional cost.
- 28.2 The Engineer shall decide whether and by how much to extend the Intended Completion Date within 35 days of the Contractor asking the Engineer for a decision upon the effect of a compensation event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.
- 28.3 The Engineer shall within 14 days of receiving full justification from the contractor for extension of Intended Completion Date refer to the Employer his decision. The employer shall in not more than 21 days communicate to the engineer the acceptance or otherwise of the Engineer's decision. If the employer fails to give his acceptance, the Engineer shall not grant the extension and the contractor may refer the matter under Clause 24.1

### **29. Deleted**

### **30. Delays Ordered by the Engineer**

- 30.1 The Engineer may instruct the Contractor to delay the start or progress of any activity within the works.

**31. Management Meetings**

- 31.1 Either the Engineer or the Contractor may require the other to attend a management meeting. The business of a management meeting shall be to review the plans for remaining work and to deal with matters raised in accordance with the early warning procedure.
- 31.2 The Engineer shall record the business of management meetings and is to provide copies of his record to those attending the meeting and to the Employer. The responsibility of the parties for actions to be taken is to be decided by the Engineer either at the management meeting or after the management meeting and stated in writing to all who attended the meeting.

**32. Early Warning**

- 32.1 The Contractor is to warn the Engineer at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract price or delay the execution of works. The Engineer may require the contractor to provide an estimate of the expected effect of the future event or circumstance on the contract price and completion date. The estimate is to be provided by the Contractor as soon as reasonably possible.
- 32.2 The Contractor shall cooperate with the Engineer in making and considering proposals for how the effect of such an event or circumstance can be avoided or reduced by anyone involved in the work and in carrying out any resulting instruction of the Engineer.



## C.QUALITY CONTROL

### **# 33. Identifying Defects/ Defect liability period**

33.1 : Defect liability period: The contractor shall be responsible to make good and remedy at his own expense any defect which may develop or may be noticed before the period mentioned hereunder from the certified date of completion. The Engineer in charge shall give the contractor a notice in writing about the defects and the contractor shall make good the same within 15 days of receipt of the notice. In the case of failure on the part of the contractor, the Engineer-in-charge may rectify or remove or re-execute the work at the risk & cost of the contractor. The Engineer-in-charge shall be entitled to appropriate the whole or any part of the amount of security deposit towards the expenses, if any, Incurred by him in rectification, removal or re-execution. The Defects Liability period shall be as under....

- (a) For all works costing up to Rs. 50,000 (amount put to tender), the period shall be 3 Months from the certified date of completion.
  - (b) For all works costing more than Rs. 50,000 and up to Rs. 1 crore (amount put tender), the period shall be 12 (Twelve) months from the certified date of completion or one monsoon, whichever is later.
  - (c) For major projects costing more than Rs. 1 crore, the period shall be 36 Months from the certified date of completion which should include three monsoons.
  - (d) For original building works the defect liability period will be 4 years or elapse of 4 monsoon period following date of possession of building taken over by user agency following the certified date of completion, whichever is later.
- For the purpose of deciding the monsoon period, the 30th September shall be treated as the last date.

Modified vide R & B D Circular No. PAC-11-102008-2076-N dated 31/8/2009, PRCH/102013(2976) 2759-N, Dated 27/05/2013 and Circular No.TNC/10/2016/Clause 17A (Correction/(1)C Dated 12/05/2016]

### **33.2 Free maintenance guarantee period for works of Road/Bridge construction**

- (a) For resurfacing work of road free maintenance guarantee period one year from the date of completion.
- (b) In case of widening of the road/strengthening of the road/bridge, the contractor shall have to give four years free maintenance guarantee from the certified date of completion. During this period the contractor shall visit the site every six months along with the concerned Section Officer / Chief officer and will examine the work already carried out in this contract like road work, jungle cutting, side shoulders, side gutter, road furniture, patta etc. and will prepare Km. wise inspection report duly signed by all concerned and any defect observed shall be done within 15 days by the contractor at his risk and cost as per the direction of Engineer in charge. The contractor needs to do videography of these visits and require to submit at the time of release of FMG. If B.T. the surface during the maintenance period of 4 years is worn out then agency shall have to provide renewal coating as per tender item as directed by the Engineer-in- charge. The amount equivalent to 5% of each running bill shall be withheld and will be released after the free maintenance guarantee period (i.e. 4 years) is over.

However, this amount shall be released against fixed deposit or bank guarantee pledged in the name of Chief Officer after completion certificate of work is issued.

(1) The flakiness and elongation index (combined) for coarse aggregates under no circumstances shall exceed the allowable limit set forth in the relevant clause for the material in question.

(2) 2% of the amount eligible for the payment of bituminous items shall be withheld till the miscellaneous items like earthwork in embankment / cutting for side shoulders, side gutters, kilometer / indicator / guard stones, sign boards etc. are completed in all respect by the contractor. After completion of the miscellaneous items, the above said 2% withheld amount shall be released.

(Govt. of Gujarat's G.R. No.: TNC-10-2013-3(Part-3)/C, Dtd. 13/12/2013).

(3) Videography for the surface under Maintenance Guarantee is to be done as per Govt. letter No.: SSR/10/2015-16/26/C, Dtd. 26/11/15 for the work costing more than Rs. 5.00 Crore.

(4) Setting up of adequate laboratory & deployment of quality engineers.

The contractor shall have to set up the laboratory with adequate equipment. Till the setting up of adequate laboratory is completed & reported of this to the engineer (subject to due verification by engineer's representative) by contractor in writing, Rs.2,00,000/- shall be withheld. The qualified quality Engineer shall be deployed exclusively for this contract by the contractors. If quality Engineer is not deployed by contractor within one month after the date of work order, the amount equivalent to Rs.20,000 per month shall be recovered till the actual deployment of quality engineer. The amount so recovered towards the deployment of quality engineers shall not be refunded.

(5) Asphalt work will have to be cross checked as per G.R. No.: RGN/60/2006/35/C, dtd.31/05/07 before final bill is paid.

(6) Maintenance during Construction Period

During the Construction Period, the Contractor shall maintain, at his own risk and cost, the existing lane(s) of the road so that the traffic worthiness and safety thereof are at no time materially inferior as compared to their condition 10 (ten) days prior to the date of the Agreement, and shall undertake the necessary repair and maintenance works for this purpose; provided that the Contractor may, at his cost, interrupt and divert the flow of traffic if such interruption and diversion is necessary for the efficient progress of works and conforms to Good Industry Practice; provided

Further that such interruption and diversion shall be undertaken by the Contractor only with the prior written approval of the Chief Officer which approval shall not be unreasonably withheld. For the avoidance of doubt, it is agreed that the Contractor shall at all times be responsible for ensuring safe operation of the road.

- 33.3 The Engineer shall check the Contractor's work and notify the Contractor of any defects that are found. Such checking shall not affect the Contractor's responsibilities the Engineer may instruct the Contractor to search for a Defect and to uncover and test any work that the Engineer considers may have a Defect.

#### **34. Tests**

- 34.1 If the engineer instructs the Contractor to carry out a test not specified in the Specification to check whether any work has a Defect and the test shows that it does, the Contractor shall pay for the test and any samples. If there is no defect the test shall be a Compensation Event.

- 34.2 #1% of the amount of **work done** should be deducted from R.A. Bill of the contractor for testing the quality of material workmanship, irrespective of actual charges.

- 34.3 Agency has to establish testing laboratory on site for the various test to be carried out in the work for this purpose agency shall construct a pukka laboratory building with all facility on site at location specified by the engineer in charge.

#### **35. Correction of defects**

- 35.1 The engineer shall give notice to the Contractor of any defects before the end of the defects Liability Period, which begins at Completion and is defined in the contract data. The Defects Liability Period shall be extended for as long as Defects remain to be corrected.

- 35.2 Every time notice of a Defect is given, the Contractor shall correct the notified defect within the length of time specified by the Engineer's notice.

#### **36. Uncorrected Defects**

- 36.1 If the Contractor has not corrected a defect within the time specified in the Engineer's notice, the Engineer will assess the cost of having the Defect corrected, and the Contractor will pay this amount.

## **C. COST CONTROL**

### **37. Bill of Quantities**

- 37.1 The bill of Quantities shall contain items for the constructions, installation, testing and commissioning work to be done by the Contractor.
- 37.2 The bill of Quantities is used to calculate the Contract price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item.

### **38. Change in the Quantities**

- 38.1 The Engineer shall have power to make any alterations in or addition to the original specifications , drawings, designs and instructions that may appear to him to be necessary or advisable during the progress of the work and the contractor shall be bound to carry out the work in accordance with any instruction in this connection which may be given to him in writing signed by the Engineer and such alteration shall not invalidate the contract and any additional work which the contractor may be directed to do in the manner above specified as part of the work shall be carried out by the contractor on the same conditions in all respects on which he agreed to do the main work and at the same rate as are specified in the tender for the main work.

Except that when the quantity of any item exceeds the quantity as in the tender by more than 130%, the contractor will be paid for the quantity in excess of 130%, at the rate entered in the SOR of the year during which the excess in quantity is first executed.

### **39. Variations**

- 39.1 All Variations shall be included in updated programmes produced by the Contractor.

### **40. Payments for Variations**

- 40.1 If the additional or altered work includes any class of work for which no rate is specified in this contract, then such class of work shall be carried out as under.
- (i) At the rate derived from the item within the contract which is comparable to the one involving additional or altered class of work; where there are more than one comparable items, the item of the contract which is nearest in comparison with regard to class or classes of the work involved shall be selected and the decision of the Superintending Engineer as to the nearest comparable item shall be final and binding on the contractor.
  - (ii) If the rate cannot be derived in accordance with (i) above, such class of works shall be carried out at the rate entered in the Schedule of Rates of the division

for the year in which the tender was received, increased or decreased by the percentage by which the tender amount is more or less as compared to the amount arrived at the rates in the “Schedule of Rates” of the Division in the year in which the tender was received. If the Schedule of rates of the Division does not contain all the items, the percentage increase or decrease of the tender shall be calculated considering such items which were included in the “Scheduled Rates” of the division for the year and for materials consumed on such item the rate to be charged would be the basic rate taken into account for fixing the rate in S.O.R. referred to above.

- (iii) If it is not possible to arrive at the rate from (i) and (ii) above, such class of work shall be carried out at the rate decided by the competent authorities on the basis of detailed rate analysis after hearing the contractor before a Committee of two Superintending Engineers stationed at the same place or the nearest place.

- 402 If the additional or altered work, for which no rate is entered in the “Schedule of Rates” of the Division is ordered to be carried out before the rate is agreed upon, then the contractor shall within seven days of the date of receipt by him of the order to carry out the work, inform the Engineer-in-charge of the rate, which it is his intention to charge for such class of work and if the Engineer in charge does not agree to this rates, he shall by notice in writing be at liberty to cancel his order to carry out such class of work and arrange to carry it out in such manner as he may consider it advisable, provided always that if the contractor shall commence work or incur any expenditure in regard thereof before the rates shall have been determined as lastly herein before mentioned, then in such cases he shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of the determination of the rate as aforesaid according to such rate or rates as shall be fixed by the Engineer-in-charge. In the event of the dispute, the decision of the Superintending Engineer of the Circle shall be final.

Where, however, the work is to be executed according to the designs, drawings and specifications recommended by the contractor and accepted by the competent authority, the alternation above referred to shall be within the scope of such designs, drawings and specifications appended to the tenders.

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

#### **41. Cash Flow Forecasts**

- 41.1 When the programme is updated, the contractor is to provide the engineer with an updated cash flow forecast.

**42. Payment certificates.**

- 421 The Contractor shall submit to the Engineer monthly statements of the estimated value of the work completed less the cumulative amount certified previously.
- 422 The Engineer shall check the Contractor's monthly statement within 14 days and certify the amount to be paid to the Contractor after taking in to account any credit or debit for the month in question in respect of materials for the works in the relevant amounts and under conditions set forth in sub-clause 32.3 of the Contract Data (secured Advance).
- 423 The value of work executed shall be determined by the Engineer.
- 424 The value of work executed shall comprise the value of the quantities of the items in the Bill of Quantities completed.
- 425 The value of work executed shall include the valuation of variations and compensation events.
- 426 The Engineer may exclude any item certified in a previous certificate or reduce the proportion of any item previously certified in any certificate in the light of later information

**43. Payments**

- 431 Payments shall be adjusted for deductions for advance payments, retention, other recoveries in terms of the contract and taxes at source, as applicable under the law. The Employer shall pay the Contractor the amounts certified by the Engineer within 28 days of the date of each certificate.
- 432 Payment of GST (prevailing rates) on the amount payable under the contract to the Contractor will be made by the Employer. Hence, it is the responsibility of the contractor to pay the GST to the concerned Authority.
- 433 Items of the works for which no rate or price has been entered in will not be paid by the Employer and shall be deemed covered by other rates and prices in the Contract.

**44. Compensation events**

- 441 The following are compensation Events unless they are caused by the Contractor:
- (a) The Employer does not give access to a part of the Site by the site Possession date stated in Contract data to the Contractor
- 442 In case of compensation event occurs and it prevents the work being completed beyond the Intended Completion Date then Authority will approve EOT with eligible contractual price escalation.

#### **45. Tax**

- 45.1 The rates quoted by the Contractor must be inclusive of all taxes prevailing on due date of bid submission including GST. However, any subsequent changes in the tax structure by Government after due date of bid submission will be compensated (+/-) on availability or submission of actual documentation. Contractor will have to intimate Engineer regarding changes occurred in the tax structure after bid submission. If the contractor fails to provide such information and if any financial obligation may arise due to change in tax structure, same will be recovered from the contractor.
- 45.2 GST will not be paid separately on the bills. Hence, it is the responsibility of the contractor to pay the GST to the concerned Authority.

#### **46. Currencies.**

- 46.1 All payment shall be made in Indian Rupees.

#### **47. Price Adjustment**

- 47.1 Contract price shall be adjusted for increase or decrease in rates and price of labor, materials, fuels and lubricants in accordance with the following principles and procedures and as per formula given in the contract data:
- (a) The price adjustment shall apply for the work done from the start date given in the contract data up to end of the initial intended completion date or extensions granted by the Engineer and shall not apply to the work carried out beyond the stipulated time for reasons attributable to the contractor.
  - (b) The price adjustment shall be determined during each month from the formula given in the contract data.
  - (c) Following expressions and meanings during to the work done during each month  
R = Total value of work done during the month. It would include the amount of secured advance granted, if any, during the month less the amount of secured advance recovered, if any during the month. It will exclude value for works executed under variations for which price adjustment will be worked separately based on the terms mutually agreed.
- 47.2 To the extent that full compensation for any rise or fall in costs to the contractor is not covered by the provisions of this or other clause in the contract, the unit rates and prices included in the contract shall be deemed to include amounts to cover the contingency of such other rise or fall in costs.

#### **48. Retention**

- 48.1 The Employer shall retain from each payment due to Contractor the proportion stated in the Contract Data until Completion of the whole of the Works.



- 482 On Completion of the whole of the Works half the total amount retained is repaid to the Contractor and half when the Defects Liability Period has passed and the Engineer has certified that all Defects notified by the Engineer to the Contractor before the end of this period have been corrected.
- 483 On completion of the whole works, the contractor may substitute retention money with an “on demand” Bank guarantee.

In case, Contractor requests for refund of the Retention Money deducted by the Employer under the provision of this clause, Employer shall consider the said request of the Contractor provided that the refund hereunder shall be made in tranches of not less than 1% (One Percent) of the Contract Price and Contractor furnishes an irrevocable and unconditional Bank guarantee for an equal amount substantially in the format of Bank Guarantee for Performance Guarantee enclosed with SBD and valid up to 60 day beyond the scheduled / extended Defects Liability Period. On completion of the whole works, the contractor has however an option to submit a fresh irrevocable and unconditional Bank Guarantee for an amount equal to 5% of the total value of work executed substantially in the format of Bank Guarantee for Performance Guarantee enclosed with SBD and valid up to 60 days beyond the Defect Liability Period and yet refund the Retention Money Bank Guarantee submitted for refund of Retention Money.

#### **49. Liquidated Damages**

- 491 The Contractor shall pay liquidated damages to the Employer at the rate per day stated in the Contract Data for each day that the Completion Date is later than the Intended Completion Date (for the whole works or the milestone as stated in the contract data). The total amount of liquidated damages shall not exceed the amount defined in the Contract Data. The Employer may deduct liquidated damages from payment due to the Contractor. Payment of liquidated damages does not affect the Contractor’s liabilities.
- 492 If the Intended Completion Date is extended after liquidated damages have been paid, the Engineer shall correct any overpayment of liquidated damages by the Contractor by adjusting the next payment certificate. The Contractor shall not be entitled for any interest on the over payment calculated from the date of payment to the date of repayment.
- 493 If the contractor fails to comply with the time for completion as stipulated in the tender, then the contractor shall pay to the employer the relevant sum stated in the Contract Data as Liquidated damages for such default and not as penalty for everyday or part of day which shall elapse between relevant time for completion and the date stated in the taking over certificate of the whole of the works on the relevant section, subject to the limit stated in the contract data.

The employer may, without prejudice to any other method of recovery deduct the amount of such damages from any monies due or to become due to the contractor. The payment or deduction of such damages shall not relieve



the contractor from his obligation to complete the works on from any other of his obligations and liabilities under the contract.

- 49.4 If, before the Time for Completion of the whole of the Works or, if applicable any Section, a Taking Over Certificate has been issued for any part of the Works or of a Section, the liquidated damages for delay in completion of the remainder of the Works or of that Section shall, for any period of delay after the date stated in such Taking-Over-Certificate, and in the absence of alternative provisions in the Contract, be reduced in the proportion which the value of the part so certified bears to the value of the whole of the Works or Section, as applicable. The provisions of this Sub-clause shall only apply to the rate of liquidated damages and shall not affect the limit thereof.

## 50 Bonus

- 50.1 If the contractor achieves completion of the whole of the works prior to the intended Completion Date prescribed in Contract Data the Employer shall pay to the contractor a sum stated in Contract Data as bonus for every completed month **but subjected to maximum amount as stated in Contract Data**; which shall elapse between the date of completion of all items of works as stipulated in the contract, including variations ordered by the Engineer and the time prescribed in Clause 17.
- 50.2 Bonus shall be paid only to works amounting to above INR 5 crore with time limit of the works is equal or more than 6 months. The bonus would be paid as under

% of Time Saved	% of Initial Contract Price entitled for Bonus
50 %	5%
40 %	4%
30 %	3%
20 %	2%
10 %	1%
Less than 10%	0%

## ~~51. Advance Payment.~~

- ~~51.1 The Employer shall make advance payment (not to be paid less than two installments except in special circumstances for which the reason to be Recorded in writing) to the Contractor of the amounts stated in the Contract Date by the date stated in the Contract Date, against provision by the Contractor of an Unconditional Bank Guarantee in a form and by a bank acceptable to the Employer in amounts and currencies equal to be at least 110% of the advance payment. The guarantee shall remain effective until the~~

~~Advance payment has been repaid, but the amount of the guarantee shall be progressively reduced by the amounts repaid by the Contractor. The Mobilization advance would be deemed as interest bearing advance at an interest rate of 10 % to be compounded, quarterly.~~

~~512 The Contractor is to use the advance payment only to pay for Equipment, plant and Mobilization expenses required specifically for execution of the Works. The Contractor shall demonstrate that advance payment has been used in this way by supplying copies of invoices or other documents to the engineer.~~

~~513 The advance payment shall be repaid by deduction proportionate amount from payments otherwise due to the Contractor, following the schedule of completed percentages of the Works on a payment basis. No account shall be taken of the advance payment or its repayment in assessing valuations of work done, variations, price adjustments, Compensation Events, or Liquidated damages.~~

514 Deleted

## **52. Securities**

521 The performance Security (including additional security for unbalanced bids) shall be provided to the Employer no later than the date specified in the Letter of Acceptance and shall be issued in an amount and form and by a bank or surety acceptable to the Employer, and denominated in Indian Rupees. The performance Security shall be valid until a date 60 days from the date of expiry of Defects Liability Period and the additional security for unbalanced bids shall be valid until a date 28 days from the date of issue of the certificate of completion.

## **53. Deleted**

## **54. Cost of Repairs.**

541 Loss or damage to the Works or Materials to be incorporated in the Works between the Start date and the end of Defects Correction periods shall be remedied by the Contractor at the Contractor's cost if the loss or damages arises from the Contractor's acts or omissions.

## **D. FINISHING THE CONTRACT**

### **55. Completion**

- 55.1 The Contractor shall request the Engineer to issue a Certificate of Completion of the works and the Engineer will do so upon deciding that the work is completed.

### **56. Taking Over**

- 56.1 The Employer shall take over the Site and the Works within seven days of the Engineer issuing a certificate of Completion.

### **57. Final Account**

- 57.1 The Contractor shall supply to the Engineer a detailed final account of the total amount that the Contractor considers payable as full and final settlement of all claims under the Contract for items before the end of the Defects Liability Period. The Engineer shall issue a Defect Liability Certificate and certify any final payment that is due to the Contractor within 56 days of receiving the Contractor's account if it is correct and complete. If it is not, the Engineer shall issue within 56 days a schedule that states the scope of the corrections or additions that are necessary. If the Final Account is still unsatisfactory after it has been resubmitted, the Engineer shall decide on the amount payable to the Contractor and issue a payment certificate, within 56 days of receiving the Contractor's revised account.
- 57.2 If reversal in characteristic of tender (L1 becoming L2) on account of excesses and savings in final account is observed, the Engineer/Employer shall be at liberty to restrict the final payment of BOQ items to the lowest amount evaluated of the bids considering the final quantities and the rates quoted including the rebates if any. Payment of variation items shall however be made at the rates approved by the Employer, within 90 days from the physical completion of work.

### **58. Operating and Maintenance Manuals**

- 58.1 If "as built" drawings and/or operating and maintenance manuals are required, the Contractor shall supply them by the dates stated in the Contract data.
- 58.2 If the Contractor does not supply the Drawings and/or manuals by the dates stated in the Contract data, or they do not receive the Engineer's approval, the Engineer shall withhold the amount stated in the Contract Data from payments due to the Contractor.

### **59. Termination**

- 59.1 The Employer or the Contractor may terminate the Contract if the other party causes a fundamental breach of the Contract.

592 Fundamental breaches of Contract include, but shall not be limited to the following:

1. The contractor stops work for 28 days when no stoppage of work is shown on the current programme and the stoppage has not been authorized by the Engineer
2. The Engineer instructs the Contractor to delay the progress of the Works and the instructions is not withdrawn within 28 days;
3. The Employer or the Contractor is made bankrupt or goes into liquidation other than for a reconstructions or amalgamation
4. A payment certified by the Engineer is not paid by the Employer to the Contractor within 56 days of the date of the Engineer's certificate
5. The Engineer gives Notice that failure to correct a particular Defect is a fundamental breach of Contract and the Contractor fails to correct it within a reasonable period of time determined by the Engineer;
6. The Contractor does not maintain a security which is required;
7. The Contractor has delayed the completion of works by the number of days for which the maximum amount of liquidated damages can be paid as defined in the Contract data; and
8. If the Contractor, in the judgment of the Employer has engaged in corrupt or fraudulent practices in competing for or in executing the Contract.

For the purpose of this paragraph: "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution. "Fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the borrower, and includes collusive practice among Bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Borrower of the benefits of free and open competition.

593 When either party to the Contract gives notice of a breach of contract to the Engineer for a cause other than those listed under Sub Clause 59.2 above, the Engineer shall decide whether the breach is fundamental or not.

594 Notwithstanding the above, the employer may terminate the Contract for convenience.

## **60. Payment upon Termination**

601 If the Contract is terminated because of a fundamental breach of Contract by the Contractor, the Engineer shall issue a Certificate for the value of the work done less advance payments received up to the date of the issue of the

Certificate, less other recoveries due in terms of the contract, less taxes due to deducted at source as per applicable law and less the percentage to apply to the work not completed as indicated in the Contract data. Additional Liquidated Damages shall not apply. If the total amount due to the Employer exceeds any payment due to the Contractor the difference shall be a debt payable to the Employer.

- 602 If the Contract is terminated at the Employer's convenience or because of a fundamental breach of Contract by the Employer, the Engineer shall issue a certificate for the value of the work done, the cost of balance material brought by the contractor and available at site, the reasonable cost of removal of equipment, repatriation of the Contractor's personnel employed solely on the works, and the Contractor's cost of protecting and securing the Works and less advance payment received up to the date of the certificate, less other recoveries due in terms of the contract and less taxes due to deducted at source as per applicable law.

**61. Property**

- 61.1 All materials on the Site, Plant Equipment's, Temporary Works and Works are deemed to be property of the Employer, if the Contract is terminated because of a Contractor's default.

**62. Release from Performance**

- 62.1 If the Contract is frustrated by the outbreak of war or by any other event entirely outside the control of either the Employer or the Contractor the Engineer shall certify that the Contract has been frustrated. The Contractor shall make the Site safe and stop work as quickly as possible after receiving this certificate and shall be paid for all work carried out before receiving it and for any work carried out afterwards to which commitment was made.

## **E. SPECIAL CONDITIONS OF CONTRACT**

### **63. LABOUR**

The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour, local or other, and for their payment of housing, feeding and transport.

The Contractor shall, if required by the Engineer, deliver to the Engineer a return in detail, in such form and at such intervals as the Engineer may prescribe, showing the staff and the numbers of the several classes of labor from time to time employed by the Contractor on the site and such other information as the Engineer may require.

### **64. COMPLIANCE WITH LABOUR REGULATIONS**

During continuance of the contract, the Contractor and his sub-contractor shall abide at all times by all existing labor enactments and rules made thereunder, regulations, notification and bye laws of the State or central Government or local authority and any other labor law (including rules), regulations, bye laws that may be passed or notifications that may be issued under any labor law in future either by the State or the Central Government or the local authority. Salient features of some of the major labor laws that are applicable to the construction industry are given below. The Contractor shall keep the Employer indemnified in case any action is taken against the Employer by the competent authority on account of contravention of any of the provisions of any Act or rules made thereunder, regulations or notifications including amendments. If the Employer is caused to pay or reimburse, such amounts as may be necessary to cause or observe, or for observance of the provisions stipulated in the notifications/bye laws/Acts/Rules/regulations including amendments, if any, on the part of the Contractor, the Engineer/employer shall have the right to deduct any money due to the Contractor including his amount of performance security. The Employer/Engineer shall also have the right to recover from the Contractor any sum required or estimated to be required for making good the loss or damage suffered by the Employer.

The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Employer at any point to time.

## **SALIENT FEATURES OF SOME MAJOR LABOUR AND OTHER LAWS APPLICABLE TO ESTABLISHMENTS ENGAGED IN BUILDING AND OTHER CONSTRUCTIONS WORK**

- A) **Workmen Compensation Act 1923**:- The Act provides for compensation in case of injury by accident arising out of and during the course of employment.
- B) **Payment of Gratuity Act. 1972** :- Gratuity is payable to an employee under the Act on satisfaction of certain conditions on separation if an employee has completed 5 years' service or more on death, the rate of 15 days wages for every completed year of service. The Act is applicable to all establishments employing 10 or more employees.
- C) **Employees P.F. and Miscellaneous Provision Act 1952**:- The Act Provides for monthly contributions by the employer plus workers @ 10% or 8.33% The benefits payable under the Act are :
1. Pension or family pension on retirement or death, as the case maybe.
  2. Deposit linked insurance on the death in harness of the worker.
  3. Payment of P.F. accumulation on retirement/death etc.
- D) **Maternity Benefit Act 1951** :- The Act provides for leave and some other benefits to women employees in case of confinement or miscarriage etc.
- E) **Contract Labour (Regulation & Abolition) Act 1970** : The Act provides for certain welfare measures to be provided by the Contractor to contract labor and in case the Contractor fails to provide, the same are required to be provided, by the Principal Employer by Law. The principal Employer is required to take Certificate of Registration and the Contractor is required to take license from the designated Officer. The Act is applicable to the establishments or Contractor of Principal Employer, if they employ 20 or more contract labor.
- F) **Minimum Wages Act 1948** :- The Employer is supposed to pay not less than the Minimum Wages fixed by appropriate Government as per provisions of the Act, if the employment is a scheduled employment. Construction of Building, Roads, Runways are scheduled employment.
- G) **Payments of wages Act 1936**:- It lays down as to by what date the wages are to be paid, when it will be paid and what deductions can be made from the wages of the workers.
- H) **Equal remunerations Act 1979** :- The Act provides for payment of equal wages for work of equal nature to Male and Female workers and for not making discrimination against female employees in the matter of transfer, training and promotions etc.
- I) **Payments of Bonus Act 1965** :- The Act is applicable to all establishments employing 20 or more employees. The Act provides for payments of annual bonus subject to a minimum of 8.33% of wages and maximum of 20 % of wages to employees drawing Rs. 3500/- per month or less. The bonus to be paid to employees getting Rs. 2500/- per month or above Rs. 3500/- per month shall be worked out by taking wages as Rs. 2500/- per month only. The Act does not

Apply to certain establishments. The newly set-up establishments are exempted for five years in certain circumstances. Some of the State Governments have reduced the employment size from 20 to 10 for the purpose of applicability of this Act.

- J) **Industrial Disputes Act 1947 :-** The Act lays down the machinery and procedure for resolutions of Industrial disputes, in what situations a strike or lock-out becomes illegal and what are the requirements for laying off or retrenching the employees or closing down the establishment.
- K) **Industrial employment (standing Orders) Act 1946 :-** It is applicable to all establishments employing 100 or more workmen (employment size reduced by some of the State and Central Government to 50). The Act provides for laying down rules governing the conditions of employment by the Employer on matters provided in the Act and get the same certified by the designated Authority.
- L) **Trade Unions Act 1926:-** The Act lays the procedure for registration of trade unions of workmen and employers. The Trade Unions registered under the Act have given certain immunities from civil and criminal liabilities.
- M) **Child Labour (Prohibition & Regulation Act 1986 :-** The Act prohibits employment of children below 14 years of age in certain occupations and process and provides for regulation of employment of children in all other occupations and processes. Employment of Child labour is prohibited in Building and Construction Industry.
- N) **Inter – State Migrant workmen’s (Regulation of Employment & Conditions of service) Act 1979:-** The Act is applicable to an establishment which employs 5 or more inter-state migrant workmen through an intermediary (who has recruited workmen in one state for employment in the establishment situated in another state).The inter-state migrant workmen, is an establishment to which this Act becomes applicable, are required to be provided certain facilities such as housing, medical aid, traveling expenses from home upto the establishment and back, etc.
- O) **The Building and Other Construction workers (Regulation of employment and Conditions of Service) Act 1996 and the Cess Act of 1996:-** All the establishments who carry on any building or other constructions work and employ 10 or more workers are covered under this Act.  
All such establishments are required to pay cess at the rate not exceeding 2% of the cost of construction as may be modified by the government. The Employer of the establishment is required to provide safety measures at the Building or construction work and other welfare measures, such as canteens, First Aid facilities, Ambulance, Housing accommodations for workers near the workplace etc. The Employer to whom the Act applies has to obtain a registration certificate from the Registering Officers appointed by the Government.



P) **Factories Act 1948 :-** The Act lays down the procedure for approval of plans before setting up a factory, health and safety provisions, welfare provisions, working hours, annual earned leave and rendering information regarding accidents or dangerous occurrences to designated authorities. It is applicable to premises employing 10 persons or more with aid of power or 20 or more persons without the aid of power engaged in the manufacturing process.

Q) **Royalty charges-**The contractor shall pay the royalty to the competent authority as per rule. The **royalty** charges paid shall be borne by the contractor and shall not be reimbursed by the Employer.

R) **Following Pollution control Acts and amendments made thereof from time to time shall be applicable.**

1. Water (Preservation and control of Pollution) Act, 1974
2. Air (Prevention and Control of Pollution Act 1981
3. Environmental (Protection) Act 1986

The contractor must commit to adopting Environmental management plan for best energy use, waste management, the reduction of pollution as in EMS (Environmental Management system)ISO-14001- 2015

#### **65. ARBITRATION (GCC Clause 24)**

The procedure for arbitration will be as follows: -

24.1 If the Contractor is of the view that a decision taken by the Engineer was either outside the authority given to the Engineer by the Contract or that the decision was wrongly taken, the decision shall be referred to **#Superintending Engineer** (Higher Authority) within 14 days of the notification of the Engineer's decision. If the issue is not resolved, any party can refer the matter for conciliation within 15 days from the decision given by the **#Superintending Engineer**.

24.2

- (a) For the work up to Rs.100 Cr., if any of the parties is not satisfied with the decision of the **#Superintending Engineer**, both the parties have to refer to the **#Chief Engineer** concerned for the conciliation process.
- (b) For the work more than Rs.100 Cr., if any of the parties is not satisfied with the decision of the **Superintending Engineer**, both parties have to refer to the **#Secretary, Roads & Building Department, Government of Gujarat** for the conciliation process.

If the dispute is not resolved through the conciliation process, contractor may refer the dispute to Gujarat Public Works Contract Dispute Arbitration Tribunal. If the Contractor fails to refer a claim / dispute to the Higher Authority within 14 days of the notification of the Engineer's decision, the Contractor shall not be entitled to any additional payment/claim if he doesn't follow the above sequence in stipulated time. However, during such period, he would not stop the work in any case.

## **66. MODEL RULES FOR LABOUR WELFARE**

### **66.1 Definitions**

- a) Work place means a place at which, on an average, twenty or more workers and employed.
- b) Large work place means a site at which, on an average, 250 or more workers are employed

### **66.2 First Aid**

At every work place, there shall be maintained in a readily accessible place first aid appliances including an adequate supply of sterilized dressings and sterilized cotton wool as prescribed in the factory rules of the state in which the work is carried on the appliances shall be kept in good order and, in large work places, they shall be placed under the charge of a responsible person who shall be readily available during working hours.

At large workplaces where hospital facilities are not available within easy distances of the workers, first Aid posts shall be established and be run by a trained compounder.

Where large workplaces are remotely situated and away from regular hospitals, an indoor ward shall be provided with one bed for every 250 employees.

Where large work place are situated in cities or in their suburbs and no beds are considered necessary owing proximity of city or town hospitals, suitable transport shall be provided to facilitate removal of urgent cases to these hospitals. At other workplaces, some conveyance facilities shall be kept readily available to take injured person or persons suddenly taken seriously ill, to the nearest hospital.

At large workplace there shall be provided and maintained an ambulance room containing the prescribed equipment and in the charge of such medical and nursing staff as may be prescribed. For this purpose, the relevant provisions of the factory rules of the state government of the area, where the works carried on, may be taken as the prescribed standard.

### **66.3 Accommodation for Labour**

The contractor shall during progress of the work provide, erect and maintain necessary temporary living accommodation and ancillary for labour at his own expenses to the standards and scales as approved by the CONSULTANT .

### **66.4 Drinking Water**

In every work place, there shall be provided and maintained at suitable places, easily accessible to labour, a sufficient supply of cold water fit for drinking.

Where drinking water is obtained from an intermittent public water supply, each work place shall be provided with storage where drinking water shall be stored.

Every water supply storage shall be at a distance not less than 15 meters from any latrine, drain or other source of pollution. Where water has to be drawn from an existing well which is within such proximity of latrine, drain or any other source of pollution, well shall be properly chlorinated before water drawn from it for drinking. All such wells

shall be entirely closed in and be provided with a trap door which shall be dust proof and water proof.

A reliable pump shall be fitted to each covered well. The trap door shall be kept and opened only for cleaning or inspection, which shall be done at least once a month.

#### 66.5 Washing and Bathing Places

Adequate washing and bathing places shall be provided separately for men and women, such places shall be kept in clean and drained condition.

#### 66.6 Scale of Accommodation in Latrines and urinals

There shall be provided within the precincts of every workplace, latrines and urinals in an accessible place and the accommodation, separately for each of these shall not be less than at the following scale.

	No of seats	
a) Where number of persons does not exceed	50	2
b) Where number of persons exceed but does not exceed	100	3
c) For additional person per 100 or part thereof	3	

In particular cases, the CONSULTANT shall have the power to increase the requirement, whenever necessary.

#### 66.7 Latrines and Urinals

Except in work places provided with water/flushed latrines connected with a water borne sewage system, all latrines shall be provided with receptacles on dry-earth system which shall be cleaned at least four time daily and at least twice during working hours and kept in a strictly sanitary condition. Receptacles shall be tarred inside and outside at least once a year.

If women are employed, separate latrine and urinals, screened from those for men and marked in the vernacular in conspicuous letters "For women only" shall be provided on the scale laid down in rule (vi) those for men shall be similarly marked "For Men only". A poster showing the figure of a man and women shall also be exhibited at the entrance to latrines for each sex. There shall be adequate supply of water, close to latrines and urinals.

#### 66.8 Construction of Latrines

Inside walls shall be constructed of masonry or other non- absorbent materials and shall be cement washed inside and outside at least once a year. The dates of cement washing shall be noted in a register maintained for the purpose and kept available for inspection. Latrines shall have at least thatched roof.

#### 66.9 Disposal of Excreta

Unless otherwise arranged for by the local sanitary authority, arrangement for proper disposal of excreta by incineration at the workplace shall be made means of suitable incinerator approved by the local medical, health and, municipal or cantonment authorities. Alternatively, excreta may be disposed off by putting a layer or night soils at the bottom of a pucca tank prepared for the purposed and covering it with a 15 cm layer of waster or refuse and then covering it with a layer of earth for a fort night (when it will turn in to manure).

The contractor shall, at his own expense carry out all instructions issued to him y the CONSULTANT to effect proper disposal of soil and other conservancy work in respect of contractor's work purpose or employees on the site. The contractor shall be responsible for payment of any charges which may be levied by municipal or cantonment authority for execution of such work in his behalf.

#### 66.10 Provision of shelters during rest

At every workplace, there shall be provided, free of cost, four suitable sheds, two for meals and two others for rest, separately for use of men and women labour. Height of each shelter shall not be less than 3 meters from floor level to lowest part of roof sheds shall be kept clean and the space provided shall be on the basis of at least 0.5 sq.m. per head.

#### 66.11 Crèches

At a place at which 20 or more women are ordinarily employed, there shall be provided at least one hut for use of children under the age of 6 years belonging to such women. Huts shall not be constructed to a standard lower than that of thatched roof. Mud floor and wall with wooden planks spread over mud floor and covered with matting.

Huts shall be provided with suitable an sufficient openings, for light and ventilation. There shall be adequate provision of sweepers to keep the places clean. There shall be two maid servants in attendance. Sanitary utensils shall be provided to the satisfaction of local medical, health an municipal or cantonment authorities. Use of huts shall be restricted to children, there attendants and mothers of children.

Where the number of women workers is more than 25 but less than 50 the contractor shall provide at least one hut and one maid servant to look after children or women workers.

Size of crèche(s) shall vary according to the number of women workers employed.

Crèche (s) shall be properly maintained and necessary equipment like toys, etc. Provide.

#### 66.12 Canteen

A cooked fool canteen on a moderate scale shall be provided for the benefit of workers wherever it is considered necessary.

#### 66.13 Planning, setting and erecting of the above mentioned structures shall be, approved by the CONSULTANT or his representative and the whole of such temporary accommodation shall at all times during the progress of the work be kept tidy and in a clean and sanitary condition to the satisfaction of the CONSULTANT or his representative and at the contractor's expense. The contractor shall conform generally to sanitary requirement of local medial health and municipal or cantonment authorities and at all times adopt such precautions as may be prevent soil pollution of the site.

On completion of the works, the whole of such temporary structures shall be cleared away, all rubbish burnt, excreta or other disposal pits or trenches filled in an effectively sealed of and the whole of site left clean and tidy at the contractor's expense, to the entire satisfaction of the CONSULTANT .

#### **66.14 Enforcement**

Inspecting office mentioned in the contractor's labor regulations or any other officer nominated on his behalf by the CONSULTANT shall report to the CONSULTANT shall report to the CONSULTANT all cases of failure on the part of the contract and/of his sub-contractor to comply with the part of the contract and his sub-contractor to comply with the provisions of these rules either wholly or in part and the CONSULTANT shall impose such fines and other penalties as are prescribed in conditions of contract.

#### **66.15 Interpretations etc**

On any question as to the application, interpretation or effect of these rules, the decision of the chief labor commissioner or deputy chief labor commissioner (central) shall be final and binding.

- 66.16 The OWNER may, from time to time, add to or amend these rules and issue directions a it may be considered necessary for the proper implementation of these rules or for the purpose of removing and difficulty which arise in the administration thereof.

#### **67.00 PROVISIONS OF SECTION 297/299 OF COMPANIES ACT**

The Certificate submitted by the CONTRACTOR as per the prescribed format in terms of section 297 / 299 of Companies Act 1956 (with latest amendment) forms part of the CONTRACT.

**67.1** The CONTRACTOR shall give all notices and pay / bear all duties, taxes, charges, fees and expenses, except where otherwise expressly provided in the CONTRACT, required to be given or paid by any National or State statute, ordinance or other law or any regulation or bye law of any International, local or other duly constituted authority in relation to the performance of the WORKS or of any TEMPORARY WORKS and by the rules and regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the WORKS or any TEMPORARY WORKS. The CONTRACTOR shall acquire all permits, approvals and or licenses from all local, State or Central Government authorities or Public Sector Undertakings in the country, where the SITE is located, which, such authorities require the CONTRACTOR to obtain in his name and which are necessary for the performance of the CONTRACT including interest limitations, import license for materials and VISAS for the CONTRACTOR's and SUB CONTRACTOR's personnel and entry permits for all imported CONSTRUCTIONAL PLANT AND EQUIPMENT and shall acquire all other permits, approvals and / or licenses, which are not the responsibility of the OWNER and which are necessary for the performance of the CONTRACT.

**67.2** The CONTRACTOR shall comply with and conform in all respects and shall ensure that all his SUB CONTRACTORS also comply with and conform in all respects with the provisions of any statute, ordinance or law as aforesaid and the regulations or bye laws of any international, local or other duly constituted authority, which may be applicable to the WORKS or to any TEMPORARY WORKS and with such rules and regulations of public bodies and companies as aforesaid and shall be responsible for all costs arising from compliance and / or violation of the same and shall keep the OWNER indemnified against all penalties and liabilities of every kind for breach of any statute, ordinance or

law, regulations or bye laws.

**67.3** The CONTRACTOR shall indemnify and hold the OWNER harmless from and against all penalties, liabilities, damages, claims, fines and expenses of whatever nature, arising out of or resulting from the violation of such laws or rules or regulation having the force of law within the scope of clause No.22.6, 22.8 & 22.9 by the CONTRACTOR or his SUB CONTRACTORS including their personnel.

#### **68. CONTRACTOR TO INDEMNIFY OWNER**

68.1 The CONTRACTOR shall indemnify the OWNER and every member, officer and employee of the OWNER , also the ENGINEER-IN-CHARGE and his staff against all actions, proceedings, claims, demands, costs and expenses whatsoever arising out of or in connection with the matters referred to in Labor Laws or clause mentioned in the CONTRACT / elsewhere and all actions, proceedings, claims, demands, costs and expenses which may be made against the OWNER for or in respect of or arising out of any failure by the CONTRACTOR in the performance of his obligations under the CONTRACT. The OWNER shall not be liable for or in respect of any demand or compensation payable by law in respect or in consequence of any accident or injury to any workman or other person in the employment of the CONTRACTOR or his SUB CONTRACTOR and CONTRACTOR shall indemnify and keep indemnified the OWNER against all damages and compensation and against all claims, damages, proceedings, costs, charges and expenses, whatsoever, in respect thereof or in relation thereto.

68.2 Should the OWNER have to pay any money in respect of such claims or demands as aforesaid and the costs incurred by the OWNER shall be charged will be paid by the CONTRACTOR and the CONTRACTOR shall not be at liberty to dispute or question for the same.

68.3 WAIVER OF RECOURSE Except for claims of breach of the CONTRACT or for claims specifically assumed or authorized therein, the CONTRACTOR and the OWNER waive recourse each against the other claims which may arise with respect to the WORKS.

#### **69.00 IMPLEMENTATION OF APPRENTICES ACT 1961**

The contractor shall comply with the provision of the apprenticeship Act 1961 and the rules and orders issued there under from time to time. If he fails to do so, his failure will be a breach of the contract and the Engineer in charge may at his discretion cancel the contract. The contractor shall also be liable for any pecuniary liability arising on account of any violation by him of the provisions of the Act.



## 70.00 SAFETY PROVISIONS

The contractor shall comply with all precautions as required for the safety of the workmen by the I.L.O. convention No. 62 as far as they are applicable to the contract. The contractor shall provide all necessary safety appliances, gears like goggles, helmets, masks etc. to the workmen and the staff.

- i) Suitable scaffolds shall be provided for workmen for all work that cannot safely be done from the ground. Or from solid construction except for such short period work as solid construction except for such short period work as can be done safely from ladders. When a ladder is used, an extra labor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable foot holds and hand holds shall be provided on the ladder, which shall be given an inclination not steeper than 1/4 to 1(1/4) horizontal in 1 vertical )
- ii) Scaffolding or staging more than 3.25 meters above the ground or floor, swing, or suspended from an overhead support or erected with stationary support, shall have guard rail properly attached, bolted, braced and otherwise secured at least 1 meters high above the floor or platform of such scaffolding or staging and extending along the entire length may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the support for structure.
- iii) Working platform gangways, and stairways shall be so constructed that they do not sag unduly or unequally and if a height of a platform or gangway or stairway is more 3.25 meters above ground level or floor level, it shall have closely spaced boards, have adequate width and be suitably provided with guard rails as directed in (ii).
- iv) Every opening in floor of a structure or in a working platform shall be provided with suitable means to prevent fall of persons or materials by providing suitable fencing or railing with a minimum height of one meter.
- v) 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 meters shall in no case be less than 30 cm for ladders up to and including 3 meters in length. For longer ladders the width shall be increased at least 6 mm for each additional 30 cm of length. Spacing of steps shall be uniform and shall, not exceed 30 cm. Adequate precautions shall be taken to prevent danger form electrical equipment. No materials on any of the sites shall be so stacked or place as to cause danger or inconvenience to any person or the public. The contractor shall provide all necessary fencing and lights to protect public form accidents and shall be bound to bear expenses of defending every suit, action or other proceeding at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages and cost which may be awarded in any such suit, action or proceeding to any such person or which may with the consent of the contractor be paid to compromise any claim by any such person.
- vi) Excavation and Trenching

All trenches, 1.5 meters or more in depth, shall at any times by supplied with at least one ladder each 20 meters in length or fraction there of ladder shall be extended from bottom of trench to at least 1 meters above surface of the ground sides of a trench which is 1.5 meters or more in depth shall be stepped back to

give suitable slope or securely held by timber bracing so as to avoid the danger of collapsing of sides. Excavated material shall not be placed within 1.5 meters of edge of trench or half the depth of trench whichever is more. Cutting shall be done from top to bottom. Under to circumstances, undermining or undercutting shall be done.

vii) Demolition

Before any demolition work is commenced and also during the process of the work

- a) All roads and open areas adjacent to the work site shall either be closed or suitably protected.
- b) No electric cable or apparatus which is liable to be a source of danger over a cable or apparatus used by operator shall remain electrically charged.
- c) All practical steps shall be taken to prevent danger to persons employed by the OWNER, from risk of fire or explosion or flooding. No floor roof, or other part of a building shall be so overloaded with debris or materials as to render it unsafe.

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

- a) Workers employed on mixing asphaltic materials, cement, lime mortars/ concrete shall be provided with protective footwear and protective goggles.
- b) Those engaged in handing any material which is injurious to eyes shall be provided with protective goggles.
- c) Those engaged in welding works shall be provided with welder's protective eye-shield.
- d) Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.
- e) When workers are employed in sewers and manholes, which is in use, the contractor shall insure that manholes covers are open and manholes are ventilated at least for an hour before workers are allowed to get in to them. Manholes so open shall be cordoned off with suitable railing and provided warning signals or boards to prevent accident to public.

The contractor shall not employ men below the age of 18 years and women on the work of painting with products containing lead in any form. Whenever men above the age of 18 years are employed on the work of lead painting, the following precautions shall be taken.

No paint containing lead or lead products shall be used except in the form or readymade paint.



Suitable face masks shall be supplied for use by workers when paint is applied in the form of spray or a surface having lead paint dry rubber and scrapped.

Overalls shall be supplied by the contractor to workmen and adequate facilities shall be provided to enable workers to wash during and on close of day's work.

- ix) When work is done near any place where there is risk of drowning all necessary 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 made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.
- x) Use of hoisting machines and tackle including their attachments, anchorage and supports shall conform to the following.
  - a - (i) These shall be of good mechanical construction, sound material and adequate strength and free from patent defects and shall be kept in good working order and properly maintained.
  - (ii) Every rope used in hoisting or lowering materials or as a means of suspension shall be of durable quality and adequate strength, & free from defects.
  - b Every crane driver or hoisting appliance operators shall be properly qualified and no person under the age of 21 shall be in charge of any hoisting machine including scaffold or of signals to operator.
  - c In case of every hoisting machine and of every chain hook, shackle swivel and pulley block used in hoisting, lowering or as a means of suspension, safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with safe working load. In case of a hoisting machine or a variable safe working load, each safe working load and condition under which it is applicable shall be clearly indicated. No part of any machine or any gear referred to above in the paragraph shall be loaded beyond safe working load except for the purpose of testing.
  - d In case of the OWNER's machine, safe working load shall be notified by the CONSULTANT or his representative. As regards contractor's machine the contractor shall notify safe working load of each machine to the CONSULTANT or his representative whenever he brings it to site of work and get it verified by him.
- xi) Motors, gearing, transmission, electric wiring and other dangerous part of hoisting appliance shall be provided with efficient safeguards. Hoisting appliance shall be provided with such means as will reduce the risk of accident during descent of load to the minimum. Adequate precautions shall be taken to reduce to the minimum risk of any part of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, working apparel such as gloves, sleeves, and boots as may be necessary, shall be provided, workers shall not wear any rings, watches and carry keys or other material which are good conductors of electricity.

- xii) All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe conditions and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities shall be provided at or near places work.
- xiii) There safety provisions shall be brought tot he notice of all concerned by display on notice board at a prominent place at the work spot persons responsible for ensuring compliance with the safety code shall be named there in by the contractor.
- xiv) To ensure effective enforcement of the rules and regulations relating to safety precautions, arrangements made by the contractor shall be open to inspections by the CONSULTANT or his representative and the inspecting officer as defined in the contractors labour regulation mentioned in thereafter these documents as annexure "A" of section IV.
- xv) Notwithstanding anything contained in conditions (i) to (xiv) above, the contractor shall remain liable to comply with the provisions of all acts, rules, regulations and bylaws for the time being in force in India and applicable in this matter.

#### **FOOTWEAR**

The contractor shall at his own expenses provide footwear for all labour engaged on concrete mixing work and all other types of work involving the use of tar, cement etc. to the satisfaction of the CONSULTANT or his representative, and on his failure to do so, the OWNER shall be entitled to provide the same and recover the cost from the contractor.

#### **LOCAL LABOUR**

The contractor is encouraged for as possible to employ, in the execution of the contract qualified India citizens as workmen. Employment of expatriate personal is subject to the Indian laws and regulations in case the contractor wished to employ expatriate personnel in any particular trade or skill required to execute the contract, the OWNER will assist the contractor in obtaining permission for which the contractor shall submit requisite date.

## **71. SAFETY CODE**

### **1.00 GENERAL RULES**

Smoking within the battery area, tank farm or dock limits is strictly prohibited. Violators of the no smoking rules shall be discharged immediately.

#### **1.1 Contractor's Barricades**

- a) Contractor shall erect and maintain barricades required in connection with his operations to guard or protect.
  - i) Excavation
  - ii) Hoisting area
  - iii) Areas adjudged hazardous by consultant or OWNER's inspectors
  - iv) OWNER's existing property subject to damage by contractor's operations
  - v) Rail / road unloading spots
- b) Contractor's employees and those of his sub-contractors shall get themselves acquainted with OWNER's protective barricading and shall respect the provisions thereof.
- c) Barricades and hazardous areas adjacent to but not located in normal routes or travel shall be marked by red flashers/ lanterns at nights.

#### **1.2 Care In Handling Inflammable Gas**

The contractor has to ensure all precautionary measures and exercise utmost care in handling the inflammable gas cylinder/inflammable liquids / paints etc. as required under the law and /or as advised by the fire authorities of the OWNER.

#### **1.3 Temporary Combustible Structures**

Temporary combustible structures will not be built near or around work site.

#### **1.4 Precautions against Fire**

The contractor will have to provide fire extinguishers / fire buckets and drums at work site as recommended by engineer in charge. They will have to ensure all precautionary measures and cylinders / inflammable liquid / paints etc. as advised by engineer in charge. Temporary combustible structures will not be built near or around the work site.

#### **1.5 EXPLOSIVES**

Explosives shall not be stored or used on the work or on the site by the contractor without the permission of the engineer in charge in writing and then only in the manner and to the extent to which such permission is given. When explosive are required for the works they will be stored in a special magazine to be provided at the cost of the contractor in accordance with the license for the storage and the use of explosives and all operations in which or for which explosives are employed shall be at sole risk and responsibility of the contractor and the contractor shall indemnify the OWNER against any loss or damage resulting directly or indirectly there from.

### **2.00 MINES ACT**

## 2.1 SAFETY CODE

The contractor shall at his own expense arrange for the safety provisions as required by the engineer in charge in respect of all labor directly employed for performance of the works and shall provide all facilities in connection therewith. In case the contractor fails to make arrangements and provide necessary facilities as aforesaid, the engineer in charge shall be entitled to do so and recover the costs thereof from the contractor.

- 2.2 Failure to comply with safety code or the provisions relating to, report on accidents and to grant of maternity benefits to female workers shall make contractor liable to pay company Liquidated Damages an amount not exceeding Rs. 50 /- for each default or materially incorrect statement. The decision of the engineer in charge shall be final and binding and deductions for recovery of such liquidated damages may be from any amount payable to the contractor from all the provisions of the Mines Act-1952 or any statutory modifications or re-enactment thereof for the time being in force and any rules and regulations made there under in respect of all the persons employed by him under this contract and shall indemnify the OWNER from and against any claim under the mines act or the rules and regulation framed there under by or on behalf of any persons employed by him or otherwise.

## 3.00 PRESERVATION OF PEACE

The contractor shall take requisite precautions and use his best endeavor to prevent any riotous or unlawful behavior by or amongst his workmen and others employed on the works and for the preservation of peace and protection of the inhabitants and security of property in the neighborhood of the work. In the event of the OWNER requiring the maintenance of the work. In the event of the OWNER requiring the maintenance of the special police force in the vicinity of the site during the tenure of the works, the expenses thereof shall be borne by the contractor and if paid by the OWNER, shall be recoverable from the contractor.

## 4.00 OUTBREAK OF INFECTIOUS DISEASES

The contractor shall remove from his camp such labour and their families as refuse protective inoculation and vaccination when called upon to do so by the engineer in charge representatives. should cholera, plague or other infectious diseases break out, the contractor shall burn the huts, bedding, clothes and other belongings used by the infected parties and promptly erect new huts on healthy sites as required by the engineer in charge failing which within the time specified in the engineer requisition, the work may be done by the OWNER and the cost thereof recovered from the contractor.

## 5.00 USE OF INTOXICANTS

The unauthorized sale of spirits or other intoxicating beverages upon the work, in any of the buildings, encampments or tenements owned, occupied by or within the control of the contractor shall exercise his influence and authority to the utmost extent to secure strict compliance with this condition.

## 6.00 SAFETY REGULATIONS

6.1 In respect of all labour, directly or indirectly employed in the WORK, the CONTRACTOR shall at his own expense arrange for all the safety provisions as per safety codes of CPWD, Indian Standard Institution, the Electricity Act, the Mines Act. Regulations, Rules and Orders and such other Acts as applicable.

6.2 Contractor shall maintain first aid facilities for his employees and those of his Sub-contractors.

## 7.00 WATCHING AND LIGHTING

The Contractor shall, in connections with the Works, provide and maintain at his own cost all lights , guards, fencing, markers and watching when and where necessary for the safety and convenience of the public and others.

8.00 In addition to the above, the Contractor shall abide by the safety code provision as per CPWD safety code and Indian Standard safety code framed from time to time.

**SECTION - 4**  
**CONTRACT DATA**

CONTRACT DATA Clause Reference with respect to section 3		
Item marked "N/A" do not apply to this Contract.		
1.	The Employers is Name: The Chief Officer KHAMBHAT NAGARPALIKA KHAMBHAT Address: Three Darwaja At. Khambhat Dist: Anand Khambhat-388620 Phone (o) 2698-221300	[CL.1.1]
2.	The Engineer is	
	Name of Authorized Representative: Deputy Executive Engineer/City Engineer/ PWD Engineer of KHAMBHAT NAGARPALIKA KHAMBHAT .	
3.	The Defects Liability Period is <b>36 months</b> from the date of completion.	[CL.1.1 & 33]
4.	The Start Date shall be <b>1<sup>st</sup></b> days for the date of issue of the Notice to proceed with the work.	[CL.1.1]
5.	The Intended Completion Date for the whole of the works is <b>18 Months</b> after start of work with the following milestones:	[CL. 1.1, 17 & 2]
	Milestone dates: <u>Physical works to be completed Period from the start date</u> Milestone 1 i.e. 16 % 80 days. Milestone 2 i.e. 50 % 165 days. Milestone 3 i.e. 75 % 247 days. Milestone 4 i.e. 100 % 330 days.	[CL. 2.2 & 49.1]
6.	The Site is located at Khambhat City, Ta. Khambhat, Dist. Anand	[CL.1.1]
7.	The name and identification number of the Contract is:	[CL.1.1]
8.	The works consist of <b>(Building Work)</b> with items as per B.O.Q. The works shall, inter alia, include the following, as Specified or as directed:	[CL.1.1]
	<p><b>(A) Building Works</b> Site clearance; setting –out and layout, carried out survey work, Construction, furniture work, electrical work and five years of Operation &amp; Maintenance, all aspects of quality assurance; clearing the site and handing over the works on completion; rectification of the defects during the Defects Liability Period and submission of “As-built” drawings and other related documents and other items of work as may be required to be carried out for completing the works in accordance with the drawings and the provisions of the contract and to Insure safety.</p> <p><b>(B) Road Works</b> Site clearance; setting – out and layout; widening of existing carriageway and strengthening including camber corrections; construction of new road/ Parallel service road; bituminous pavements remodeling/construction of Junctions, intersections, bus bays, lay-bays; supplying and placing of drainage Channels, flumes, guard posts and guard other related items; construction/extension of cross drainage works, bridge, approaches and other related stones; protective works for roads/bridge; all aspects of quality assurance of various components of the works; rectification of The defects in the completed works during the Defects Liability Period; submission of “As- built” drawings and any other related documents; and other item of work as may be required to be carried out for completing the work in accordance with the drawings and the provisions of the contract and to ensure safety.</p> <p><b>(C) Bridge Works</b> provision of foundations, piers abutments and bearing; prestressed/reinforced cement concrete superstructure; wearing coat, hand railings, expansion joints, approach slabs, drainages spouts/ down take pipes, arrangements for fixing light posts, water mains, utilities etc.; provision of suitably designed protective works; providing wing/return walls; provision of road markings, road signs etc.; all aspects of quality assurance; clearing the site and handing over the works on completion; rectification of the defects during the Defects Liability Period and submission of “As-built” drawings and other related documents; and other items of work as may be required to be carried out for completing the works in accordance with the drawings and the provisions of the contract and to Insure safety</p> <p><b>(D) Other Items</b> Any Other Items as required to fulfill all contractual obligations as per the Bid documents.</p>	

10. The following documents also form part of the Contract: [CL.2.3(9)]  
\_\_\_\_\_As per clause 2-3\_\_\_\_\_
11. The law which applies to the Contract is the law of Union of India [CL.3.1]
12. The language of the Contract documents is English [CL.3.1]
- ~~13. Limit of subcontracting ——— 25% of the Initial Contract Price [CL.7.1]~~
14. The Schedule of Other Contractors [CL.8]
15. The Schedule of Key Personnel As per Annex – II to Section I [CL.9]
16. The minimum insurance cover for physical property, injury and death is [CL.13]  
Rs. 5 lakhs per occurrence with the number of occurrences limited to  
four. After each occurrence, the contractor will pay an additional  
premium necessary to make insurance valid for four occurrences always.
17. Site Investigation report [CL.14]
18. The Site Possession dates shall be ..... [CL.21]
19. The period for submission of programme for approval of the engineer [CL. 27.1]  
shall be 21 days from the issue of Letter of Acceptance.
20. The period between program updates will be..... days. [CL.27.3]
21. The amount to be withheld for late submission of an updated [CL. 27.3]  
programme shall be Rs ..... lakhs
22. The following events shall also be Compensation Events [CL. 44]  
Substantially adverse ground conditions encountered during the course  
of execution of work not provided for in the bidding document.
  - (i) Removal of underground utilities detected subsequently
  - (ii) Significant changes in classification of soil requiring  
additional mobilization by the contractor, e.g. ordinary soil  
to rock excavation,
  - (iii) Removal of unsuitable material like marsh, debris dumps,  
etc. not caused by the contractor.



- (iv) Artesian conditions
- (v) Seepage, erosion landslide
- (vi) River training requiring protection of permanent work
- (vii) Presence of historical, archeological or religious structures, monuments interfering with the works
- (viii) Restriction of access to ground imposed by civil, judicial, or military authority

23. The currency of the Contract is Indian Rupees

[CL. 46]

24. **The formula (e) for adjustment of prices are as under:**

[CL.47]

- ~~If any of the commodities like Cement, Steel or Bitumen are not found applicable in a work, the weight component of that commodities (i.e. 'Cement' (Pc), 'Steel' (Ps) or 'Bitumen' (Pb) as indicated in SBD for the purpose of Price Adjustment) shall be clubbed with the weight component of 'Other Material' (Pm), such that the gross % weight of the components shall remain as 100%.~~

~~R = value of work as defined in Clause 47.1 of Conditions of Contract~~

#### **Adjustment for labour component**

- (i) ~~Price adjustment for increase or decrease in the cost due to labour shall be paid in accordance with the following formula:~~

$$V_L = \frac{0.85 \times (P_L/100) \times R \times (L_i - L_0)}{L_0}$$

~~V<sub>L</sub> = Increase or decrease in the cost of work during the month under consideration due to changes in rates for local labour~~

~~L<sub>0</sub> = The consumer price index for industrial workers for the State on 28 days preceding the scheduled date of opening of technical Bids as published by Labour Bureau, Ministry of Labour, Government of India~~

~~L<sub>i</sub> = The consumer price index for industrial workers for the State for the month under consideration as published by the Labour Bureau, Ministry of Labour, Government of India.~~

~~P<sub>L</sub> = Percentage of labor component of the work.~~

#### **Adjustment for cement component.**

- (ii) ~~Prices adjustment for increase or decrease in the cost of cement procured by the contractor~~

$$V_c = \frac{0.85 \times (P_c/100) \times R \times (C_i - C_0)}{C_0}$$

~~V<sub>c</sub> = Increase or decrease in the cost of work during the month under consideration due to changes in rates for cement.~~

~~C<sub>0</sub> = The all India wholesale price index for Ordinary Portland Cement on 28 days preceding the scheduled date of opening of technical bid as published by the Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.~~

$C_i$  = ~~The all India average wholesale price index for Ordinary Portland Cement for the month under consideration as published by Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.~~

$P_c$  = Percentage of cement component of the work

#### **Adjustment for steel component**

- (iii) — Price adjustment for increase or decrease in the cost of steel procured by the contractor shall be paid in accordance with the following formula

$$V_s = 0.85 \times (P_s/100) \times R \times (S_i - S_0)/S_0$$

$V_s$  = ~~Increase or decrease in the cost of work during the month under consideration due to changes in the rates for steel~~

$S_0$  = ~~The all India wholesale price index for steel (Mild Steel - Long Products Rebars) on 28 days preceding the date of opening of Bids as published by the Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.~~

$S_i$  = ~~The all India average wholesale price index for steel (Mild Steel - Long Products Rebars) for the month under consideration as published by Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.~~

$P_s$  = Percentage of steel component of the work

Note : For the application of this clause, the index of **Mild Steel - Long products Rebars** has been chosen to represent the steel group.

#### **Adjustments of bitumen component**

- (iv) — Price adjustment for increase in the cost of bitumen shall be paid in accordance with the following formula

$$V_b = 0.85 \times (P_b/100) \times R \times (B_i - B_0)/B_0$$

$V_b$  = ~~Increase or decrease in the cost of work during the month under consideration due to changes in rates for bitumen.~~

$B_0$  = ~~The official retail price of bitumen at the IOC depot at the nearest centre on the day 28 days prior to the scheduled date of opening of technical bid.~~

$B_i$  = ~~The official retail price of bitumen of IOC depot at the nearest centre for the 15<sup>th</sup> day of the month under consideration.~~

$P_b$  = Percentage of bitumen component of the work

### **Adjustment of POL (fuel and lubricant) component**

- ~~(v) — Price adjustment for increase or decrease in cost of POL (fuel and lubricant) shall be paid in accordance with the following formula~~

$$V_f = 0.85 \times (P_f/100) \times R \times (F_i - F_0)/F_0$$

~~V<sub>f</sub> = Increase or decrease in the cost of work during the month under consideration due to changes in rates for fuel and lubricants.~~

~~F<sub>0</sub> = The official retail price of High Speed Diesel (HSD) at the existing consumer pumps of IOC at the nearest centre on the day 28 prior to the date of opening of Bids.~~

~~F<sub>i</sub> = The official retail price of HSD at the existing consumer pumps of IOC at the nearest centre for the 15<sup>th</sup> day of the month of the under consideration.~~

~~P<sub>f</sub> = Percentage of fuel and lubricants component of the work~~

~~Note: For the application of this clause, the price of High-Speed diesel Oil has been chosen to represent the fuel and lubricants group.~~

### **Adjustment for Construction Machinery**

- ~~(vi) — Price adjustment for increase or decrease in the cost of plant and Machinery spare procured by the Contractor shall be paid in accordance with the following formula~~

$$V_p = 0.85 \times (P_p/100) \times R \times (P_i - P_0)/P_0$$

~~V<sub>p</sub> = Increase or decrease in the cost of work during the month under consideration due to changes in rates for plant and machinery spares~~

~~P<sub>0</sub> = The all India wholesale price index for **manufacturer of machinery for mining, quarrying and Construction** for the month under consideration as published **Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.**~~

~~P<sub>i</sub> = The all India average wholesale price index for **manufacturer of machinery for mining, quarrying and Construction** for the month under consideration as published **Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.**~~

~~P<sub>p</sub> = Percentage of plant and machinery spares component of the work.~~

~~Note: For the application of this clause, index of Heavy Machinery and parts has been chosen to represent the Plant and Machinery Spares group~~

## Adjustment of other materials Component

- (vii) ~~Price adjustment for increase or decrease in cost of local materials other than cement, steel, bitumen and POL procured by the contractor shall be paid in accordance with the following formula~~

$$V_m = 0.85 \times (P_m/100) \times R \times (M_i - M_0)/M_0$$

~~$V_m$  = Increase or decrease in the cost of work during the month under consideration due to change in rates for local materials other than cement, steel, bitumen and POL.~~

~~$M_0$  = The All India wholesale price index (all commodities) on 28 days preceding the scheduled date of opening of technical Bids, as published by the **Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.**~~

~~$M_i$  = The All India wholesale price index (all commodities) for the month under consideration as published by the **Office of the Economic Adviser, Department for Promotion of Industry and Internal Trade, Ministry of Commerce & Industry.**~~

~~$P_m$  = Percentage of local material components (other than cement, steel, bitumen and POL) of the work.~~

The following percentage will govern the price adjustment for the entire contract:

1. Labour	$P_l$	.....%
2. Cement	$P_c$	.....%
3. Steel	$P_s$	.....%
4. Bitumen	$P_b$	.....%
5. POL	$P_f$	.....%
6. Plant & Machinery Spares	$P_p$	.....%
7. Other Materials	$P_m$	.....%
Total		100 %

25. The proportion of payments retained (retention money) shall be 6% {CL. 48} from each bill subject to a maximum of 5% of final contract price.
26. Amount of Liquidated damages for in completion of works
- For Whole of work {CL.49} delay (1/2000)<sup>th</sup> of the Initial contract price, rounded off to the nearest Thousand, per day. ~~For sectional Completion (wherever specified In item 6 of Contract data) (1/2000)<sup>th</sup> of initial contract price for #5 km Section, rounded off to the nearest thousand per day.~~

27. Maximum limit of liquidated damages For delay in completion work 10 percent of the Initial {CL. 49} Contract Price rounded off to the nearest thousand
- ~~28. Amount of Bonus for early completion~~ ~~Amount of bonus for early Completion of work shall be given as per CL.50 of Section 3~~
- ~~29. Maximum limit of bonus for early Completion of work~~ ~~5 percent of the Contract {CL. 50} Price~~
30. The amount of the advance payment are: {CL. 51 & 52}

#### #Nature of Advances

#### Amount (Rs.) Conditions to Be fulfilled

- |     |   |  |
|-----|---|--|
| i   | Mobilization 10% of the contract Price  | On submission of unconditional Bank Guarantee. (To be drawn Before the end of 20% of the contract period). The contractor may furnish four bank guarantees of 2.5 % of each valid for the full period.         |
| ii  | Equipment 90% for new and 50% of depreciated value for old equipment. Total amount will be subject to a maximum of 5% of the Contract Price | After equipment is brought to site (provided the Engineer is satisfied That the equipment is required for performance of the contract) and on submission of unconditional Bank Guarantee for amount of advance |
| iii | Secured Advance for Non-persish able material Brought to site   | <b>Deleted</b>   |

(The advance payment will be paid to the Contractor no later than 28 days after fulfillment of the above conditions).

31. **Repayment of advance payment for mobilization and equipment** {CL. 51.3}  
The advance loan shall be repaid with percentage deduction from the interim payments certified by the Engineer under the Contract. Deduction shall commence in the next Interim Payment Certificate following that in which the total of all such payments to the Contractor has reached not less than 20 percent of the Contract Price or 6 (six) months from the date of payment of first installment of advance, whichever period concludes earlier, and shall be made at the rate of 20 percent **(collectively for both Mobilization Advance and Equipment Advance)** of the amounts of all Interim Payment Certificate until such time as the loan has been repaid, always provided that the loan shall be completely repaid prior to the expiry of the original time for completion pursuant to Clause 17 and 28.
32. Deleted
33. The securities shall be for the following minimum amounts equivalent {CL. 52}  
As a percentage of the Contract Price:  
Performance Security for 5 percent of contract price plus Rs..... (to be decided after evaluation of the bid) as additional security in terms of ITB Clause 29.5  
The standard form of Performance security acceptable to the Employer shall be an unconditional Bank Guarantee of the type as presented in Section 8 of the Bidding Documents.
34. The Schedule of Operating and maintenance Manuals.....N/A. {CL. 58}
35. The date by which “as– built” drawings (in scale as directed) in 2 sets {CL. 58} are required within 28 days of the issue of certificate of completion of the whole or section of the work, as the case may be.
36. The amount to be withheld for failing to supply “as built” drawings {CL. 58} by the Date required is Rs..... Lakhs.
37. The following events shall also be fundamentals breach of contract: {CL.59.2} “The Contractor has contravened Sub- clause 7.1 and Clause 9 of GCC”
38. The percentage to apply the value of the work not completed representing {Cl 60} the Employer’s additional cost for completing the Works shall be 20 per cent.

## **SECTION-5 TECHNICAL SPECIFICATION**

## **GENERAL TECHNICAL SPECIFICATIONS**

### **1.0 General:**

All measurements shall be made in the metric system. Different items of work shall be measured in accordance with the procedures set forth in the relevant sections read in conjunction with General Conditions of Contract. The same shall not however apply in the case of lump-sum items. All measurements and computations unless otherwise indicated shall be carried nearest to the following limits :

- (i) length and breadth..... 10 mm
  - (ii) height, depth or thickness of earthwork, sub-base, bases, surfacing, and structural members .....5 mm
  - (iii) areas, .....0.01 Sq Metre
  - (iv) cubic contents..... 0.01 cubic metre.
- in recording dimensions of work the sequence of length, width and height or depth or thickness shall be followed.

### **2.0 Measurement of lead for Materials:**

Where lead is specified in the contract for construction materials, the same shall be measured as described hereunder.

Lead shall be measured over the shortest practicable route and not the one actually taken and the decision of the Engineer-in-charge in this regard shall be taken as final. Distance upto and including 100 meters shall be measured in units of 50 metres, exceeding 100 metres but not exceeding 1 KM. in units of 100 metres and exceeding 1 km. in units of 500 metres. The half and greater than half of the units shall be reckoned as one and less than half of the units ignored. In this regard, the source of the material shall be divided into suitable blocks and for each block the distance from the centre of the block to the centre of placing pertaining to that block shall be taken as the lead distance.

### **3. Surface Regularity of Sub grade & Pavement Courses :**

The surface regularity of completed sub-base courses and wearing surfaces in the longitudinal and transverse directions shall be within the tolerances indicated in Table below. The longitudinal profile shall be checked with a 3 metre long straight edge, at the middle of each traffic lane along a line parallel to the centre line of the road. The transverse profile shall be checked with a set of three camber boards at intervals of 10 metres.

#### **PERMITTED TOLERANCES OF SURFACE REGULARITY FOR PAVEMENT COURSES**

Sr. No	Type of Construction	Longitudinal Profile with 3 metre straight edge					Cross Profile
		Maximum Permissible undulation in mm	Maximum number of undulation permitted in any 300m. length exceeding in mm.				Maximum permissible variation from specified profile camber template—mm
			18	12	10	6	
1	2	3	4	5	6	7	8
1	Earth Sub grade	36	30	-	-	-	15
2	Granular / lime / Cement Stabilised Sub – base.	23	-	30	-	-	12
3	Water Bound Macadam with nominal size metal (20-50) mm	18	-	-	30	-	8
4	Semi – Dense Carpet @	15	-	-	-	20	6



**Notes:-**

1 . These are for machine laid surfaces. If laid manually, due to unavoidable reason, tolerance upto 50 percent above these values in this column may be permitted. However, this relaxation does not apply to the values of maximum undulation for longitudinal and cross profiles mentioned in columns 3 and 8 in the table.

2. Surface evenness requirements in respect of both the longitudinal and cross profiles should be simultaneously satisfied.

3. **Rectification** : Where the surface irregularity of subgrade and the various pavement courses fall outside the specified tolerances, the contractor shall be liable to rectify these in the manner described below and to the satisfaction of the Engineer-in-charge at his own cost.

(i) **Subgrade** : Where the surface is high, it shall be trimmed and suitably compacted. Where the same is low, the deficiency shall be corrected by adding fresh material. The degree of compaction and the type of material to be used shall conform to the specified requirements.

(ii) **Granular/Sub-base** : Same as at (i) above except that the degree of compaction and the type of material to be used shall conform to the specified requirements.

(iii) **Lime/Cement stabilized soil sub-base** : For Lime/Cement treated materials where the surface is high, the same shall be suitably trimmed while taking care that the material below is not disturbed due to this operation. However, where the surface is low, the same shall be corrected as described herein below.

For cement treated material, when the time elapsed between detection of irregularity and the time of mixing of the material is less than 2 hours, the surface shall be scarified to a depth of 50 mm, supplemented with freshly mixed material as necessary and recomposed to the relevant specification. When this time is more than 2 hours, the full depth of the layer shall be removed from the pavement and replaced with fresh material to specification. In either case, the area treated shall not be less than 5 metres long by 2 metres wide. This shall also apply to lime treated material except that the time criterion shall be 3 hours instead of 2 hours.

(iv) **Water Bound Macadam Base** : Where the surface is high or low, the top 75mm shall be scarified, reshaped with added material as necessary and recompacted. The area treated at a place shall not be less than 5 metres long and 2 metres wide.

(v) **Bituminous Constructions** : For bituminous constructions, other than wearing course, where the surface is low, the deficiency shall be corrected by adding fresh material and recompaction to specifications.

Where this surface is high, the full depth of the layer shall be removed and replaced with fresh material and compacted to specifications. For wearing course, where the surface is high or low; the full depth of the layer shall be removed and replaced with fresh material and compacted to specifications in all cases where the removal and replacement of a bituminous layer is involved, the area treated shall not be less than 5 metre long and not less than 1 lane wide.

**4. Quality Control Tests During Construction :**

The materials supplied and the works carried out by the Contractor shall conform to the enclosed relevant specifications. For ensuring the requisite quality of construction, the materials and works shall be subjected to quality control test as described hereinafter, by the Engineer-in-charge. The testing frequencies set forth are the desirable minimum and the Engineer-in-charge shall have the full authority to carry out test as frequently as he may deem necessary to satisfy that the materials at work comply with the appropriate specifications. Test procedures for the various quality control tests are indicated in the respective sections of the specifications or for certain tests within this section. Where no specific testing procedure is mentioned, the test shall be carried out as per prevalent accepted engineering practice to the directions of the Engineer-in-charge.

**5. Tests on embankment for Embankment Construction :****5.1 Borrow Material:**

- (a) Sand Content (IS : 2720 Part IV)  
Two test per 8000 Cubic Metres of soil.
- (b) Plasticity Test (IS : 2720 Part-V)  
Each type to be tested. Two tests per 8000 Cubic Metres of soil.

- (c) Density test (IS : 2720 Part VII)  
Each soil type to be tested. Two tests per 8000 Cubic Metres of soil.
- (d) Moisture Content Test (IS : 2720 Part-II)  
One test for every 250 Cubic Metres of soil.

## 5.2 Compaction Control :

Control shall be exercised by taking at least one measurement of density for each 1000 square meters of compacted area, or closer as required to yield the minimum number of test results for evaluating day's work on statistical basis. The determination of density shall be in accordance with IS. : 2720 (Part XXVMI). Test locations shall be chosen only through random sampling techniques. Control shall not be based on the result of any one test but on the mean value of a set of 5-10 density determinations. The number of tests in one set of measurements shall be 5 as long as it is felt that sufficient control over borrow material and the method of compactions is being exercised. If considerable variations are observed between individual density results, the minimum number of tests in one set of measurement shall be increase to 10. The acceptance of work shall be subject to the condition that the mean dry density equals or exceeds the specified density and the standard deviation for any set of results is below 0.08 gm/cc. However for earthwork in shoulders and in top 500 mm portion of the embankment below the sub grade at least one density measurement shall be taken for every 500 square meters of the compacted area provided further that the number of the tests in each set-of measurement shall be at least 10. In other respects, the control shall be similar to that described earlier.

## 6. Following materials shall conform to the Indian Standards shown against them :

- (1) ....Cement.....
- (2) ....Sand for masonry.
- (3).....Sand for concrete.
- (4).....Coarse aggregate.
- (5).....Mild Steel...
- (6) ....High yield strength deformed bars
  - (a) Hot Rolled..... IS : 1139
  - (b) Cold Twisted..... IS : 1786

## 7. Barrel thickness of pipes of different class shall be as under :

Sr. No.	Internal Diameter of pipe in mm	Barrel thickness (in mm).		
		NP1	NP2	NP2
1	80	25	25	-
2	100	25	25	-
3	150	25	25	-
4	250	25	25	-
5	300	30	30	-
6	350	32	32	75
7	400	32	32	75
8	450	35	35	75
9	500	-	35	75
10	600	-	40	80
11	700	-	40	80
12	800	-	45	90
13	900	-	50	100
14	1000	-	55	100
15	1100	-	60	115
16	1200	-	65	115

## DETAILED TECHNICAL SPECIFICATION

### CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA.

#### SCHEDULE-B1-Ground Floor - Main Building.

#### SCHEDULE-B2-First Floor - Main Building.

#### SCHEDULE-B3-Second Floor - Main Building.

#### SCHEDULE-B4-Third Floor - Main Building.

#### SCHEDULE-B5-Fourth Floor - Lift Machine Room.

#### ITEM NO.1:

**Excavation for Foundation upto 1.5 m. Depth including sorting out and stacking of useful materials and disposing of excavated stuff upto 50 Meter lead (A) (loose or soft soil) All sorts of soil**

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

**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 removal as directed The materials so obtained shall be property of the Government and shall be conveyed und stacked as directed with all lead. The roots of the trees coming in the sides shall be cut and coated with a hot asphalt.
- 2.2. The rate of side clearance is deemed to be included in the rate of earth work for which no extra will be paid.

**3.0. 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 labors materials, etc. required for setting out the reference marks and bench 'marks and shall maintain them as long as required and directed.

**4.0. Excavation**

The excavation in foundation shall be carried out in true line and level and shall have the width and depth as shown in the drawings or as directed. The contractor shall do the necessary shoring and shutting or providing necessary slopes to a safe angle, at his own cost. The payment for such precautionary measures shall be paid separately it not specified. The bottom of the excavated area shall be leveled both longitudinally and transversely as directed by removing and watering as required no. earth filling will be allowed for bringing it to level, if by mistake or any excavation is made deeper or wider than, that shown on the plan or directed. The extra depth or width shall be made up with concrete of same proportion as specified for the foundation concrete at the cost of the contractor. The excavation **up to 1.5 mt. depth** shall be measured under this item.

**5.0. Disposal of the excavated stuff**

- 5.1. The excavated stuff of the selected type shall be used in filling the trenches and plinth or leveling the ground in layers including ramming and watering etc.
- 5.2. The balance of the excavated quantity shall be removed by the contractor from the site of work to a place as directed with lead up to all lead and lift.

**6.0. Mode of measurements & payment**

- 6.1.** The measurement of excavation in trenches for foundation shall be made according to the sections of trenches shown on the drawing or as per sections given by the Engineer-in-charge. No payment shall be made for surplus excavation made in excess of above requirements or due to stopping and sloping back as found necessary on account of conditions of soil and requirements of safety.
- 6.2.** The rate shall be for a unit of **one cubic meter**.

**ITEM NO.2:**

**Excavation for Foundation from depth 1.5 m. to 3.0 m. including sorting out and stacking of useful materials and disposing of excavated stuff upto 50 Meter lead (A) (loose or soft soil). For column.**

**All sorts of soil**

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

**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 removal as directed The materials so obtained shall be property of the Government and shall be conveyed und stacked as directed with all lead. The roots of the trees coming in the sides shall be cut and coated with a hot asphalt.
- 2.2.** The rate of side clearance is deemed to be included in the rate of earth work for which no extra will be paid.

**3.0. 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 labours materials, etc. required for setting out the reference marks and bench 'marks and shall maintain them as long as required and directed.

**4.0. Excavation**

The excavation in foundation shall be carried out in true line and level and shall have the width and depth as shown in the drawings or as directed. The contractor shall do the necessary shoring and shutting or providing necessary slopes to a safe angle, at his own cost. The payment for such precautionary measures shall be paid separately if not specified. The bottom of the excavated area shall be leveled both longitudinally and transversely as directed by removing and watering as required no. earth filling will be allowed for bringing it to level, if by mistake or any excavation is made deeper or wider than, that shown on the plan or directed. The extra depth or width shall be made up with concrete of same proportion as specified for the foundation concrete at the cost of the contractor. The excavation **1.5 mt. to 3.00 mt depth** shall be measured under this item.

**5.0. Disposal of the excavated stuff**

- 5.1.** The excavated stuff of the selected type shall be used in filling the trenches and plinth or leveling the ground in layers including ramming and watering etc.
- 5.2.** The balance of the excavated quantity shall be removed by the contractor from the site of work to a place as directed with lead up to all lead and lift.

**6.0. Mode of measurements & payment**

- 6.1.** The measurement of excavation in trenches for foundation shall be made according to the sections of trenches shown on the drawing or as per sections given by the Engineer-in-charge. No payment

shall be made for surplus excavation made in excess of above requirements or due to stopping and sloping back as found necessary on account of conditions of soil and requirements of safety.

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

### **ITEM NO.3:**

**Filling available excavated earth (excluding Rock) in trenches. Plinth, sides of foundations etc. in layers not exceeding 20cm. In depth consolidating each disposed layer by ramming and watering.**

#### **1.0 WORKMANSHIP**

- 1.1. The earth to be used for filling shall be free from salts, organic or other foreign matter all clots of earth shall be broken.
- 1.2. As soon as the work in foundation has been completed and measured the site of foundation shall be cleared of all debris brick bats mortar dropping etc. and filled with earth in layers not exceeding 20cms. 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 ends of crow-bars, where rammer cannot be used.
- 1.3. The plinth shall be similarly filled with earth in layers not exceeding 20 cms adequately watered and consolidated by ramming with iron or wooden rammers. When filling reaches finished level the surface shall be flooded with water for at least 24 hours and allowed to dry and then rammed and consolidated.
- 1.4. The finished level of filling shall be kept to shape 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.

#### **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 a unit of **one cubic meter**.

### **ITEM NO.4:**

**Filling in foundation and plinth with murrum or selected soil in layers of 20cm thickness including watering, ramming and consolidating etc. complete.**

#### **1.0. Materials**

1.1. Murrum shall be clean, of good binding quality and of approved quality obtained from approved pits/quarries of disintegrated rocks which contain silicon material and natural mixture of clay of clastic origin. The size of murrum shall not be more than 20 mm

#### **1.0. Workmanship**

- 1.1. The earth to be used for filling shall be free from salts, organic or other foreign matter. All clods of earth shall be broken.
- 1.2. As soon as the work in foundation has been completed and measured the site of foundation shall be cleared of all debris, brick bats, mortar dropping etc., and filled with earth in layers not exceeding 20 cms. Each layer shall be adequately watered, rammed and consolidated before the succeeding layer is laid. The earth shall be rammed with iron rammers where feasible and with the but ends of crow-bars, where rammer cannot be used.
- 1.3. The plinth shall be similarly filled with earth in layers not exceeding 20 cms. adequately watered and consolidated by ramming with iron or wooden rammers. When filling reaches finished level the surface shall be flooded with water for at least 24 hours and allowed to dry and then rammed and consolidated.
- 1.4. The finished level of filling shall be kept to shape 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 the selected type shall be allowed to be used in filling the trenches and plinth. Under no circumstances black cotton soil be used for filling the plinth.

## **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 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.

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

## **ITEM NO.5:**

**Applying general insecticide pest control treatment to floors, cupboards etc including labour materials etc. complete. Using Imidacloprid 20 EC As Per 6113 pests Concentration Weight 0.50 percent is recommended on litre chemical emulsion dilute with 39 liter of water will give. Total dilute concentration with will be 40 litre inclusive of one litre chemical emulsion application 0.5 litre chemical /Sqm of surface is recommended as per I.S.**

Applying general insecticide pest control treatment to floors, cupboards etc including labor materials etc. complete. Using Imidacloprid 30.5 SCas Per IS 6313 part -II( (0.075% concentration by mass) is recommended 10.5ml chemical diluted with 5 liters of water application 0.5 litre chemical /Sqm of surface is recommended as per I.S.

## **1.0 MATERIALS**

The chemicals used for the soil treatment shall be only one of the following with concentration shown against each in aqueous emulsion.

<b>Chemicals</b>	<b>Concentration</b>
1 Aldrin	1.00% (By Weight)
2 Heptachlor	0.50% (By Weight)
3 Chlordane	0.50% (By Weight)

## **2.0 WORKMANSHIP**

**2.1** The chemicals barrier shall be complete and continuous under whole of the structure to be protected.

**2.2** The bottom and the sides of foundations up to a height of 30 cms from the bottom of excavation made for masonry foundation and for basement column pits shall be treated with the chemical emulsion at the rate 5 liters/sq. Meters of the surface area.

**2.3** The chemical treatment shall be carried out when the surface is quite dry. Chemical treatment shall not be carried out when it is raining or when the soil wet with rain or sub soil water.

**2.4** Once formed, treated soil berries shall be not disturbed. If by chance, treated soil barriers and disturbed, immediately steps shall be taken to restore the continuation and compactness of the barrier system.

**2.5** The treatment against termite infection shall remain fully effective for a period not less than 10 years from date of issue of the final certificate to completion of work. If at any time during this period, any defects in treatment are revealed or any evidence of infection in any part of the building or structure is noticed, the contractor shall be rectify the concerned failure to do so, the Engineer-in-charge any get the same rectified through any other agency at Contractor's risk and cost, any decision of Engineer-in-charge as to the cost payable by contractor for the same shall be binding to the contractor.

**2.6** A Guarantee bond on appropriately stamped paper shall be given by the contractor to the Department in the manner and form prescribed below.

## **FORM OF GUARANTEE BOND**

I/ We (Contractor) here by guarantee that work will remain unaffected an will not be in anyway damaged by termite or any other germs of similar types. For a period for 10 years after completion of the work of



anti-termite as per the terms and conditions of the contract and damage that might be caused on account of termite and or other similar type of germs and hereby Guarantee to make good any loss of damages suffered by the Govt. of Gujarat and further guarantee to redo effective work without claiming any extra cost

**2.7** This guarantee shall remain in force for the period of 10 years from the completion of the work under the contract and it shall remain binding to the contractor for period of 10 years.

**2.8** The deposit at the rate of 50% of the cost of this item from the running and final bills shall be recovered and remained for the first one year after completion of the work or at least on monsoon season passed whichever is later and 10% shall be retained for the balance of the guarantee period and shall be refunded only after completion of the guarantee period.

### **3.0 MODE OF MEASUREMENT AND PAYMENT**

**3.1.** The length and breadth shall be measured correct to a cm. as per the dimensions of sanctioned plans. No deduction shall be made nor extra paid for any opening for pipes etc. up to 0.1 sq. mt. The rate shall include the cost of all labor and materials required for the operation involved for satisfactory completion of this item. The sides of the trenches 30 cms, each side and bottom shall be measured under this item.

**3.2.** The rate shall be for a unit of One sq. meter.

### **ITEM NO.6:**

**Providing and laying cement concrete 1:3:6 (1 Cement, 3 coarse sand, 6 crushed stone aggregates 20mm nominal size) and curing complete excluding cost of formwork in Foundation and Plinth. Do For PCC.**

#### **1.0. Materials**

**1.1.** Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Aggregate 20 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, coarse sand and aggregate shall be one part of cement. 3 parts of coarse sand and 6 parts of 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 colour 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 all the interstices to be filled with mortar.

##### **2.6. Curing:**

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

### 3.0. Mode of measurement and payment

- 3.1. The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plans or as directed.
- 3.2. The rate shall be for a unit of **one cubic meter**.

### ITEM NO.7:

**Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in Column footings.**

#### 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 conform M-12.
- 1.2. The shuttering to be provided shall be of ordinary timber plank and shall conform to M-26.
- 1.3. The dimensions of scantlings and battens shall conform to the design. The strength of the wood shall not be less than that assumed in the design.

#### 2.0. General

- 2.1. The concrete mix shall be designed from preliminary tests. The proportion of the concrete mix shall be 1:1:2 (1 cement : 1 coarse sand : 2 graded stone aggregate 20 mm. nominal size) by volume concrete work shall have exposed concrete surface or as specified in the item.
- 2.2. The proportioning of cement and aggregates shall be done by weight and necessary precautions shall be taken in the production to ensure that the required work cube strength is attained and maintained. The controlled concrete shall be in grades of M-100, M-150, M-200, M-250, M-300, M-350 & M-400 with prefix controlled added to it. The letter M refers to mix and the numbers specify 28 days works cube compressive strength of 200 mm. cubes of the mix expressed in Kg./cm.
- 2.3. The proportion of cement, sand and coarse aggregate shall be determined of weight. The weigh batch machine shall be used for maintaining proper control over the proportion of aggregates as per mix design. The strength requirements of different grades of concrete shall be as under:

Grade of Concrete	Compressive strength of 15 cms. cubes in kg/cmt. at 28 days, conducted in accordance with I.S. 516-1959.	
	Preliminary test Min.	Work Test Min.
M 150	200	150
M 200	260	200
M 250	320	250
M 300	380	300
M 350		350
M 400	500	400

In all cases, the 28 days compressive strength specified in above be the criteria for acceptance or rejection of the concrete. Where the strength of a concrete mix as indicated by tests, lies in between the strength of any two grades specified in the above table, such concrete shall be classified in for purpose as concrete belonging to the lower of the grades between which its strength lies.

#### 3.0. Workmanship

- 3.1. The proportions for ingredients chosen shall be such that concrete has adequate workability for conditions prevailing on the work question and can be properly compacted with means available except where it can be shown to the satisfaction of the Engineer-in-charge, that supply of properly graded aggregate of uniform quality can be maintained till the completion of work, grading of aggregate shall be controlled by obtaining the coarse aggregates in different sizes and bending them in the right proportions as required. Aggregates of different sizes shall be stocked in separate stock piles. The required quantity of material shall be stock piled several hours, preferably a day before use. The grading of coarse and fine aggregate shall be checked as frequently as possible, the frequency for a given job being determined by Engineer-in-charge to ensure that the suppliers are maintaining the uniform grading as approved for samples used in the preliminary tests.
- 3.2. In proportioning concrete, the quantity of both cement and aggregate shall be determined by weight. Where the weight of cement is determined by accepting the maker's weight per bag, a reasonable number of bags shall be



- weighted separately to check the net weight. Where cement is weighted from bulk stocks at site and not by bags, it shall be weighed separately from the aggregate. Water, shall either be measured by volume in calibrated tanks or weighed. All measuring equipment shall be maintained in clean and serviceable condition. Their accuracy shall be periodically checked.
- 3.3.** It is most important to keep the specified water cement ratio constant and at its correct value. To this end, 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 I.S. 2386 (Part-III) shall be referred to. Suitable adjustments shall also be made in the weights of aggregates due to variation in their moisture content. Minimum quantity of cement to be used in controlled concrete shall not be less than 220 kg./m<sup>3</sup> in plain concrete and not less than 250 kg/m<sup>3</sup> in reinforced concrete.
- 3.4** The form work shall conform to the shape lines and dimensions as shown on the plans and be constructed as to remain sufficiently rigid during the placing and compacting of the concrete. Adequate arrangements shall be made by the contractor to safeguard against any settlement of the form-work during the course of concreting and after concreting. The form work of shuttering, centering, scaffolding, bracing etc. shall be as per design.
- 4.0. Clearing and Treatment of forms:**
- 4.1.** All rubbish, particularly chipping shaving and saw dust shall be removed from the interior of the form before the concrete work is placed and the form in contact with concrete shall be cleaned and thoroughly wetted or treated. The surface shall be then coated with soap solution applied before concreting is done. Soap solution for the purpose shall be prepared by dissolving yellow soap in water to get consistency of paint. Alternatively a coat of raw linseed oil shall be applied after thoroughly cleaning the surface. Care shall be taken that the coating does not get on construction joint surface and reinforced bars..
- 5.0 Stripping time:**
- 5.1.** In normal circumstances and where ordinary cement is used forms may be struck after expiry of following periods.
- (a) Sides of walls columns and vertical faces of beams.....24 to 48 hours.
  - (b) Beam soffits, (props, left under).....7 days.
  - (c) Removal of props slabs:
    - (i) Slabs spanning up to 4.5 m.....7 days.
    - (ii) Spanning over 4.5 m.....14 days.
  - (d) Removal of props for beams and Arches:
    - (i) Spanning up to 6 m.....14 days.
    - (ii) Spanning over 6 m.....21 days.
- 6.0 Procedure when removing the form work :**
- 6.1.** All form work shall be removed without such shock or vibrations as would damage the reinforced concrete surface. Before the soffits form work and struts are removed, the soffits and the concrete surface shall be exposed where necessary in order to ascertain that the concrete has sufficiently hardened.
- 7.0 Centering:**
- 7.1.** The centering to be provided shall be got approved. It shall be sufficiently strong to ensure absolute safety of the form work and concrete work before, during and after pouring concrete. Watch should be kept to see that behavior or centering and form work is satisfactory during concreting. Erection should also be such that it would allow removal of forms in proper sequence without damaging either the concrete or the forms to be removed.
- 7.2.** The props of centering shall be provided on firm foundation or base of sufficient strength to carry the loads without any settlement.
- 7.3.** The centering and form work shall, be inspected and approved by the Engineer-in-charge before concreting. But this will not relieve the contractor of his responsibility for strength, adequacy and safety of form work and centering. If there is a failure of form work or centering, contractor shall be responsible for the damages to property.
- 8.0 Scaffolding:**
- 8.1.** All scaffolding, hoisting arrangements and ladders etc. required for the facilitating of concreting shall be provided and removed on completion of work by contractor at his own expense. The scaffolding, hoisting arrangements and ladders etc. shall be strong enough to withstand all live, dead and impact loads expected to act and shall be subject to the approval of the Engineer-in-charge. However contractor shall be solely responsible for the safety of the scaffolding, hoisting arrangement, ladders, work and workman etc.
- 8.2.** The scaffolding, hoisting arrangements and ladder shall allow easy approach to the work spot and afford easy inspection.

- 8.3. The rate is applicable to all condition of working and height up to 4 mts. The rate shall include the cost of materials and labour for various operations involved such as :
- (a) Splayed edges, notching, allowance for overlaps and passing at angles, battens centering, shuttering propping, bolting, wedging easing, striking and removal.
  - (b) Filleting to form stop chamfered edges or splayed external angles not exceeding 20 mm: width to beams, columns and the like.
  - (c) Temporary openings in the forms for pouring concrete, if required removing rubbish etc.
  - (d) Dressing with oil to prevent adhesion of concrete with shuttering and.
  - (e) Raking or circular cutting.
- 9.0 **Re-Use:**
- 9.1. Before re-use, all form shall be inspected by Engineer-in-charge and their suitability ascertained. The forms shall be scarred, cleaned and joints are gone over, repaired where required. Inside surface shall be retreated to prevent adhesion of concrete.
- 10.0. **Mode of measurement & payment**
- 10.1. The consolidated cubical contents of concrete work as specified in item shall be measured. No deduction shall be made for  
(a) Ends of dissimilar materials such as joints, beams, posts, girders, falters, purling trusses, corbels and steps etc. up to 500 Sq. Cm. in section.
- 10.2. Form work shall be measured as the area in square meters to shuttering in contract with concrete except in the case of inclined member and portion of curved profile and upper side in which case on area of underside shall be measured for payment.
- 10.3. Form work to secondary beams shall be measured up to the sides of main beams but no deduction shall be made from the form work of the main beam at the inter section point. No deduction shall be made from the form work of a column at inter section of beams.
- 10.4. The rate includes cost of all materials labour, tools and plant required for mixing, placing in position, vibrating and compacting, finishing, as directed, curing and all other incidental expenses for producing concrete of specified strength. The rate includes the cost of form work.
- 10.5. The rate shall be for a unit of **one cubic meter**.

**ITEM NO.8:**

**Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork But Excluding the cost of reinforcement for reinforced concrete work in Column upto Plinth Level having any cross section area.**

Detailed Technical Specification As per Item No.7

**ITEM NO.9:**

**Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in Columns having any cross section area for all floors.**

Detailed Technical Specification As per Item No.7

**ITEM NO.10:**

**Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in RCC WALL having any cross section area for all floors.**

Detailed Technical Specification As per Item No.7

**ITEM NO.11:**

**Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Ground Beam having any cross section area.**

Detailed Technical Specification As per Item No.7

**ITEM NO.12:**

**Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in coping.**

Detailed Technical Specification As per Item No.7

**ITEM NO.13:**

**Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Lintel/ Chajjas for all floor.**

Detailed Technical Specification As per Item No.7

**ITEM NO.14:**

**Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Slab having any thickness for all floors.**

Detailed Technical Specification As per Item No.7

**ITEM NO.15:**

**Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Beams having any cross section area for all floors.**

Detailed Technical Specification As per Item No.7

**ITEM NO.16:**

**Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Stairs for all floors.**

Detailed Technical Specification As per Item No.7

**ITEM NO.17:**

**Providing ISI Mark TMT Bar Fe-500 Reinforcement for R.C.C work including bending, binding and placing in position etc. complete for all Floors.**

**1.0. GENERAL**

This work shall consist of furnishing and placing coated, or uncoated or high strength deformed reinforcement, bars (intentioned) of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer in charge.

## **2.0. MATERIAL**

### **2.1. TMT Bars**

Reinforcements may be either T.M.T. tensile steel, conforms to IS 1786-2008 bars. They may be uncoated or coated with epoxy or with approved protective coatings.

**2.2.** T.M.T. bars reinforcement for R.C.C. work shall conform IS 432 (Part II) 1982 (Reaffirmed 1995) and shall be of tested quality. It shall also comply with relevant part of IS 456-2000.

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

**2.4.** All steel shall be procured from original producers no re-rolled steel shall be incorporated in the work.

**2.5.** Only new steel shall be delivered to the site every bar shall be inspected before placing to its position and defective brittle or burnt bar shall be discarded cracked ends of bars shall be discarded.

### **3.0. Pitch**

**3.1.** Distance between bars shall be as specified in drawings and as directed by the Engineer in charge all bars shall be placed at an accurate distance from each other and shall be bind tightly to maintain the desired pitch Suitable means shall be provided for holding bars securely in position.

### **4.0. Binding wire**

**4.1.** Mild steel binding wire shall be of 1.63 mm or 1.22 mm (16 to 18 gauge diameter and shall conform IS 280-2006.

**4.2.** The use of black wire will be permitted for binding reinforcement bars. It shall be free from dirt, paint, grease or oil, oil scale or loose or thick rust and any other undesirable coating which may prevent adhesion of cement mortar at the time of binding.

**4.3.** Only new binding wire shall be delivered to the site all binding wire shall be inspected before binding to its position and defective brittle, rusted, used wire, shall be discarded.

## **5.0. PROTECTION OF REINFORCEMENT**

**5.1.** Uncoated reinforcing steel shall be protected from rusting or chloride contamination. Reinforcements shall be free from rust, mortar, loose mill scale, grease, oil or paints. This may be ensured either by using reinforcement fresh from the factory or thoroughly cleaning all reinforcement to remove rust using any suitable method such as sand blasting, mechanical wire brushing, etc. as directed by the Engineer. Reinforcements shall be stored on bricks, racks or platforms and above the ground in a clean and dry condition and shall be suitably marked to facilitate inspection and identification.

**5.2.** Portions of uncoated reinforcing steel and dowels projecting from concrete shall be protected within one week after initial placing of concrete with a brush coat of neat cement mixed with water to a consistency, of thick paint. This coating shall be removed by lightly tapping with a hammer or other tool not more than one week before placing of the adjacent pour of concrete. Coated reinforcing steel shall be protected against damage to the coating. If the coating on the bars is damaged during transportation or handling and cannot be repaired, the same shall be rejected.

### **6.0. Workmanship**

**6.1.** The work shall consist of furnishing and placing reinforcement to the shape and dimensions shown as on the drawings or as directed by The Engineer in charge.

**6.2.** Reinforcing steel shall conform accurate to the dimensions given in the bar bending schedules shown on relevant drawing.

## **7.0. BENDING OF REINFORCEMENT**

- 7.1. Bar bending schedule shall be furnished by the Contractor and got approved by the Engineer before start of work.
- 7.2. Reinforcing steel shall conform to the dimensions and shapes given in the approved bar bending Schedules.
- 7.3. Bars shall be bent cold to the specified shape and dimensions or directed by the Engineer using a proper bar bender operated by hand power to obtain the correct radius of bends and shape. Bars shall not be bent or straightened in a manner that will damage parent material or the coating bars bent during transport or handling shall, be straightened before being used on work and shall not be heated to facilitate straightening.

## **8.0. PLACING OF REINFORCEMENT**

- 8.1. The reinforcement cage should generally be fabricated in the yard at ground level, and then shifted and placed in position. The reinforcement shall be placed strictly, in accordance with the drawings and shall be assembled in position, only when structure is otherwise ready for placing of concrete. Prolonged time gap, between assembling of reinforcements and casting of concrete, which may result in rust formation on the surface, shall not be permitted.
- 8.2. Reinforcement bars shall be placed accurately in position as shown on the drawings. The bars, crossing one another shall be tied together at every intersection with binding wire (annealed), conforming to IS: 280 to make the skeleton of the reinforcement rigid such that the reinforcement does not get displaced during placing of concrete, or any other operation. The diameter of binding wire shall not be less than 1 mm.
- 8.3. Bars shall be kept in position usually by the following methods:  
In case of beam and slab construction, industrially produced polymer cover blocks of thickness equal to the specified cover shall be placed between the bars and formwork subject to Satisfactory evidence that the polymer composition is not harmful to concrete and reinforcement. Cover blocks made of concrete may be permitted by the Engineer, provided they have the same strength and specification as those of the member.
- 8.4. In case of dowels for Columns and walls the vertical reinforcement shall be kept in position by means of timber templates with slots in them accurately, or with cover blocks tied to the Reinforcement Timber templates shall be removed after the concreting has progressed up to a level just below their location.
- 8.5. Layers of reinforcements shall be separated by spacer bars at approximately One meter intervals. The minimum diameter of spacer bars shall be 12 mm or: equal to maximum size of main reinforcement or maximum size of coarse aggregate, whichever is greater. Horizontal reinforcement shall not be, allowed to sag between supports.
- 8.6. Necessary stays, blocks, metal chairs, spacers, metal hangers supporting wires etc, or Other subsidiary, reinforcement shall be provided to fix the reinforcements firmly in its correct position.
- 8.7. Use of pebbles, broken stone, metal pipe, brick, mortar or wooden blocks etc as devices for positioning reinforcement shall not be permitted.
- 8.8. Bars coated with epoxy or any other approved protective coating shall be placed on supports that do not damage the coating. Supports shall be installed in a manner such that planes of weakness are not created in hardened concrete. The coated reinforcing steel shall be held in place by use of plastic or plastic coated binding wires especially manufactured for the Purpose.
- 8.9. Placing and fixing of reinforcement shall be inspected and approved by the Engineer before concrete is deposited.
- 9.0. **Lapping**
- 9.1. All reinforcement shall be furnished in full lengths as indicated on the drawing. No splicing of bars, except where shown on the drawing; will be permitted without approval of the Engineer. The lengths of

the splice shall be as indicated on drawing or as approved by the Engineer. Where practicable, overlapping bars shall not touch each other, and shall be kept apart by 25 mm or 1 1/4 times the maximum size of coarse aggregate, whichever is greater. If this is not feasible, overlapping bars shall be bound with annealed steel binding wire, not less than 1 mm diameter and twisted tight in such a manner as to maintain minimum clear cover to the reinforcement from the concrete surface. Lapped splices shall be staggered or located at points, along the span where stresses are low.

#### **10.0. Welding**

**10.1** Splicing by welding of reinforcement will be permitted only if detailed on the drawing or approved by the Engineer. Weld shall develop an ultimate strength equal to or greater than that of the bars connected.

**10.2.** While welding may be permitted for T.M.T. reinforcing bars conforming to IS:432, welding of deformed bars conforming to IS: 1786 shall in general be prohibited. Welding may be permitted in case of bars of other than S 240 grade including special. Welding grade of 500D grade bars conforming to IS: 1786, for which necessary chemical analysis has been secured and the carbon equivalent (CE) calculated from the chemical composition using the formula:

$$CE = C + \frac{Mn}{6} + \frac{Cr + Mg + V}{5} + \frac{Ni + Cu}{15}$$

is 0.4 or less.

**10.3.** The method of welding shall conform to IS: 2751 and IS: 9417 and to any supplemental specifications to the satisfaction of the Engineer.

**10.4.** Bars shall be bent cold to the specified shape and dimensions or as directed by Engineer in charge using the proper bender tool, operated by hand or power to attain proper radius of bends. Bars shall not be bent or straightened in a manner that will injure the material. Bars bent during transport or handling shall be straightened before being used in the work. Bars shall not be heated to facilitate bending.

**10.5.** 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 the round bar and the length of the straight part of the bar beyond the end of the curve shall be at least four times of the diameter of the round bar. In case of bars which are not round and in case of deformed bars, the diameter shall be taken as the diameter of circle having an equivalent effective area. The hooks shall be suitably encased to prevent any spalling of the concrete.

**10.6.** All 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 say blocks or metal chairs spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals. Bars shall not be allowed to sag between supports not displaced during concreting or any other operations of the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal supports shall not extend to the surface of the concrete, except where shown in drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed. Pieces of broken stone or brick and wooden blocks shall not be used. Layers of bars shall be separated by spacer bars, pre-cast mortar blocks or other approved devices. Reinforcement after bending placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement from corrosion, concrete cover shall be provided as indicated on drawings. All bars protruding from concrete and to which other bars are to be lapped and which are likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout.

**10.7.** 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 at the time of fixing and concreting. As far as possible bars of full length shall be used. In case this is not possible, overlapping of bars shall be done as directed by the Engineer in charge. When practicable overlapping bars shall not touch each other, but be kept apart by 25 mm. Where no 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 sheer not bending moments is maximum.

**10.8.** Whenever indicated on drawing or desired the Engineer in charge bars shall be joined by coupling which shall have a cross section sufficient to transmit the full stresses of bars The end 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 standards threads Steel for coupling shall conform to IS 226.

**10.9.** When permitted or specified on the drawings joints of reinforcement bars shall butt-welded so as to transmit their full stresses Welded joints shall preferably be located at points when steel will not be 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 form the molten metal and conforms to any or 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 bars shall be cleaned of all loose scale rust stages 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 IS 814 Welded pieces of reinforcement shall be tested. Specimen shall be taken from the actual site and their number shall frequency to test shall be as directed by the Engineer in charge.

## **11.0 MODE OF MEASUREMENTS & PAYMENT**

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

Sr. No	Diameter of steel	weight of steel per running meter	Sr. No	Diameter of steel	weight of steel per running meter
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	40mm	9.86 Kg / Rmt

**11.2.** Reinforcement shall be measured in length including hooks, if any, separately for different diameters as actually used in work, excluding overlaps. From the length so measured, the weight of reinforcement shall be calculated in tones on the basis of IS: 1732. Wastage, overlaps, couplings, welded joints, spacer bars, chairs, stays, hangers and annealed steel wire or other methods for binding and placing shall not be measured and cost of these items shall be deemed to be included in the rates for reinforcement.

**11.3.** The contract unit rate for coated/uncoated reinforcement shall cover the cost of material, fabricating, transporting, storing, bending, placing, binding and fixing in position as shown on the drawings as per these specifications and as directed by the Engineer, including all labour, equipment, supplies, incidentals, sampling, testing and supervision.

The unit Rate for coated reinforcement shall be deemed to also include cost of all material, labour, tools and plant, royalty, transportation and expertise required to carry out the work. The rate shall also cover sampling, testing and supervision required for the work.

**11.4** The rate shall be for a unit of **One Kgs.**

### **ITEM NO.18:**

**Providing and Laying brick work using common burnt clay building bricks (Conventional) having crushing strength not less than 35 Kg./Sq. Cm. in foundation and plinth in Cement Mortar. (1:6) (1 Cement : 6 fine sand). (up to Plinth Level)**



## **1.0. Materials**

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

## **2.0. Workmanship**

### **2.1. Proportion:**

2.1.1. The proportion of the cement mortar shall be 1:6 (1 cement: 6 finesand) by volume.

### **2.2. Wetting of bricks:**

2.2.1. 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 as indication of through wetting of bricks.

### **2.3. Laying:**

2.3.1. Bricks shall be laid in English bond unless directed otherwise. Half or cut bricks shall not be used except when necessary to complete to bond; closures in such case shall be cut to required size and used near the ends of walls.

2.3.2. A layer of mortar shall bespread on full width for suitable length of the lower course. Each brick shall first be property bedded and set home by gently tapping with handle of trowel or wooden mallet. Its inside face shall be flushed with mortar before the next brick is laid and pressed against it. On completion of course, the vertical joints shall be fully filled from the top with mortar.

2.3.3. The walls 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 course shall be kept uniform.

2.3.4. The brick shall be laid with frog up wards. A set of tools comprising of wooden straight edges, man son's spirit level, square half meter rub, and pins, string and plumb shall be kept on the site of work for frequent checking during the progress of work.

2.3.5. 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.

2.3.6. 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.

### **2.4. Joints:**

2.4.1. Bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not exposed 12 mm. The face joints shall be raked out as directed by raking tools daily during the progress of work, when the mortar is still green so as to provide key for plaster or pointing to done.

2.4.2. The face of brick shall be cleaned the very day on which the work is laid and all mortar dropping removed.

### **2.5. Curing:**

2.5.1. 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.

### **2.6. Preparation of foundation bed:**

2.6.1. If the foundation is to be laid directly on the excavated bed, the shall be leveled, cleared of all loose materials, cleaned and wetted before stating masonry, If masonry is to be laid on concrete footing, the top of concrete shall be cleaned and moistened. The contractor shall obtain the engineer's approval for the foundation bed before foundation masonry is started. When pucca flooring is to be provided flush with the top to plinth, the inside plinth offset shall be kept lower than the outside plinth top by the thickness of the flooring.

## **3.0. Mode of measurements & payment**



- 3.1. The measurements 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 plinths or as directed shall be final. Battered tapered and curved portions shall be measured net.
- 3.2. No deduction shall be made from quantity of brick work nor any extra payment made for embedding in masonry of marking holes in respect of following item.
  - (1) Ends of joints, beams, posts, girders, rafters, purlins trusses corbel, steps, etc. where cross sectional area does not exceed 500 sq.cm.
  - (2) Opening not exceed in 1000 sq.cm.
  - (3) Wall plate sand bed plates bearing of slab, chajjas and like whose thickness does not exceed 10 cms. and the bearing does not extend the full thickness of wall.
  - (4) Drainage holes and recesses for cement concrete blocks to embed hold fasts for doors, window etc.
  - (5) Iron fixtures, pipes up to 300 mm. dia. hold fasts of doors, and window built into masonry and pipes etc. for concealed wiring.
  - (6) Forming charges of section not exceeding 350 sq.cm. in masonry.
- 3.3. Apparatuses for fire places shall not be deducted nor shall extra labour required to make splaying of jumps, throating and making trenches over the aperture be paid for separately.
- 3.4. The rate shall be for a unit of **one cubic meter**.

#### **ITEM NO.19:**

**Providing and Laying Brick work using common burnt clay building bricks (Conventional) having crushing strength not less than 35 Kg./Sq. Cm. in Super Structure Above Plinth level in Cement Mortar (1:6) (1 Cement : 6 fine sand) etc. complete for any Height.**

#### **1.0. Materials**

Bricks shall conform to M-15. Cement mortar shall conform to M-11.

#### **2.0. Workmanship**

##### **2.1. Proportion:**

- 2.1.1. The proportion of the cement mortar shall be 1:6 (1 cement : 6 fine sand) by volume.

##### **2.2. Wetting of bricks:**

- 2.2.1. 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 as indication of through wetting of bricks.

##### **2.3. Laying:**

- 2.3.1. Bricks shall be laid in English bond unless directed otherwise. Half or cut bricks shall not be used except when necessary to complete to bond, closures in such case shall be cut to required size and used near the ends of walls.
- 2.3.2. A layer of mortar shall be spread on full width for suitable length of the lower course. Each brick shall first be properly bedded and set home by gently tapping with handle of trowel or wooden mallet. Its inside face shall be flushed with mortar before the next brick is laid and pressed against it. On completion of course, the vertical joints shall be fully filled from the top with mortar.
- 2.3.3. The walls 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 course shall be kept uniform.
- 2.3.4. The brick shall be laid with frog up wards. 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 the site of work for frequent checking during the progress of work.
- 2.3.5. 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.

- 2.3.6.** All futures, 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.

**2.4. Joints:**

- 2.4.1.** Bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not exposed 12 mm. The face joints shall be raked out as directed by raking tools daily during the progress of work, when the mortar is still green so as to provide key for plaster or pointing to done.
- 2.4.2.** The face of brick shall be cleaned the very day on which the work is laid and all mortar dropping removed.

**2.5. Curing:**

- 2.5.1.** 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.

**2.6. Preparation of foundation bed:**

- 2.6.1.** If the foundation is to be laid directly on the excavated bed, it shall be leveled, cleared of all loose materials, cleaned and wetted before stating masonry, If masonry is to be laid on concrete footing, the top of concrete shall be cleaned and moistened. The contractor shall obtain the engineer's approval for the foundation bed before foundation masonry is started. When pucca flooring is to be provided flush with the top to plinth, the inside plinth offset shall be kept lower than the outside plinth top by the thickness of the flooring.
- 2.7.** The frames of doors, windows, cupboards etc. shall be housed into the brick work at the correct location and level as directed. The heavy steel doors, window frames etc. shall be built in with work, but for ordinary steel doors and windows required opening for frames, hold-fasts etc. shall be in the wall and frame embedded later on in order to avoid damage to the frames.
- 2.8.** Necessary scaffolding shall be provided. The supports of the scaffolding shall be sound and strong tied, together with horizontal pieces over which the scaffolding plunks shall be fixed. Simple scaffolding shall be allowed normally. In this case scaffolding hole shall rest in hole header horizontal coarse only. Minimum number of holes be left in brick work for supporting horizontal scaffolding poles. The contractor is responsible for providing and maintaining sufficiently strong scaffolding so as to withstand all loads likely to come upon it.
- 2.9.** For the face of brick work, where plastering is to be done, joints shall be raked out to a depth not less than thickness of joints. The face of brick work shall be cleaned and mortar dropping removed on very same day that brick work is laid.

**3.0. Mode of measurements & payment**

- 3.1.** The masonry work of G.F. & First floor shall be measured and paid under this item rate includes cost of all materials & labour.
- 3.2.** Brick work in parapet shall be included in the corresponding masonry item of floor immediately below the floor above which the parapet is built.
- 3.3.** No deduction shall be made from quantity of brick work nor any extra payment made for embedding in masonry of marking holes in respect of following item.
- (1) Ends of joints, beams, posts, girders, rafters, purlins trusses corbel, steps, etc. where cross sectional area does not exceed 500 sq.cm.
  - (2) Opening not exceed in 1000 sq.cm.
  - (3) Wall plate sand bed plates bearing of slab, chhajjas, and like whose thickness does not exceed 10 cms. and the bearing does not extend the full thickness of wall.
  - (4) Drainage holes and recesses for cement concrete blocks to embed hold fasts for doors, window etc.
  - (5) Iron fixtures, pipes up to 300 mm. dia. hold fasts of doors, and window built into masonry and pipes etc. for concealed wiring.

- (6) Forming charges of section not exceeding 350 sq.cm. in masonry.
  - (7) Apparatuses for fire places shall not be deducted nor shall extra labour required to make splaying of jumps, throating and making trenches over the aperture be paid for separately.
- 3.4.** The rate shall be for a unit of **one cubic meter**.

**ITEM NO.20:**

**Providing, laying and constructing half brick masonry work in super structure having crushing strength not less than 35 Kg./Sq. Cm. in cement mortar (1:4) (1 Cement : 4 Coarse sand) etc. complete for All Floors.**

**1.0. 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.

**2.0. Workmanship**

**2.1. Proportion:**

**2.1.1.** The proportion of the cement mortar shall be 1:5 (1 cement: 5 fine sand) by volume.

**2.2. Wetting of bricks:**

**2.2.1.** 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 as indication of through wetting of bricks.

**2.3. Laying:**

**2.3.1.** Bricks shall be laid in English bond unless directed otherwise. Half or cut bricks shall not be used except when necessary to complete to bond; closures in such case shall be cut to required size and used near the ends of walls.

**2.3.2.** A layer of mortar shall be spread on full width for suitable length of the lower course. Each brick shall first be properly bedded and set home by gently tapping with handle of trowel or wooden mallet. Its inside face shall be flushed with mortar before the next brick is laid and pressed against it. On completion of course, the vertical joints shall be fully filled from the top with mortar.

**2.3.3.** The walls 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 course shall be kept uniform.

**2.3.4.** The brick shall be laid with frog up wards. A set of tools comprising of wooden straight edges, man son's spirit level, square half meter rub, and pins, string and plumb shall be kept on the site of work for frequent checking during the progress of work.

**2.3.5.** 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.

**2.3.6.** All futures, 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.

**2.4. Joints:**

**2.4.1.** Bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not exposed 12 mm. The face joints shall be raked out as directed by raking tools daily during the progress of work, when the mortar is still green so as to provide key for plaster or pointing to done.

**2.4.2.** The face of brick shall be cleaned the very day on which the work is laid and all mortar dropping removed.

**2.5. Curing:**

**2.5.1.** 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.

**2.6. Preparation of foundation bed:**

**2.6.1.** If the foundation is to be laid directly on the excavated bed, the shall be leveled, cleared of all loose materials, cleaned and wetted before stating masonry, If masonry is to be laid on concrete footing, the top of concrete shall be cleaned and moistened. The contractor shall obtain the engineer's approval for the foundation bed before foundation masonry is started. When pucca flooring is to be provided flush with the top to plinth, the inside plinth offset shall be kept lower than the outside plinth top by the thickness of the flooring.

**2.1.** Relevant specifications of bricks, wetting and laying of bricks, joints, curing etc shall conform to item no. 6.19.(A) except that the brick work of half shall be carried out.

**2.2.** Cement mortar used in masonry work shall be in proportion of 1 part of cement and 4 parts of sand by volume.

**2.3.** AH 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 said truly horizontal and all vertical joints shall be truly vertical. The bricks shall be laid with frogs upwards. A set of masons tools shall be maintained on work as required for frequent checking.

**3.0. Mode of measurement and payment**

**3.1.** The half brick masonry work in foundation and plinth shall be measured under this item the limiting dimensions shall not exceed those shown in the plan or as directed. Any work done extra over the specified dimensions shall be ignored.

**3.2.** The relevant specifications of item no. 6.12. shall be followed. The length shall be measured nearest to one cm.

**3.1.** The measurements 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 plinths or as directed shall be final. Battered tapered and curved portions shall be measured net.

**3.2.** No deduction shall be made from the quantity of brick work, for any extra payment made for embedding in masonry or making holes in respect of following items:

(1) Ends of joists, beams, posts, girders, purlins, trusses, corbel, steps etc. where cross sectional area does not exceed 500 Sq.Cm.

(2) Openings not exceeding 1000 Sq.Cm.

(3) Wall plates and bed plates, bearing of slabs, chajjas and the like whose thickness does not exceed 10 Cms. and the bearing does not extend to the full thickness of wall.

(4) Drainage holes, and recesses for cement concrete blocks to embed hold fasts for doors, windows etc.

(5) Iron fixtures, pipes up to 300 mm. dia hold fasts, and doors and windows built into masonry and pipes etc. for concealed wiring.

(6) Forming chases of section not exceeding 350 -Sq. Cm. in masonry.

**3.3.** Apertures for fire places shall not be deducted nor shall be paid for separately.

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

**ITEM NO.21:**

**Providing and fixing 35mm thick flush door shutters, solid core construction with frame of first class hardwood with cross band and face veneer or plywood face panels, including anodized aluminum butt hinges with necessary screws. (A) Decorative type and bright finished M.S. Piano hinges of Nickel plated piano hinges in flush door shutters.**

**1.0. Materials**

Flush door shall conform to M-30. Plywood shall conform to M-37. Anodized aluminum butt hinges shall conform to M-43.

**2.0. Workmanship**

2.1. 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.

## **2.0. Workmanship**

2.1. The item covers the requirement of preparation of shutters for doors, windows, clerestory windows, their supply and fixing.

### **2.2. Shutters:**

2.2.1. Paneled shutters shall be constructed in the form of timber frame work of styles and rails with panel inserted of type as specified in the detailed drawings. Panel shall be fixed by providing grooves in the style and rails. The styles and rails shall be joined to each other by mortise and tenon joints at right angles.

2.2.2. All members of the shutters shall be straight without any warp or bow and shall have smooth, well planed faces at right angles to each other.

2.2.3. The size of styles and rails shall be as per drawings or as directed. Styles and rails of shutters shall be made of one piece only.

### **2.3. Timber paneling:**

2.3.1. Thickness of the panel shall be as specified in the item as shown in the drawing or as directed. If the panel is made from more than one piece the pieces shall be finished as shown in the detailed drawings and shall be joined with continuous groove with specified size. The end pieces of the panel and the top and bottom of the panel shall be provided with continuous tongue to frame into groove of the frame shutter. An air space of 1.5 mm. shall be left in the groove of frame of shutter while framing the panels in it.

2.3.2. The faces of the panel as well as various pieces of the panel shall be- closely fitted to the sizes of the grooves.

2.3.3. Finishing of the corners of raised panel edges shall be done as shown in drawings or as directed.

2.3.4. The thickness specified shall be finished thickness and no tolerance will be permitted.

### **2.5. Fixtures and Fastenings:**

2.5.1. The rate shall include anodized butt hinges including fixing with iron screws. The size and number of hinges shall be as per table given in annexure-1.

2.2. Readymade shutters shall be of correct size and shall fit into the door or other openings without excessive scraping of edges. Adding of battens etc., to make up to the size shall not be allowed.

## **3.0. Mode of measurement and payment**

3.1. The rate for shutter includes cost of providing block and cleat for keeping the shutter in open position if directed.

3.2. The dimension of the shutter shall be measured clear size of the shutter in close position between the grooves of the frame.

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

## **ITEM NO.22:**

Providing and fixing window having extruded aluminum color powder coated section frame main outer size 95.00mm x 24.00mm x 1.17mm (of jindal Section no: 2459 @ wt. 0.738 Kg/Rmt.), horizontal three track member size 92.0 mm x 31.75mm x 1.30mm (of jindal Section no: 8688, @ Wt. 0.1.07Kg./Mt.), vertical member of size 92mm x 31.75mm x 1.50mm (of jindal section no: 8933@ Wt. 1.06 Kg/mt.) with sliding shutters of horizontal member size 40mm x 18mm x 1.29mm (of Jindal section no: 8947@ Wt. of 0.456 Kg./Mt) vertical member of size 40mm x 18mm x 1.29mm (of jindal Section No : 8949, @ Wt. 0.456 Kg/mt. with 5mm thick transparent bronze colour tinted float glass with powder coated aluminum fittings & fixtures and transparent silicon sealant glass fixing to frame as per details etc. Complete for Window.

## **1.0 MATERIAL**

### **1.1 Aluminum standard section**

#### **1.1.1 Window having extruded aluminum color powder coated**

Aluminum alloy used in the manufacture of window section shall confirm to I.S. designation HEA-WP of I.S. 733-1975 and also designation WVG-WP of I.S. 1285-1975 section shall Beas specified in the drawing and design.

The works included standard window having extruded aluminum color powder coated frame main outer size 95mm x 24mm x 1.17mm (@wt. 0.738 Kg/mt.), horizontal Three track member size 92mm x 31.75 mm x 1.30mm (@wt. 1.07 Kg/mt.), vertical member of size 92mm x 31.75mm x 1.50mm (@wt. 1.06 Kg/mt.) with sliding shutters of horizontal member size 40mm x 18mm x 1.29mm (@wt. 0.456 Kg/mt.), vertical member of size 40 x 18 mm x 1.29mm (@wt. 0.456 Kg/mt.) as per details as directed by Engineer in charge.

All sections shall be free from any scratches or holes or any damages on surface. All section shall have finished luster surface on all sides

**1.1 Glass :** The transparent bronze color tinted float glass shall be of approved make having thickness of **5mm**. The glass shall be clear and free from scratches and cracks. The glass shall be provided on wall panel and fixed with transparent silicon gasket

**1.2 Glazing clips:** Glazing clips (structural glass) shall be of size as directed by the Engineer in charge around the glass allover shall be free from any scratches or holes or any damage of on surface all section shall have finished luster surface on all sides.

**1.3 Rubber Gasket**

Rubber gasket shall be of approved make shall be free from any scratches or holes or any damages on surface, and shall have finished luster surface on all sides.

**1.4 Fixtures**

Hinges shall be of approved make shall be free from any scratches or holes or any damages on surface and shall have finished luster surface on all sides.

**1.5 Handles**

Handles shall be of approved make shall be free from any scratches or holes or any damages on surface, and shall have finished luster surface on all sides.

**1.6 Bolts**

All Bolts shall be of approved make shall be free from any scratches or holes or any damages on surface and shall have finished luster surface on all sides.

**1.7 Stoppers**

Stoppers shall be of approved make shall be free from any scratches or holes or any damages on surface, and shall have finished luster surface on all sides.

Product is from reputed company having ISO 9001-2000 certificate and with three years performance guarantee.

## **2.0 WORKMANSHIP**

The work of window having extruded aluminum color anodized section frame shall be done with extreme finishing the partial board shall be fixed in the bottom panel and glass shall be fitted on top panel as directed by Engineer in charge, using glazing clips and rubber gaskets as required. All the fixtures and fastenings shall be fitted at right place and as directed by Engineer in charge floor spring shall be fitted properly so as to align the window properly and shall be given trial of opening and closing properly.

### **3.0 Mode of Measurement& Payment**

**3.1.** The unit rate of window having extruded aluminum color anodized section frame shall include the cost of all materials, cost of anodizing, cost of all necessary fixtures and fastenings, labor charges for fixing frames, shutters and fixing the window in wall at the place shown in drawing and as instructed by Engineer in charge, all tools and plant required for assembling and fixing in position, finishing as per direction of the Engineer-in-charge, and all other incidental expenses for preparing frame and shutter of specified size to complete the structure or its components as shown on the drawings and according to these specifications. They shall also include the cost of making, fixing and making walls good by plaster patch color etc. as required.

**3.2.** The Window shall be measured for its improvising and fixing window having extruded aluminum color anodized section frame having heavy handle, heavy lock, bracket, stoppers, **5mm** thick transparent glass panel of approved make with anodized aluminum fixtures and transparent silicon glass fixings to from as detail including PVC T in frame silicon based linings handles, locks two nos. PVC gasket screws aluminum joints special runner etc. complete.

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



### **ITEM NO.23:**

**Providing and fixing rolling shutters of approved make made of 80 mm wide M.S. laths inter-locked together through their entire length and jointed together at the ends by end locks mounted on specially designed pipe shaft with bracket plates, guide channels and arrangements for inside and outside locking with push-pull operation including the cost of hood cover and spring etc. complete.(A) Shutters having width below 3.5 M.**

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.
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.
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.
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.
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.
6. The locking arrangement shall be provided at the bottom of shutter at both ends The shutters shall be opened from outside.
7. The Shutters shall be completed with door suspension shafts, looking arrangements, pulling hooks, handles and other accessories.

### **ITEM NO.24:**

**Providing and fixing glazed louvered glass windows and ventilators with teakwood frame 10cm x 7cm size including 3 Coats of oil painting to wood work etc. complete.**

#### **1.0. Materials**

Indian teak wood shall conform to M-29. Glass shall conform to M-38.

#### **2.0. Workmanship**

**2.1.** The item covers the requirement of frames for doors, windows, clerestory windows, their supply and fixing.

#### **2.2. Frames:**

**2.2.1.** All members of frames shall be exactly at right angles. The right angle shall be checked from inside surfaces of the-frames of the respective members.

**2.2.2.** All members of frames shall be straight without any warp of bow and shall have smooth surfaces well planned on the three sides exposed at right angles to each other. The surfaces touching the wall may not be planed unless it is required in order to straighten up the member or to obtain the overall sizes within the tolerances as specified.

**2.2.3.** Frame shall have dovetail joints. When clerestory windows in included, it shall be provided by having full length one piece post for door or windows and clerestory window extending the frame on top at the head to the required extent. Horns shall not be provided in the head of the frame. When no sills are provided, the vertical posts of the frame in the ground floor shall be embedded in the sill masonry for 10 cm. on upper floors, the vertical posts shall be fixed in the floor or masonry by forming notches 10 mm. deep. Slight adjustment of spacing as necessary shall be done to have the hold fasts in the joints of masonry; course. The frame shall be erected in position and held plumb with strong support form north sides and built in masonry as it is being built. The transom shall be through tenoned into the mortises of the jamb pot to the full width of the jamb post and the thickness of the tenon shall be not less than 15 mm.

### 2.3. Tolerance:

Unless specially mentioned otherwise tolerance of + 1.5. mm shall be allowed for each wrought face.

**2.4.** The tenons shall be closely fitting into the mortises and suitably pinned with wood dowels not less than 10 mm. dia. meter. The depth of rebates for housing the shutter shall be as shown in the detailed drawing or as directed.

**2.5.** The concrete surface of tenon and mortise shall be treated before putting together with an adhesive of approved make.

**2.6.** Minimum number of three hold-fasts shall be fixed on each side of door and windows frames, one at the center point and the other two at 30 mm. from the top and bottom of the frames. In case of windows and ventilators frames. The size c. each hold-fast shall be 300 x 25 x 6 mm. and of mild-steel with split end. The hold fasts shall be fixed with screws to frames.

**2.7.** Mild steel hold fasts shall be protected with a coating of coal asphalt tar. The surface of frame abutting the masonry or concrete faces shall be properly treated by applying a coat of approved coating.

The specifications shall be followed for frame work except that the frame work of 10 x7 cms. size of required size ventilators shall be provided with glazed glass louvers. The glass louvers shall be provided as directed. In the groove of 1.25 cms. depth made in frames, the thickness of glass shall be 5 mm. and glass shall be glass of best quality. The ventilation blades shall slope done towards the outside at an angle of 45°.

### 3.0. Mode of measurements and payment

**3.1.** The area of opening within the frame in which louvers are fixed shall be measured in sq. meters.

**3.2.** The rate included painting 3 coats to wood work with ready mix paint.

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

### ITEM NO.25:

**Providing and fixing standard extruded of aluminum section of size 63.50 x 38.10 x 1.95mm (of jindal section no : 4605, @ Wt. 1.094 Kg/ Rmt with color powder coated aluminum frame with 5mm thick transparent bronze color tinted float glass as details etc. complete for Fix Windows/Glazing.**

#### 1.0 MATERIAL

##### 1.1 Aluminum standard section

##### 1.1.1 Window having extruded aluminum color anodized section

Aluminum alloy used in the manufacture of window section shall conform to I.S. designation HEA-WP of I.S. 733-1975 and also designation WVG-WP of I.S. 1285-1975 section shall be as specified in the drawing and design.

The work shall be included standard window having extruded aluminum colour anodized section frame main outer size 63.50 x 38.10 x 1.95 mm (@ Wt 1.094 Kg / Rmt), horizontal two track member size 61.85 mm x 31.75 mm x 1.20mm (@ wt.of 0.695 Kg/mt), vertical member of size 61.85 mm x 31.75mm x 1.30 mm (@ wt.of 0.659 Kg/mt) with sliding shutters of horizontal member size 40mm x 18mm x 1.29mm (@ wt.of 0.456 Kg/mt), vertical member of size 40mm x 18mm x 1.29mm (@ wt.of 0.456 Kg/mt. & @ Wt. 0.457 Kg/mt) as directed by Engineer in charge.

All sections shall be free from any scratches or holes or any damages on surface. All section shall have finished luster surface on all sides

**1.1 Glass :** The transparent bronze colour tinted float glass shall be of approved make having thickness of **5mm**. The glass shall be clear and free from scratches and cracks. The glass shall be provided on wall panel and fixed with transparent silicon gasket



- 1.2 Glazing clips:** Glazing clips (structural glass) shall be of size as directed by the Engineer in charge around the glass allover shall be free from any scratches or holes or any damage of on surface all section shall have finished luster surface on all sides.
- 1.3 Rubber Gasket**  
Rubber gasket shall be of approved make shall be free from any scratches or holes or any damages on surface, and shall have finished luster surface on all sides.
- 1.4 Fixtures**  
Hinges shall be of approved make shall be free from any scratches or holes or any damages on surface and shall have finished luster surface on all sides.
- 1.5 Handles**  
Handles shall be of approved make shall be free from any scratches or holes or any damages on surface, and shall have finished luster surface on all sides.
- 1.6 Bolts**  
All Bolts shall be of approved make shall be free from any scratches or holes or any damages on surface and shall have finished luster surface on all sides.
- 1.7 Stoppers**  
Stoppers shall be of approved make shall be free from any scratches or holes or any damages on surface, and shall have finished luster surface on all sides.  
Product is from reputed company having ISO 9001-2000 certificate and with three years performance guarantee.
- 2.0 WORKMANSHIP**  
The work of window having extruded aluminum colour anodized section frame shall be done with extreme finishing the partial board shall be fixed in the bottom panel and glass shall be fitted on top panel as directed by Engineer in charge, using glazing clips and rubber gaskets as required. All the fixtures and fastenings shall be fitted at right place and as directed by Engineer in charge floor spring shall be fitted properly so as to align the window properly and shall be given trial of opening and closing properly.
- 3.0 Mode of Measurement & Payment**
- 3.1.** The unit rate of window having extruded alluminium colour anodized section frame shall include the cost of all materials, cost of anodizing, cost of all necessary fixtures and fastenings, labour charges for fixing frames, shutters and fixing the window in wall at the place shown in drawing and as instructed by Engineer in charge, all tools and plant required for assembling and fixing in position, finishing as per direction of the Engineer-in-charge, and all other incidental expenses for preparing frame and shutter of specified size to complete the structure or its components as shown on the drawings and according to these specifications. They shall also include the cost of making, fixing and making walls good by plaster patch colour etc as required.
- 3.2.** The Window shall be measured for its improvising and fixing window having extruded alluminium colour anodized section frame having heavy handle, heavy lock, bracket, stoppers, **5mm** thick transparent glass panel of approved make with S.S. fixtures and transparent silicon glass fixings to from as detail including PVC T in frame silicon based linings handles, locks two nos. PVC gasket screws aluminum joints special runner etc. complete.
- 3.3** The rate shall be for a unit of **one square meter**.

**ITEM NO.26:**

**Supplying and fitting Stainless Steel railing 3" pipe as hand rail with & S304 grade including required accessories or as directed by engineer in charge etc. complete.**

**Material:**

- Stainless Steel Pipe: Grade S304, seamless/welded, 3" (76.2 mm) diameter, minimum wall thickness 2.0 mm.
- Accessories: Stainless Steel elbows, end caps, wall brackets, base plates, bolts, and fasteners of S304 grade.
- Finish: Hairline / Matt / Mirror finish (as specified in BOQ or by Engineer).

**Workmanship:**

- Handrails shall be cut, bent, welded, and polished to smooth joints with uniform alignment.
- All exposed surfaces shall be free from sharp edges, burrs, and visible welding marks.
- Welding shall be TIG/MIG welding, ground smooth and polished.

- Railing shall be firmly anchored to floor/wall using SS base plates with anchor fasteners or as directed.

**Execution:**

- Handrail shall be installed true to line, level, and gradient as per approved drawings.
- All supports, brackets, and fixings shall be properly aligned and securely tightened.
- Protection tape or covering shall be applied to prevent damage during installation and until final handover.

**Approval:**

Work shall be carried out to the satisfaction of the Engineer-in-Charge.

**Measurement & Payment:**

- Measurement shall be taken in running meter (Rmt) of completed hand railing, including all fittings, accessories, fixing, and polishing.
- Rate shall include supply, fabrication, transportation, fixing, finishing, wastage, labor, and all incidental works to complete the job in all respects.

**ITEM NO.27:**

**Providing and fixing M. S. grills of required pattern to wooden frames of window etc. with M. S. flats at required spacing's and frame around square or round bars with round headed bolts and nuts or by screws. (A) plain grill.**

**1.0. Materials**

The structural steel shall conform to M-22

**2.0. Workmanship**

**2.1.** The M.S. Grill shall be prepared as per the drawing or as directed for fixing to wooden frames of windows etc.

**2.2.** The grill shall be fabricated to the designs and patterns shown in the drawings and the weight shall be as directed, and the joints shall be reverted or welded as shown in the plan or as directed. The grill so formed shall be fixed into the frames of the windows etc. before they are erected in position. The outside strip frame of the grill shall be housed to its full thickness into the recess cut into the frame of the windows etc. The grill shall be fixed to the frame with number of bolts and nuts or screws viz. bolt nut/screw per 30 cm. of the length of outer strip subject to minimum of 2 Nos. on each side of the frame or as indicated in the drawing or as directed.

**2.3.** 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 the frame strips.

**3.0. Mode of measurements & payment**

**3.1.** No payment shall be made for weight of screws, bolts nuts etc. only weight of grill shall be paid.

**3.2.** The rate shall be for a unit of one kg.

**ITEM NO.28:**

**Applying Priming Coat on new steel and other metal surface by thoroughly cleaning, oil, grease and scoured with brushes fine steel wood, scrapers and sand paper with ready mixed priming paint brushing red lead and Painting two coats with synthetic enamel paint, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.**

**1.0. Materials**

**1.1.** The ready mixed primer, brushing red shall conform to I.S. 102-1962.

**1.2.** The thinner (linseed oil) shall conform to I.S. 75-1973. If for any reason, thinning is necessary in case of ready mix paint the brand of thinner recommended by manufacture shall be used.

**2.0. Workmanship**

**2.1. Preparation of surfaces :** The surfaces painting shall be cleaned of all rust, scale, dirt and other foreign matter sticking to it with wire brushes, steel wool, scrapers, sand paper etc. This surface shall then be wiped finally with

mineral turpentine which shall also remove grease and perspiration of hand marks. The surface shall then be allowed to dry.

## **2.2. Application of primer :**

**2.2.1.** After the preparation of the surface, the priming coat shall be applied immediately. The brushing operations are to be adjusted to the spreading capacity advised by the manufacturer of the particular primer. 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 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 laying off wall constitute one coat.

**2.2.2.** During painting, every time, after the priming coat has been worked out of the brush bristles or after the brush has been unloaded, the bristles of the brush shall be opened up by striking the brush against portion of the unpainted surface with the end of the bristles, held at right angles to the surface, so that bristles thereafter will collect the correct amount of paint when dipped again in to a paint container. The prima/y coat shall be allowed to dry completely before painting is started.

**2.2.3.** No hair marks from the brush or clogging at pain puddles in the corner of panels angles of molding etc. Shall be left on the work

**2.2.4.** Special care shall be taken while painting over bolts, nuts, rivets, overlaps etc.

**2.2.5.** The container when not in use shall be kept close and free from air so that paint does not thickness and also shall be kept guarded from dust.

## **3.0. Mode of measurements & payment**

**3.1.** The new steel and other metal surface shall be measured under this item.

**3.2.** 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 sq. meter.

**3.3.** No deductions shall be made for openings not exceeding 0.5 sq. mt. each and no addition shall be made for painting to beddings, moldings, edges, jambs, soffits, sills etc. of such opening.

**3.4.** In case of fabricated structural steel and iron work, priming coat of paint shall be included with fabrication. In case of trusses if measured in sq. m. compound girders, stanchions, lattices, grader and similar work, actual area shall be measured in sq. m. 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.

**3.5.** 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.

**3.6.** The rate shall be for a unit of One sq. meter.

## **ITEM NO.29:**

**Providing 15mm thick cement plaster in single coat on brick/concrete wall for interior plastering and finished even and smooth in cement mortar 1:4 (1 cement : 4 sand) and finishing with a floating coat of neat cement slurry upto floor two level.**

### **1.0. Materials**

**1.1.** Water shall conform to M-1. The cement mortar of proportion **1:4** shall conform to M-13.

### **2.0. Workmanship**

#### **2.1. Scaffolding:**

Wooden bullies, bamboos, planks, trestles 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 cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface shall be toughened by wire brushing if it is not hard and by hacking if it is hard. In case of concrete surface, if a chemical retarded 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 readers if left on the

- surface. Trimming of projections on brick/concrete surfaces where necessary shall be carried out to get an even surface.
- 2.2.2. Raking 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 supports of the ceiling resting on the wall of the floor have been removed. Ceiling plaster shall be completed before starting plaster to walls.
- 2.3. Application of plaster :**
- 2.3.1. The plaster about 15x15 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 working a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally, the surface shall be finished off true with a trowel or wooden float according as a smooth or a smooth or a sandy granular texture is required Excessive troweling or overworking the float shall be avoided. All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Hounding or chamfering, corners, arises junctions etc. shall be carried out with proper templates to be size required.
  - 2.3.2. Cement plaster shall be used within half an hour after addition of water and mortar or plaster which is partially set shall be rejected and removed forthwith from the site.
  - 2.3.3. 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 scraped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of the wall and nearer than **15 cm.** to any corners or arises. It shall not be closed on the body of features such as plaster bands and cornices not at the corners or 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 to be packed up later on.
  - 2.3.4. 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 oh the outside of the plaster and keeping them wet.
  - 2.3.5. The plastering work shall be in single coat on brick / concrete walls for interior plastering up to floor two level, finished even and smooth **in C.M. 1:4.**
  - 2.3.6 The coat of cement and fine sand mortar of proportion 1:1 (15 mm thick about) shall be applied to the plastered surface with a trowel to provide uniform texture while the base coat is still plastic.
  - 2.3.7. In any continuous face of wall the finishing treatment should be carried out continuously and day lo day breaks made to coincide with architectural breaks in order to avoid unsightly Junctions
  - 2.3.8. **Curing :** All the plaster work shall be kept damp continuously for a period 7 days.
  - 2.3.9. Providing necessary grooves between structural members as directed by Engineer in charge.
- 3.0. Mode of measurements & payment**
- 3.1. The rate shall include the cost of all materials, labour and scaffolding etc. involved in the operations described under workmanship.
  - 3.2. All plastering shall be measured in square 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 **15 mm** at any point on this surface.
- 3.4. This item includes plastering for all floors.
- 3.5. 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.
- 3.6. Soffits of stairs shall be measured as plastering on ceilings, following soffits shall be measured separately.
- 3.7. For jambs, soffits, sills etc. for openings not exceeding 0.5 sq. met 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 manners.
  - (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 openings, 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 of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from areas of plaster and / or pointing as the case may be.
- 3.8. For openings having door frames equal to or 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 openings but jambs, soffits and sills shall be measured.
- 3.10 The payment shall be made for a unit of 1.0 sq.mt of work done over and above the finishing of work of base coat.
- 4.0. The rate shall be for a unit of **one sq. meter**.

#### **ITEM NO.30:**

**Providing 10mm thick cement plaster in single coat on ceilings and soffits of stairs for interior plastering and finished even and smooth in. Cement Mortar 1:4 ( 1 Cement : 4 Sand) and finishing with a floating coat of neat cement slurry for all floors.**

#### **1.0. Materials**

- 1.1. Water shall conform to M-1. The cement mortar of proportion 1:4 shall conform to M-13.

#### **2.0. Workmanship**

##### **2.1. Scaffolding:**

Wooden bullies, bamboos, planks, trestles and other scaffolding shall be sound. These shall be properly examined before erection and use. Stage scaffolding shall be provided for ceiling and soffits of stairs plaster which shall be independent of the walls.

##### **2.2. Preparation of back ground:**

- 2.2.1. The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface shall be toughened by wire brushing if it is not hard and by hacking if it is hard. In case of concrete surface, if a chemical retarded 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 readers if left on the

- surface. Trimming of projections on brick/concrete surfaces where necessary shall be carried out to get an even surface.
- 2.2.2. Raking 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 supports of the ceiling resting on the wall of the floor have been removed. Ceiling plaster shall be completed before starting plaster to walls.
- 2.3. Application of plaster :**
- 2.3.1. The plaster about 15x15 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 working a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally, the surface shall be finished off true with a trowel or wooden float according as a smooth or a smooth or a sandy granular texture is required Excessive troweling or overworking the float shall be avoided. All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Hounding or chamfering, corners, arises junctions etc. shall be carried out with proper templates to be size required.
  - 2.3.2. Cement plaster shall be used within half an hour after addition of water and mortar or plaster which is partially set shall be rejected and removed forthwith from the site.
  - 2.3.3. 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 scraped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of the wall and nearer than 15 cm. to any corners or arises. It shall not be closed on the body of features such as plaster bands and cornices not at the corners or 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 to be packed up later on.
  - 2.3.4. 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 oh the outside of the plaster and keeping them wet.
  - 2.3.5. The plastering work shall be in single coat on fair side of brick / concrete work for interior plastering upto floor two level and finished even and smooth in **C.M. 1:4.**
  - 2.3.6. The coat of cement and fine sand mortar of proportion 1:1 (1.5 mm thick about) shall be applied to the plastered surface with a trowel to provide uniform texture while the base coat is still plastic.
  - 2.3.7. In any continuous face of wall the finishing treatment should be carried out continuously and day lo day breaks made to coincide with architectural breaks in order to avoid unsightly Junctions The smooth concrete shall be suitably say read to provide necessary bond before plastering.
  - 2.3.8. **Curing :** All the plaster work shall be kept damp continuously for a period 7 days.
- 3.0. Mode of measurements & payment**
- 3.1. The rate shall include the cost of all materials, labour and scaffolding etc. involved in the operations described under workmanship.
  - 3.2. All plastering shall be measured in square 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 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.
- 3.6. Soffits of stairs shall be measured as plastering on ceilings, following soffits shall be measured separately.
- 3.7. For jambs, soffits, sills etc. for openings not exceeding 0.5 sq. met 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 manners.
  - (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 openings, 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 of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from areas of plaster and / or pointing as the case may be.
- 3.8. For openings having door frames equal to or 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 openings but jambs, soffits and sills shall be measured.
- 3.10. The payment shall be made extra for this work over and above the plaster work
- 3.11. The rate shall be for a unit or 1 Kg of water proofing materials used in 1 bag of weighing 50 Kg. cement used extra over the rate of plastering work.
- 3.12. The rate shall be for a unit of **One sq. meter**.

#### **Item No.31**

**Providing 20 mm thick double coat mala cement plaster on interior brick/ concrete work for plastering comprising of base coat of 12 mm thick cement plaster in cement mortar (1 Cement : 4 coarse sand) in rough finishing and 8 mm thick top coat of cement mortar 1:2 ( 1 Cement : 2 coarse sand) finished with trowel including scaffolding curing etc. complete. Do for Texture Plaster.**

#### **1.0. Materials**

- 1.1. Water shall conform to M-1. The cement mortar of proportion 1:4 shall conform to M-13.

#### **2.0. Workmanship**

- 2.1. The work shall be carried out in the coats. The backing coat (base coat) shall be 12 mm. thick in C.M. 1:4.

#### **2.2. Scaffolding:**

Wooden bullies, bamboos, planks, trestles 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.

- 2.3. **Preparation of back ground :**

- 2.3.1. The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface shall be toughened by wire brushing if it is not hard and by hacking if it is hard. In case of concrete surface, if a chemical retarded 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 readers is left on the surface. Trimming of projections on brick/concrete surfaces where necessary shall be carried out to get an even surface.
- 2.3.2. Raking of joints in case of masonry where necessary shall be allowed to dry out for sufficient period before carrying out the plaster work.
- 2.3.3. 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.
- 2.3.4. 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 supports of the ceiling resting on the wall of the floor have been removed. Ceiling plaster shall be completed before starting plaster to walls.
- 2.4. **Application of plaster :**
- 2.4.1. The plaster about 15x15 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 working a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally, the surface shall be finished off true with a trowel or wooden float according as a smooth or a smooth or a sandy granular texture is required excessive troweling or overworking the float shall be avoided. All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Hounding or chamfering, corners, arises junctions etc. shall be carried out with proper templates to be size required.
- 2.4.2. Cement plaster shall be used within half an hour after addition of water and mortar or plaster which is partially set shall be rejected and removed forthwith from the site.
- 2.4.3. 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 scraped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of the wall and nearer than 15 cm. to any corners or arises. It shall not be closed on the body of features such as plaster bands and cornices not at the corners or 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 to be packed up later on.
- 2.4.4. 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 oh the outside of the plaster and keeping them wet.
- 2.4.5. 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.
- 2.4.6. The second coat shall be completed to 8 mm. thickness in C.M. 1:2 as described above, including raising sand facing by bushing. The sample of sand face shall be got approved before the work is started. The whole work shall be carried out uniformly as per sample approved.
- 2.4.5. The plastering work shall be in double coat mala cement plaster on interior brick / concrete work up to floor two level, finished even and smooth in C.M. 1:4.
- 2.4.6 **Curing :**  
The curing shall be started overnight after finishing of plaster. The plaster shall be kept wet for a period of 7 days. During this period, it shall be protected from all damages.
- 2.4.7. The finishing shall be gutkha finishing with 1 cm x 1 cm grooves shall be done as directed.
- 3.0. **Mode of measurements & payment**
- 3.1. The rate shall include the cost of all materials, labor 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 20 mm at any point on this surface.
- 3.4. This item includes plastering up to floor two level.
- 3.5. 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.
- 3.6. Soffits of stairs shall be measured as plastering on ceilings, following soffits shall be measured separately.
- 3.7. For jambs, soffits, sills etc. for openings not exceeding 0.5 sq. met 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 manners.
  - (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 openings, 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 ravels, 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 of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from areas of plaster and / or pointing as the case may be.
- 3.8. For openings having door frames equal to or 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 openings but jambs, soffits sand sills shall be measured.
- 3.10. The rate shall be for a unit of **One Sq. meter**.

### **Item No.32**

**Providing and Applying Textured Plaster of approved design/sample with all kinds of material, labor, taxation charges. Complete. As directed on site by EIC or any concern authority.**

#### **1. Scope**

This specification covers the complete provision and application of textured plaster of approved design and sample on interior and/or exterior walls and ceilings, including all materials, labor, tools, equipment, scaffolding, curing, cleaning, and protection. The work shall be executed in strict accordance with the approved drawings, samples, and directions of the Engineer-in-Charge (EIC) or concerned authority. The rate shall be inclusive of all taxes, duties, overheads, and profit, and complete in all respects. Textured plaster shall provide a durable, decorative finish resistant to cracking, weathering, and fungal growth, suitable for the specified environment (interior or exterior).

#### **2. Standards and References**

The work shall comply with the following standards, unless otherwise specified:

- ASTM C926: Standard Specification for Application of Portland Cement-Based Plaster.
- ASTM C1063: Standard Specification for Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Based Plaster.
- ASTM C897: Standard Specification for Aggregate for Job-Mixed Portland Cement Plasters.

- ASTM C144: Standard Specification for Aggregate for Masonry Mortar.
- ASTM C979: Specification for Pigments for Integrally Colored Concrete.
- ASTM C847: Standard Specification for Metal Lath.
- International Building Code (IBC) and International Residential Code (IRC) for structural, durability, fire-resistance, and weather protection compliance (for one/two-coat systems). All materials and workmanship shall conform to the latest editions of these standards.

### 3. Materials

Materials shall be of first quality, from approved manufacturers, and stored in a dry, covered area. Samples of all materials shall be submitted to the EIC for approval prior to procurement.

Material	Description/Specifications	Quantity/Notes
<b>Base Plaster (Portland Cement-Based or Gypsum for Interiors)</b>	Factory-pre-blended or job-mixed Portland cement (Type I or II), fine/medium/coarse sand aggregates (ASTM C144/C897), lime (for workability), and water. For interiors, gypsum-based plaster may be used. Include integral pigments for color (ASTM C979).	Proportioned per manufacturer (e.g., 1:3 cement: sand for base coats). Fiber-reinforced for crack resistance.
<b>Finish Coat (Textured)</b>	Acrylic co-polymer based with aggregates (e.g., marble/quartz 1-3 mm), liquid pigments, biocides for mold resistance, and silicone for durability. Options: fine sand (1 mm), medium sand (1.5 mm), worm/swirl (3 mm), or colored aggregate.	Applied over primed base; DPR (Dirt Pick-up Resistant) technology recommended for exteriors.
<b>Lath/Reinforcement</b>	Galvanized expanded metal lath or woven wire plaster base (ASTM C847/C1032).	Installed over moisture barrier for three-coat systems.
<b>Moisture Barrier/Primer</b>	Asphalt-saturated felt or building paper (Grade D); acrylic primer matching finish color for acrylic textures over brown coats.	Essential between substrate and lath; primer ensures uniform absorption.
<b>Additives</b>	Accelerators for cold weather; fibers for reinforcement.	As per site conditions and EIC approval.

All materials shall be compatible and free from defects. Pigments and colors shall match approved samples under site lighting conditions.

### 4. Substrate Preparation

- Surfaces (masonry, concrete, or approved substrates like plywood/OSB/gypsum sheathing) shall be clean, free of dust, oil, loose particles, and efflorescence. New masonry shall be dampened 24 hours prior to application.
- Install moisture barrier and lath securely with fasteners at 6-inch spacing, ensuring 3/8-inch furring for drainage (for exterior applications).

- Expansion/control joints shall be provided at 144 sq ft intervals or as per design to accommodate movement.
- Apply scratch coat over lath if using three-coat system; roughen surface for keying.

## 5. Application

Application shall be by skilled labor using hand tools or machine spraying (pump grade mixes). Ambient temperature: 40°F–100°F (4°C–37°C); avoid direct sun, rain, or high humidity. Total thickness: 3/8–7/8 inch (10–22 mm) depending on system.

### 5.1 Three-Coat System (Traditional Hard-Coat, Recommended for Exteriors)

1. **Scratch Coat:** Apply 3/8–1/2 inch thick over lath; score horizontally for keying. Allow to set 24–48 hours.
2. **Brown Coat:** Apply 3/8 inch thick, level and plumb; dash bond if needed. Cure moist for 48 hours.
3. **Finish Coat (Textured):** Apply 1/16–1/8 inch thick; texture as per approved sample using specified methods below. Total system weight: 10–12 lb/sq ft.

### 5.2 One/Two-Coat System (For Approved Substrates, Lighter Weight)

1. **Base Coat:** Spray or trowel 3/8–1/2 inch thick over primed substrate with moisture barrier.
2. **Finish Coat (Textured):** Apply directly; texture immediately. Total weight: 4–6 lb/sq ft. ICC-compliant.

### 5.3 Texturing Methods (As Per Approved Design/Sample)

Textures shall match approved mock-up panels (min. 4x4 ft) prepared on-site.

Texture Type	Application Method	Tools
<b>Float Finishes (Fine/Medium/Heavy Sand)</b>	Apply two coats; rub second coat in circular motions to expose aggregates. Minimal water use.	Plastic float.
<b>Dash Finishes (Light/Medium/Heavy, Knockdown)</b>	First coat for coverage; dash second coat with varying water/air ratio at gun.	Spray gun, dash broom.
<b>Hard Trowel/Smooth (Santa Barbara, Cat Faces)</b>	Steel trowel second coat; leave minor marks or expose base for texture. Avoid over traditional brown without leveling coat.	Steel trowel.
<b>Lace/Swirl (Light/Heavy Lace, Worm/Swirl)</b>	Trowel in random directions; retain patterns after high-spot troweling. Figure-8 motions for acrylic.	Steel trowel, rounded trowel for thick coats.
<b>Specialty (Combed, Scraped, Simulated Timber)</b>	Comb with templates; scrape or groove with tools; embed aggregates if needed.	Coarse brush, comb templates, joint rods.

Apply in sections not exceeding 100 sq ft; feather edges to avoid cold joints.

## 6. Curing and Protection

- Keep plaster moist for minimum 48 hours post-application using wet burlap, misting, or curing compounds (non-staining).
- Protect from weather, traffic, and damage with tarps or barriers. Remove debris daily.
- Allow full cure (7–28 days) before painting or further finishing.

## 7. Quality Control and Testing

- EIC inspection at each stage (preparation, coats, finishing).
- Test for adhesion (ASTM D7234), thickness (min. gauge), and color uniformity under site conditions.
- Defective work (cracks >1/16 inch, uneven texture) shall be rectified at contractor's cost.
- Provide warranties for 1 year against defects in materials/workmanship.

## 8. Measurement and Payment

As Per Schedule-B

### **ITEM NO.33:**

**Applying two coats of putty & 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.**

#### **1.0. Materials**

Water shall be conform M-1. The acrylic emulsion paint shall conform to I.S.: 5411-1969 (Part-I).

#### **2.0. Workmanship**

The painting work shall be of acrylic lappy (putty) and two coats of primer of approved brand & manufactures on new wall surface to give an even shade.

**2.1. Scaffolding :** Wherever scaffolding is necessary it shall be erected in such a way that as far as possible on part of scaffolding shall rest against the surface to be white or colour washed. A properly secured strong and well tied suspended platform (Zoola) may be used for white washing. Where ladders are used pieces of old gunny bags shall be tied at top and bottom to prevent scratches to the floors and walls. For white washing of ceilings, proper stage scaffolding shall be erected where necessary.

**2.2. Preparation of surface :** The undecorated surface to be distempered shall be thoroughly brushed from dust, dirt, grease, mortar dropping and other foreign matter and sand papered smooth. New plaster surface shall be allowed to dry for at least 2 months before applications of distemper.

**2.2.1.** All unnecessary nails shall be removed. Pitting in plaster shall be made good with plaster again with a fine grade sand paper and made smooth. A coat of distemper shall be applied over the patches. The surface shall be allowed to dry thoroughly before the regular coat of distemper is allowed. The surface affected by moulds, moss, fungi, algae lichens, efflorescence etc. shall be treated in accordance with I.S; 2395 (Part 01) 1966. Before applying distempering, any unevenness shall be made good by applying putty made of plaster of paris mixed with water on entire surface including filling up the undulation and then sand papering the same after it is dry.

#### **2.3. Preparation of Mix :**

This shall be done as per manufacturer's instructions. The thinning of emulsion is to be done with water and not with turpentine. The quantity of thinner to be added shall be as per manufacturer instructions.

#### **2.4. Application :**

**2.4.1.** Before pouring into small containers for use, the paint shall be stirred thoroughly in item container. When applying also, the paint shall be continuously stirred in the smaller container, so that its consistency is kept uniform.

**2.4.2.** The paint shall be laid on evenly and smoothly by means of crossing and laying off the crossing and consist of covering the area over with paint, brushing the surface hard for the first time over and then, brushing alternately in opposite direction 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. 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. The full process of crossing and laying off will constitute one coat.

**2.4.3.** The paint shall be applied with brush or rollers. For undecorated surfaces, the surface shall be treated with minimum two coats of cement water proofing paint. The second or subsequent coat shall not be started until the proceeding coat as become sufficiently hard to resist marking by brushing being used.

**2.4.4.** The surface on finishing shall present a flat velvety smooth finish. It shall be even and uniform in shade without patches, brush marks, paint drops etc.

**2.5. Precautions :**

(a) Old brushes if they are to be used with emulsion paints shall be completely dried of turpentine or oil paint by washing in warm soap water. Brushes shall be quickly washed in water immediately after use and kept immersed in water fusing break periods to prevent the paint from hardening on the brush.

(b) In the preparation of wall for plastic emulsion painting, no oil base petals shall be sued in filling cracks, holes etc.

(c) Splashes on floors etc. shall be cleaned out without delay as they will be difficult to remove after hardening.

(d) Washing or surfaces treated with emulsion paint shall not be done within 3 to 4 weeks of application.

**2.6. Protective measures :** The surface of doors, windows, floors, articles, of furniture etc. and such other parts of the building not to be white washed shall be protected from being splashed upon. Such surfaces shall be cleaned of white wash splashed if any.

**3.0. Mode of measurements and payment**

**3.1.** All the work shall be measured in the decimal system as under:

(a) Dimensions shall be measured to the nearest 0.01 m.

(b) Area in individual item shall be worked out to the nearest 0.01 sq.m.

All the work shall be measured in sq.mt. Deductions for jambs, soffits, sills etc. for openings not exceeding 0.5 sq.mt. each in area, for ends of joists, posts, beams, girders, steps etc. not exceeding 0.5 sq.mt. each in area and for openings exceeding 0.5 sq.mt. and not exceeding 3.0 sq.mt. each in area, deductions and additions shall be made as under.

**3.2.** No deductions shall be made for ends of joists, beams, posts, etc. and openings not exceeding 0.5 sq mt. each. No addition shall be made for reveals, jambs, soffits, sills etc. of these openings not for finish around ends of joints, beams, posts etc.

**3.3.** No deductions for openings exceeding 0.5 sq.mt. but not exceeding 3 sq.mt. each shall be made as follows and no addition will 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 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. Where width 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 nor additions to be made for reveals, jambs, soffits, sills etc.

**3.4** In case of area of openings exceeding 3 sq. mt. each, deductions shall be made for openings but jambs, soffits, sills shall be measured.

**3.5.** No deductions shall be made for attachment such as casing, conducts, pipe, electric wiring and the like.

**3.6.** Corrugated surfaces shall be measured flat as fixed and not girth. The quantities so measured shall be increased by the following percentage and the resultant shall be included with the general areas:

(a) Corrugated steel sheets..... 14%

- (b) Corrugated A.C. sheets..... 20%
- (c) Semi corrugated A.C. Sheets..... 10%
- (d) Nainital pattern roof (Plain sheeting sheets)..... 10%
- (e) Nainital pattern roof (with corrugated sheets)..... 25%

**3.7.** Cornices and other wall features, when they are not picked out in a different finish/colour shall be girthed and included in the general area.

**3.8** Extra payment shall be done on ceiling and sloping roofs.

**3.9.** The rate shall include the cost of all materials, labour, scaffolding, protective measures etc. involved in all the operations described above.

**4.0** The rate shall be for a unit of **One sq. meter**.

#### **ITEM NO.34:**

**Distempering (Three Coat) with oil bound washable distemper of approved brand and manufacture and of required shade on ceiling & sloping roof surfaces to give an even shade over and including a primer coat with alkali resistance primer of approved brand after thoroughly brushing the surface to give an even shade free from foreign matter and also including preparing the surface even and smooth.**

#### **1.0. Materials**

**1.1.** Oil bound washable distemper and primer shall be of approved brand and manufacture. The distemper shall be of required colour and shade and the same shall conform to I.S. : 428-1969. The shade shall be approved by Engineer in charge. Birla or Asian acrylic lappy (putty) and primer shall be of approved brand and manufacture.

#### **2.0. Workmanship**

The distempering shall be carried out on wall surfaces to give an even shade.

#### **2.1. Scaffolding**

Where scaffolding is required, it shall be erected in such a way that as far as possible no part of scaffolding shall rest against the surface to be distempered. A properly secured and well tied suspended platform (Joola) may be used for distempering. Where ladders are used, pieces of old gunny bags shall be tied at top and bottom to prevent scratches to the walls and floors. For distempering to ceiling, proper stage scaffolding shall be erected where necessary.

#### **2.2. Preparation of surface :**

**2.2.1.** The undecorated surface to be distempered shall be thoroughly brushed from dust, dirt, grease, mortar dropping and other foreign matter and sand papered smooth. New plaster surface shall be allowed to dry for at least 2 months before applications of distemper.

**2.2.2.** All unnecessary nails shall be removed. Pitting in plaster shall be made good with plaster again with a fine grade sand paper and made smooth. A coat of distemper shall be applied over the patches. The surface shall be allowed to dry thoroughly before the regular coat of distemper is allowed. The surface affected by moulds, moss, fungi, algae lichens, efflorescence etc. shall be treated in accordance with I.S; 2395 (Part 01) 1966. Before applying distempering, any unevenness shall be made good by applying putty made of plaster of paris mixed with water on entire surface including filling up the undulation and then sand papering the same after it is dry.

**2.2.3 The lappy (putty) shall be carried out on wall surfaces to give an even shade.**

#### **2.3. Priming coat :**

**2.3.1.** A priming coat of distemper primer of approved manufacture and shade shall be applied over the papered surface in case of new work on undecorated surface. If the distemper priming is done after the wall surface dries completely, the distemper primer shall be applied.

**2.3.2.** Application of primer shall be done as under: The primer shall be applied with a brush on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks. It shall be allowed to dry for at least 48 hours before oil bound distemper or paint is applied.

**2.3.3.** Oil bound distemper is not recommended to be applied within six months of the completion of wall plaster.

#### **2.4. Preparation of oil bound distemper :**



**2.4.1.** The distemper shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer only. Sufficient quantity of distemper required for a days work shall be prepared.

**2.5. Application of Distemper coat:**

**2.5.1.** For undecorated surfaces, after the primer coat is dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the distemper, taking care not to rub out priming coat. All loose particles shall be dusted off after rubbing. Minimum two coats of distemper shall be applied with brushes in horizontal strokes followed immediately by vertical strokes which together shall constitute one coat. The subsequent coats shall be applied after a time interval of at least 24 hours between consecutive coats to permit proper drying of the proceeding coat. The finished surface shall be even and uniform without patches, brush marks, distemper drops etc.

**2.5.2.** Sufficient quantity of distemper shall be mixed to finish one room at a time. The application of a coat in each room shall be finished in one operation and no work shall be started in any room which cannot be completed on the same day.

**2.5.3.** 15 cm. double bristled distemper brush shall be used. After day's work brushes shall be thoroughly washed in hot water with soap solution and hung down to dry. Old brushes which are dirty and caked with distemper shall not be used on the work.

**2.6. Protective measurements :** The surfaces of doors, windows, floors, articles of furniture etc. and such other parts of the buildings as are not to be distempered shall be protected from being splashed upon. Such surfaces shall be cleaned of distemper splashes if any.

**3.0. Mode of measurements and payment**

**3.1.** Priming coat of distemper primer, scraping of surface spoiled by struck roots, removal of oil and grease spots, treatment for infestation of efflorescences, mould moss, fungi, algae and lichen and patch repairs to plaster shall be included in this item for which nothing extra shall be paid.

**3.2.** All the work shall be measured net in the decimal system as in place subject to the following limits unless otherwise stated hereinafter:

(a) Dimensions shall be measured to the nearest 0.01 m.

(b) Area in individual items shall be worked out to the nearest 0.01 sq. m. All work shall be made for ends of joints, beams, posts etc. and openings, not exceeding 0.5 sq.m. each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings not for finish around ends of joints, beams, posts etc.

**3.3.** Deductions of opening exceeding 0.5 sq.m. but not exceeding 3 sq. m. each shall be made as follows and net addition shall be made for reveals, jambs, soffits etc. of these openings :

(a) When both the faces of wall are provided with same finish, deductions shall be made for one face only.

(b) When each face of wall is provided with different finish, deduction shall be made for that side of frame for doors, windows etc. on which width of reveals is less than that of the other side but no deduction shall be made on the other side. Where the width of reveals on the both the faces of wall are equal, deduction of 50% of area of opening on each face shall be made from area of finish.

(c) When only one face of wall is treated and the other face is not treated, full deductions shall be made if the width of the reveal on treated side is less than that on untreated side but if the width of the reveal is equal or more than that on untreated side neither deductions nor additions to be made for reveals, jambs, soffits, sills etc.

**3.4.** In case of opening of area exceeding 3 sq. m. each deduction shall be made for openings but jambs, sills and soffits shall be measured.

**3.5.** No deductions shall be made for attachments such as casings, conduits, pipes, electric wiring and the like.

**3.6.** Item includes removing nails, making good holes, patches with materials similar in composition of distemper.

**3.7.** The extra rate shall be paid for carrying out distempering work on ceiling/sloping roofs over and above.

**3.8.** The rate includes cost of all materials, labours, scaffolding, protective measures etc. involved in all the operations described above. This shall also include conveyance, delivery, handling, unloading, storing work etc.

**3.9.** The rate shall be for a unit of one sq. meter.

### **ITEM NO.35:**

**Distempering (Three Coat) with oil bound washable distemper of approved brand and manufacture and of required shade on Ceiling & Sloping Roof surfaces to give an even shade over and including a primer coat with alkali resistance primer of approved brand after thoroughly brushing the surface to give and free from other foreign matter and also including preparing the surface even and sand papered smooth.**

#### **1.0. Materials**

**1.1.** Oil bound washable distemper and primer shall be of approved brand and manufacture. The distemper shall be of required colour and shade and the same shall conform to I.S. : 428-1969. The shade shall be approved by Engineer in charge. Birla or Asian acrylic lappy (putty) and primer shall be of approved brand and manufacture.

#### **2.0. Workmanship**

The distempering shall be carried out on wall surfaces to give an even shade.

#### **2.1. Scaffolding**

Where scaffolding is required, it shall be erected in such a way that as far as possible no pail of scaffolding shall rest against the surface to be distempered. A properly secured and well tied suspended platform (Joola) may be used for distempering. Where ladders are used, pieces of old gunny bags shall be tied at top and bottom to prevent scratches to the walls and floors. For distempering to ceiling, proper stage scaffolding shall be erected where necessary.

#### **2.2. Preparation of surface :**

**2.2.1.** The undecorated surface to be distempered shall be thoroughly brushed from dust, dirt, grease, mortar dropping and other foreign matter and sand papered smooth. New plaster surface shall be allowed to dry for at least 2 months before applications of distemper.

**2.2.2.** All unnecessary nails shall be removed. Pitting in plaster shall be made good with plaster again with a fine grade sand paper and made smooth. A coat of distemper shall be applied over the patches. The surface shall be allowed to dry thoroughly before the regular coat of distemper is allowed. The surface affected by moulds, moss, fungi, algae lichens, efflorescence etc. shall be treated in accordance with I.S; 2395 (Part 01) 1966. Before applying distempering, any unevenness shall be made good by applying putty made of plaster of paris mixed with water on entire surface including filling up the undulation and then sand papering the same after it is dry.

**2.2.3 The lappy (putty) shall be carried out on wall surfaces to give an even shade.**

#### **2.3. Priming coat :**

**2.3.1.** A priming coat of distemper primer of approved manufacture and shade shall be applied over the papered surface in case of new work on undecorated surface. If the distemper priming is done after the wall surface dries completely, the distemper primer shall be applied.

**2.3.2.** Application of primer shall be done as under: The primer shall be applied with a brush on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks. It shall be allowed to dry for at least 48 hours before oil bound distemper or paint is applied.

**2.3.3.** Oil bound distemper is not recommended to be applied within six months of the completion of wall plaster.

#### **2.4. Preparation of oil bound distemper :**

**2.4.1.** The distemper shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer only. Sufficient quantity of distemper required for a days work shall be prepared.

#### **2.5. Application of Distemper coat:**

**2.5.1.** For undecorated surfaces, after the primer coat is dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the distemper, taking care not to rub out priming coat. All loose particles shall be dusted off after rubbing. Minimum two coats of distemper shall be applied with brushes in horizontal strokes followed immediately by vertical strokes which together shall constitute one coat. The subsequent coats shall be applied after a time interval of at least 24 hours between consecutive coats to permit proper drying of the proceeding coat. The finished surface shall be even and free from patches, brush marks, distemper drops etc.



**2.5.2.** Sufficient quantity of distemper shall be mixed to finish one room at a time. The application of a coat in each room shall be finished in one operation and no work shall be striated in any room which cannot be completed on the same day.

**2.5.3.** 15 cm. double bristled distemper brush shall be used. After day's work brushes shall be thoroughly washed in hot water with soap solution and hung down to dry. Old brushes which are dirty and caked with distemper shall not be used on the work.

**2.6. Protective measurements :** The surfaces of doors, windows, floors, articles of furniture etc. and such other parts of the buildings as are not to be distempered shall be protected from being splashed upon. Such surfaces shall be cleaned of distemper splashes if any.

**3.0. Mode of measurements and payment**

**3.1.** Priming coat of distemper primer, scraping of surface spoiled by struck roots, removal of oil and grease spots, treatment for infraction of effloresces., mould moss, fungi, algae and lichen and patch repairs to plaster shall be included in this item for which nothing extra shall be paid.

**3.2.** All the work shall be measured net in the decimal system as in place subject to the following limits unless otherwise stated hereinafter:

(a) Dimensions shall be measured to the nearest 0.01 m.

(b) Area in individual items shall be worked out to the nearest 0.01 sq. m. All work 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 openings not for finish around ends of joints, beams, posts etc.

**3.3.** Deductions of opening exceeding 0.5 sq.m. but not exceeding 3 sq. m. each shall be made as follows and net addition shall be made for reveals, jambs, soffits etc. of these openings :

(a) When both the faces of wall are provided with same finish, deductions shall be made for one face only.

(b) When each face of wall is provided with different finish, deduction shall be made for that side of frame for doors, windows etc. on which width of reveals is less than that of the other side but no deduction shall be made on the other side. Where the width of reveals on the both the faces of wall are equal, deduction of 50% of area of opening on each face shall be made from area of finish.

(c) When only one face of wall is treated and the other face is not treated, full deductions shall be made if the width of the reveal on treated side is less than that on untreated side but if the width of the reveal is equal or more than that on untreated side neither deductions nor additions to be made for reveals, jambs, soffits, sills etc.

**3.4.** In case of opening of area exceeding 3 sq. m. each deduction shall be made for openings but jambs, sills and soffits shall be measured.

**3.5.** No deductions shall be made for attachments such as casings, conduits, pipes, electric wiring and the like.

**3.6.** Item includes removing nails, making good holes, patches with materials similar in composition of distemper.

**3.7.** The extra rate shall be paid for carrying out distempering work on ceiling/sloping roofs over and above.

**3.8.** The rate includes cost of all materials, labours, scaffolding, protective measures etc. involved in all the operations described above. This shall also include conveyance, delivery, handling, unloading, storing work etc.

**3.9.** The rate shall be for a unit of one sq. meter.

**ITEM NO.36:**

**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.**

**General**

This work shall consist of painting the walls with weather proof acrylic emulsion paint of approved brand & manufacture and of required shade on exterior wall surfaces of the shape and dimensions shown on the drawings and conforming to these specifications or as approved by the Engineer in charge.

## **MATERIALS**

### **1.0 Exterior acrylic emulsion paint**

Exterior acrylic emulsion paint shall be of specified colour as approved by Engineer in charge the ready mixed exterior acrylic emulsion paint shall not be allowed, If however ready mix emulsion paint of specified shade or tint is not available white ready mixed paint with approved Steiner will be allowed in such case the contractor shall ensure that the shade of the paint so allowed shall be uniform exterior emulsion paint shall meet with the following general requirements

1. Exterior acrylic emulsion paint shall not show excessive setting in freshly opened full can and shall easily be readdressed with a paddle to a smooth homogeneous state. The exterior acrylic emulsion paint shall show no curding, livering cracking or colour separation and shall be free from lumps and skins.
2. The exterior acrylic emulsion paint as received shall brush easily possess good leveling properties and show no running or sagging tendencies.
3. The exterior acrylic emulsion paint shall not skin within 48 hours in a three quarters filled closed container
4. The exterior acrylic emulsion paint shall dry to a smooth uniform finish free from roughness grit unevenness and other imperfections
5. Ready mix exterior acrylic emulsion paint if allowed for specified shade, shall be used exactly as received from the manufacturers and generally according to their instruction and without any admixtures whatsoever.

### **2.0 WORKMAN SHIP**

#### **2.1 Scaffolding :**

Where scaffolding is required, it shall be erected in such a way that as far as possible no part of scaffolding shall rest against the surface to be distempered. A properly secured strong and well tied suspended platform (joola) may be used for distempering. Where ladders are used, pieces of old gunny bags.

#### **3.0 Application coat :**

The exterior acrylic emulsion paint on wall surfaces shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer only. Sufficient quantity of distemper required for a day's work shall be prepared.

**3.1** For undecorated surfaces, after the primer coat is dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the exterior emulsion paint, taking care not to rub out the priming coat. All loose particles shall be dusted off after rubbing. Minimum two coats of the exterior acrylic emulsion paint shall be applied with brushes in horizontal strokes followed immediately by vertical strokes which together shall constitute one coat. The subsequent coats shall be applied after a time interval of at least 24 hours between consecutive coats to permit proper drying of the preceding coat. The finished surface shall be even and uniform without patches, brush marks, distemper drops etc.

**3.2** Sufficient quantity of the exterior acrylic emulsion paint shall be mixed to finish one room at a time.

#### **3.0 MODE OF MEASUREMENT & PAYMENT :**

**3.1.** The unit rate wall painting with two coats of exterior acrylic emulsion paint and one coat of priming coat shall include the cost of all materials, tools and plant required for mixing, cleaning brushing sand papering & painting with all required specials and Lapi compound, finishing as per direction of the Engineer-in-charge, and all other incidental expenses for producing pipe line work of specified diameter to complete the structure or its components as shown on the drawings and according to these specifications. They shall also include the cost of making, fixing and removing of all scaffolding and forms required for the work.

**3.2** The rate of wall painting with exterior acrylic emulsion paint shall include the cost of all labour, materials tools and plant scaffolding and all incidental expenses as described herein above.

**3.3.** The wall painting with exterior acrylic emulsion paint shall be measured for its length and height limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one square meter.

**3.4.** The payment will be made on **square meter** basis of the finished work.

### **ITEM NO.37:**

**P & L 24" x 24" vitrified 8 mm thick tile flooring over 20 mm (average) base of cement mortar 1:6 ( 1 cement: 6 coarse sand) on new surface or fixing on existing flooring by adhesive material including dismantling of existing flooring and jointed with color cement slurry including finished with flush pointing & cleaning the surface etc. complete for light shade.**

**1.0. Materials**

Water shall conform to M-1. Cement mortar shall conform to M-11. **24" x 24" vitrified 8 mm thick tiles** of standard quality shall conform to relevant Indian standard. The size & color of vitrified tiles shall be approved by Engineer in charge.

**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 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 flooring tiles** shall be laid on cement mortar bedding of 20 mm. thick in C.M. 1:6 (1 cement: 6 coarse sand) on existing surface flooring by adhesive material including dismantling of existing flooring and jointed with color cement slurry. 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 10 mm. at any place and average 20 mm thickness. The proportion of the cement mortar shall be as specified in the item.

**2.2. Fixing tiles :**

**2.2.1.** The tiles before laying shall be soaked in water for at least two hours. Neat gray cement grout at 33 kg/Cement/Sq.mt. 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 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 joints shall be true to centre 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 5 mm. and loose material removed. White cement shall be used for pointing the joints. After fixing the tiles finally in an even plane the flooring shall be kept wet and allowed to nature undisturbed for 7 days. The pattern shall be approved by Engineer in charge.

**2.3. Cleaning :**

**2.3.1.** The surplus cement grout that may have come out of the joints shall be cleaned off before it sets. Once the floor has set, it shall be carefully washed, cleared by dilute acid and dried. Proper precautions and measures shall be taken to ensure that the tiles are not damaged in any way till the completion of the construction.

**3.0. Mode of measurements & payment**

**3.1.** The work done shall be measured in sq.mt. for visible area of work done. The length and width of the flooring shall be measured not between the faces of skirting or dedos or plastered face of wall as the case may be. The paving under dedo or skirting shall not be measured. No deduction shall be made not extra paid for any opening in the floor of area up to 0.1 sq.mt. Nothing extra shall be paid for laying the floors at different levels in the same rooms.

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

**ITEM NO.38:**

**Providing and Laying 24" x 24" 8mm thick Antiskid Vitrified tiles flooring over 20mm (average) base of cement mortar 1:6 (1 cement : 6 coarse sand) on new surface including dismantling of existing flooring and jointed with color cement slurry including finished with flush pointing and cleaning the surface etc. complete.**

**Detailed Technical Specification As per Schedule B -1 Item no.37**

**ITEM NO.39:**

Providing and laying 24"x24" Vitrified 8 mm to 10mm thick tiles flooring over 20 mm (average) base of cement mortar 1:3 (1 Cement : 3 Coarse Sand) and jointed with colour cement slurry including finished with flush pointing and cleaning the surface etc. complete. For Skirting./Wall Tiles/Dedo.

Detailed Technical Specification As per Schedule B -1 Item no.37

**ITEM NO.40:**

Providing and Laying colored glazed tiles of the size 300mm x 200mm x 8mm/300mm x 450mm x 8mm / 300mm x 450mm x 8mm in skirting, riser of steps and dedo on 10mm thick cement plaster 1:3 (Cement : 3 coarse sand) and jointed with matching color cement slurry.

**1.0. Materials**

Water shall conform to M-1. Cement mortar shall conform to M-11. **Colored glazed tiles of the size 300 mm x 200 mm x 8 mm thick approved by Engineer in charge** shall conform to relevant Indian standard.

**2.0. Workmanship**

**2.1. Preparation of Surface:**

In case of brick masonry wall, the joints shall be raked out to a depth of least 8 mm. while the masonry is being laid. In case of concrete wall the surface shall be chiseled and roughed with wire brushes. The surface shall be cleaned and wetted thoroughly before commencing the laying work.

**2.2. Laying ;**

**2.2.1.** The wall surface shall be covered with 10 mm. thick plaster of cement plaster 1:3 mix and allowed to harden. The plaster shall be roughened with wire brushes both way. The back of tiles shall be floated with grey cement slurry set and edges with white cement slurry in bedding mortar. The tiles shall be gently tapped in position on after the other keeping the joints as thin as possible. Top of skirting or dedo shall be truly horizontal and the joints vertical or as per required pattern.

**2.2.2.** Risers of steps, skirting and dedo shall rest on top of treads or flooring. Where full size tiles cannot be fixed. They shall be cut to the required size and the edges be smoothened.

**2.2.3.** The joints shall be cleaned and flush pointed with white cement. The surface shall be kept wet for seven days. After curing the surface shall be washed clean.

**3.0. Mode of measurements and payment**

**3.1.** The rate shall include the cost of all materials and labour required for various operations described above.

**Risers of steps:** skirting and dedo shall be measured in square meters, length and height shall be measured along the finished face of the skirting or dedo including curves, where special such as covers internal and external angles, etc. used. The length and height shall be measured correct to the centimeter except in case of risers and skirting where height shall be measured correct to 3 mm.

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

**ITEM NO.41:**

Providing and laying polished Granite tiles 18 mm thick in risers of steps, skirting Dedo and pillars laid on 10 mm thick cement mortar 1 : 3 (1 cement : 3 coarse sand) and jointed with gray cement slurry mixed with pigment to match the shade of slab including rubbing, polishing, Moulding etc. complete. For Flooring, Doors & Windows Edges.

**General**

This work shall consist of providing and fixing machine cut, free edges, pre mirror polished Granite stone slab 18 to 20mm thick in single piece for Doors & windows sill, jambs & cladding as per design of the shape and dimensions shown on the drawings and conforming to these specifications or as approved by the Engineer in charge.

**1.0 MATERIAL**

Water shall confirm to M-1. Cement Mortar shall confirm to M-11. Granite slab shall confirm to M-52. Sand shall conform to M-6.

## **1.0 GRANITE SLAB**

- 1.1.** Granite slab shall be hard even sound, and regular in shape and generally uniform in colour. The colour of the stone shall generally be green. Only approved coloured shall not be allowed for use. They shall be without any soft veins cracks or flaws Granite slab shall be hard, even, and regular in shape and it should without fault.
- 1.2.** The size of the Granite slab to be used as approved by Engineer in charge or Architect. However smaller sizes will be allowed to be used to the extent of maintaining required pattern. Thickness shall be as specified. For Doors & windows sill, jambs & cladding the Granite slab shall be in single piece.
- 1.3.** Tolerance of minus 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.
- 1.4.** The edges of Granite slab 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 chipping and surface shall be true and plain.
- 1.5.** The Granite slab shall have machine cut free edges with half round pipe moulding mirror polished surface. When brought on site. The stones to be used for flooring dado, skirting, sink, veneering, sills, steps etc.

## **2.0 WORKMANSHIP**

- 2.1** Granite slab shall be of approved quality shall be laid evenly to level and slope as directed by Engineer in charge over a bed of a base layer consisting of cement mortar 1:6 (1 cement: 3 coarse sand by volume) or Lime Mortar 1:1.5 (1 lime : 1.5 lime putty by volume).
- 2.2** Granite slab shall be laid evenly as per detailed drawing or as directed by Engineer in charge. Width, length and shape of stone shall be as per pattern shown in detailed drawing.
- 2.3.** Cement and sand for base layer shall be mixed in proportions of 1:3 (1 cement: 3 coarse sand by volume). Cement and sand shall be proportioned by volume after making due allowance for bulking. The required quantity of water shall then be added and the mortar mixed to produce workable consistency before mixing platform shall be thoroughly cleaned before changing from one type of cement to another.
- 2.4.** The mixing for base layer shall be done intimately. The operation shall be carried out on clean water tight platform, and cement sand shall be first mixed dry in the required proportion to obtain uniform color and then the mortar shall be mixed for at least two minutes after addition of water. In case of cement mortar, that has suffered because of evaporation of water the same shall be re-tempered by adding water as frequently as needed to restore the requisite consistency but its re-tempering shall be permitted only within thirty minute from the time of addition to water at the time of initial mixing.
- 2.5.** Cement and sand for base layer shall be mixed in proportion as specified in the item, Cement and sand shall be proportioned by volume after making due allowance for bulking. The required quantity of water shall then be added and the mortar mixed to produce workable consistency.
- 2.6.** Curing shall be started as soon as the mortar used for finished has hardened sufficiently so as to be damaged when watered. It shall be kept wet for a period of at least 7 days. During this period, it shall be suitably protected from all damages;
- 2.7.** During hot weather, all finished or partly finished work shall be covered or wetted in such manner as will prevent rapid drying of the flooring work.
- 2.8.** Joints of Granite slab flooring shall be through and continuous throughout the building as directed by Engineer in charge.

- 2.9. Joints shall be filled with a stiff mixture of gray cement slurry.
- 2.10. The Granite slab flooring work shall be finished by rubbing and mirror polishing after the work of flooring is set properly.
- 3.0 MODE OF MEASUREMENT & PAYMENT :**
- 3.1. The unit rate Granite stone slab flooring shall include the cost of all materials, tools and plant required for mixing, laying of base layer in true level and slope as required applying & placing stones in position, finishing, curing etc. flooring all over the length of walls and corners and sill of doors etc. and all other incidental expenses for producing flooring work to complete the structure or its components as shown on the drawings and according to these specifications. They shall also include the cost of making, fixing and removing of all scaffolding and forms required for the work. The rate includes cost of mirror polishing of flooring and dado work.
- 3.2. The rate shall include the cost of all materials and labours involved in all the operations described above. The granite stone slab flooring shall be measured in Square meter correct to 2 places of decimal. Length and breadth shall be measured to correct to a centimeter and between the finished the finished face of the skirting, dado or wall plaster and no deduction shall be made nor extra paid for any opening in floors or areas up to 0.1 square meter.
- 3.3. The rate shall be for a unit of **one Square meter**.

#### **ITEM NO.42:**

**Providing and fixing PVC Printed plain color false ceiling with grid type with aluminums frame consisting of 600mm x 600mm 3mm thick plain PVC sheet used as panel insert in a frame work made using anodized aluminums T section of size 1 x 1 (235 x 25mm, 19 gauge or 1 mm thick) in square pattern of grid sizes of 2 x 2 (600 x 600mm) The aluminums frame work is supported from the ceiling with the help of G.I. hook and G.I. wire/6mm M.S. rods of required sizes to maintain proper level etc. The aluminum frame work is supported on side wall with the use of aluminums L section of size 1 x 1 (25 x 25mm) angles etc. complete as per direction of Engineer in charge. Manufactures specification and drawing.**

##### **1 Scope of Work**

Providing and fixing a grid-type false ceiling system using printed plain color PVC panels supported by an anodized aluminum framework. The system shall be installed in a square grid pattern, complete with ceiling and sidewall supports, as per the directions of the Engineer-in- Charge. All work shall conform to the manufacturer's specifications and approved drawings.

##### **2 Materials**

###### **• PVC Panels:**

- Size: 600 mm × 600 mm
- Thickness: 3 mm
- Type: Plain PVC sheets (printed in plain color)
- Usage: Inserted as panels into the aluminum framework grid

###### **• Aluminum Framework:**

- **Main Sections:** Anodized aluminum T-sections
  - \* Size: 235 mm × 25 mm (1" × 1")
  - \* Gauge/Thickness: 19 gauge or 1 mm thick
- **Wall Angles:** Anodized aluminum L-sections
  - \* Size: 25 mm × 25 mm (1" × 1")
- **Grid Pattern:** Square configuration with grid modules of 600 mm × 600 mm (2' × 2')

###### **• Support Components:**

- Ceiling Supports: Galvanized Iron (G.I.) hooks and G.I. wires, or 6 mm diameter Mild Steel (M.S.) rods (of required lengths/sizes)
- Purpose: To suspend the framework from the structural ceiling while maintaining proper level and



alignment

### 3 Installation Requirements

- The aluminum framework shall be assembled in a square grid pattern using the specified T-sections to form 600 mm × 600 mm modules.
- Panels shall be inserted into the grid openings, ensuring a flush and secure fit.
- **Ceiling Suspension:**
  - Framework supported from the soffit of the slab/ceiling using G.I. hooks anchored into the ceiling.
  - Suspension via G.I. wires or 6 mm M.S. rods at appropriate spacing to ensure level installation and load distribution.
- **Wall Support:**
  - Perimeter framework fixed to side walls using aluminum L-angle sections (25 mm × 25 mm).
- All joints, clips, and connections shall be as per manufacturer's recommendations to ensure stability and prevent sagging.
- Leveling: Use plumb bob, spirit level, or laser level to maintain uniformity; maximum deflection shall not exceed 1/360 of span.
- Clearances: Minimum 50 mm gap between framework and walls for expansion/contraction.

### 4 Workmanship and Quality Control

- Installation shall be carried out by skilled labor experienced in false ceiling systems.
- Ensure panels are clean, free from defects, and uniformly colored.
- Seal all perimeter joints with approved acoustic sealant to minimize sound leakage.
- Fire Rating: Panels and framework shall comply with relevant local building codes (e.g., Class A or B as per ASTM E84 for surface burning characteristics).
- Testing: Post-installation inspection for levelness, alignment, and secure fixing.

Mode of measurement

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

### **ITEM NO.43:**

**Supplying and fixing Board & Signages with 3mm thick exterior grade ACP of Aludecore, Alstrong or Eurobond brand with Vinyl letters [Non Reflective] including proper M.S. Structure of 45x45mm Hollow square box section of 20 gauge with one coat of Anticorrosive paint and two coat of oil paint with required anchoring fasteners etc. Complete as per directed.**

1 Scope of Work Supplying and fixing boards and signages using 3 mm thick exterior grade Aluminum Composite Panel (ACP) of approved brands such as Aludecore, Alstrong, or Eurobond, with non-reflective vinyl letters. The work includes providing a proper Mild Steel (M.S.) structure using 45 mm × 45 mm hollow square box sections of 20 gauge, finished with one coat of anticorrosive paint and two coats of oil paint, along with required anchoring fasteners. The complete installation shall be as per the directions of the Engineer-in-Charge and in conformity with manufacturer's specifications and approved drawings.

2 Materials • Aluminum Composite Panel (ACP):– Thickness: 3 mm– Grade: Exterior grade, suitable for outdoor applications– Brands: Aludecore, Alstrong, or Eurobond (or equivalent approved by Engineer-in-Charge)– Properties: Fire-retardant core, UV-resistant, weatherproof, with aluminum skins of minimum 0.5 mm thickness each– Finish: Plain or as specified, with provision for vinyl lettering • Letters and Graphics:– Type: Non-reflective vinyl letters and graphics– Material: High-quality cut vinyl film, adhesive-backed, suitable for exterior use– Color and Font: As per approved design and layout– Application: Applied directly on ACP surface using heat transfer or pressure-sensitive method for durability • M.S.

Structure:– Type: Hollow square box sections– Size: 45 mm ×45mm– Gauge/Thickness: 20 gauge (approximately 0.9 mm to 1.0 mm thick)– Material: Mild Steel (M.S.), hot-dip galvanized or equivalent for corrosion resistance– Joints: Welded or bolted with approved fasteners • Painting and Finishing:– Primer: One coat of anticorrosive zinc chromate primer or equivalent 1– Top Coats: Two coats of synthetic oil paint in approved shade and finish (e.g., semigloss)– Coverage: Uniform application ensuring complete coverage and adhesion • Anchoring Fasteners:– Type: Expansion anchors, bolts, nuts, washers, or chemical anchors as required for substrate (e.g., concrete, brick, or steel)– Material: Stainless steel or galvanized steel for corrosion resistance– Size: As per structural calculations and load requirements 3 Fabrication and Installation Requirements • Fabrication:– ACP sheets shall be cut to required sizes using CNC router or guillotine shear, with edges routed for clean finish.– Vinyl letters shall be precisely cut and applied on ACP panels in a controlled environment to avoid bubbles or misalignment.– M.S. structure shall be fabricated in shop, with accurate measurements, mitred joints, and pre-drilled holes for fasteners.– All welding shall be done with MIG/TIG process, followed by grinding for smooth finish. • Installation:– Structure fixed to wall or supporting surface using anchoring fasteners at intervals not exceeding 600 mm vertically and horizontally.– ACP panels routed and fixed to M.S. frame using aluminum rivets or screws at 150-200 mm centers.– Ensure panels are plumb, level, and aligned; maximum gap between panels not exceeding 2 mm.– Bracing: Provide cross-bracing in M.S. frame where span exceeds 1.5 m to prevent deflection.– Weatherproofing: Seal all joints with silicone sealant (neutral cure) for water tightness. • Structural Considerations:– Design load: Wind load as per local codes (e.g., IS 875 Part 3), with factor of safety 1.5.– Deflection: Maximum L/240 under service loads.

- 5 Workmanship and Quality Control • All materials shall be sourced from approved manufacturers and tested for compliance with standards (e.g., ASTM D1781 for ACP, IS 1079 for steel). 2• Installation by skilled fabricators experienced in signage works. • Surface preparation: ACP to be free from dents, scratches; M.S. structure degreased and rust-removed prior to painting. • Painting inspection: Adhesion test, dry film thickness (DFT) minimum 50 microns per coat. • Final inspection: Check for alignment, adhesion of vinyl, paint finish, and overall stability. • Warranty: Minimum 5 years against delamination, fading, or corrosion.

#### **Mode of measurement**

**The rate shall be for a unit of one Square meter.**

#### **ITEM NO.44:**

**Providing, Supplying & Fixing The Terracotta Jali of the size 8.5" X 8.5" X 2.5" INIGMA JALI & 8.5" X 8.5" X 2.5" PANAMA JALI. Including Transportation & Loading Unloading Charges Excluding labour Charges Etc. Complete. As directed on site by EIC or any concern authority.**

#### **1. General Description**

Providing, supplying, and fixing of Terracotta Jali of approved make and design, manufactured from natural terracotta clay, properly kiln-fired, free from cracks, warpage, saline deposits, or other defects. The Jali shall conform to the best quality standards, suitable for decorative as well as functional ventilation and façade applications.

Sizes to be provided:

- INIGMA Jali – 8.5" x 8.5" x 2.5"
- PANAMA Jali – 8.5" x 8.5" x 2.5"

#### **2. Material & Manufacturing**

- Raw Material: Natural terracotta clay without impurities.
- Firing: Kiln-fired at temperature not less than 950°C to ensure durability and strength.



- Finish: Smooth surface with uniform terracotta red color. No glaze unless otherwise specified.
- Dimensional Tolerance:  $\pm 3$  mm in length, width, and thickness.
- Water Absorption: Not more than 15% by weight (as per IS: 3367).
- Compressive Strength: Not less than 3.5 N/mm<sup>2</sup>.
- Durability: Resistant to weathering and efflorescence.

### **3. Transportation, Loading & Unloading**

- The supplier shall arrange safe and secure transportation to site.
- Loading and unloading shall be carried out carefully to prevent breakage.
- Materials shall be stacked on level ground, at least 150 mm above ground level, and protected from direct rain and impact.

### **4. Fixing & Installation**

- Fixing shall be done in cement mortar (1:4) or with approved adhesive mortar as per site requirements.
- Jali shall be placed in true line and level with proper spacing and joint thickness not exceeding 10 mm.
- Mortar joints shall be neatly finished and excess mortar removed immediately.
- Proper curing shall be ensured for at least 7 days after installation.
- Any broken, cracked, or defective pieces shall not be used.

### **5. Scope of Work**

- Supply of terracotta jali units at site.
- Transportation, loading, unloading, and stacking at site.
- Fixing and finishing as directed by Engineer-in-Charge (EIC) or concerned authority.

### **6. Measurement**

- Measurement shall be taken in Numbers (Nos.) for each Jali supplied and fixed.
- Breakage during transportation or fixing shall not be considered for payment.

### **7. Rate Includes**

- Cost of approved quality Terracotta Jali.
- Transportation, loading, unloading, stacking.
- All incidental charges, wastage, and taxes.

### **8. Rate Excludes**

- Labour charges for fixing and finishing (unless otherwise specified).
- Cement mortar/adhesive, curing water, and other consumables.

### **9. Testing & Quality Assurance**

- Supplier shall provide manufacturer's test certificate for strength and water absorption.
- Random pieces may be tested at approved laboratories as directed by EIC.
- Materials not meeting specifications shall be rejected and removed from site at contractor's cost.

### **10. Execution & Supervision**

Entire work shall be executed strictly in accordance with the instructions of the Engineer-in-Charge or authorized representative. Any deviation in size, alignment, or quality noticed during execution shall be rectified immediately.

### **ITEM NO.45:**

**Providing and fixing FRP frame size 125 x 65 mm and 35 mm thick FRP shutter with wood grain raised paneled design finish shutter having extra reinforcement on side & 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 & fixtures. The whole FRP frame & Shutter is to be water proof weather proof, termite proof & resistance to mild acid/alkhli. Rates are to be inclusive of S.S.hinges with fastener Sleeve & aluminum fixtures & fastenings.**

#### **1.0 SHUTTER MATERIAL :**

28 mm thick FRP single shutter in depress panel design shall be having frame size 100 x 50 mm FRP thickness fire retardantgrade FRP skin and embedded wooden pieces for stiffening

as well as holding hinges and fixtures all moulded into one piece shutter. Core material shall be injected fire retardant grade rigid polyurethane foam done in situ having density 32 to 36 Kg/m<sup>3</sup>, compressive strength 1.8 to 2.0 kg/cm<sup>2</sup>, flexural strength 3.5 to 4.5 kg/cm<sup>2</sup>. Whole shutter shall be water proof, weather proof, termite proof and mild acid / alkali resistance.

## **2.0 SHUTTER :**

28 mm thick depress panel FRP single shutter shall be joint less. It shall be straight and smooth and of standard shape finished in gel coat. All necessary fixtures and fastening shall be fixed where wooden piece provided.

## **3.0 SHUTTER WORKMANSHIP:**

Shutter shall be fixed in line, level and proper manner having 2.0 to 3.0 mm play i.e. air space for smooth and easy working. Three S.S. hinges shall be fixed properly with necessary screws.

## **4.0 SHUTTER TOLERANCE:**

1.5 mm tolerance will be allowed in thickness of shutter.

## **5.0 SHUTTER FIXTURES AND FASTENING:**

All fixtures & fastening like S.S. aldop, tadi or baby-latch, stopper, handle shall be fixed with shutter in usual manner.

The shutter shall be fixed to frame using fixing necessary Khila or screws including drilling in granite frame as directed.

During fixing of shutter if the granite frame is damage the same will be replaced by contractor's own cost without any extra payment.

Product is from reputed company having ISO 9001-2000 certificate and with three years performance guarantee.

## **6.0 MODE OF MEASUREMENT AND PAYMENT :**

Rate includes the cost of all materials, S.S. fixtures and fastening with necessary screws for fixing in position, labor, tools, equipment's etc. required for satisfactory completion of item as directed by the Engineer in charge with all lead and lift.

The payment shall be made on unit of smt. basis.

## **ITEM NO.46**

**Providing and Laying Broken China Mosaic flooring for Terrace using 12mm Broken pieces of glazed tiles to be laid over cement mortar 1:3 to plain or slope and to be tempered to bring mortar cream out up to surface using white cement including rounding off junctions and extending them up to 15cm long the wall, clearing with water and oxalic acid etc. as directed.**

## **1.0 MATERIAL - 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 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 huddling of water shall be clean. Water shall conform to the Standard Specification in I.S. 455 - 1978.
- 1.2 If required by the Engineer in charge, it shall be tested by comparison with distilled water compression 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 50 minutes or more or decrease of more than 10 percent strength of mortar prepared with distilled water sample when compared with the result

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/too alkaline.
- 1.4 It shall be free of elements which significantly affect the hydration reaction or otherwise interface with the hardening of mortar or concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces.
- 1.5 Hard and bitter water shall not be used for curing.
- 1.6 Potable water will generally found suitable for curing mortar or concrete.

## **2.0 CEMENT**

- 2.1 Cement shall be ordinary Portland slag cement as per I.S. 1624 - 1974 or Portland slag cement as per I.S.455-1976.
- 2.2 Cement shall be stored above the ground level in perfectly and dry and water tight sheds. Wherever bulk storage containers are used, there capacity should be sufficient to cater to the requirements at site and should be cleaned at least once every 3 to 4 months. The aggregate shall be stored in such a way as to prevent admixture of foreign materials. Different size of fine or coarse aggregate shall be stored in separate stock piles sufficiently away from the each other to prevent inter mixing the materials.

## **3.0 SAND**

- 3.1 Sand shall be natural sand, clean, well graded, hared, strong, durable and gritty particular free from immures amounts of dust, clay, kankar, modules, soft or flaky particles shall alkali salts, organic matter, learn mica or other deleterious substance and shall be got approved from the Engineer in charge. The sand shall not contain more than 8 percent of slit as determined by field test if necessary, the sand

**COARSE SAND** - The fineness modules of coarse sand shall not be less than 2.5 and shall not exceed 3.0. The sieve analysis of coarse sand be as under :

<b>I.S. Sieve Designation</b>	<b>% by wt. passing</b>
4.75 mm	100
2.36 mm	90 to 100
1.18 mm	70 to 100
600 MC	30 to 100
300 MC	85 to 70
150 MC	00 to 50

- 3.2 **FINE SAND** : The fineness modules shall not exceed 1.0 the sieve analysis of fine sand be as under:

<b>I.S. Sieve Designation</b>	<b>% by wt. passing</b>
4.75 mm	100
2.36 mm	100
1.18 mm	70 to 100
600 MC	40 to 85
300 MC	05 to 50
150 MC	00 to 10

- 3.3 Materials shall be stored as to prevent their deterioration of their quality and fitness for the work. Any material which has deterioration or has been damaged or is otherwise considered defective by the Engineer in charge shall not be used in the work.

## **1.4 WATER PROOFING COMPOUND**

Water proofing compound shall be of approved quality and make as approved by Engineer in charge.

## **1.5 CHINA MOSAIC TILE PIECES**

China mosaic tiles pieces shall be of 50 mm to 90 mm nominal size, tiles pieces shall be made from hard and good quality of tiles.

## **1.7 WHITE CEMENT**

White cement shall be of approved make it shall confirm definition of I.S. 8042-E-1978 the sample of white cement shall be approved by Engineer in charge.

## WORKMANSHIP

- A** First of all surface of the entire terrace shall be cleaned by thoroughly brooming and then by wire brushes. All the loose material, dust and debris shall be removed thoroughly from the entire surface of the terrace.  
All joints and cracks shall be raked off and cut in trench which shall be filled by neat cement slurry admixed with water proofing compound. The joints with parapet shall be raked up to 30 cm height and shall be applied by neat cement slurry admixed with water proofing compound.  
Neat cement slurry shall be prepared and a water proofing compound of approved make shall be mixed with the slurry in proportion specified by the manufacturer of the compound and shall be laid throughout the surface of the terrace by the use of brushes mala etc. Cement slurry shall be prepared by adding adequate quantity of water so as to spread it uniformly on the surface. Applying neat cement slurry 2.75 Kgs./Smt. of cement admix with water proofing compound after cleaning the surface.
- B** (b) laying cement concrete using brick bats 25mm to 100mm size with 50% cement mortar 1:3 (1 Cement: 3 Coarse Sand) admixed mortar proofing compound over 20 mm thick layer of cement mortar 1:5 to required slope including rounding of junctions of walls and slabs  
After two days of proper curing applying a second coat of cement slurry on entire surface of the terrace.
- D** The entire surface shall be finished with 20 mm thick C.M. 1:4 and China mosaic tilling in true level and slope as directed by Engineer in charge and finally finishing the surface with trowel with white cement slurry (Specification of white glazed tiles flooring shall be followed for the execution of this item).
- E** Finishing the surface with 20 mm thick C.M. 1:3 and China mosaic tilling and finally finishing the surface with trowel with white cement slurry.
- F** After two days proper curing the terrace shall be flooded for 15 days.

## 7.0 MODE OF MEASUREMENT AND PAYMENT

- 7.1** The unit rate of flooring shall include the cost of all materials, tools and plant required for mixing, laying of base layer in true level and slope as required applying and placing broken pieces of china mosaic tile in position, compacting, finishing, curing, providing treatment of 30 cm high allover the length of parapets and corners and sill of doors etc. and all other incidental expenses for producing flooring work to complete the structure of its components as shown on the drawings and according to these specifications. Item shall also include the cost of making, fixing of all scaffolding and forms required for the work.  
The rate of plastering shall include the cost of all labour, materials, tools and plants, scaffolding and all incidental expenses as described herein above.
- 7.2** The plaster work shall be measured for its length and width, limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one Square Meter.
- 7.4** A guarantee bond on appropriately stamped paper shall be given by the contractor to the Department in the manner and form prescribed below.
- 7.3** The payment will be made on **Square Meter** basis of the finished work.

## **SCHEDULEB-6**

### **PLUMBING AND SANITARY - MAIN BUILDING**

#### **ITEM NO.01**

**Providing and fixing wash down water closet (European type W.C. Pan) with internal P or S trap including jointing the trap with soil pipe in cement mortar 1:1 ( 1 cement : 1 fine sand). Rates including providing and fixing plastic seat cover with C.P. brass hinges and rubber buffers, Jet spray heavy duty with S.S. braided hose 60 cm long and chromium plates brass half turn flush cock of approved quality etc. complete as directed.**

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.

#### **1.0. Materials**

Wash down water closet (European type W.C. Pan) shall conform to M-60. Cement mortar shall conform to M-11.

#### **2.0. Workmanship**

**2.1.** The closet shall be fixed to the floor by means of 75 mm. long 6.5 mm. diameter counter sunk bolts and nuts embedded in the floor concrete using rubber or before washers so as not to allow any lateral displacement. The joint between the trap of W.C. and soil pipe shall be made with C.M. 1:1 (1 cement : 1 fine sand).

#### **3.0. Mode of measurements and payment**

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

**3.2.** The rate includes cost of all labour for fixing pans and seat and cover, inlet, connections etc. complete including testing the same. The payment of seat and cover shall be made separately.

**3.3.** The rate shall be for a unit of One number.

#### **G.I. inlet connection for flush pipe with W.C. Pan.**

#### **1.0. Materials**

**1.1.** The G.I. inlet connection for flush pipe shall conform to M-56.

#### **2.0. Workmanship**

**2.1.** The flush pipe from the cistern shall be connected to the closet by means of cement or red-lead.

#### **3.0. Mode of measurements & payment**

**3.1.** The rate shall include the cost of all materials, fittings and labour involved in all the operations described under workmanship including testing.

**3.2.** The rate shall be for a unit of One number.

#### **Providing and Fixing Plastic Seat Cover**

**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.

#### **25mm dia flush cock**

**1.0. Materials :** Chromium plated brass half turn flush cock shall conform to M-67.

**2.0. Workmanship**

The half turn flush cock of specified diameter shall be fixed as directed. The flush cock shall be fixed in G.I. pipe line with necessary fittings. The joints shall be made leak proof by using spun yarn and white Zink. The fixing work shall be carried out as per relevant specifications of item No. 23.2(4).

**3.0. Mode of measurements and payment**

**3.1.** The rate includes cost of all materials and labour required for satisfactory completion of this item including fittings.

**3.2.** The rate shall be for a unit of One number.

100mm size P or S Trap

**1.0. Materials :** The 100 mm. size 'P' or 'S' trap for water closet shall conform to M-62. Cement mortar shall conform to M-11.

**2.0. Workmanship**

**2.1.** The 'P' or 'S' trap shall be fixed with cast iron pipe with C.M. 1:1. The pan shall be provided with a 100 nun. 'P' or 'S' trap as specified in the item with an approximately 50 mm. seal. The joint between the pan and the trap shall be made leak-proof with cement mortar 1:1 (1 cement : 1 fine sand).

**3.0. Mode of measurements and payment**

**3.1.** The rate shall include the cost of all materials and labour involved in the operations described under workmanship including testing.

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

**ITEM NO.02**

**Providing and fixing 15mm. Dia Chromium Plated Brass screw down bib tap of approved quality in pipeline and testing etc. complete as directed by Engineer-in-charge.**

**1.0. Materials :** 15 mm. dia. brass screw down with bright polished finished shall conform to I.S. 781-1977. The bib cock shall be best Indian make and quality.

**2.0. Workmanship**

**2.1.** The screw down bib cock 15 mm. as specified above shall be fixed as directed. The threaded portion shall be smeared with white or red lead and around with a few turns of fine spun yarn round the screwed end of the pipe. The bib cock shall be then screwed and fixed to water tight position.

**3.0. Mode of measurements and payment**

**3.1.** The rate includes cost of all labor, materials, tools and plant etc. required for satisfactory completion of this item.

**3.2.** The rate shall be for a unit of One Number.

**ITEM NO.03**

**Providing and fixing gun metal check or non-return full way wheel valve of 25 mm Dia.**

**1.0. Materials :** The gun metal check or non return full way wheel valve or specified dial, shall conform to I.S. :778-1964. The non-return valve shall be of tested quality.

**2.0. Workmanship**

**2.1.** The gun metal check or non-return valve shall be fully cleared of all foreign matter before fixing. The fixing of shall be done by means of bolts nuts and 3 mm. rubber insertions with flaps of spigot and socketed tail pieces, drilled to the same specifications as in case of socket and spigot flanges in case of flanged pipes. The joining shall be done leak proof.

**3.0. Mode of measurements and payment**

**3.1.** The rate includes all labours, 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.04**

##### **Providing and fixing gun metal check or non return fullway wheel valve of 40 mm Dia.**

**1.0. Materials :** The gun metal check or not return full way wheel valve or specified dial, shall conform to I.S. :778-1964. The non-return valve shall be of tested quality.

##### **2.0. Workmanship**

**2.1.** The gun metal check or non-return valve shall be fully cleared of all foreign matter before fixing. The fixing of shall be done by means of bolts nuts and 3 mm. rubber insertions with flags of spigot and socketed tail pieces, drilled to the same specifications as in case of socket and spigot flanges in case of flanged pipes. The joining shall be done leak proof.

##### **3.0. Mode of measurements and payment**

**3.1.** The rate includes all labours, **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.05**

**Providing and fixing PVC SWR Nahni trap IS 14735 for drain - 100 mm diameter with jali of the following nominal diameter of self-cleansing design with C.I screed down or hinged grating including the cost of cutting and making good the walls.**

##### **1.0. Materials**

**1.1.** The PVC SWR Nahni Trap IS 14735 for drain with jali shall conform to M-69. The C.I. hinged or screwed down cover shall be of best quality and approved by Engineer in charge.

##### **2.0. Workmanship**

**2.1.** The PVC SWR Nahni Trap with 75mm. dia inlet and 50 mm. dia. outlet shall be fixed as per drawing or as directed.

**2.2.** The PVC SWR Nahni Trap shall be jointed with C.I. pipe, 75 mm. dia. with lead joints. The lead joints shall be done in conformation with I.S. 782-1976.

##### **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.06**

**Providing and fixing S.W. gully trap with C.I. grating brick masonry chamber and water tight C.I. cover with frame of 300mm x 300mm size (inside) with standard weight.(i) Square mouth traps. (A) 100mm x 100mm size P type.**



**1.0. Materials :** (t) 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 conform to M-70.

## **2.0. Workmanship**

**2.1.** Excavation for gulley 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 gulley trap shall be fixed over cement concrete 1:5:10 (1 cement : 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 gulley 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 gulley and branch drain, a brick masonry 300 x 330 mm. inside with bricks in CM 1:5 (1 cement : 5 sand) shall be built with a 100 mm. brick work round OH; gulley trap from the top of bed concrete up to ground level. The space between the chamber walls and the trap shall be filled with cement concrete 1:5:10. The upper portion of the chamber i.e. above the top level of the trap shall be plastered inside with cement mortar 1:3 (1 cement: 3 sand) finished with floating coat of neat cement.

The corners and bottom of the chamber shall be rounded off so as to slope towards the grating.

**2.4.** C.I. cover with frame 300 mm, x 300 mm. (inside) size shall then be fixed on the top of the brick masonry with C.c. 1:2:4 (1 cement : 2 coarse sand : 4 graded aggregate 20 mm. nominal size) 40 mm. thick and rendered smooth. The finished top of the cover shall be left about 40 mm. above the adjoining ground level so as to exclude the surface water from entering the gulley trap.

### **3.0. Mode of measurements & payment**

**3.1.** The rate includes cost of all 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.7**

**Constructing brick masonry chamber for underground C.I. Inspection chamber and bends with bricks having crushing strength not less than 35Kg/Cm<sup>2</sup> in C.M. 1:5 C.I. cover with frame (Light duty) 455mm x 610mm internal dimensions total weight of cover with frame to be not less than 38Kg. (Wt. of cover 23 Kg.) and Wt. of frame 15Kg. ) (R.C.C. top slab with 1:2:4 mix (1-cement :2- coarse sand :4-graded stone aggregate 20mm size) foundation concrete 1:5:10 inside plaster 15mm thick with cement mortar 1:3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete.(ii) Inside dimensions 500mm x 700 mm and 450mm deep for pipe line with one or two inlets**

**1.0. Materials :** Water shall conform to M-1. Cement shall conform to M-3. Coarse sand shall conform to M-5. Brick shall conform to M-15. Stone aggregate shall conform to M-12. Brick bat shall conform to M-14. M.S. bar shall conform to M-18.

## **2.0. Workmanship**

**2.1.** C.I. inspection chamber with provision of C.I. bends of specified size with bolts, nuts and felt washers for underground drain shall be enclosed in masonry chamber which shall be constructed as under:

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

**2.3.** Bed concrete shall be 15. Cms, thick C.C. 1:5:10 (1 cement : 5 coarse sand : 10 graded brick bat aggregates. The projection of bed concrete beyond the masonry walls shall be 7.5 cms.

**2.4.** Masonry walls and plaster work shall be carried out as per relevant specifications of item 24.40.

**2.5.** The walls and the bed concrete of chamber shall be plastered inside with 12 mm. thick cement plaster 1 : 3 (1 cement : 3 coarse sand) finished smooth.

**2.6.** The gulley grating cover shall be hinged to frame to facilitate its opening for cleaning and repairs. The frames of the gulley grating g shall be fixed on the top of masonry wall of the chamber in 15 cms. thick C.C.



1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) laid over the full thickness of walls..

**2.7.** The chamber shall have connection pipe, the length of which in meter between the road gully chamber and the manhole of the drain shall not be less than 1/40 times the nominal diameter of the pipe in MM. i.e. for 150 mm connection pipe the length shall not be cement plaster on the bed concrete.

**2.8. Painting :** After the completion of the work of exposed surface of the grating of the frame shall be painted with a thick coat of coal tar.

**3.0. Mode of measurements and payment**

**3.1.** The cost of connection pipes is not included in the item and shall be paid separately. However, fixing the connection pipes in the walls of gully chamber is included in the rate for gully chambers and nothing extra shall be paid for this separately.

**3.2.** The rate shall be for a unit of One number.

**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.8**

**Providing erecting and fixing double coated ISI mark water tank of required capacity with all necessary fittings & connection etc. complete on terrace.**

**1.0 Materials: -**

**1.1** Polyethylene water storage tank of double coated shall be as per I.S.: 12701, this material should be light weight, non-toxic all fitting materials shall be H.D.P.E. / Brass

**1.2** The P.V.C. cylindrical vertical type having storage capacity as required or as directed. Water tank shall have closed top monolithic single piece molded without any joints, welds or seams. It should have F.D.A. approved grade of polythene and shall be suitable for storing potable water. The tank should have ribbed construction in molding for added structural strength. It shall be of I.S.I. mark and approved quality and brand like Infra, Syntax or National or equivalent. It shall be approved by Engineer in charge

**1.3** The thickness of P.V.C. materials shall be as per Company's specification. The size of tank shall be decided by Engineer in charge

**2.0 Workmanship: -**

**2.1** Water tank shall be installed on perfectly planed and smooth surface.

**2.2** Outlet pipe shall be 7.5 cm high then bottom surface.

**2.3** Diameter of overflow pipe shall be bigger than inlet pipe diameter.

**2.4** Unions shall be used in inlet and outlet pipe.

**2.5** For connection in water tank required vicar and check-nuts shall be used.

**2.6** Fitting shall be done by G.I. / P.V.C. pipes as per instruction of Engineer in charge in each tank. All joints shall be leak proof.

**2.7** All necessary accessories like neo-preen gasket / packing / washers, GI washer & check nuts for inlet and outlet connections, ball cock and locking arrangements shall be fixed without any extra cost.

**3.0 Mode of Measurement and Payment: -**

**3.1** This shall be measured in one-liter basis and rates are as per liter basis for the volumetric capacity of the water tank.

**3.2** Rate shall be inclusive of placing, lifting, storing and making connection for inlet, outlet, overflow pipe, out pipe with all necessary plumbing work, material, for fixing additional accessories supplied by the supplier accessories. The necessary pedestal / supporting structures shall be measured relevant items

**3.3** The contract rate shall be for a unit of one **Liter** basis for completed item.

**ITEM NO.9**

**Providing and fixing white vitreous china flat back wash basin of 550mm x 400mm size with single hole for pillar tap with C.I. or M.S. brackets painted white including cutting holes and making good the same. Rates including providing and fixing 32mm dia C.P. Brass waste couplin, 32mm dia M.I. Fisher unit, Brass screw down stop tap of 15mm dia pillar tap capstan head, screw down high pressure with screws, shanks, back nuts, PVC pipe & 32mm dia flexible waste pipe up to Nani Trap etc. complete as directed by engineer in charge.**

#### **1.0. Materials**

**1.1.** The white glazed earthenware wash basin shall be 550 mm. x 400mm. of 1st quality and make as approved by the Engineer-in-charge. The wash basin shall conform to M-59.

#### **2.0. Workmanship**

**2.1.** The washbasin shall be fixed on the wall as and where directed. The wash basin shall be supported on a pair of M.S. or C.I. brackets fixed in C.M. 1:3 (1 cement : 3 sand). The bracket shall conform to I.S. : 775-1962. The wall plaster on the rear shall be cut to rest the top edge of the washbasin. After fixing the basing, plaster shall be made good and surface finished to match the existing one.

**2.2.** The brackets shall be painted white with ready-mixed paint.

**2.3.** The C.I. brass trap and union shall be connected to 32 mm. dia. waste pipe which shall be suitably bent towards the wall and which shall discharge into an open drain leading to a gully trap or direct in to gully-trap on the ground floor and shall be connected to a waste pipe through a floor trap on the upper floors. C.P. brass trap and union may not be provided where the surface drain or a floor trap is placed directly under the basin and the waste is discharged in to vertically.

**2.4.** The height of the front edge to the wash basin from the floor level shall be 80 cms.

**2.5.** The necessary inlet, outlet connections and fittings such as pillar cocks, CP dress waste trap waste pipe, stop cock, chain with rubber plug etc. shall be fixed.

**2.6.** The payment of fittings shall be made separately under separate items.

#### **3.0. Mode of measurements & payment**

**3.1.** The rate includes cost of all labour, materials, tool3 and plant etc. required for satisfactory completion of this item as specified in workmanship.

**3.2.** The rate shall be for a unit of One number.

#### **ITEM NO.10**

**Providing and laying (To level or slopes) and jointing with stiff mixture of cement mortar in proportion 1:1 salt glazed stone ware pipes including testing of pipes and joint complete. (B) 150 mm Dia.**

1. This shall consist of furnishing and installing reinforced cement concrete pipe of the type diameter and length required at the location shown on the drawings or as ordered by the Engineer-in-charge.
2. Reinforced concrete pipe shall be of NP2 type conforming to the requirements of IS : 458 and shall be of dia. as specified in the item. Each consignment of cement concrete pipes shall be inspected, if necessary and approved by the Engineer-in-charge either at the place of manufacture or at the site before their incorporation in the works.

NP3, NP2 and NP1 pipes are used for R.C.C. Pipes. Where the testing of pipes will not be feasible the contractors will have to produce a certificate from the 'manufacturer on company's letter head in the given' hereinafter from.

Production of such certificate will not however relieve the Contractor from his responsibility of supplying pipes of required standard and will have to bear the loss or damage caused to the work on account of defects found subsequently during execution. It will also be necessary to purchase these pipes from manufacturer having standard equipments for carrying out various tests as per IS : 458 at his factory.

### Form of Certificate for NP-3, NP-2, NP-1 Pipes

We \_\_\_\_\_

Manufacturer or R.C.C. Pipes produce R.C.C. pipes as per the requirement of IS : 458 and also carry out the required test at out place, We have acquired equipments for carrying out test and are prepared to carry out tests at our factory sites. We have experience of manufacturing of pipes of years. The pipes supplied by us to M/S. \_\_\_\_\_.

Satisfy the requirement of IS:458.

Date: \_\_\_\_\_

Place: \_\_\_\_\_

Manufacturer's Sign \_\_\_\_\_

3. No pipes shall be placed in position until the foundations have been approved by the Engineer-in charge. Where two or more pipes are to be laid adjacent to each other, they shall be separated by a distance equal to at least half the diameter of the pipe subject to minimum of 250 mm. The laying of pipes on the prepared foundation shall start from the outlet and proceed towards the inlet and be completed to the specified lines and grades. The pipes shall be fitted and matched so that when laid in works they form a culvert with a smooth uniform invert. Any pipe found defective or damaged during laying shall be removed at their cost of Contractor.
4. The pipes shall be jointed either by collar joint or by flush joint in the former case the collars shall be of R.C.C. 150 to 200 mm. wide and having the same strength as the pipes to be jointed. Caulking space shall be between 13 and 20 mm. according to the diameter of the pipes caulking material shall be slightly wet mix of cement and sand in the ratio of 1:2 rammed with caulking irons. Before caulking the collar shall be so placed that its centre coincides with that of pipes and an even annular space is left between the collar and the pipes. Flush joint may be shaped to form a self centering joint with a joining space 13 cm wide. The joining space shall be filled with cement mortar 1:2 (1 cement : 2 sand) mixed sufficiently dry to remain in position when forced with a trowel or rammer. Care shall be taken to fill all voids and excess mortar shall be removed. All joints shall be made with care so that their interior surface is smooth and consistent with the interior surface of the pipes. After finishing, the joint shall be kept covered and damp for at least four days.
5. R. C. C. pipes shall be measured along their centre between their inlet and outlet ends in linear meters.
6. The rate for the pipes shall include the cost of pipe including loading, unloading, handling, storing laying in position and joining complete. The contract rate shall be for a unit of one running meter.
7. The unit rate shall be for a unit of running meter.

## **ITEM NO.11**

**Providing and fixing 600 mm x 450 mm bevelled edge mirror of superior glass mounted on 6 mm thick A.C Sheets or plywood sheet and fixing to wooden pluge with C.P. brass screws and wasers.**

- 1.1. The 600 mm. x 450 mm. size mirror shall be of superior glass with edge rounded and beveled as specified. It shall be free from flaws, specks, or bubbles and its thickness shall not be less than 6 mm. The glass for the mirror shall be uniformly silver plated at the back and shall be free from silvering defects. Silvering shall have a protective uniform covering of red lead paint. The 6 mm thick plywood shall conform to M-37. The 6 mm. thick A.C. sheets shall conform to M-24.

### **2.0. Workmanship**

- 2.1. The mirror of 600 mm. x 450 mm. size mounted on A.C. Sheet or plywood 6 mm thick with C.P. brass clips shall be fixed as directed, by fixing wooden plugs in wall and C.P brass screws and washers. The work shall be carried out in best workman like manner.

### **3.0. Mode of measurements & payment**

- 3.1. The rate includes cost of all labor and materials, tools and plant etc. required for satisfactory completion of this item. The rate shall be for a unit of One number.

## **ITEM NO.12**

**Providing and fixing concealed center point to wall ceiling & floor CPVC (SDR 13.5) PIPE having National Sanitation Foundation (NSF) seal for potable water of following dia. Nominal bore tube fitting and clamps including making good the wall, ceiling and floor etc. complete. For 40mm Dia.**

### **1. Material**

CPVC (Chlorinated Polyvinyl Chloride) pipe, SDR 13.5, conforming to ASTM D 2846 standards. Pipe shall bear NSF (National Sanitation Foundation) certification mark for potable water use. All fittings (tees, elbows, sockets, reducers, bends, etc.) shall be CPVC SDR 13.5 and compatible with the pipe.

Adhesive/solvent cement shall be as recommended by manufacturer, NSF-approved, and applied as per standard procedure.

### **2. Size**

Nominal Bore: 40 mm (1 ½ inch approx.)

### **3. Fixing & Installation**

Pipes to be fixed concealed in walls, ceilings, and floors using suitable clamps and supports at intervals not exceeding 1 m for horizontal runs and 1.2 m for vertical runs.

Proper chase cutting in wall, floor, or ceiling to be done, ensuring adequate depth and width for embedding.

Pipes shall be jointed with solvent cement, ensuring leak-proof and strong connections.

All joints to be tested under hydrostatic pressure before concealment.

### **4. Clamps & Supports**

Non-corrosive MS/GI clamps with rubber lining shall be used.

Spacing and alignment shall ensure no sagging of the pipeline.

### **5. Finishing**

After successful testing, chases shall be refilled with cement mortar (1:3) to make surface flush with surrounding walls/floors.

Final surface finishing (plastering/tiling/painting) shall be restored to original condition.

#### 6. Testing

The installed pipeline shall be tested at a pressure of 10 kg/cm<sup>2</sup> (10 bar) for at least 1 hour. No leakage, sweating, or drop in pressure shall be acceptable.

#### 7. Measurement

Measurement shall be taken along the centerline length of the installed pipe including fittings but excluding valves, specials, and fixtures (which shall be paid separately).

#### 8. Scope

Includes supply, installation, testing, and making good of all disturbed surfaces.

Complete job as per specification and direction of Engineer-in-Charge.

### **ITEM NO.13**

**Providing and fixing concealed center point to wall ceiling & floor CPVC (SDR 13.5) PIPE having National Sanitation Foundation (NSF) seal for potable water of following dia. Nominal bore tube fitting and clamps including making good the wall, ceiling and floor etc. complete for 25mm.**

#### **1.0. Materials**

- 1.1. The pipes shall be standard C.P.V.C. (SDR 13.5) pipe having National Sanitation Foundation (NSF) seal for potable water of specified dia.
- 1.2. The fittings, clamps etc. required for specified dia. bore pipes shall be of best quality and makes as approved by the Engineer-in-charge.

#### **2.0. Workmanship**

##### **2.1. Cutting, Laying & Jointing**

- 2.1.1. When the tubes are to be cut or rethreaded, the ends shall be carefully filed out so that no obstruction to bore is offered. The ends of the tubes shall then be threaded conforming to the requirements of I.S. 554-1955 with pipe dies and taps carefully in such a manner that it will not result in slackness of joints when the two pieces are screwed together.
- 2.1.2. The taps and dies shall be used only for straightening screw threads which have becoming bent or damaged and shall not be used for turning of the threads so as to make them slack as the latter procedure may not result in the water tight joint. The screw threads for tube and fitting shall be protected from edge until they are fitted.
- 2.1.3. In jointing the tubes, the inside of the socket and the screwed end of the tubes shall be oiled and smeared with white or red lead and wrapping around with a few turns of fine spun yarn round the screwed end of the tube. The end shall then be tightly screwed in the socket, tees, etc. with a pipe wrench. Care shall be taken that all times free from dust and dirt during fixing. But from the joints shall be removed after screwing. After laying the open ends of the pipes shall be temperately plugged to prevent access of water, soil, or any other foreign matter.
- 2.1.4. Any threads exposed after jointing shall be painted or in the case of underground piping thickly coated with approved anti-corrosive paint to prevent corrosion.

##### **2.2. Fixing of tube fittings to wall, ceiling & floors.**

- 2.2.1.** In case of fixing of tubes and fittings concealed center point to the walls or ceilings, these shall run on the surface of the wall, or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern, holder clamps keeping the pipes about 15 mm. clear of the wall. When it is found necessary to 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 ducts or recesses etc. provided that there is sufficient space to work on the pipe with usual tools. The pipe shall not ordinarily be buried in walls or solid floors, where unavoidable, pipe may be buried for short distances provided that adequate protection is given against damage and where so required joints are not buried. Where required M.S. tube sleeve shall be fixed at a place a pipe is passed through a wall or floor for expansion and contraction and other movements. In case the pipe is embedded in walls or floors, it should be painted with anti-corrosive bitumastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe is affected by lime. Under the floors, the pipe shall be laid in layer of sand filling.
- 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 lengths at 2 MC/C interval in horizontal run and 2.5 m. interval in vertical run. For pipe of 15 mm. dia. up to 25 mm. dia the holes in the walls and floors shall be made by drilling with chisel or jumper and not by dismantling the brick work or concrete. However for bigger diameter pipes the holes shall be carefully made (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 joints found leaky shall be redone, and all leaking pipes removed and replaced without extra cost.
- 2.3.2.** The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 Kg./Sq cm. The pipe shall be slowly and carefully charged with water allowing all air to escape and avoiding all shocks and water hammer. The draw off tap and stop cock shall then be closed and specified hydraulic pressure shall be applied gradually. The pressure gauge must be accurate. The pipes and fittings shall be tested in sections as the work laying proceeds, keeping, the joints exposed for inspection during the testing.
- 3.0. Mode of measurements and payment**
- 3.1.** The description of the 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, setting, fitting in position straight, cutting 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 concealed center point to wall, 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 cutting shall unless otherwise stated by held to include the consequent waste.
- 3.5. In case of fitting of unequal bore, the targets bore shall be measured for the test.
- 3.6. Testing of pipe lines fittings, and joints include for providing all plant appliances necessary for obtaining access to the work to be tested and carrying out the tests.
- 3.7. The rate includes C.P.V.C. (SDR 13.5) pipe having National Sanitation Foundation (NSF) seal for potable water with screwed socket joints to gather with all fittings (such as bends, sockets springs, elbows, test, crosses, short pieces, clamps and plugs, unions etc.) and fixing complete with clamping wall hooks, wooden plug etc. and also curing, screwing and waste and for making forged (or hand made) 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 tubes are to be fixed to wall, ceiling and flooring, the rates shall not include painting of pipes, providing sleeves and sand filling under floor for which separate payment shall be made.
- 3.8. The rate shall be for a unit of one running meter.

#### **ITEM NO.14**

**Providing and fixing concealed center point to wall ceiling & floor CPVC (SDR 13.5) PIPE having National Sanitation Foundation (NSF) seal for portable water of following dia. Nominal bore tube fitting and clamps including making good the wall, ceiling and floor etc. complete for 15mm dia.**

##### **1.0. Materials**

- 1.1. The pipes shall be standard C.P.V.C. (SDR 13.5) pipe having National Sanitation Foundation (NSF) seal for potable water of specified dia.
- 1.2. The fittings, clamps etc. required for specified dia. bore pipes shall be of best quality and makes as approved by the Engineer-in-charge.

##### **2.0. Workmanship**

##### **2.1. Cutting, Laying & Jointing**

- 2.1.1. When the tubes are to be cut or rethreaded, the ends shall be carefully filed out so that no obstruction to bore is offered. The ends of the tubes shall then be threaded conforming to the requirements of I.S. 554-1955 with pipe dies and taps carefully in such a manner that it will not result in slackness of joints when the two pieces are screwed together.



- 2.1.2.** The taps and dies shall be used only for straightening screw threads which have becoming bent or damaged and shall not be used for turning of the threads so as to make them slack as the latter procedure may not result in the water tight joint. The screw threads for tube and fitting shall be protected from edge until they are fitted.
- 2.1.3.** In jointing the tubes, the inside of the socket and the screwed end of the tubes shall be oiled and smeared with white or red lead and wrapping around with a few turns of fine spun yarn round the screwed end of the tube. The end shall then be tightly screwed in the socket, tees, etc. with a pipe wrench. Care shall be taken that all times free from dust and dirt during fixing. But from the joints shall be removed after screwing. After laying the open ends of the pipes shall be temperately plugged to prevent access of water, soil, or any other foreign matter.
- 2.1.4.** Any threads exposed after jointing shall be painted or in the case of underground piping thickly coated with approved anti-corrosive paint to prevent corrosion.
- 2.2. Fixing of tube fittings to wall, ceiling & floors.**
- 2.2.1.** In case of fixing of tubes and fittings concealed center point to the walls or ceilings, these shall run on the surface of the wall, or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern, holder clamps keeping the pipes about 15 mm. clear of the wall. When it is found necessary to 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 ducts or recesses etc. provided that there is sufficient space to work on the pipe with usual tools. The pipe shall not ordinarily be buried in walls or solid floors, where unavoidable, pipe may be buried for short distances provided that adequate protection is given against damage and where so required joints are not buried. Where required M.S. tube sleeve shall be fixed at a place a pipe is passed through a wall or floor for expansion and contraction and other movements. In case the pipe is embedded in walls or floors, it should be painted with anti-corrosive bitumastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe is affected by lime. Under the floors, the pipe shall be laid in layer of sand filling.
- 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 lengths at 2 MC/C interval in horizontal run and 2.5 m. interval in vertical run. For pipe of 15 mm. dia. up to 25 mm. dia the holes in the walls and floors shall be made by drilling with chisel or jumper and not by dismantling the brick work or concrete. However for bigger diameter pipes the holes shall be carefully made (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 fillings shall be inspected under working conditions of pressure and flow. Any joints found like shall be redone, and all leaking pipes removed and replaced without extra cost.
- 2.3.2.** The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 Kg./Sq cm. The pipe shall be slowly and carefully charged with water allowing all air to escape and avoiding all shocks 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 fittings shall be tested in sections as the work laying proceeds, keeping, the joints exposed for inspection during the testing.
- 3.0. Mode of measurements and payment**
- 3.1.** The description of the 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, setting, fitting in position straight, cutting 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 concealed center point to wall, 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 cutting shall unless otherwise stated by held to include the consequent waste.
- 3.5.** In case of fitting of unequal bore, the targets bore shall be measured for the test.
- 3.6.** Testing of pipe lines fittings, and joints include for providing all plant appliances necessary for obtaining access to the work to be tested and carrying out the tests.
- 3.7.** The rate includes C.P.V.C. (SDR 13.5) pipe having National Sanitation Foundation (NSF) seal for potable water with screwed socket joints to gather with all fittings (such as bends, sockets springs, elbows, test, crosses, short pieces, clamps and plugs, unions etc.) and fixing complete with clamping wall hooks, wooden plug etc. and also curing, screwing and waste and for making forged (or hand made) 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 tubes are to be fixed to wall, ceiling and flooring, the rates shall not include painting of pipes, providing sleeves and sand filling under floor for which separate payment shall be made.
- 3.8.** The rate shall be for a unit of one running meter.

## **ITEM NO.15**

**Providing and Fixing to wall ceiling and floor 110 mm Dia 6.kg. F/Cm2 working Pressure polythene pipes of the following outside Dia. Low density, complete with special flange compression type fitting, wall clips etc. including making good the wall ceiling and floor.**

### **1.0. Materials**

- 1.1. The low density polythene pipe of specified diameter with **10.0 Kg./Sq.cm.** working pressure shall conform to I.S. 3076-1968. The specials and fittings required shall be of best quality.

### **2.0. Workmanship**

- 2.1. The P.V.C. pipes of specified diameter shall be fixed as directed. Due to thermal expansion of rigid P.V.C. pipes, due allowance shall be made particularly in over ground pipe lines for any change in length of pipe line which may occur during installation or when pipe line which may occur during installation or when pipe line is in service.
- 2.2. Above ground installation of rigid P.V.C. pipe should be under taken after preparations are observed for their protection against direct sun rays and mechanical damage.
- 2.3. The rigid P.V.C. pipe lines should not be kept exposed above ground when it passes through public places, railway lines, road side and foot paths.
- 2.4. P.V.C. pipes shall be supported at the following intervals :  
-20 mm. dia 500 mm.                      -25 mm. dia 750.mm.                      -32 mm. dia.900 mm.
- 2.5. Closer support spacing shall be provided if recommended by the manufacture.
- 2.6. The guide lines indicated by the manufacturer regarding handling, transportation, storing, laying and jointing pf pipes shall be kept in view during execution.
- 2.7. P.V.C. pipes shall be fixed on wall with wooden plugs and suitable plastic clamps.

### **2.8. Jointing the pipes :**

- 2.8.1. 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 P.V.C. care must be taken to avoid applying excessive cement to the inside of pipe sockets as any surplus cement cannot be wiped of after jointing. Empty solvent cement tins, brushes, rags, or paper impregnated 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.
- 2.8.2. If any manufacturer recommends its own methods of jointing the same shall be adopted after necessary approval from the Engineer-in-charge.

### **2.9. Laying pipes in Trenches :**

- 2.9.1. The pipes shall be laid over uniform relatively soft fine trained soil found to be free of presence of hard object such as large flints, rocky projections, large tree roots etc. The width of the trenches shall be minimum width required for working.
- 2.9.2. The pipes laid underground shall not be less than one meter from the ground level. The 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.

### **3.0. Mode of measurements & payment**

- 3.1. The description of the 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, setting, fitting in position straight, cutting 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 wall, 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 cutting shall unless otherwise stated by held to include the consequent waste
- 3.5. In case of fitting of unequal bore, the targets bore shall be measured for the test.

- 3.6. Testing of pipe lines fittings, and joints include for providing all plant appliances necessary for obtaining access to the work to be tested and carrying out the tests
- 3.7. The rate includes P.V.C. pipes with screwed socket joints. to gather with all fittings (such as bends, sockets springs, elbows, test, crosses, short pieces, clamps and plugs, unions etc.) and fixing complete with clamping wall hooks, wooden plug etc. and also curing, screwing and waste and for making forged (or hand made) 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 tubes are to be fixed to wall, ceiling and flooring, the rates shall not include painting of pipes, providing sleeves and sand filling under floor for which separate payment shall be made.
- 3.8. The unit rate shall be for a unit of **One running meter.**

## **ITEM NO.16**

**Providing, laying and jointing in true line and level 110 diameter U.P.V.C (Type B) conforming to IS 13592-1992 with one end plain and other end socketed with rubber ring, & fittings conforming to ISI 14735-1999 of approved make for drainage system pipe line, pipe shall be jointed with each other with rubber lubricant, pipe shall be fixed on wall using of PVC clamp of the size 110 mm diameter x 149 mm length x 145 mm height at every 2000 mm center to center or shall be concealed in walls as directed including necessary fittings such as bends, shoes etc. including testing of pipes and joints and jointed with adhesive solvent cement including cost of all materials.**

### **1.0. Materials**

- 1.1. The pipes shall be standard I.S.I. mark U.P.V.C. SWR Type B pipe of specified dia.
- 1.2. The fittings, clamps etc. required for specified dia. bore pipes shall be of best quality and makes as approved by the Engineer-in-charge. Necessary accessories with inner/ outer brass thread shall be used as required and instruction by Engineer in charge.

### **2.0. Workmanship**

#### **2.1. Cutting, Laying & Jointing**

- 2.1.1. When the tubes are to be cut or rethreaded, the ends shall be carefully filed out so that no obstruction to bore is offered. The ends of the tubes shall then be threaded conforming to the requirements of I.S. 554-1955 with pipe dies and taps carefully in such a manner that it will not result in slackness of joints when the two pieces are screwed together.
- 2.1.2. The taps and dies shall be used only for straightening screw threads which have becoming bent or damaged and shall not be used for turning of the threads so as to make them slack as the latter procedure may not result in the water tight joint. The screw threads for tube and fitting shall be protected from edge until they are fitted.
- 2.1.3. In jointing the tubes, the inside of the socket and the screwed end of the tubes shall be oiled and smeared with white or red lead and wrapping around with a few turns of fine spun yarn round the screwed end of the tube. The end shall then be tightly screwed in the socket, tees, etc. with a pipe wrench. Care shall be taken that all times free from dust and dirt during fixing. But from the joints shall be removed after screwing. After laying the open ends of the pipes shall be temperately plugged to prevent access of water, soil, or any other foreign matter. Jointing shall be carried out with proper chemical adhesive material and allow to dry.

**2.1.4.** Any threads exposed after jointing shall be painted or in the case of underground piping thickly coated with approved anti-corrosive paint to prevent corrosion.

**2.2. Fixing concealed to wall, ceiling & floors.**

**2.2.1.** In case of fixing concealed cement point to walls or ceilings, these shall run on the surface of the wall, or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern, holder clamps keeping the pipes about 15 mm. clear of the wall. When it is found necessary to 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 ducts or recesses etc. provided that there is sufficient space to work on the pipe with usual tools. The pipe shall not ordinarily be buried in walls or solid floors, where unavoidable, pipe may be buried for short distances provided that adequate protection is given against damage and where so required joints are not buried. Where required M.S. tube sleeve shall be fixed at a place a pipe is passed through a wall or floor for expansion and contraction and other movements. In case the pipe is embedded in walls or floors, it should be painted with anti-corrosive bitumastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe is affected by lime. Under the floors, the pipe shall be laid in layer of sand filling.

**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 lengths at 2 MC/C interval in horizontal run and 2.5 m. interval in vertical run. For pipe of 15 mm. dia. up to 25 mm. dia the holes in the walls and floors shall be made by drilling with chisel or jumper and not by dismantling the brick work or concrete. However for bigger diameter pipes the holes shall be carefully made (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 joints found leaky shall be redone, and all leaking pipes removed and replaced without extra cost.

**2.3.2.** The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 Kg./Sq cm. The pipe shall be slowly and carefully charged with water allowing all air to escape and avoiding all shocks and water hammer. The draw off tap and stop cock shall then be closed and specified hydraulic pressure shall be applied gradually. The pressure gauge must be accurate. The pipes and fittings shall be tested in sections as the work laying proceeds, keeping, the joints exposed for inspection during the testing.

**3.0. Mode of measurements and payment**

**3.1.** The description of the 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, setting, fitting in position straight, cutting and waste return of packing etc.

- 3.2. The length shall be measured on running meter basis of finished work. The length shall be taken along the center line of the pipe and fittings. The pipes fixed to wall, 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 cutting shall unless otherwise stated be held to include the consequent waste.
- 3.5. In case of fitting of unequal bore, the targets bore shall be measured for the test.
- 3.6. Testing of pipe lines fittings, and joints include for providing all plant appliances necessary for obtaining access to the work to be tested and carrying out the tests.
- 3.7. The rate includes U.P.V.C. SWR Type B pipe with screwed socket joints to gather with all fittings (such as bends, sockets, springs, elbows, tees, crosses, short pieces, clamps and plugs, unions etc.) and fixing complete with clamping wall hooks, wooden plug etc. and also curing, screwing and waste and for making forged (or hand made) 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 tubes are to be fixed to wall, ceiling and flooring, the rates shall not include painting of pipes, providing sleeves and sand filling under floor for which separate payment shall be made.
- 3.8. The rate shall be for a unit of one running meter.

#### **ITEM NO.17**

**Providing and fixing Urinal of approved quality including connection with trap and with integral longitudinal flush pipe.(A) Squatting plate pattern white earthenware 550mm x 300mm.**

**1.0. Materials :** The squatting plate pattern, white glazed earthenware urinal of 550 mm x 300 mm shall conform to I.S. 771-1063. It shall be test India make.

#### **2.0. Workmanship**

**2.1.** The squatting plate urinal shall be fixed as directed.

**2.2.** The top edge of the squatting plate shall be flush with the finished floor level adjacent to it. It shall be embedded on a layer of 25 mm. thick cement mortar 1:8 (1 cement: 8 fine sand) laid over a bed of burnt brickbat cement 1:5 :10( 1 cement: 5 fine sand, 10 graded brick aggregate 20 mm. nominal size). There shall be 100 mm. dia. glazed earthenware or vitreous china channel as specified with stop and outlet pieces suitably fixed in floor in cement mortar 1:3 (1 cement: 3 coarse sand) and joint finished with white cement. The earthenware vitreous china shall discharge into 65 mm. C.P. brass outlet grating. The trap and fitting shall be fixed as directed.

#### **3.0. Mode or measurements and payment**

**3.1.** The rate includes .cost of all materials, tools and plants and labour required for satisfactory completion of this item.

**3.2.** The rate shall be for a unit of One number

## **ITEM NO.18**

**Providing and fixing washbasin with single hole for pillar tap with C.I. or M.S. brackets painted white including cutting holes and making good the same but excluding fittings.(A) Vitreous China:(ii) Flat Back washbasin 550 mm x v 400mm size. (i) In white colour.**

### **1.0. Materials**

**1.1.** The white glazed earthenware wash basin shall be 550 mm. x 400mm. of 1st quality and make as approved by the Engineer-in-charge. The wash basin shall conform to M-59.

### **2.0. Workmanship**

**2.1.** The washbasin shall be fixed on the wall as and where directed. The wash basin shall be supported on a pair of M.S. or C.I. brackets fixed in C.M. 1:3 (1 cement : 3 sand). The bracket shall conform to I.S. : 775-1962. The wall plaster on the rear shall be cut to rest the top edge of the washbasin. After fixing the basing, plaster shall be made good and surface finished to match the existing one.

**2.2.** The brackets shall be painted white with ready-mixed paint.

**2.3.** The C.I. brass trap and union shall be connected to 32 mm. dia. waste pipe which shall be suitably bent towards the wall and which shall discharge into an open drain leading to a gully trap or direct in to gully-trap on the ground floor and shall be connected to a waste pipe through a floor trap on the upper floors. C.P. brass trap and union may not be provided where the surface drain or a floor trap is placed directly under the basin and the waste is discharged in to vertically.

**2.4.** The height of the front edge to the wash basin from the floor level shall be 80 cms.

**2.5.** The necessary inlet, outlet connections and fittings such as pillar cocks, CP dress waste trap waste pipe, stop cock, chain with rubber plug etc. shall be fixed.

**2.6.** The payment of fittings shall be made separately under separate items.

### **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 specified in workmanship.

**3.2.** The rate shall be for a unit of One number.

## **SCHEDULE-B-7:**

### **PARKING AREA DEVELOPMENT - PAVER BLOCK PAVING**

#### **ITEM NO.1:**

**Box Cutting the Road Surface to proper slope and camber for making a base for road work including removing the excavated stuff and disposing to road slope as directed all lead and lift etc. complete upto 50 mt. Lead.**

The sub grade / sub base / base to receive the water bound macadam course shall be prepared to the specified grade and camber and made of dust and other extraneous materials. Any nets of soft places shall be corrected in on approved manner and rolled until firm.

Cutting shall be paid on cross section area as established by the longitudinal level and cross sections for this purpose.

The work shall be started after the initial longitudinal section of the ground and cross sections are taken and recorded.

The final surface shall confirm to proper profile, camber and super elevation etc. as directed by the Engineer. The earthwork shall be paid on sectional measurements, cross sectional etc. taken.

No allowance or payments shall be made for materials excavated prior to the taking of level by the Engineer.

The rate is inclusive of cutting in all soil and murrum including removal of all shrubs, jungle cutting, cutting stuff in slopes, side drain bank etc. complete.

This item also includes the clearing the sides and demarking the line as per requirement and cutting out the existing tress on the road side, not extra payment will be paid for.

At the time of preparing final bill, the road formation in embankment and cutting shall have be perfect condition true to grade, camber and side slope duly dressed and damages due to rain cuts etc. during entire working period shall have to be done by the contractor.

The work taken in length shall be completed in all respects viz. width, grades, camber, side drains, side slopes etc. and measurements for incomplete work shall not be taken otherwise.

#### **1.0 Mode of Measurement & Payment :**

The unit rate box cutting shall include the cost of all materials, tools and plant required for excavation in all type of soils in grade and camber, line and levels and finishing as per direction of the Engineer-in-charge, excavation and all other incidental expenses for producing item of box cutting of specified breadth and depth and grade to complete the item or its components as shown on the drawings and according to these specifications.

The box cutting shall be measured for its cross section area and compacting volumes in cubic meters by the method of average areas.

The rate will be made on Cubic Meter basis of the finished work.

#### **ITEM NO.2:**

Providing and laying cement concrete (1:4:8) (1 Cement, 4 Coarse sand, 8 Crushed stone aggregate 40 mm nominal) and curing complete excluding cost of formwork in foundation and plinth

#### **1.0. Materials**

**1.1.** Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Graded brick bat aggregate 40 mm. nominal size shall conform to M-14.

#### **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 stone aggregate shall be one part of cement. 4 parts of coarse sand and 8 parts of **graded brick bat aggregate** 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 colour 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 all the interstices to be filled with mortar.

**2.6. Curing:**

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

**3.0. Mode of measurement and payment**

3.1. The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plans or as directed

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

**ITEM NO.3:**

**Providing and fixing pre-cast Rubber Dye inter locking concrete block 60mm thick with grade of concrete M300 pneumatic compressed / Vibrated mechanically as per approved design conforming to IS 15658 : 2006 including 35mm sand layer for levelling and filling the joint with sand in proper line and level etc complete as per guidelines of IRC : SP 63 - 2018.**

**CEMENT:-**

The cement used in the manufacture of high quality precast concrete paving block shall be conforming to IS 12269 (53 grade) ordinary Portland Cement or IS 8112 (43 grade ordinary Portland cement). The minimum cement content in concrete used for making paver blocks should be 310 kg/Cu.M. And the upper limit of cement shall not be more than 425kg/Cu.M.

**AGGREGATES:-**



The fine and coarse aggregates shall consist of naturally occurring crushed or uncrushed materials which, apart from the grading requirements comply with IS 383-1970. The fine aggregates used shall contain a minimum of 25% natural silicon sand. Lime stone aggregates shall not be used. Aggregates shall contain no more than 3% by weight of clay and shall be free from deleterious salts and contaminants.

**WATER :-**

The water shall be clean and free from any deleterious matter. It shall meet the requirements stipulated in IS:456-2000.

**OTHER MATERIALS:-**

Any other material/ingredients used in the concrete shall conform to latest IS specifications.

**PAVER BLOCKS CHARACTERISTICS**

The concrete pavers should have perpendicular ties after release from the mould and the same should be retained until the laying. The surface should be of anti-skid and anti glare type. The paver should have uniform chamfers to facilitate easy drainage of surface run off.

The pavers should have uniform interlocking space of 2 mm to 3 mm to ensure compacted sand filling after vibration on the paver surface.

The concrete mix design should be followed for each batch of materials separately and automatic batching plant is to be used to achieve uniformity in strength and quality. The pavers shall be manufactured in single layer only. Skilled labour should be employed for laying blocks to ensure line and level for laying, desired shape of the surface and adequate compaction of the sand in the joints.

**LAYING OF PAVER BLOCKS :-**

**PRIMING :-**

It will be responsibilities of the Contractors to ensure that the manhole/pipeline cable trenches/circular drainage system etc. raised to driveway level using the requisite materials as per instruction of Engg. The areas of potholes/deep depressions at the isolated locations also have to be filled up before laying the paver blocks. No extra payments will be made for this purpose.

It will be the responsibility of the Contractors to ensure that undulations on the paver blocks are eliminated after the traffic is allowed on it. Proper slope for drainage of water needs to be ensured by the Contractor. All necessary materials, tools, tackles are required to be arranged by the Contractor.

**BEDDING SAND COURSE :-**

The bedding sand shall consist of a clean well graded sand passing through 4.75 mm sieve and suitable for concrete. The bedding should be from either a single source or blended to achieve the following grading.

In sieve size	% passed
9.52 mm	100
4.75 mm	95-100
2.36 mm	80-100
1.18 mm	60-100
600 microns	25-60
300 microns	10-30

Contractor shall be responsible to ensure that single-sized, gap graded sands or sands containing an excessive amount of fines or plastic fines are not used. The sand particles should preferably be sharp not rounded as sharp sand possess higher strength and resist the migration of sand from under the block to less frequently areas even though sharp sands are relatively more difficult to compact than rounded sands, the use of sharp sands is preferred for the more heavily trafficked driveways. The sand use for bedding shall be free of any deleterious soluble salts or other contaminants likely to cause efflorescence.

The sand shall be of uniform moisture content and within 4%-8% when spread and shall be protected against rain when stock piled prior to spreading. Saturated sand shall not be used. The bedding sand shall be spread loose in a uniform layer as per drawing. The compacted uniform thickness shall be of 45mm and within +/- 5 mm. Thickness variation shall not be used to correct irregularities in the base course surface.

The spread sand shall be carefully maintained in a loose dry condition and protected against pre-compaction both prior to and following screening. Any pre-compacted sand or screened sand left overnight shall be loosened before further laying of paving blocks take place. Sand shall be slightly screened in a loose condition to the predetermined

depth only slightly ahead of the laying of paving unit. Any depressions in the screened sand exceeding 5 mm shall be loosened, raked and rescreened before laying of paving blocks.

**LAYING OF INTERLOCKING PAVER BLOCKS:-**

Paver blocks shall be laid in herringbone laying pattern throughout the pavement. Once the laying pattern has been established, it shall continue without interruption over the entire pavement surface. Cutting of blocks, the use of infill concrete or discontinuities in laying pattern is not be permitted in other than approved locations.

Paver blocks shall be placed on the un-compacted screened sand bed to the nominated laying pattern, care being taken to maintain the specified bond through out the job. The first row shall be located next to an edge restraint.

Specially manufactured edge paving blocks are permitted or edge blocks may be cut using a power saw, a mechanical or hydraulic guillotine, bolster or other approved cutting machine.

Paver blocks shall be placed to achieve gaps nominally 2 to 3 mm wide between adjacent paving joints. No joint shall be less 1.5 mm not more than 4mm. Frequent use of string lines shall be used to check alignment. In this regard the "laying face" shall be checked at least every two meters as the face proceeds. Should the face become out of alignment, it must be corrected prior to initial compaction and before further laying job is proceeded with.

In each row, all full blocked shall be laid first. Closure blocks shall be cut and fitted subsequently. Such closer blocks shall consist of not less than 25% of a full blocks.

To infill spaces between 25 mm and 50 mm wide concrete having screened sand, coarse aggregate mix shall be used. Within such mix the nominal aggregate size shall not exceed one third the smallest dimension of the infill space. For smaller spaces dry packed mortar shall be used.

Except where it is necessary to correct any minor variations occurring in the laying bond, the paver blocks shall not be hammered into position. Where adjustment of paver blocks necessary care shall be taken to avoid premature compaction of the sand bedding.

#### **INITIAL COMPACTION:-**

After laying the paver blocks, they shall be compacted to achieve consolidation of the sand bedding and brought to design levels and profiles by not less than Two (2) passes of a suitable plate compactor.

The compactor shall be a high-frequency, low amplitude mechanical flat plate vibrator having plate area sufficient to cover a minimum of twelve paving blocks. Prior to compaction all debris shall be removed from the surface.

Compaction shall proceed as closely as possible following laying and prior to any traffic. Compaction shall not, however, be attempted within one metre of the laying face. Compaction shall continue until lipping has been eliminated between adjoining blocks. Joints shall then be filled and re-compacted as described in Cl. 3.5. All work further than one metre from the laying face shall be left fully compacted at the completion of each day's laying. Any blocks that are structurally damaged prior to our during compaction shall be immediately removed and replaced. Sufficient plate compactors shall be maintained at the paving site for both bedding compaction and joint filling.

#### **JOINT FILLING AND FINAL COMPACTION:-**

As soon as possible after compaction and in any case prior to the termination of work on that day and prior to the acceptance of vehicular traffic, sand for joint filling shall be spread over the pavement.

Joint sand shall pass a 2.36 mm (No.8) sieve and shall be free of soluble salts or contaminants likely to cause efflorescence. The same shall comply with the following grading limits.

In sieve size	% passed
2.36 mm	100
1.18 mm	90-100
600 microns	60-90
300 microns	30-60
150 microns	15-30
75 microns	10-20

The Contractor shall supply a sample of the jointing sand to be used in the contract prior to delivering any such materials to site for incorporation into the works. Certificates of test results issued by a recognized testing laboratory confirming that the samples conform to the requirements of this specifications shall accompany the sample.

The jointing sand shall be broomed to fill the joints. Excess sand shall then be removed from the pavement surface and the jointing sand shall be compacted with not less than one (1) Pass by the plate vibrator and joints refilled with sand to full depth.

This procedure shall be repeated until all joints are completed filled with sand. No traffic shall be permitted to use the pavement until all joints have been completely filled with sand and compacted.

Both the sand and paver block shall be dry when sand is spread and broomed into the joints to prevent premature setting of sand. The difference in level (lipping) between adjacent blocks shall not exceed 3mm with not more than 1% in any 3 m x 3 mm area exceeding 2 mm. Pavement which is deformed beyond above limits after final compaction shall be taken out and reconstructed to the satisfaction of the Engineer.

#### **EDGE RESTRAINT:-**

Edge restrains need to be sufficiently robust to withstand override by the anticipated traffic, to withstand thermal expansion and to prevent loss of the laying course material from beneath the surface course. The edge restraint should present a vertical face down to the level of the underside of the laying course.

The surface course should not be vibrated until the edge restraint, together with any bedding or concrete haunching, has gained sufficient strength. It is essential that edge restraints are adequately secured.

#### **SAMPLING AND TESTING PROCEDURES FOR PAVER BLOCKS:-**

##### **SAMPLE SIZE:-**

Internal - Average of minimum 3 samples per 5000 blocks - for paver block manufacturers.

External - Minimum 2 blocks per 10000 blocks. Average of minimum 8 blocks per site - for captioned contractors.

##### **SAMPLING FOR TESTING :-**

Sampling for testing of paver blocks shall be done in accordance with Appendix-A.

##### **COMPRESSIVE STRENGTH :-**

Testing for 28 days compressive strength shall be undertaken in accordance with Appendix-B. The average compressive strength of 60 mm thick paver blocks tested shall be 31.8 MPa.

Note:- 10% lower tolerance limit in compressive strength shall be allowed.

##### **WATER ABSORPTION:-**

Testing for water absorption shall be in accordance with IS 2185:1979:Part I

(Specifications for concrete masonry blocks) Appendix C

#### **3.0. Mode of measurement and payment**

**3.1.** The Paver Block shall be measured for its length, breadth, limiting dimensions to those specified on plans or as directed

**3.2.** The rate shall be for a unit of one SQM .

#### **ITEM NO.4:**

**Providing cement vata (10cm.x10cm.size) quarter round in cement mortar 1:1 including neat cement finishing , watering etc. complete.**

#### **1.0. Materials**

1.1. Water shall conform to M-1. Cement mortar shall conform to M-11.

#### **2.0. Workmanship**

2.1. The work of cement vata of 10 cms x 10 cms. size shall be earned out at Functions of parapets and terraces as directed. The vata shall be finished in quarter round shape. The work shall be earned out in the best workman like manner. The inter portion of rain water pipe shall be rounded off properly during constructing the vata. The work shall be cured for 7 days.

#### **3.0. Mode of measurements and payment**

3.1. The work shall be measured for finished item in running meter.

3.2. The rate shall be for a One running meter.

## **SCHEDULE-B-8**

### **COMPOUND WALL WITH MS GATE**

**ITEM NO.1:**

**Excavation for foundation up to 1:5 mt. Depth including sorting out and stacking of useful materials and depositing of the excavated stuff up to 50 meter lead.**

Column Footing  
For Ground beam

Detailed technical Specification As per Schedule B-1 Item No.1

**ITEM NO.2:**

**Excavation for foundation from depth 1:5 mt. to 3.0 mt. Depth including sorting out and stacking of useful materials and depositing of the excavated stuff up to 50 meter lead. (a) Loose or soft soil.**

Detailed technical Specification As per Schedule B-1 Item No.2

**ITEM NO.3:**

**Filling available excavated earth (excluding rock) in trenches plinth sides of foundations etc. in layers not exceeding 20cm. Consolidating each deposited layer by ramming and watering.**

Detailed technical Specification As per Schedule B-1 Item No.3

**ITEM NO.4:**

**Providing and laying cement concrete 1:4:8 (1-Cement : 4-fine sand : 8-graded birck aggregates 40 mm nominal size) and curing complete excluding cost of form work in (a) Foundation and plinth.**

Detailed technical Specification As per Schedule B-7 Item No.2

**ITEM NO.5:**

**Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in Column footings.**

Detailed technical Specification As per Schedule B-1 Item No.7

**ITEM NO.6:**

**Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork But Excluding the cost of reinforcement for reinforced concrete work in Column up to Plinth Level having any cross section area.**

Detailed technical Specification As per Schedule B-1 Item No.8

**ITEM NO.7:**

**Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in Columns having any cross section area up to floor two level.**

Detailed technical Specification As per Schedule B-7 Item No.6

**ITEM NO.8:**

**Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Ground Beam having any cross section area.**

Detailed technical Specification As per Schedule B-7 Item No.6

**ITEM NO.9:**

**Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork and excluding the cost of reinforcement of reinforced concrete work in COPING**

Detailed technical Specification As per Schedule B-7 Item No.6

**ITEM NO.10:**

**T.M.T Bars**

**Providing and supplying TMT Fe-500 bar steel reinforcement for R.C.C work including bending, binding and placing in position etc. complete**

Detailed technical Specification As per Schedule B-1 Item No.17

**ITEM NO.11:**

**Brick work using common burnt building bricks having crushing strength not less than 35 Kg./cm<sup>2</sup> in super structure for Ground Floor in C.M. (1:6) (1 Cement, 6 fine sand) racking out joints curring etc. complete directed by Engineer-in-charge.**

Detailed technical Specification As per Schedule B-1 Item No.18

**ITEM NO.12:**

**20 mm thick sand faced cement plaster on walls up to height 10 meters above ground level consisting of 12 mm thick backing coat of C:M 1:3 (1-cement :3-sand )and 8mm thick finishing coat of C:M 1:1 (1-cement :1-sand ) etc. complete.**

**1.0. Materials**

**1.1.** Water shall conform to M-1. The cement mortar of proportion 1:3 shall conform to M-13.

**2.0. Workmanship**

**2.1.** The work shall be carried out in the coats. The backing coat (base coat) shall be 12 mm. thick in C.M. 1:3.

**2.2. Scaffolding:**

Wooden bullies, bamboos, planks, trestles 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.

**2.3. Preparation of back ground :**

**2.3.1.** The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface shall be toughened by wire brushing if it is not hard and by hacking if it is hard. In case of concrete surface, if a chemical retarded 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 readers is left on the surface. Trimming of projections on brick/concrete surfaces where necessary shall be carried out to get an even surface.

**2.3.2.** Raking of joints in case of masonry where necessary shall be allowed to dry out for sufficient period before carrying out the plaster work.

- 2.3.3.** 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.
- 2.3.4.** 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 supports of the ceiling resting on the wall of the floor have been removed. Ceiling plaster shall be completed before starting plaster to walls.
- 2.4. Application of plaster :**
- 2.4.1.** The plaster about 15x15 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 working a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally, the surface shall be finished off true with a trowel or wooden float according as a smooth or a smooth or a sandy granular texture is required. Excessive troweling or overworking the float shall be avoided. All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Hounding or chamfering, corners, arises junctions etc. shall be carried out with proper templates to be size required.
- 2.4.2.** Cement plaster shall be used within half an hour after addition of water and mortar or plaster which is partially set shall be rejected and removed forthwith from the site.
- 2.4.3.** 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 scraped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of the wall and nearer than 15 cm. to any corners or arises. It shall not be closed on the body of features such as plaster bands and cornices not at the corners or 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 to be packed up later on.
- 2.4.4.** 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.
- 2.4.5.** 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.
- 2.4.6.** The second coat shall be completed to 8 mm. thickness in C.M. 1:1 as described above, including raising sand facing by bushing. The sample of sand face shall be got approved before the work is started. The whole work shall be carried out uniformly as per sample approved.
- 2.4.5.** The plastering work shall be in single coat on rough side of half brick wall for interior plastering up to floor two level, finished even and smooth in C.M. 1:3.
- 2.4.6 Curing :**
- The curing shall be started overnight after finishing of plaster. The plaster shall be kept wet for a period of 7 days. During this period, it shall be protected from all damages.
- 2.4.7.** The finishing shall be gutkha finishing with 1 cm x 1 cm grooves shall be done as directed.

### **3.0. Mode of measurements & payment**

- 3.1.** The rate shall include the cost of all materials, labour and scaffolding etc. involved in the operations described under workmanship.
- 3.2.** All plastering shall be measured in square 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 20 mm at any point on this surface.
- 3.4.** This item includes plastering up to floor two level including making necessary cornices as directed.
- 3.5.** 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.
- 3.6.** Soffits of stairs shall be measured as plastering on ceilings, following soffits shall be measured separately.
- 3.7.** For jambs, soffits, sills etc. for openings not exceeding 0.5 sq. met 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 manners.
  - (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 openings, 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 ravel, 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 of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from areas of plaster and / or pointing as the case may be.
- 3.8.** For openings having door frames equal to or 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 openings but jambs, soffits and sills shall be measured.
- 3.10.** The rate shall be for a unit of One Sq. meter. No extra payment for making necessary cornices shall be made.

#### **ITEM NO.13**

**Finishing wall with water proof exterior emulsion apex paint of on wall surfaces (two coats) to give an approved brand and manufacture and of required slope even shade after thoroughly brushing the surface to remove all dirt and remains of loose powered materials. etc completed.**

Detailed technical Specification As per Schedule B-1 Item No.36



#### **ITEM NO.14**

**Providing and fixing M.S. grills of required pattern to wooden frames of windows etc. with M.S. flats at required spacing's and frame around, square or round bars with round headed bolts and nuts or by screws (A) Plain Grill.**

Detailed technical Specification As per Schedule B-2 Item No.16

#### **ITEM NO.15**

**Painting two coats (Including Priming Coat) on new steel and other metal surface with synthetic enamel paint, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.**

##### **1.0. Materials**

The enamel paint shall conform to M-44 B.

##### **2.0. Workmanship**

**2.1. General :** The materials required for work of painting work shall be obtained directly from approved manufacturers or approved dealer and brought to the site in maker's 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 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 stock tins. When not in use the containers shall be kept properly closed.

**2.1.3.** If for any reasons, things is necessary, the brand of thinner recommended by the manufacturer shall be used.

**2.1.4.** 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 part o 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 of paint:**

**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 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 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 the last 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 and payment**

**3.1.** The relevant specifications of item No. 19.12 shall be followed for mode of measurements and payment. The rate is excluding priming coat.

**3.4.** The rate shall be for a unit of One sq. meter.



**SCHEDULE-B 9**  
**8/10 PASSENGER LIFT WITH G+3 FLOOR PROVISION**

Supplying, Erecting, Testing & Commissioning the passenger / stretcher lift having following main features:
<p><b>[1]</b> GEAR LESS LIFT DRIVE (MRL) comprising of High Starting torque Lift 3 phase 440 V A. C. Permanent Magnet Synchronous motor of proper rating with high efficiency shall be used.</p> <p><b>[2]</b> Micro processor based / PLC, ACVVVF, vector control drive with encoder feedback closed loop system shall be used for lift car and door operation which shall be full collective selective operation hall call demand response, UP/DOWN hall stops, Main, Up/ Down Contactor with overload and phase reversal relay and safety controls.</p>
<p><b>[3]</b> Car with M S platform with bracings of adequate size and to sustain the impact load cabin + passenger with safety factor of fire for steel and side panels of Stainless steel of sheet of grade 304 duty. Car ceiling will be S.S. finishes with aesthetic appearance with LED ceiling lights. Car flooring shall be of anti skid PVC with choice of colour of engineer in charge. Car doors shall be of stainless steel grade 304, hairline finish with centre opening / telescopic automatic doors. Car panel will also be S.S. 304 finished with emergency stop device, mechanical door safety device, facility of auto/ attended mode. All car panel buttons and all floor switches must be with brail language as per lift act.</p>
<p><b>[4]</b> All landing doors must be fire rated for 2 hour shall be fully automatic centre opening/ telescopic opening made of hairline finish steel grade of 304 with key holes and infrared curtains with Unlocking facility from outside</p> <p><b>[5]</b> Appropriate battery operated emergency light in the car along with alarm switch shall be provided. Also, Emergency Light &amp; Fan should start immediately without any Time Delay as soon as power fails.</p> <p><b>[6]</b> Digital scrolling indicator system for up-down arrow along with floor position indicator shall be provided inside the car and at all floors.</p> <p><b>[7]</b> Full height infra red curtain with multiple cross / crossing light beams shall be provided.<b>[8]</b> Automatic Rescue Device (ARD) shall be provided accordingly of passenger capacity with Manual Rescue Operation ( Manual Cranking Facility).</p> <p><b>[9]</b> Audio visual indication in the lift car showing over loading shall be provided such that doors kept open till excess load is removed.</p>
<p><b>[10]</b> Spring buffers/PU Buffers shall be provided.</p> <p><b>[11]</b> Car fan as per passenger capacity with automatic sleep timer shall be provided.</p> <p><b>[12]</b> Voice annunciator with suitable music shall be provided in lift car.</p> <p><b>[13]</b> Self diagnostics system for operational and safety parameters shall be provided in control panel.</p> <p><b>[14]</b> Mechanical over speed governor with governor calibration as per actual site parameters and submission of calibration certificate submission, door key holes in the floor doors, fireman switch shall be provided.</p> <p><b>[15]</b> Lift machine hoisting arrangement in the lift machine room and monkey ladder for lift pit should be provided by the lift agency, along with the other steel structure works, foundations for the machine etc...</p> <p><b>[16]</b> In the hoist way fascia plate shall be provided without any extra cost, where ever required as / if directed by engineer in charge.</p>

<p>[17] Permanent wiring with necessary safety devices like RCCB in all circuit, Over Voltage Under Voltage protection and THD eliminator in circuit for lift machine room and lift well with proper numbers of light points, with fixtures, exhaust fan and plug points shall be provided by the agency. Only 3 phase Power Supply shall be made available by department in lift machine room. Necessary Earthing as per Lift Act/Rules shall be arranged by Lift Agency.</p> <p>[18] Any civil / electrical works for additional and alteration in lift shaft and machine room related to erection of lift shall be made by lift agency without any extra cost. ( granite/ marble fixing around all landing door openings are not in lift agency's scope.)</p> <p>[19] Agency has to provide all working drawings and documents and liaison services for obtaining all necessary permission from lift inspector and other authorities.</p> <p>[20] acrylic transparent licence/display A4 size holder in lift car</p>
<p>[20A] As per statutory requirement of Govt. Of Gujarat lift &amp; escalator act 2000, lift agency has to provide</p> <ol style="list-style-type: none"> <li>1. Car top safety barricade</li> <li>2. Push &amp; talk communication system.</li> <li>3. Fireman's switch operation at Ground Floor.</li> <li>4. carrying out third party lift inspection during/after lift erection and provide report by third party authorized by concern licensing authority</li> <li>5. agency has to provide third party insurance up to completion of free maintenance period and submit the document for the same.</li> </ol>
<p>[21] Car Panel Operating Buttons with floor position indicator/buttons must be of Auto Glow type clearly visible when view from inside cabin.[22] For Physically Handicapped person Full Length Handrails of hairline finish steel grade of 304 should be provided at appropriate height on the Rear &amp; Side Wall Panels in Lift Car.</p>
<p>8/10 Passengers, Ground plus 3 upper floors with Rated Speed of 1.0 m/sec.,(B) With General Specification attached herewith. Cat.II</p>
<p>Supplying &amp; erecting approved make Lift Announcing solid state system in the Passenger/ Stretcher lifts having AC2/ACVV/ACVF drives &amp; automatic doors only. The system comprising following features &amp; facilities.</p> <p>(i) Announcing floor message, message to close period.(ii) Announcing 'Emergency Message' when lift is stuck between floors due to power failure or any other reason.</p> <p>(iii) Instrumental Music between floor announcing.(iv) Announcement in English / Hindi &amp; Gujarati Languages..</p> <p>(v) Flexible to accommodate special per-programmed message such as name of the building /office.(vi)Volume adjustment control</p>
<p>Providing &amp; erecting approved make overload non-start feature &amp; overload warning Indicator system in the lift with making use of sound isolated floating platform &amp; micro switches on SI frame to get sensation of live load inside lift cage at any given moment, with provides new fixtures of overload warning inside lift cage with new relay in the existing control panel to activate 'Overload Non-Start Function with carrying out additional wiring including laying of new travelling cable, include minor civil work &amp; without changing the existing capacity speed stops, travel &amp; operation of the desired lift</p>

Mode of Payment

The Payment Shall be made as Each.

DETAILED TECHNICAL SPECIFICATION AS PER BOOKLET ATTACHED

## **SCHEDULE B-10:**

### **PROVIDING GENERAL TYPE RAIN WATER HARVESTING SYSTEM IN MUNICIPALITY BUILDING AT KHAMBHAT**

#### **ITEM NO. 01**

**Excavation for pipe line trenches for water supply, sewerage line, manhole, etc. all with shoring and strutting if required as per required gradient and line including safety provisions using site rails and stacking excavated stuff including up to all required lead cleaning the site etc. complete for all lifts and strata as specified in (A) Soft Soils and Soft Murrum 0 to 1.5m**

#### **1.0 General**

1.1 The excavation for trenches will generally, refers to open excavation for trenches in wet / dry conditions for pipe laying work.

#### **2.0 Clearing of Sites:**

2.1 The site on which the pipelines are to be laid and shown on plan and the area required for setting out and other operations shall be cleared and all obstruction loose stones and materials, rubbish of all kinds, stumps, brushwood as trees shall be removed as directed the roots shall be entirely grubbed up.

2.2 The products of the clearing to restacked in such a place and in such a manner, as directed by the engineer in charge.

2.3 All holes or hollows whether originally existing or produced by digging up roots, shall be carefully filled up with earth, well watered, well rammed leveled off, as may be directed.

2.4 The agency has to obtain necessary permission for diverting the traffic or public as per requirement from competent authority for carrying out the work.

#### **3.0 Setting Out:**

The center lines of all pipe trenches etc. shall be given by the Engineer-in-charge and it will be the responsibility of the contractor to install substantial reference marks, bench marks, etc. and maintain them as long as required true to line, level curve and slopes. The contractor shall assure full responsibility for alignment, and dimension of trench.

The labor materials etc. required for setting out and establishing benchmarks and other reference marks shall be arranged by the contractor at his own cost.

#### **4.0 Excavation**

4.1 The excavation for the pipe trenches shall also include removal of all materials of whatever nature and whether wet or dry condition necessary for laying of pipelines exactly in accordance with alignment, levels grades and curves shown on the plans or as directed by the Engineer-in-charge. Trenches shall be excavated to the exact width and depth according to the size of pipe and the sides shall be left vertical as far as possible or according to the angle of repose of various soils. Unless there is a specific extra provision in the contract for shoring and strutting or for cutting side slopes the contractor shall at his own cost do the necessary shoring and strutting or cutting of slopes to the angle of repose or both approved by the Engineer-in-charge. The contractor shall notify the Engineer before starting excavation to enable him to take cross sectional levels for

purpose of measurements before the ground is disturbed. The bottom of the trenches shall be leveled both longitudinally and transversely or slopped as directed by the Engineer. The contractor shall at his own cost to remove such portions of boulders or rocks, as are rectified to make the bottom of the trench level. No filling shall be allowed to bring the trench to level. If by contractor's mistake excavation is made deeper than shown on the plans and if ordered by the Engineer the extra depth shall have to be made with selected excavated stuff only with watering, ramming etc. as directed, by the Engineer and at the cost of the contractor. Other hard excavation shall be cleared of all sorts including loose materials and cut to firm surface, either level, stepped as directed by the Engineer. The Engineer may order such changes in the dimensions and alignment of pipe trench as may be deemed necessary to secure satisfactory cover over pipeline.

After each excavation is completed, the contractor shall notify the Engineer to that effect and no laying of pipeline will be allowed to be laid until Engineer has approved the depth and dimensions of trenches, level and measurements.

#### **Excavation by the Use of Explosives**

Unless otherwise stated herein, I.S. Specification "IS: 4081: Safety Code for Blasting and IS 3764-1966 safety code of Excavation works and related Drilling Operations" shall be followed. As far as possible all blasting shall be completed prior to commencement of construction. At all stages of excavation, precautions shall be taken to preserve the rock below and beyond the lines specified for the excavation, in the soundest possible condition. The quantity and strength of explosives used shall be such as will neither damage nor crack the rock outside the limits of excavation. All precautions, as directed by Employer's Representative, shall be taken during the blasting operations and care shall be taken that no damage is caused to adjoining buildings or structures as a result of blasting operations. In case of damage to permanent or temporary structures, Contractor shall repair the same to the satisfaction of Employer's Representative at his cost. As excavation approaches its final lines and levels, the depth of the charge holes and amount of explosives used shall be progressively and suitably reduced.

The contractor shall obtain a valid Blasting License from the authorities concerned. No explosive shall be brought near the work in excess of quantity required for a particular amount of firing to be done; and surplus left after filling the holes shall be removed to the magazine. The magazine shall be built as a way as possible from the area to be blasted. Employer's Representative's prior approval shall be taken for the location proposed for the magazine.

In no case shall blasting be allowed closer than 30 meters to any structure or to locations where concrete has just been placed. In the latter case the concrete must be at least 7 days old. Blasting for excavation in hard rock will only be allowed if permitted by competent authority otherwise shall be done with chiseling only.

#### **For blasting operations, the following points shall be observed.**

- i) Contractor shall employ a competent and experienced supervisor and licensed blaster in-charge of each set of operation, which shall be held personally responsible to ensure that all safety regulations are carried out.
- ii) Before any blasting is carried out, Contractor shall intimate Employer's Representative and obtain his approval in writing for resorting to such operations. He shall intimate the hours of firing charges, the nature of explosive to be used and the precautions taken for ensuring safety.
- iii) Contractor shall ensure that all workmen and the personnel at site are excluded from an area within 200 m radius from the firing point, at least 15 minutes before firing time by sounding warning whistle. The area shall also be given a warning by sounding a distinguishing whistle.
- iv) The blasting of rock near any existing buildings, equipments or any other property shall be done under cover and Contractor has to make all such necessary muffling arrangements. Covering may preferably be done by MS plates with adequate dead weight over them. Blasting shall be done with

small charges only and where directed by Employer's Representative; a trench shall have to be cut by chiseling prior to the blasting operation, separating the area under blasting from the existing structures.

- v) The firing shall be supervised by a Supervisor and not more than 6 (six) holes at a time shall be set off successively. If the blasts do not tally with the number fired, the misfired holes shall be carefully located after half an hour and when located, shall be exploded by drilling a fresh hole along the misfired hole (but not nearer than 600 mm from it) and by exploding a new charge.
- vi) A wooden tamping rod with a flat end shall be used to push cartridges home and metal rod or hammer shall not be permitted. The charges shall be placed firmly into place and not rammed or pounded. After a hole is filled to the required depth, the balance of the hole shall be filled with stemming, which may consist of sand or stone dust or similar inert material.
- vii) Contractor shall preferably detonate the explosives electrically.
- viii) The explosives shall be exploded by means of a primer, which shall be fired by detonating a fuse instantaneous detonator (F.I.D) or other approved cables. The detonators with F.I.D. shall be connected by special nippers.
- ix) In dry weather and normal dry excavation, ordinary low explosive gunpowder may be used. In damp rock, high explosive like gelatin with detonator and fuse wire may be used. Underwater or for excavation in rock with substantial accumulated seepage electric detonation shall be used.
- x) Holes for charging explosives shall be drilled with pneumatic drills, the drilling pattern being so planned that rock pieces after blasting will be suitable for handling without secondary blasting.
- xi) When excavation has almost reached the desired level, hand trimming shall have to be done for dressing the surface to the desired level.
- xii) Any rock excavation beyond an over break limit of 75 mm shall be filled up as instructed by Employer's Representative, with concrete of strength not less than M10. Stopping in rock excavation shall be done by hand trimming.
- xiii) Contractor shall be responsible for any accident to workmen, public or Employer's property due to blasting operations. Contractor shall also be responsible for strict observance of rules, laid by Inspector of explosives, or any other Authority duly constituted under the State and / or Union Government as applicable at the place of excavation.

### **Stripping Loose Rock**

All loose boulders, detached rocks partially and other loose material which might move therewith not directly in the excavation but so close to the area to be excavated as to be liable, in the opinion of Employer's Representative, to fall or otherwise endanger the workmen, equipment, or the work shall be stripped off and removed from the area of the excavation. The method used shall be such as not to render unstable or unsafe the portion, which was originally sound and safe.

Any material not requiring removal in order to complete the permanent works, but which, in the opinion of Employer's Representative, is likely to become loose or unstable later, shall also be promptly and satisfactorily removed.

### **Classification of Strata:**

The decision regarding, classification of strata shall rest with the Engineer in charge and his decision shall be final and binding to the contractor.

All the materials encountered in the excavation shall be classified as under:-

#### **Ordinary soil and soft murrum:**

These will include all materials of an earthy or sandy nature, which can be easily ploughed or small shingle, and gravel, which can be easily removed.

#### **Hard murrum:**

This shall include all kinds of disintegrated rock or shale or inundated clay which can be removed with a shovel without difficulty and which do not require blasting.

**Soft rock:**

This shall include all materials which is rock or hard conglomerate, all decomposed and weathered rock, highly fissured rock old masonry and also soft rock boulders bigger than 1/2 cubic meter and other varieties of rock. Which do not require blasting and which can be removed with the pie crowbars wedges and hammer.

**Hard rock:**

This shall include rocks, occurring in masses, which could best be removed by chiseling.

5.0 Shoring and Strutting:

5.1 Shoring & strutting if required shall have to be carried out by the contractor, for which any extra charge will not be paid.

5.2 During excavation if water connections, sewage connections, telephone lines khalkuva (soak pits) etc. are damaged by the contractor, the same shall have to be restored by the contractor without any extra cost.

6.0 Protection

6.1 The trenches shall be strongly fenced and red light signal shall be kept at night and arrangement of watchman to prevent accidents should be done. Sufficient care and protective measure shall be taken to see that the excavation shall not affect or damage the adjoining structure. The contractor shall be entirely responsible for any injury to life and damage to the properties etc. Necessary protection work such as guide ropes, crossing places, barricades, caution boards etc. shall be provided by the contractor.

7.0 The excavation in all sorts of soil, hard murram, soft rock or hard rock or any type of soil shall have to be carried out up to the required depth by the agency

8.0 Disposal of Excavated Stuff

8.1 No excavated stuff from trench are to be placed even temporarily nearer than 1.5 meter or greater distance up to 90 meter or as prescribed by the Engineer from the outer edge of trench. All excavated material will be the property of the owner. The rate of excavation includes sorting out of useful materials and stacking them separately as directed within specified lead. The excavated stuff suitable and useful for refilling or for other use shall be stacked at convenient places. The materials not useful in any way shall be disposed of as directed by the Engineer from the outer edge of trench.

8.2 The site should be cleared off on completion of work.

9.0 Additional Requirements

9.1 At the joints of pipes, the trench shall be excavated to an additional depth of 15 cm. and width of 30 cm. And length of 15 cm. beyond the edge of collar on both the sides or as directed. The rate include for such extra excavation made at the joints. The trenches shall be excavated perfectly in straight line. The bottom of the trench shall be kept as per invert level or as directed. To maintain the proper slope the usual method of site rails and boning rods shall be adopted. The contractor shall have to provide and fix and maintain sight rails and boning rods without any extra cost.



If the contractor fails or makes delay to give hydraulic test of the pipe line laid in any of the section, without any genuine reason, he shall be responsible to get any part of the length trenches refill in such case (i.e. before testing) for safety of pedestrian and/or vehicular traffic as found necessary by the engineer-in-charge without any extra cost. If found necessary and directed by the Engineer-in-charge, the contractor shall have to excavate the refilled trenches, during hydraulic test without any extra cost.

At all road crossings, trenches shall be excavated only for half width of the road and pipe shall be laid. The other half shall be excavated only after back filling over the laid pipeline is done so as to make it suitable for the traffic. The contractor shall provide diversion when the pipeline is to be laid along the road as required and shall maintain the diversion or any part of it, without any extra cost. At all road crossings, the pipe shall be laid below the crest of road.

- 9.2 The contractor shall break the road surface by chiseling to the exact width and length as shown on the drawing or as directed by the Engineer-in-charge.

The excavated stuff shall be deposited in uniform layers to avoid mixing with other kind of materials at non-objectionable place or as directed by the Engineer-in-charge.

10.0 Measurement and Payment

- 10.1 Payment shall be made as per actual work done. On cu mt. unit bases

- 10.2 The rate for the item of excavation shall include the following unless and otherwise mentioned.

- (a) Clearing of site
- (b) Setting out work including all materials and labour.
- (c) Providing and subsequently removing, shoring and strutting outing slopes etc.
- (d) Excavation and removal and staking of all excavated stuff as directed.
- (e) Necessary protection including labour materials equipment etc. to ensure safety and protection against risk or accident.
- (f) Providing facilities for inspection and damage to property if caused during progress of work.
- (g) Compensation for injury to life and damage to property if caused during progress of work.
- (h) Restoring of water supply connections, sewer connections, telephone lines, khalkuva soak pits Septic Tank etc. if damaged by contractor without extra payment.
- (j) Clearing the site on completion of works directed by the Engineer.

**ITEM NO.02**

**Providing and casting in situ mass cement concrete in grade M-10 (approx. corresp. To prop. 1:3:6) using granite quartzite trap metal of size 12mm to 25mm incl. consolidation curing with form work etc. complete.**

Detailed Technical Specification As per Schedule-B-1, Item No.6

**ITEM NO.03**

**Providing and Laying brick work using common burnt clay building bricks (Conventional) having crushing strength not less than 35 Kg./Sq. Cm in foundation and plinth in Cement Mortar. (1:6) (1 Cement : 6 fine sand)- (A) Conventional.**

**1.0. Materials**

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

## **2.0. Workmanship**

### **2.1. Proportion:**

2.1.1. The proportion of the cement mortar shall be 1:6 (1 cement : 6 fine sand) by volume.

### **2.2. Wetting of bricks:**

2.2.1. 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 as indication of through wetting of bricks.

### **2.3. Laying:**

2.3.1. Bricks shall be laid in English bond unless directed otherwise. Half or cut bricks shall not be used except when necessary to complete to bond; closures in such case shall be cut to required size and used near the ends of walls.

2.3.2. A layer of mortar shall be spread on full width for suitable length of the lower course. Each brick shall first be properly bedded and set home by gently tapping with handle of trowel or wooden mallet. Its inside face shall be flushed with mortar before the next brick is laid and pressed against it. On completion of course, the vertical joints shall be fully filled from the top with mortar.

2.3.3. The walls 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 course shall be kept uniform.

2.3.4. The brick shall be laid with frog up wards. 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 the site of work for frequent checking during the progress of work.

2.3.5. 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.

2.3.6. 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.

### **2.4. Joints:**

2.4.1. Bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not exceed 12 mm. The face joints shall be raked out as directed by raking tools daily during the progress of work, when the mortar is still green so as to provide key for plaster or pointing to be done.

2.4.2. The face of brick shall be cleaned the very day on which the work is laid and all mortar dropping removed.



## **2.5. Curing:**

- 2.5.1.** 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.

## **2.6. Preparation of foundation bed:**

- 2.6.1.** If the foundation is to be laid directly on the excavated bed, the shall be leveled, cleared of all loose materials, cleaned and wetted before stating masonry, If masonry is to be laid on concrete footing, the top of concrete shall be cleaned and moistened. The contractor shall obtain the engineer's approval for the foundation bed before foundation masonry is started. When pucca flooring is to be provided flush with the top to plinth, the inside plinth offset shall be kept lower than the outside plinth top by the thickness of the flooring.

## **3.0. Mode of measurements & payment**

- 3.1.** The measurements 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 plinths or as directed shall be final. Battered tapered and curved portions shall be measured net.
- 3.2.** No deduction shall be made from quantity of brick work nor any extra payment made for embedding in masonry of marking holes in respect of following item.
- (1) Ends of joints, beams, posts, girders, rafters, purlins trusses corbel, steps, etc. where cross sectional area does not exceed 500 sq.cm.
  - (2) Opening not exceed in 1000 sq.cm.
  - (3) Wall plate sand bed plates bearing of slab, chhajjas and like whose thickness does not exceed 10 cms. and the bearing does not extend the full thickness of wall.
  - (4) Drainage holes and recesses for cement concrete blocks to embed hold fasts for doors, window etc.
  - (5) Iron fixtures, pipes up to 300 mm. dia. hold fasts of doors, and window built into masonry and pipes etc. for concealed wiring.
  - (6) Forming charges of section not exceeding 350 sq.cm. in masonry.
- 3.3** Apparatuses for fire places shall not be deducted nor shall extra labour required to make splaying of jumps, throating and making trenches over the aperture be paid for separately.
- 3.4.** The rate shall be for a unit of one cubic meter.

### **ITEM NO. 04**

**Providing & supplying ISI standard NP3 class R.C.C. Pipes (of sulphate resisting Cement) in standard lengths of following class and diameter suitable for either collar joints or rubbing ring joints including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete including lowering, laying & jointing of RCC pipes in C:M 1:1.5 in position, grade alignment as directed by engineer in charge including conveyance from stores to site of work, labour, giving hydraulic testing as per ISI code - 250mm dia NP3.**

## **1.1 Scope**

This specification covers the requirements for manufacturing, testing, supplying, jointing and testing at work sites of Reinforced Cement Concrete (RCC) pipes, of non pressure varieties, sewers and storm water drains. R.C.C. NP3 class pipes are to be used for sewer collecting system.

## **1.2 Applicable Codes**

The manufacturing, testing, supplying, jointing and testing at work sites of RCC pipes shall comply with all currently applicable statutes, regulations, standards and codes. In particular, the following standards, unless otherwise specified herein, shall be referred. In all cases, the latest revision of the codes shall be referred to. If requirements of this specification conflict with the requirements of the codes and standards, this specification shall govern.

### **2.1 Materials**

- (a) IS: 458 - Specification for concrete pipes (with and without reinforcement. – latest edition, 2003) (where mentioned it should be latest revised code.)
- (b) IS: 3597 - Method of tests for concrete pipes.
- (c) IS: 5382 - Specification for rubber sealing rings for gas mains, water mains & sewers.
- (d) IS: 516 - Method of test for strength of concrete.

### **2.2 Codes of Practice**

- (a) IS: 456 - Code of practice for plain and reinforced concrete.
- (b) IS: 783 - Code of practice for laying of concrete pipes.

## **3. Design**

- 3.1** Design of RCC pipes shall be in accordance with the relevant clauses of IS 458.
- 3.2** The details of reinforcement shall be as per clause 5.2 of IS: 458-2003.
- 3.3** The ends of pipes shall be in accordance with relevant clauses of IS: 458.

## **4. Manufacturing**

### **4.1 General**

Pipe can be manufactured by spinning process or by vibrated casting process.

- 4.1.1** The method of manufacture shall be such that the form and the dimensions of the finished pipes are accurate within the limits specified in relevant clause of IS: 458. The surfaces and edges of the pipes shall be well defined and true, and their ends shall be square with the longitudinal axis. The ends of the pipes shall be further reinforced by an extra ring of reinforcement to avoid breakage during transportation.
- 4.1.2** The RCC pipes and rubber rings shall be systematically checked for any manufacturing defects by experienced supervisors so as to maintain a high standard of quality.
- 4.1.3** Owner representative / Engineer In-Charge shall at all reasonable times have free access to the places where the pipes and collars / rubber rings are manufactured for the purpose of examining and testing the pipes and collars / rubber rings and of witnessing the test and manufacturing.
- 4.1.4** All tests specified either in this specification or in the relevant Indian Standards shall be performed by Supplier / Contractor at his own cost and in presence of Owner representative / Engineer In-Charge if desired. For this, sufficient notice before testing of the pipes shall be given to Owner representative / Engineer In-Charge.

- 4.1.5** If the test is found unsatisfactory, Owner representative / Engineer In-Charge may reject any or all pipes of that lot. The decision of Owner representative/ Engineer In-Charge in this matter shall be final and binding on Contractor and not subject to any arbitration or appeal.

## **4.2 MATERIALS**

### **4.2.1 Cement**

Cement used for the manufacture of RCC pipes should be Sulfate Resisting Cement (SRC) only and shall conform to relevant IS codes.

### **4.2.2 Aggregates**

Aggregates used for the manufacture of RCC pipes shall conform to IS: 383. The maximum size of aggregate should not exceed one-third the thickness of the pipe or 20 mm, whichever is smaller.

### **4.2.3 Mixing and Curing Water**

Water shall be clean, colorless and free from objectionable quantities of organic matter, alkali, acid, salts or other impurities that might reduce the strength, durability or other desirable qualities of concrete and mortar.

### **4.2.4 Reinforcement**

Reinforcement used for the manufacture of the RCC pipes shall be mild steel Grade I or medium tensile steel bars conforming to IS: 432 (Part-I) or hard-drawn steel wire conforming to IS: 421 (Part-2). A reinforcement cage for pipes shall be as per relevant requirements of IS: 458.

### **4.2.5 Concrete**

Concrete used for the manufacture of RCC pipes shall conform to IS: 456. The minimum cement content and minimum compressive strength of concrete shall be as per relevant requirements of IS: 458 (Latest Edition). Compressive strength tests shall be conducted on 15 cm cubes in accordance with the relevant requirements of IS: 456 and IS: 516.

### **4.2.6 Rubber Ring**

Rubber ring chords used in pipe joints shall be EPDM rubber ring as per IS 5382: 1985.

## **4.3 Curing**

- 4.3.1** Pipes manufactured in compliance with IS: 458 (Latest Edition) shall be either water cured or steam cured for minimum stipulated curing period in accordance with relevant requirements of the latest revised IS:458 (Latest Edition).

## **4.3 Dimensions**

- 4.3.1** The internal diameter, wall thickness and length of barrel and collar of pipes, reinforcement (longitudinal and spiral), type of ends and minimum clear cover to reinforcement and strength test requirements shall be as per the relevant clauses / tables of IS:458 for different classes of pipes.

**Table – 1**

**PHYSICAL TEST AND DIMENSIONAL REQUIREMENTS FOR STANDARD STRENGTH BELL AND SPIGOT, PERFORATED NONREINFORCED CONCRETE UNDERDRAINAGE PIPE**

(Clauses 4.1, 4.2, 4.3.1, 4.3.2 and fig 1 {IS: 7319 - 1974})

Internal Diameter, D mm	Minimum Thickness of Barrel, T mm	Minimum Laying Length, L m	Inside Diameter at Mouth of socket, D S mm	Depth of Socket, L S mm	Minimum Taper of Socket, H:L S	Minimum Thickness of Socket, TS	Rows of Perforation	Perforation per Row	Length of Slots mm	Spacing of Slots mm	Minimum Strength, kg/m, Three Edge Bearing Method	Maximum Absorption, %
1	2	3	4	5	6	7	8	9	10	11	12	13
80	25	1	130	40	1 : 20	$\frac{3}{4}$ T all size s	4	9	25	50	-	8
100	25	1	150	40	1 : 20		4	9	25	75	1560	8
150	25	1	210	50	1 : 20		4	9	37.5	75	1560	8
200	25	1	275	57	1 : 20		4	9	50	100	1560	8
225	25	1	305	65	1 : 20		6	10	50	100	1670	8
250	25	1	330	65	1 : 20		6	10	50	100	1670	8
300	30	1	390	65	1 : 20		6	10	75	150	1790	8
350	32	1	475	65	1 : 20		6	10	75	150	1880	8
400	32	1	525	65	1 : 20		8	10	75	150	2020	8
450	35	1	565	70	1 : 20		8	10	75	150	2230	8

**Note:**

- Shorter lengths may be used for closures and specials.
- When pipes are furnished having an increase in thickness over that given in col 2, then the diameter at the inside of the socket shall be increased by an amount equal to twice the increase of the barrel.
- This measurement TS shall be taken 6 mm from the outer end of the socket.

For laying lengths greater than 1 m, the perforations per row shall be increased to Provide a spacing of approximately 75 mm.

**Table – 2**

**Design and Strength Test Requirements of Concrete Pipes of Class NP3 Reinforced Concrete, Medium Duty, Non-Pressure Pipes**

Internal Diameter of Pipes in mm	Barrel Wall Thickness	Reinforcements			Strength Test Requirements for Three Edge Bearing Test	
		Longitudinal, Mild Steel or Hard Drawn Steel		Spirals, Hard Draws Steel	Load to Produce 0.25 mm Crack kN/linear meter	Ultimate Load
		Minimum number	Kg/linear meter	Kg/linear meter		kN/linear meter
(1)	(2)	(3)	(4)	(5)	(6)	(7)
300	40	8	0.78	1.80	15.50	23.25
400	75	8	0.78	3.30	19.16	28.74
600	85	8 or 6+6	1.18	7.01	28.74	43.11
800	95	8 or 6+6	2.66	13.04	38.32	57.48
900	100	6 + 6	2.66	18.30	43.11	64.67
1000	115	6 + 6	2.66	21.52	47.90	71.85

1200	120	8 + 8	3.55	33.57	57.48	86.22
1400	135	8 + 8	3.55	46.21	67.06	100.60
1600	140	8 + 8	3.55	65.40	76.64	114.96
1800	150	12 + 12	9.36	87.10	86.22	129.33
2000	170	12 + 12	9.36	97.90	95.80	143.70
2200	185	12 + 12	9.36	133.30	105.38	158.07

**Note:**

1. If mild steel is used for spiral reinforcement, the weight specified under col.5 shall be increased to 140/125.
2. The longitudinal reinforcement given in this table is valid for pipes up to 2.5 m. effective length for internal diameter of pipe up to 250 mm and up to 3 m. effective length for higher diameter pipes.
3. Total mass of longitudinal reinforcement shall be calculated by multiplying the values given in col.4 by the length of the pipe and then deducting for the cover length provided at the two ends.
4. Concrete for pipes shall have a minimum compressive strength of 35 N/mm<sup>2</sup> at 28 days.

**Table – 3**

**Design and Strength Test Requirements of Concrete Pipes of Class NP4 Reinforced Concrete, Medium Duty, Non-Pressure Pipes Made by Vibrated Casting Process**

Internal Diameter of Pipes in mm	Minimum Barrel Wall Thickness	Reinforcements			Strength Test Requirements for Three Edge Bearing Test	
		Longitudinal, Mild Steel or Hard Drawn Steel		Spirals, Hard Draws Steel	Load to Produce 0.25 mm Crack kN/linear meter	Ultimate Load kN/linear meter
		Minimum number	Kg/linear meter	Kg/linear meter		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
300	50	8	0.78	1.53	15.5	23.25
400	60	8	0.78	1.6	19.16	28.74
600	75	8 or 6 +6	1.18	2.2	28.74	43.11
800	95	8 or 6 +6	2.66	6.87	38.32	57.48
900	100	6 + 6	2.66	11.55	43.11	64.67
1000	115	6 + 6	2.66	15.7	47.9	71.85
1200	125	8 + 8	3.55	21.25	57.48	86.22
1400	140	8 + 8	3.55	30	67.06	100.6
1600	165	8 + 8	3.55	50.63	76.64	114.96
1800	180	12 + 12	9.36	64.19	86.22	129.33
2000	190	12 + 12	9.36	83.12	95.8	143.7
2200	210	12 + 12	9.36	105.53	105.4	158.07

**Note:** Concrete for pipes shall have a minimum compressive strength of 35 N/mm<sup>2</sup> at 28 days

The tolerances regarding overall length, internal diameter of pipes or socket and barrel wall thickness shall be as per relevant clauses of IS: 458.

#### **4.4 Workmanship and Finish**

- 4.4.1** Pipes shall be straight and free from cracks except that craze cracks may be permitted. The ends of the pipes shall be square with their longitudinal axis so that when placed in a straight line in the trench no opening between ends in contact shall exceed 3 mm in pipes up to 600 mm diameter (inclusive), and 6 mm in pipes larger than 600 mm diameter.
- 4.4.2** The outside and inside surfaces of the pipes shall be smooth, dense and hard, and shall not be coated with cement wash or other preparation unless otherwise agreed to between Owner representative / Engineer In-Charge and the manufacturer or supplier.
- 4.4.3** The pipes shall be free from defects resulting from imperfect grading of the aggregate, mixing or molding.
- 4.4.4** The pipes shall be free from local dents or bulges greater than 3 mm in depth and extending over a length in any direction greater than twice the thickness of barrel.
- 4.4.5** The deviation from straight in any pipes throughout its effective length, tested by means of a rigid straight edge parallel to the longitudinal axis of the pipe shall not exceed, for all diameter 3 mm for every meter run.

#### **4.5 Testing**

All pipes for testing purposes shall be selected at random from the stock of the manufacturer and shall be such as would not otherwise be rejected under the criteria of tolerances as mentioned in IS: 458.(Latest Edition)

During manufacture, tests on concrete shall be carried out as per IS: 456. The manufacturer shall supply, when required to do so by Owner representative /Engineer the results of compressive tests of concrete cubes and split tensile tests of concrete cylinders made from the concrete used for the pipes. The manufacturer shall supply cylinders or cubes for test purposes required by the Owner representative/Engineer and such cylinders or cubes shall withstand the tests prescribed by the manufacturer for the hydrostatic test pressure. For non-pressure pipes, 2 percent of the pipes shall be tested for hydrostatic test pressure.

The specimen of pipes for the following tests shall be selected in accordance with relevant clause of IS: 458(Latest Edition) and tests in accordance with the methods described in IS: 3597.

- i) Hydrostatic test
- ii) Three edge bearing test
- iii) Absorption test.

**Note:** Three edge bearing strength to produce 0.25 mm crack in case of special design of pipes shall be as per IS:458:2003.

For Inspection at manufacturing site 24 hrs. Access shall be provided to Client's Engineers as well as engineer appointed by PMC/TPI agency. Apart from this Client will establish its own pipe testing facility where pipes will be randomly tested. The cost of transporting the pipe to the testing facility & testing charges shall be borne by the contractor

#### **4.6 Sampling and Inspection**

- 4.6.1** In any consignment, all the pipes of it class and size and manufactured under similar conditions of production shall be grouped together to constitute a lot. The conformity of a lot to the requirements of this specification shall be ascertained on the basis of tests on pipes selected from it.
- 4.6.2** The number of pipes to be selected from the lot for testing shall be in accordance with column 1 and 2 of Table 22 of IS: 458-2003.(Latest Edition)

- 4.6.3** Pipes shall be selected at random. In order to ensure randomness, all the pipes in the lot may be arranged in a serial order and starting from any pipe, every 'n' th pipe be selected till the requisite number is obtained 'n' being the integral part of  $N/n$  where N is the lot size and 'n' is the sample size.
- 4.6.4** All the pipes selected, as per clause IS: 458 shall be inspected for dimensional requirements, finish and deviation from straight. A pipe failing to satisfy one or more of these requirements shall be considered as defective.
- 4.6.5** The number of pipes to be tested for tests under clause IS: 458 shall be in accordance with column 4 of Table 15 of IS: 458 (Latest Edition). These pipes shall be selected from pipes that have satisfied the requirements mentioned in clause above.
- 4.6.6** A lot shall be considered as conforming to the requirements of IS 458 (Latest Edition) of the following conditions are satisfied.
- (a) The number of defective pipes (those not satisfying one or more of the requirements for dimensions, finish and deviation from straight) shall not be more than the permissible number given in column 3 of Table 15 of IS: 458 (Latest Edition).
  - (b) All the pipes tested for various tests as per IS: 458 (Latest Edition) shall satisfy corresponding requirements of the tests. The Contractor shall inform the Engineer-in-Charge about the lot of pipes to be brought at site. The pipe brought as specified in IS code 458 (Latest Edition). From the lot brought on site any one pipe at random will be selected and will be broken and quality of concrete and quantity of steel (reinforcement) will be checked. If any deviation i.e. poor quality of concrete or less steel is found, the whole lot of pipes will be rejected and the Contractor shall remove the same from the site. No payment shall be made for pipe, which is broken for checking and clearing, rejected lot of pipes from the site.
  - (c) In case the number of pipes not satisfying requirements of any one or more tests, one or two further sample of same size shall be selected and tested for the test or tests in which failure has occurred. All these pipes shall satisfy the corresponding requirements of the test.
- 4.6.7.** Arrangement for inspection, testing & acceptance of pipes, collars/rubber ring at factory will be made by owner. Pipes & collars confirming to I.S. specification and accepted by owner / consultant only shall be transported to site of work.

#### **4.7 Marking**

The following information shall be clearly marked on each pipe:

- (a) Internal diameter of pipe.
- (b) Class of pipe.
- (c) Date of manufacture, and
- (d) Name of manufacturer or his registered trademark or both.
- (e) Name of scheme: Thasara U/G Drainage Scheme.

All pipes and fittings shall be manufactured as per ISI Code.

#### **Spigot and Socket Joint (Semi-Flexible)**

This joint is composed of specially shaped spigot and socket ends on the RCC pipes. A rubber ring as specified in Data Sheet - A, shall be lubricated and then placed on the spigot, which is forced into the socket of the pipe previously laid. This compresses the rubber ring as it rolls into the annular space formed between the two surfaces of the spigot and socket, stiff mixture of cement and mortar as specified in Data Sheet - A, shall then be filled into the remaining annular space and rammed with a caulking tool.

#### **Materials:**

The required quantity of pipes and specials and fittings, both confirming to the relevant IS and suitable for rubber joints shall be brought by the agency.



The jointing materials i.e. EPDM rubber gasket (ring joints or tyton joints) shall conform to IS 5382-1969 or its latest revision.

**Laying:**

Before lowering the pipe the trench section shall be got approved from the Engineer in charge. The contractor shall have to provide and maintain sight rails and bonding rods whenever required till the completion of work. The pipe shall be laid in reasonably dry condition and under no circumstances they shall rest on slushy bedding.

The pipes shall be lowered by means of chain pulley block and tripod stand or with the help of ropes and suitable size of wooden bullies slowly into the trench. They shall be brought to the required level by giving packing with wooden sleeper pieces and ultimately with well consolidated hard murrum must be got approved by the Engineer –in-charge. Under no circumstances pipe shall be allowed to be thrown in to the trenches.

The rubber gasket shall be inserted into the socket in the groove. The spigot end shall be lubricated with good quality of grease. Then the spigot and with gasket shall be supplied in to the socket by means of jack on the other end. The lubricating grease shall be got approved by Engineer in charge by the contractor. The socket ends of all pipes shall face up hill irrespective of the direction of water flow.

**LAYING & JOINTING**

The availability of space on sewer alignment is limited & the tendered will have to arrange open space for storage of pipes and materials, T & P, labor establishment by himself. The employee may assist by giving letters but no responsibility will be taken by employer.

Reasonable care shall be exercised in loading, transporting and unloading concrete pipes. Handling shall be such as to avoid impact. Gradual unloading by inclined planks or by chain pulley block is recommended.

Jointing of RCC pipes shall be done with SRC cement only and as per the requirements of following specifications and as per the relevant IS. The type of joints shall be as per 'Data Sheet - A'. After jointing extraneous material if any, shall be removed from the inside of the pipe and newly made joints shall be thoroughly cured. In case, rubber sealing rings are used for jointing, these shall conform to IS 5382.

**1. Collar Joint (Semi-Flexible)**

This joint is made up of a loose collar, which covers two specially shaped pipe ends. Each end shall be fitted with a rubber ring as specified as per relevant IS code, which when compressed between the spigot and collar, seal the joints. Stiff mixture of cement mortar as specified in Data Sheet - A, shall then be filled into the remaining annular space and rammed with a caulking tool.

**2. Spigot and Socket Joint (Flexible)**

The RCC pipe with the rubber ring accurately positioned on the spigot shall be pushed well home into the socket of the previously laid pipe by means of uniformly applied pressure with the aid of a jack or similar appliance. The RCC pipes shall be of spigot and socket type and rubber rings as specified in IS-458-2003, shall be used, and the manufacturer's instructions shall be deemed to form a part of these specifications. The rubber rings shall be lubricated before making the joint and the lubricant shall be soft soap water or an approved lubricant supplied by the manufacturer.

Socket & Spigot NP3 pipe with rubber ring roll on joint for diameter up to 900 mm should be provided as per table 14 of IS 458: 2003. (Latest Edition)



Socket & spigot NP3 pipe with rubber ring confined joint for diameter 1000 mm to 2200 mm should be provided as per Table -17 of IS 458:2003.(Latest Edition)

**3. Flush Joint (Internal)**

This joint shall be generally used for culvert pipe of 900mm diameter and over. The ends of the pipes are specially shaped to form a self centering joint with an internal jointing spaces 13-mm wide. The finished joint is flush, with both inside and outside with the pipe wall. The jointing space is filled with cement mortar in the proportion as specified in Data Sheet - A, mixed sufficiently dry to remain in position when forced with a trowel or rammer.

**4. Flush Joint (External)**

This joint is suitable for pipes which are too small for jointing from inside. This joint is composed of specially shaped pipe ends. Each end shall be butted against each other and adjusted in correct position. The jointing space shall then be filled with cement mortar as specified in Data Sheet - A, sufficiently dry and finished off flush. Great care shall be taken to ensure that the projecting ends are not damaged as no repairs can be readily affected from inside the pipe.

**5. Cleaning of Pipes**

As soon as a stretch of RCC pipes has been laid complete from manhole to manhole or for a stretch as directed by Owner / Engineer In-Charge, contractor shall run through the pipes both backwards and forwards a double disc or solid or closed cylinder 75 mm less in diameter than the internal diameter of pipes. The open end of an incomplete stretch of pipeline shall be securely closed as may be directed by Owner / Engineer In-Charge to prevent entry of mud or slit etc.

If as a result of the removal of any obstruction Owner / Engineer In-Charge considers that damages may have been caused to the pipelines, he shall be entitled to order the stretch to be tested immediately. If during such test prove unsatisfactory contractor shall amend the work and carry out such further tests as area required by Owner / Engineer In-Charge.

It shall also be ascertained by Contractor that each stretch from manhole to manhole or the stretch as directed by Engineer In-Charge is absolutely clear and without any obstruction by means of visual examination of the interior of the pipe line suitably enlightened by projected sunlight or otherwise.

**6. Testing At Work Site**

After laying and jointing of RCC pipes is completed the pipe line shall be tested at work site as per the following specifications and as directed by Owner / Engineer In-Charge. All equipment for testing at work site shall be supplied and erected by contractor and shall be rectified by him to the full satisfaction of Owner / Engineer In-Charge.

The water required for the flow test shall have to be arranged by the contractor at his own cost. The entire section of the pipe line laid by the contractor shall be tested by flow test from manhole to manhole or as directed by Engineer in charge. Any earth, mud, rubbish, dummy walls etc., in the pipeline or manhole be removed and whole pipeline shall be cleaned before testing is given. In side vata etc., be rectified and completed with all respect before given hydraulic test. The water shall be poured in first manhole and it should run smoothly from manhole to manhole up to last manhole without any pounding. There shall not be accumulation of water inside the pipeline. If it accumulates in certain stretch, the laid pipeline shall have to be removed and shall be laid again in gradient as specified. If this being not attended the payment for the same stretch of pipeline shall not be paid and shall be recovered in the final bill. Necessary certificate for cleaning of pipeline in all respects shall be given in writing before hydraulic flow test is given on site by the contractor. Water used for test shall be removed from pipes and should not be released to the excavated trench.

After the joints have thoroughly set and have been checked by Owner/ Engineer and before backfilling the trenches, the entire section of the sewer drain shall be tested for water tightness by filling in pipes with water to the level of 1.50 m above the top of the highest pipe in the stretch and heading the water up for the period of one hour. The apparatus used for the purpose of testing shall be approved by Owner/Engineer. The water required for one time hydraulic testing of pipe section will be supplied by municipality at free of cost. Transportation of water to site of work is to be arranged by agency at his own cost. Contractor if required by Owner / Engineer shall dewater the excavated pit and keep it dry during the period of testing. The loss of water over a period of 30 minutes should be measured by adding water from a measuring vessel at regular 10 minutes intervals and noting the quantity required to maintain the original water level. For the approval of this test the average quantity added should not exceed 1 liter/hour/100 linear meters/10 mm of nominal internal diameter. Any leakage including excessive sweating which causes a drop in the test water level will be visible and the defective part of the work should be removed and made good without extra cost.

### Measurement

All RCC pipes shall be measured accordingly to the work actually done and no allowance will be made for any waste in cutting to the exact length required. The measurement for pipes shall be in running meters nearest to a cm. of length along the centre line of pipe as actually laid at work sites.

The rate for providing, laying and jointing of RCC pipes shall be deemed to include the cost of rubber rings, jointing material, testing and the extra excavation required for ordinary bedding of pipes and also for collars and pipe sockets if any.

### Notes:

1. If any damage is caused to the pipeline during the execution of work or while cleaning / testing the pipeline as specified, contractor shall be held responsible for the same and shall replace the damaged pipeline and retest the same at his own cost to the full satisfaction of Owner / Engineer In-Charge.
2. After for testing of pipeline shall be arranged by contractor at his own cost.
3. Pipes shall be brought on site proportionate to the required progress for thirty (30) days only.

### DATA SHEET - A

Sr. No.	Item	Specification
1.	Monsoon period.	First week of June to 30 <sup>th</sup> September each year.
2.	Width of the trench from invert level of pipe up to the top (Bt) and cross-section of trench.	As per Drawing
3.	Three edge bearing strength to produce 0.25 mm crack for, NP3 & NP4 class pipes.	As per latest IS Code
4.	Type of joints	Rubber ring joint
5.	Proportion of cement mortar for use in jointing of pipes. Cement should be SRC only.	1 cement:1 sand
6.	Hydraulic test pressure at factory.	0.7 kg/cm <sup>2</sup>
7.	Site test pressure	0.15 kg/cm <sup>2</sup>

### Mode of measurement & Payment: -

The measurement of pipe line is in running meter. Payment will be made on lowering and laying of pipes as per payment schedule after satisfactory hydraulic / flow test.

#### **ITEM NO.05**

**Providing, Supplying, Lowering and Laying in standard length ISI mark rigid unplasticised PVC pipes suitable for potable water with ring fit joint including cost of rings, as per IS Specification no. 4985/1988 including all local and central taxes, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to the departmental stores and including cost of jointing material etc. complete.75 MM**

##### **1.0. Materials**

- 1.1. The pipes shall be standard I.S.I. mark U.P.V.C. pipe (SCH-40) for cold water of specified dia.
- 1.2. The fittings, clamps etc. required for specified dia. bore pipes shall be of best quality and makes as approved by the Engineer-in-charge. Necessary accessories with inner/ outer brass thread shall be used as required and instruction by Engineer in charge.

##### **2.0. Workmanship**

##### **2.1. Cutting, Laying & Jointing**

- 2.1.1. When the tubes are to be cut or rethreaded, the ends shall be carefully filed out so that no obstruction to bore in offered. The ends of the tubes shall then be threaded conforming to the requirements of I.S. 554-1955 with pipe dies and taps carefully in such a manner that it will not result in slackness of joints when the two pieces are screwed together.
- 2.1.2. The taps and dies shall be used only for straightening screw threads which have becoming bent or damaged and shall not be used for turning of the threads so as to make them slack as the latter procedure may not result in the water tight joint. The screw threads for tube and fitting shall be protected from edge until they are fitted.
- 2.1.3. In jointing the tubes, the inside of the socket and the screwed end of the tubes shall be oiled and smeared with white or red lead and wrapping around with a few turns of fine spun yarn round the screwed end of the tube. The end shall then be tightly screwed in the socket, tees, etc. with a pipe wrench. Care shall be taken that all times free from dust and dirt during fixing. But from the joints shall be removed after screwing. After laying the open ends of the pipes shall be temperately plugged to prevent access of water, soil, or any other foreign matter. Jointing shall be carried out with proper chemical adhesive material and allow to dry.
- 2.1.4. Any threads exposed after jointing shall be painted or in the case of underground piping thickly coated with approved anti-corrosive paint to prevent corrosion.

##### **2.2. Fixing concealed to wall, ceiling & floors.**

- 2.2.1. In case of fixing concealed cement point to walls or ceilings, these shall run on the surface of the wall, or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern, holder clamps keeping the pipes about 15 mm. clear of the wall. When it is found necessary to 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 inducts 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, pipe may be buried for short distances provided that adequate protection is given against damage and where so required joints are not buried. Where required M.S. tube sleeve shall be fixed at a place a pipe is peasant through a wall or floor for expansion and contraction and other movements. In case the pipe is embedded in walls or floors, it should be painted with anti-corrosive bitumastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe is affected by lime. Under the floors, the pipe shall be laid in layer of sand filling.

- 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 lengths at 2 MC/C interval in horizontal run and 2.5 m. interval in vertical run. For pipe of 15 mm. dia. up to 25 mm. dia the holes in the walls and floors shall be made by drilling with chisel or jumper and not by dismantling the brick work or concrete. However for bigger diameter pipes the holes shall be carefully made (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 fillings shall be inspected under working conditions of pressure and flow. Any joints found liken shall be redone, and ail leaking pipes removed and replaced without extra cost.
- 2.3.2.** The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 Kg./Sq cm. The pipe shall be slowly and carefully charged with water allowing all air to escape and avoiding all shocks 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 fittings shall be tested in sections as the work laying proceeds, keeping, the joints exposed for inspection during the testing.

**3.0. Mode of measurements and payment**

- 3.1.** The description of the 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, setting, fitting in position straight, cutting 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 wall, 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 cutting shall unless otherwise stated be held to include the consequent waste.
- 3.5.** In case of fitting of unequal bore, the targets bore shall be measured for the test.
- 3.6.** Testing of pipe lines fittings, and joints include for providing all plant appliances necessary for obtaining access to the work to be tested and carrying out the tests.
- 3.7.** The rate includes U.P.V.C. pipe (SCH-40) with screwed socket joints to gather with all fittings (such as bends, sockets springs, elbows, test, crosses, short pieces, clamps and plugs, unions etc.) and fixing complete with clamping wall hooks, wooden plug etc. and also curing, screwing and waste and for making forged (or hand made) 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 tubes are to be fixed to wall, ceiling and flooring, the rates shall not include painting of pipes, providing sleeves and sand filling under floor for which separate payment shall be made.
- 3.8.** The rate shall be for a unit of one running meter.

#### **ITEM NO.06**

##### **Testing of Recharge Pit by emptying a tanker of 8000 L and measuring the time as per the specifications and reporting of the same.**

Testing of Recharge Pit by emptying a tanker of 8000 L and measuring the time as per the specifications and reporting of the same. Detailed Technical Specification as per Directed By engineer in charge.

##### **Mode of Measurements & Payment**

The rate shall be for a unit of **one Number**.

#### **ITEM NO.07**

##### **Filling in foundation and plinth with murrum or selected soil in layers of 20cm. Thickness including watering, ramming and consolidating etc. complete (Up to 10 ton.**

##### **1.0. Materials**

**1.1.** Murrum shall be clean, of good binding quality and of approved quality obtained from approved pots/quarries of disintegrated rocks which contain silicon material and natural mixture of clay of clariions origin.

The size of murrum shall not be more than 20 mm

##### **1.0. Workmanship**

**1.1.** The earth to be used for filling shall be free from salts, organic or other foreign matter. All clods of earth shall be broken.

**1.2.** As soon as the work in foundation has been completed and measured the site of foundation shall be cleared of all debris, brick bats: mortar dropping etc., and filled with earth in layers not exceeding 20 cms. Each layer shall be adequately watered, rammed and consolidated before the succeeding layer is laid The earth shall be rammed with iron rammers where feasible and with the but ends of crow-bars, where rammer cannot be used.

**1.3.** The plinth shall be similarly filled with earth in layers not exceeding 20 cms. adequately watered and consolidated by ramming with iron or wooden rammers. When filling reaches finished level the surface shall be flooded with water for at least 24 hours and allowed to dry and then rammed and consolidated.

**1.4.** The finished level of filling shall be kept to shape intended to be given to floor.

**1.5.** In case off large heavy duty flooring like factory flooring, the consolidation may be done by power rollers, where so specified. The extent of consolidation required, shall also be as specified.

**1.6.** The excavated stuff of the selected type shall be allowed to be used in filling the trenches and plinth. Under no circumstances black cotton soil be used for filling the plinth.

## **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 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.

**2.3.** Rate shall be for a unit of one cubic meter.

## **ITEM NO. 08**

**Providing and fixing pre-cast Rubber Dye / steel Dye inter locking concrete block 60mm thick with grade of concrete M300 pneumatic compressed / vibrated mechanically and as per approved design Confirming to IS 15658 : 2006 including 35 mm Sand layer for levelling and filling the joint with sand in proper line and level as per guidelines of IRC : SP 63-2018 etc. Complete.**

### **CEMENT:-**

The cement used in the manufacture of high quality precast concrete paving block shall be conforming to IS 12269 (53 grade) ordinary Portland Cement or IS 8112 (43 grade ordinary Portland cement). The minimum cement content in concrete used for making paver blocks should be 310 kg/Cu.M. And the upper limit of cement shall not be more than 425kg/Cu.M.

### **AGGREGATES:-**

The fine and coarse aggregates shall consist of naturally occurring crushed or uncrushed materials which, apart from the grading requirements comply with IS 383-1970. The fine aggregates used shall contain a minimum of 25% natural silicon sand. Lime stone aggregates shall not be used. Aggregates shall contain no more than 3% by weight of clay and shall be free from deleterious salts and contaminants.

### **WATER :-**

The water shall be clean and free from any deleterious matter. It shall meet the requirements stipulated in IS:456-2000.

### **OTHER MATERIALS:-**

Any other material/ingredients used in the concrete shall conform to latest IS specifications.

## **PAVER BLOCKS CHARACTERISTICS**

The concrete pavers should have perpendicularities after release from the mould and the same should be retained until the laying. The surface should be of anti-skid and anti glare type. The paver should have uniform chamfers to facilitate easy drainage of surface run off.

The pavers should have uniform interlocking space of 2 mm to 3 mm to ensure compacted sand filling after vibration on the paver surface.

The concrete mix design should be followed for each batch of materials separately and automatic batching plant is to be used to achieve uniformity in strength and quality. The pavers shall be manufactured in single layer only. Skilled labour should be employed for laying blocks to ensure line and level for laying, desired shape of the surface and adequate compaction of the sand in the joints.

## **LAYING OF PAVER BLOCKS :-**

### **PRIMING :-**



It will be responsibilities of the Contractors to ensure that the manhole/pipeline cable trenches/circular drainage system etc. raised to driveway level using the requisite materials as per instruction of Engg. The areas of potholes/deep depressions at the isolated locations also have to be filled up before laying the paver blocks. No extra payments will be made for this purpose.

It will be the responsibility of the Contractors to ensure that undulations on the paver blocks are eliminated after the traffic is allowed on it. Proper slope for drainage of water needs to be ensured by the Contractor. All necessary materials, tools, tackles are required to be arranged by the Contractor.

#### **BEDDING SAND COURSE :-**

The bedding sand shall consist of a clean well graded sand passing through 4.75 mm sieve and suitable for concrete. The bedding should be from either a single source or blended to achieve the following grading.

In sieve size	% passed
9.52 mm	100
4.75 mm	95-100
2.36 mm	80-100
1.18 mm	60-100
600 microns	25-60
300 microns	10-30

Contractor shall be responsible to ensure that single-sized, gap graded sands or sands containing an excessive amount of fines or plastic fines are not used. The sand particles should preferably be sharp not rounded as sharp sand possess higher strength and resist the migration of sand from under the block to less frequently areas even though sharp sands are relatively more difficult to compact than rounded sands, the use of sharp sands is preferred for the more heavily trafficked driveways. The sand use for bedding shall be free of any deleterious soluble salts or other contaminants likely to cause efflorescence.

The sand shall be of uniform moisture content and within 4%-8% when spread and shall be protected against rain when stock piled prior to spreading. Saturated sand shall not be used. The bedding sand shall be spread loose in a uniform layer as per drawing. The compacted uniform thickness shall be of 45mm and within +/- 5 mm. Thickness variation shall not be used to correct irregularities in the base course surface.

The spread sand shall be carefully maintained in a loose dry condition and protected against pre-compaction both prior to and following screening. Any pre-compacted sand or screened sand left overnight shall be loosened before further laying of paving blocks take place. Sand shall be slightly screened in a loose condition to the predetermined

depth only slightly ahead of the laying of paving unit. Any depressions in the screened sand exceeding 5 mm shall be loosened, raked and rescreened before laying of paving blocks.

#### **LAYING OF INTERLOCKING PAVER BLOCKS:-**

Paver blocks shall be laid in herringbone laying pattern throughout the pavement. Once the laying pattern has been established, it shall continue without interruption over the entire pavement surface. Cutting of blocks, the use of infill concrete or discontinuities in laying pattern is not be permitted in other than approved locations.

Paver blocks shall be placed on the un-compacted screened sand bed to the nominated laying pattern, care being taken to maintain the specified bond through out the job. The first row shall be located next to an edge restraint.

Specially manufactured edge paving blocks are permitted or edge blocks may be cut using a power saw, a mechanical or hydraulic guillotine, bolster or other approved cutting machine.

Paver blocks shall be placed to achieve gaps nominally 2 to 3 mm wide between adjacent paving joints. No joint shall be less 1.5 mm not more than 4mm. Frequent use of string lines shall be used to check alignment. In this regard the "laying face" shall be checked at least every two meters as the face proceeds. Should the face become out of alignment, it must be corrected prior to initial compaction and before further laying job is proceeded with.

In each row, all full blocked shall be laid first. Closure blocks shall be cut and fitted subsequently. Such closer blocks shall consist of not less than 25% of a full blocks.

To infill spaces between 25 mm and 50 mm wide concrete having screened sand, coarse aggregate mix shall be used. Within such mix the nominal aggregate size shall not exceed one third the smallest dimension of the infill space. For smaller spaces dry packed mortar shall be used.

Except where it is necessary to correct any minor variations occurring in the laying bond, the paver blocks shall not be hammered into position. Where adjustment of paver blocks necessary care shall be taken to avoid premature compaction of the sand bedding.

**INITIAL COMPACTION:-**

After laying the paver blocks, they shall be compacted to achieve consolidation of the sand bedding and brought to design levels and profiles by not less than Two (2) passes of a suitable plate compactor.

The compactor shall be a high-frequency, low amplitude mechanical flat plate vibrator having plate area sufficient to cover a minimum of twelve paving blocks. Prior to compaction all debris shall be removed from the surface.

Compaction shall proceed as closely as possible following laying and prior to any traffic. Compaction shall not, however, be attempted within one metre of the laying face. Compaction shall continue until lipping has been eliminated between adjoining blocks. Joints shall then be filled and re-compacted as described in Cl. 3.5. All work further than one metre from the laying face shall be left fully compacted at the completion of each day's laying. Any blocks that are structurally damaged prior to or during compaction shall be immediately removed and replaced. Sufficient plate compactors shall be maintained at the paving site for both bedding compaction and joint filling.

**JOINT FILLING AND FINAL COMPACTION:-**

As soon as possible after compaction and in any case prior to the termination of work on that day and prior to the acceptance of vehicular traffic, sand for joint filling shall be spread over the pavement.

Joint sand shall pass a 2.36 mm (No.8) sieve and shall be free of soluble salts or contaminants likely to cause efflorescence. The same shall comply with the following grading limits.

In sieve size	% passed
2.36 mm	100
1.18 mm	90-100
600 microns	60-90
300 microns	30-60
150 microns	15-30
75 microns	10-20

The Contractor shall supply a sample of the jointing sand to be used in the contract prior to delivering any such materials to site for incorporation into the works. Certificates of test results issued by a recognized testing laboratory confirming that the samples conform to the requirements of this specifications shall accompany the sample.

The jointing sand shall be broomed to fill the joints. Excess sand shall then be removed from the pavement surface and the jointing sand shall be compacted with not less than one (1) Pass by the plate vibrator and joints refilled with sand to full depth.

This procedure shall be repeated until all joints are completely filled with sand. No traffic shall be permitted to use the pavement until all joints have been completely filled with sand and compacted.

Both the sand and paver block shall be dry when sand is spread and broomed into the joints to prevent premature setting of sand. The difference in level (lipping) between adjacent blocks shall not exceed 3mm with not more than 1% in any 3 m x 3 mm area exceeding 2 mm. Pavement which is deformed beyond above limits after final compaction shall be taken out and reconstructed to the satisfaction of the Engineer.

**EDGE RESTRAINT:-**

Edge restraints need to be sufficiently robust to withstand override by the anticipated traffic, to withstand thermal expansion and to prevent loss of the laying course material from beneath the surface course. The edge restraint should present a vertical face down to the level of the underside of the laying course.

The surface course should not be vibrated until the edge restraint, together with any bedding or concrete haunching, has gained sufficient strength. It is essential that edge restraints are adequately secured.

**SAMPLING AND TESTING PROCEDURES FOR PAVER BLOCKS:-****SAMPLE SIZE:-**

Internal - Average of minimum 3 samples per 5000 blocks - for paver block manufacturers.

External - Minimum 2 blocks per 10000 blocks. Average of minimum 8 blocks per site - for captioned contractors.

**SAMPLING FOR TESTING :-**

Sampling for testing of paver blocks shall be done in accordance with Appendix-A.

**COMPRESSIVE STRENGTH :-**

Testing for 28 days compressive strength shall be undertaken in accordance with Appendix-B. The average compressive strength of 60 mm thick paver blocks tested shall be 31.8 MPa.

Note:- 10% lower tolerance limit in compressive strength shall be allowed.

**WATER ABSORPTION:-**

Testing for water absorption shall be in accordance with IS 2185:1979:Part I (Specifications for concrete masonry blocks) Appendix C

**3.0. Mode of measurement and payment**

**3.1.** The Paver Block shall be measured for its length, breadth, limiting dimensions to those specified on plans or as directed

**3.2.** The rate shall be for a unit of one SQM .



#### **ITEM NO.09**

**For General Area:- Horizontal Filtration Module is Precast Modular Step well of M 25 grade, designed to capture sediments primarily from surface runoff water. This Octagonal shape structure has a circumscribing diameter of approximately 918mm and a height of 1614mm. A part of the top module of is usually kept above the ground however same can be flushed with ground. 100 / 150 mm are the available height options in case part of it has to be kept above the ground level. Top module accommodates indigenously designed 2-nos Array Filters to capture sediment effectively within the Horizontal Filtration Module. This easily removable array filters can be cleaned within or outside the module using pressurized water. Total filtration area of this filter is approximately 3000 cm<sup>2</sup>. Filtration capacity is 8m<sup>3</sup> to 10m<sup>3</sup> per hour. These module is installed prior to the Sand Filtration Module. The inlet and outlet of is 110mm diameter UPVC pipes connected with Sand Filtration Module .**

##### **1. Scope of Work**

The work shall include **design, manufacture, supply, transportation, unloading, installation, testing and commissioning** of a **Precast Modular Horizontal Filtration Module** made of **M25 grade RCC**, complete in all respects.

The module shall:

- Be **octagonal in shape** with approx. **918 mm circumscribing diameter** and **1614 mm height**
- Be installed **prior to the Sand Filtration Module** for removal of sediments from surface runoff water
- Include **excavation, preparation of bed, levelling, placing, alignment, jointing and backfilling**
- Provide and fix **110 mm dia uPVC inlet and outlet pipes** with proper connection to the **Sand Filtration Module**
- Include provision of **top projection (100 mm / 150 mm)** above ground level or flush with ground level as per site conditions
- Ensure proper sealing to avoid leakage and infiltration of soil

The scope shall also include:

- Supply and fixing of **two (2) removable array filters**
- All **labour, materials, tools, plants, dewatering (if required)** and incidental works necessary for completion

##### **2. Workmanship**

- The module shall be manufactured using **precast RCC of M25 grade** with proper compaction, curing and finishing
- The structure shall be **watertight, crack-free and dimensionally accurate**
- Edges and surfaces shall be smooth and free from honeycombing

##### **Installation:**

- Excavation shall be carried out to required depth and size as per design
- A **properly levelled and compacted base** (PCC if specified) shall be provided
- The module shall be placed in correct alignment and level
- Inlet and outlet pipes (110 mm dia uPVC) shall be properly connected and sealed
- Joints shall be made watertight using approved materials

**Filter System:**

- Two **indigenously designed array filters** shall be installed in the top module
- Filters shall be:
  - Easily removable
  - Capable of cleaning using **pressurized water** (in-situ or outside)
  - Having total filtration area of approx. **3000 cm<sup>2</sup>**

**Performance:**

- The system shall ensure effective sediment removal
- Designed filtration capacity: **8–10 m<sup>3</sup>/hour**

**Backfilling:**

- Shall be done with selected earth in layers, properly compacted
- Care shall be taken to avoid damage to the structure and pipe connections

**3. Mode of Measurement**

- The Horizontal Filtration Module shall be measured **in numbers (Nos.)**

**ITEM NO.10**

**For General Area :- Sand Filtration Module** M-25 grade cement concrete system for rainwater harvesting with SS 304 screen and natural filters. It consists of single module with internal volume of approximately 0.8 cubic meters that is to be fixed below ground level. The module is of an octagonal shape with a diameter of approximately 1000 mm below ground level. Total height of the system is 1614 mm. Filtration capacity & testing upto 8m<sup>3</sup> to 10m<sup>3</sup> per hour from modular systems only. The inlet and outlet of the system is 90mm diameter UPVC pipes. Module holds a filter media in the form of sand bed around a continuous slot fine aperture stainless screen (420 mm diameter and 240 or 300 mm length). Screen is fixed to the bottom slab and is fully covered by 0.10 cubic meter filtration sand with 40mm graded gravels. Screen creates entry points for the filtered water. This module is used for Surface water and the filtered water to get into is finally connected with the Recharge well.

**1. Scope of Work**

The work shall include **design, manufacture, supply, transportation, unloading, installation, testing and commissioning** of a **precast modular Sand Filtration Module** made of **M25 grade RCC**, complete in all respects for rainwater harvesting applications.

The module shall:

- Be **octagonal in shape** with approx. **1000 mm diameter** and **1614 mm total height**
- Have an internal volume of approx. **0.8 cubic meters**
- Be installed **below ground level**
- Be connected downstream of the **Horizontal Filtration Module** and upstream of the **Recharge Well**

The scope shall include:

- Excavation, bed preparation, levelling and installation of the module
- Supply and fixing of **90 mm dia uPVC inlet and outlet pipes**
- Providing and placing **filter media (sand and graded gravel)**

- Installation of **SS 304 continuous slot screen**
- All labour, materials, tools & plants, dewatering (if required), and incidental works

## 2. Workmanship

### Precast Structure:

- The module shall be constructed using **M25 grade RCC**, properly vibrated, cured and finished
- The structure shall be **watertight, durable and free from cracks or honeycombing**
- Shape shall be octagonal with accurate dimensions

### Installation:

- Excavation shall be carried out to required size and depth
- A **levelled and compacted base** (PCC if specified) shall be provided
- The module shall be installed in proper line and level
- All joints shall be **watertight and properly sealed**

### Filtration System:

- The module shall contain:
  - **SS 304 continuous slot fine aperture screen**
    - Approx. **420 mm diameter**
    - Length: **240 mm or 300 mm**
    - Fixed securely to the bottom slab
  - Filter media consisting of:
    - **0.10 m<sup>3</sup> filtration sand**
    - **40 mm graded gravel layer**
- The sand bed shall be uniformly placed around the screen
- Gravel shall support filtration and prevent clogging

### Hydraulic Performance:

- Filtration capacity: **8 to 10 m<sup>3</sup>/hour**
- Screen shall allow filtered water to enter through fine slots
- System shall ensure effective removal of fine suspended particles

### Connectivity:

- Inlet and outlet connections shall be **90 mm dia uPVC pipes**
- Proper connection shall be ensured from:
  - **Horizontal Filtration Module (inlet)**
  - **Recharge Well (outlet)**

### Backfilling:

- Backfilling shall be done in layers with proper compaction
- Care shall be taken to avoid displacement of the module and piping

## 3. Mode of Measurement

As Per Schedule-B

### ITEM NO.11

Submission and approval of survey, Hydro geological investigations at number of locations in Valsad City, working Drawings including

all layout sections, typical details, shop drawings, As-built drawings and submission of working drawings and implementation schedule as per priority given by Engineer-In-Charge for approval, etc. complete. Including 1) Detailed VLF profiling Survey work in a grid pattern 2) Detailed Geophysical Resistivity Test & sub-surface micro-level VES Investigation work Selected VLF anomalous point for pinpointing the most feasible location for Recharge & Roof Top Rain water recharge to be constructed in premises .3) G.P.S marking of each location by G.P.S. instrument 4) Preparation & Submission of its completely detailed draft report showing recharge potential in the prescribed area along with their interpretations specification & designs with feasible location, Physiographic, drainage, Geological, Hydrological, Climate month wise details ,rainfall data of last 20 years with drilling location, litho logical cross section & submit its final report

**METHODS OF INVESTIGATION**  
 :- (1) Geophysical Investigation Method using Schlumberger configuration by Resistivity meter Model No SSR-MPL-1 Micro-processor (2) VLF instrument (3) Remote Sensing Method. (4) Geo-Electrical Resistivity Method by newly developed latest IXID software for more accuracy. (5) Geohydrological Micro-level Investigation.

**1) Geophysical Investigation Method using Schlumberger configuration by Resistivity meter Model No SSR-MPL-1 Micro-processor**

**Introduction** The purpose of electrical surveys is to determine the subsurface resistivity distribution by making measurements on the ground surface. From these measurements, the true resistivity of the subsurface can be estimated. The ground resistivity is related to various geological parameters such as the mineral and fluid content, porosity and degree of water saturation in the rock. Electrical resistivity surveys have been used for many decades in hydrogeological, mining and geotechnical investigations. More recently, it has been used for environmental surveys. The resistivity measurements are normally made by injecting current into the ground through two current electrodes (C1 and C2 in Figure 1), and measuring the resulting voltage difference at two potential electrodes (P1 and P2). From the current (I) and voltage (V) values, an apparent resistivity ( $\rho_a$ ) value is calculated.  $\rho_a = k V / I$  where k is the geometric factor which depends on the arrangement of the four electrodes. Figure 2 shows the common arrays used in resistivity surveys together with their geometric factors. In a later section, we will examine the advantages and disadvantages of some of these arrays. Resistivity meters normally give a resistance value,  $R = V/I$ , so in practice the apparent resistivity value is calculated by  $\rho_a = k R$ . The calculated resistivity value is not the true resistivity of the subsurface, but an "apparent" value which is the resistivity of a homogeneous ground which will give the same resistance value for the same electrode arrangement. The relationship between the "apparent" resistivity and the "true" resistivity is a complex relationship. To determine the true subsurface resistivity, an inversion of the measured apparent resistivity values using a computer program must be carried out.

**(2) VLF instrument**

The VLF receiver is specially designed for high productivity surveys, in ground water and mining exploration.

No orientation of the operator with respect to the direction of the transmitter is required since three magnetic sensors measure the components of the VLF field. Tilt or horizontality of the sensor unit is neither required since two inclinometers correct for tilted position.

The receiver can be operated in two modes:

- The classical tilt angle mode, based on the measurement of magnetic-only components, and used to prospect conductive dyke-like structures that generally

correspond to weathered or mineralized zones.

- The resistivity mode based on the measurement of magnetic and electric components. In this mode, a short electric line and two metallic electrodes are used. Applications concern the prospecting of resistive dyke-like structures and geological mapping (structural studies).

### **(3) Remote Sensing Method.**

Remote sensing applications are becoming more commonly used in geothermal exploration due the ease and speed of data collection for relatively large areas (100+ km<sup>2</sup>) and the lack of need for land access and few airspace restrictions. The primary applications of remote sensing to geothermal exploration include:

- identifying and distinguishing between different rock, mineral assemblage, or mineral types;
- identifying surface thermal and vegetation anomalies; and
- determination of structural features and their orientation (i.e., strike).

In general, remote sensing applications lack the ability to penetrate into the subsurface, although some sensors can penetrate to very shallow depths (i.e., < 1 m).

### **Remote Sensing Techniques**

- Active Sensors
  - LiDAR
  - Radar
    - InSAR
    - PSInSAR
    - SAR
    - SRT
    - SqueeSAR
- Passive Sensors
  - Aerial Photography
  - FLIR
  - Geodetic Survey
  - Hyperspectral Imaging
  - Long-Wave Infrared
  - Multispectral Imaging
  - Near Infrared Surveys
  - Oblique Aerial & Ground Visible Band & Thermographic Imaging
  - Radiometrics
  - SWIR
  - Stereo Satellite Imagery
- he best time to acquire the majority of remote sensing data is in the summer (specifically, those months with the highest sun angles and longest days). Exceptions to summer data acquisition is the collection of both long-wave thermal data and active sensor data (eg. Radar, LiDAR). In thermal imaging where detectors are measuring heat, it is best to fly when the ground vs. air temperature gradient or contrast is highest. Cooler months are thus better for this type of imaging as are the several hours before dawn any time of year.
- There are additional considerations to keep in mind. Radar, for example, cannot image the bare-ground surface in thick snow cover; ditto with LiDAR. However, these active images are insensitive to light (or lack thereof) making them excellent choices for high latitude environments (as one example). Furthermore, both Radar and LiDAR are capable (depending on wavelengths used) of imaging beneath tree canopy making them useful in highly vegetated regions. In contrast, spectral data collection (both hyperspectral and multi-spectral) requires mostly sunny days; data collected in low-light conditions are typically low signal-to-noise making processing and interpretation more difficult And while hyperspectral data is capable of mapping and identifying vegetation ecosystems, it (and multi-spectral) are not capable of penetrating the tree canopy to measure the surface below.

### **(4) Geo-Electrical Resistivity Method by newly developed latest IXID software for more accuracy**

Geophysical electrical resistivity method has been one of the more popular non-destructive method to explore the subsurface. Geophysical electrical resistivity tomography (ERT) subsurface profiling was conducted to map the groundwater path along the embankment. The groundwater path able to decrease the slope stability, thus its need to locate the position for conduct the slope remediation via subsoil drainage. In this study, Terrameter LS2 model, electrodes, cables, battery, and cable connectors were the equipment used for measurement. This study uses cable spread line at 200m with 2.5m spacing between electrodes by using gradient protocol. The resistivity data was analyzed using RES2DINV software. The interpretation of groundwater path is based on the resistivity values less than 100 ohm.m, which is interpreted as saturated materials. This study demonstrates the efficiency of application of electrical resistivity tomography (ERT) in detecting the groundwater pathways. This investigation will help in sustaining the slope stability via indicating the position of groundwater pathways, and thus implementing the slope remediation work.

#### **(5) Geohydrological Micro-level Investigation.**

Micro-level evaluation of hydrogeological studies of pendlimarri area has been carried out by using IRS 1D LISS 111. The hydrological conditions of the lithological units form the base for this study. In fact, the lithology controls the ground water in terms of formation of aquifers, porosity, both primary and secondary and the quality. The area is mostly composed of quartzites, shales and limestones. Most of the lithological units are aquifuge and aquitard in nature. There is no primary porosity. It is only the secondary porosity in the form of lineaments that have helped in the infiltration of water.

#### **Mode Of Measurement:**

**Payment shall be made on JOB basis.**

#### **ITEM NO.12**

**Job work for cleaning of modules for every Premonsoon for once in years with inbuilt integral ladder at 1125 mm with safety by water cleaning system, labours, hand bucket, lari & other tools i.e. Trikam, Pavda, Rassa, Battery, G.T. Salia etc. with disposing silt as shown places. Nothing extra to be paid for any insurance or depreciation of tools etc.**

cleaning of modules for every Premonsoon for once in years with inbuilt integral ladder at 1125 mm with safety by water cleaning system, labours, hand bucket, lari & other tools i.e. Trikam, Pavda, Rassa, Battery, G.T. Salia etc. with disposing silt as shown places. Nothing extra to be paid for any insurance or depreciation of tools etc. Detailed Technical Specificati on as per Directed By engineer in charge.

**Payment shall be made on JOB basis.**

#### **ITEM NO.13**

**Providing, fixing and fabricating of G.I. Chain Link Jali 10 Gauge Fencing with necessary fittings and having angle support of 50x50x6 mm thick and c/c. distance 6.00 between two column with loading, unloading, lead and lift. Including all labour and fitting work.**

Providing, fixing and fabricating of G.I. Chain Link Jali 10 Gauge Fencing with necessary fittings and having angle support of 50x50x6 mm thick and c/c. distance 6.00 between two column with loading, unloading, lead and lift. Including all labour and fitting work.

M.S. Angle 50 x 50 6mm shall be fabricated as per detailed drawing supplied and as described in the item. General specification of fabrication shall be followed. Necessary holes for providing barbed wire on top shall be provided. Angle shall be fabricated as per drawing. Angle shall be erected in line & level at the center to center distance given on the drawing or as directed at site. Angle shall be welded with holdfasts, anchor at bottom to have fixing with concrete work done at base. MS flats / pieces 150mm long shall be welded at top & bottom on two sides as shown in the drawing with 18mm dia slotted holes to receive the bolts required for fixing chain link fencing panel. Frame work shall be hot dip galvanized as per IS 2633 /72 and 209 of 1966 or latest amendment and as directed. Fabrication work shall be as per drawing and as directed on site. Rate quoted shall be for supply and fabrication of M.S. Angle 50 x 50 x6mm with M.S. flat 5- x6mm necessary bolts, nuts, washers, cutting bending, welding, erection in line & level & plumb, hot dip galvanizing, etc. complete.

Payment shall be made on SMT basis.

**SCHEDULE-B-10.1**  
**Drilling of 250 mm dia X 60 meters deep bore by DR rig.**

**ITEM NO.1**

**Drilling pilot bore hole of size 250 / 300 mm at above village site in all strata by mud flush direct rotary rig**

250 / 300 mm dia. pilot bore is to be drilled at village specified in the Price Bid (Schedule -B) and up to specified / desired depth in all type of strata by using best quality sodium based bentonite powder.

The drilling should be done by mud flush direct circulation rotary rig with hydraulic movements fitted with heavy duty reciprocating mud pump or by Reverse Rotary Rig.

All tools and equipment's required for drilling operation should be brought to site of work by contractor at his own cost. Arrangement of fresh potable (i.e. TDS not higher than 2000 ppm) water for drilling operation should be made by the contractor at his own cost. Only in unavoidable circumstances, drilling water of salinity higher than 2000 PPM TDS may be used after obtaining the specific permission from the Hydrologist / Deputy Executive Engineer (here after referred as EIC) for drilling work.

If fresh water (i.e. 2000 ppm) is not available in surrounding area up to 2 kilometers distance from the drilling site, the necessary arrangement for departmental water tanker will be arranged by EIC and required charges for the same will be recovered from the bill of the contractor as per departmental norms.

The drilling agency has to collect and furnish following information:

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Samples of drilled cuttings from different strata shall be collected at suitable intervals preferably at every 2 meters' depth while drilling pilot borehole. However, if a change in strata occurs the same shall also be collected & followed up by collection at regular interval of 2 meters' depth. Opinion of the concerned Geo Hydrologist / Hydrologist shall be binding to the contractor in this regard. The samples should be stored in sufficient quantity in sample strata box and should be washed properly while the drilling is in progress. The Hydrologist / Jr. Geologist will prepare lithological log based on such collected samples. An accurate drilling time log shall be kept indicating the time taken for drilling every two meters' depth. This log will enable correct interpretation regarding the nature of formation viz. hard, soft, unconsolidated etc. which has bearing on the water yielding capacity of the formation.

**ELECTROLOGGING TEST:**

Department logger conducts this test as per standard practice. The contractor should inform well in advance to the EIC for the above test after completion of 250 / 300 mm dia. pilot bore hole. In no case, logging test in pilot borehole exceeding 300 mm dia. size shall be conducted / carried out. Pilot bore hole shall be made uniform i.e. finished by R. R. cutter before geophysical electro logging. The logging probe / sonde / electrode must reach at specified depth of bore hole as stated in the schedule. Failing which, Hydrologist / logger operator can ask for cleaning the borehole again and ensure clean & smoothly finished borehole to enable carrying out repeat (i. e. second time) logging test. The charges as per prevailing SOR for repeat i. e. second time logging shall be recovered from the contractor as certified by the logger operator (Hydrologist / Jr. Geologist) in the electro logging report.

If the logging is not possible in 300 mm dia. because of expanding nature of clay or any such geological reasons, the agency is not required to pay the re - logging charges. However, the logger operator will have to clarify / certify above reason in the electro logging report.



The rate shall be for a unit of One Running meter.

## **ITEM NO.2**

**Reaming of 250 / 300 mm dia pilot bore hole to size 550 mm dia. including assembling, jointing, lowering of housing casing screen pipes & other assembly items with gravel packing and clay balls packing etc**

Reaming from 250 / 300 mm diameter bore hole to 400 / 450 / 550 / 600 mm dia. size bore hole up to desired depth as specified in Schedule - B in all alluvial strata / soft and hard roc / plastic clay by using best quality sodium based bentonite powder. The drilling shall be done by mud flush direct rotary rig. Pilot borehole of size 250 / 300 mm diameter shall have to be reamed to borehole of finished size 400 / 450 / 550/ 600 by R. R. cutter of required size.

In tube wells where 200 mm diameter pipes are to be lowered size of reaming shall be 450 mm diameter and similarly in tube wells where 250 mm diameter pipes are to be lowered size of reaming shall be 550 mm diameter with following exceptions.

For 200 mm diameter tube wells, pilot bore hole shall be reamed up to size of 550 mm diameter up to the depth of cement sealing suggested in the pipe assembly and if it (cement sealing) is at a depth greater than 150 meters. In case where no cement sealing is suggested in the pipe assembly, reaming of uniform 450 mm diameter size shall be done up to full depth.

Likewise, for 250 mm diameter tube wells, pilot bore hole shall be reamed up to size of 600 mm diameter up to the depth of cement sealing suggested in the pipe assembly if it (cement sealing) is at a depth greater than 150 meters. In case where no cement sealing is suggested in the pipe assembly, reaming of uniform 550 mm diameter size shall be done up to full depth.

In both the cases above, the concerned Hydrologist in consultation with Geo Hydrologist shall give such opinion / recommendation in the writing along with geological feasibility report & suitable provision should have been made at the time of preparation of estimates & schedule B. However, if such situation arises during drilling & after electro logging of pilot borehole, the decision regarding reaming of higher size of the concerned Hydrologist / Geohydrologist shall be final & binding to the contractor.

However, if the contractor wishes to ream the pilot bore hole to uniform size i. e. 550 mm or 600 mm (as the case may be) bore hole irrespective of suggested depth of cement sealing is free to do so. But no additional payment shall be given on this account of oversized reaming. Similarly, no additional amount for extra consumption of gravels on account of such oversized reaming shall be made to the contractor. Above condition is kept so that bridging does not happen during gravel packing due to any known / unknown reasons. Department shall not be held responsible in case of bridge formation due to steps of reaming.

If further drilling cannot be done up to specified depth due to encountering the hard formation, blue sticky clay or shale or any such geological formation, the drilling will have to be stopped as per instructions of the Hydrologist and payment will be made for the work carried out by the contractor.

After completion of reaming of borehole of stated size & depth as per pipe assembly, work of lowering & jointing of ERW / MS blind pipes / strainer or screen pipes etc. is to be carried out as per pipe assembly.

To enable smooth lowering of pipe assembly in the finished & reamed borehole up to the specified depth as suggested in the pipe assembly, reaming for further depth up to 3 meters (or less as suggested by the Hydrologist) shall be carried out. This is to ensure safe lowering against any residual cutting remaining in the bore hole. No payment will be made for this extra drilling up to 3 meters depth.

Contractor shall keep all the required materials i. e. gravels, cement, clay balls etc. in sufficient quantity ready at site of work before the commencement of process of pipe lowering, gravel packing etc. In absence of unavailability of required quantities of gravels, cement & clay balls the EIC shall be within his/ her right to postpone the starting of pipe lowering till arrival of above materials at site of work. Further department shall not be liable for any delay caused due to above. No claim from the contractor shall be entertained by the department in this regard.

The pipe assembly (as per the size of tube well) suggested by the Hydrologist is to be lowered as per instructions of EIC and pipe lowering work shall be started by mutual understanding and in the presence of Deputy Executive Engineer in charge, Hydrologist, contractor and representative of the Khamhat Nagarpalika. The process of pipe lowering shall start only during day light i. e. on or after 7.00 am. However once the process is started it will be allowed to be D R Group E (Up to 300 Meter and Above 300 Meter Depth) Page 20 completed irrespective of time taken. Pipe lowering will not be allowed to start after sunset i. e. after 7.00 pm under any circumstances. The required suggested size of casing, screen / strainer pipes etc. shall be brought by the contractor from the designated store(s) of department as directed by EIC & as per pipe assembly. Carting of pipes from store(s) to site of work is to be done by the contractor without any extra cost.

The pipes should be lowered in a vertical position in proper alignment with steel bent plates of suggested size. After welding & jointing of pipes, alignment of each & every pipe should be checked while lowering with spirit level. It should be ensured that each joint of pipe assembly perfectly welded with welding rods of good quality & of reputed make for welding of MS ERW pipes of required size & thickness without any additional cost.

While welding of MS pipes, it should be ascertained that there are no air gaps left so that there is no chance of water leaking through the welded joint from outer wall of pipe across the length of the entire pipe assembly. Welding of each joint has to be done initially by 8 SWG welding rods (of reputed make & as per relevant IS) uniformly followed by removal of extra slag / flux, thereafter second line of welding

shall be applied to ensure perfect welded joint. Utmost care has to be taken to ensure that no side of bent plate remains un-welded with pipe including circumferential welding.

If the bore is required to be drilled for greater depth than the specified depth in schedule B, the contractor is bound to carry out such additional drilling work including subsequent jointing and lowering casing and strainer pipes etc. as required. In case of such additional work, payment will be paid as per approved rates of the department.

The gravel packing around housing casing and strainer pipes shall have to be carried out by the contractor without additional cost.

Before starting of gravel packing, it should be ensured that thickness of mud plaster is reduced to minimum and perfect back washing should also be carried out.

The tube well should be gravel packed with at least minimum calculated quantity and size of the gravel to be used as suggested by the concerned Hydrologist. The gravel packing operation shall be continued till filter is constructed around the slotted / screen pipes so as to ensure that no sand flows in the tube well while in normal operational condition. After gravel packing no mud slurry should remain at bottom and it should be thoroughly cleaned by fresh water.

Record of quantity of gravel packed in the bore should be kept by the contractor and should be furnished along with strata chart.

Clay packing ( clay ball packing if required) shall be done by the contractor by providing sticky clay only as desired by EIC before and after development of bore by compressed air as directed by the EIC.

Certificate regarding quality i. e. size & quantity of gravels & clay balls is to be obtained by the contractor from the Hydrologist as well as EIC & the same is to be submitted along with the bill on completion of work.

- Mode of measurements & payment

The rate shall be for a unit of One Running meter.

### **ITEM NO.3**

#### **Development of bore by air compressor of 600 cfm /150 psi capacity for minimum 06 hours or up to the availability of sand free discharge**

Material. and Workmanship:- Handling over the tube The housing pipe should be closed by bore capacity. The contractor has to clear the mud pump by clay. The following information should be furnished by the drilling agency on completion of the tube well. State chart or the tube well indicating the different types of soil met with at different depth per light plot. Samples of strata collected should be neatly packed and correctly marked in sample bag. chart of actual assembly. lowered indicating the size of the pipes depth range where housing casing. strainer pipes have been used depth of bore different hole diameters and total depth. Position of every joint in the assembly lower Housing development carried out by air compressor. Static water level and pumping water

level with discharged. Above details should be finished as appendix with duly signed by engineer in charge and geologic hydrologist in charges of works All the tools and plants such as rotary dried machine air compressor pump or such other suitable chants required for drilling developing gauging etc. for the tube well shall be providing b\ the contractor at his own cost at the site of works. The contractor shall collect the samples of different strata of the above at different levels but more than 3 mtrs. of at shorter intervals if strata charges and such samples with necessary depth and strata chart shall be submitted to the depth. The strata shall he verified by the geologist hydrologist or any other government representative and the decision will be hinging to the contractor. If further drilling cannot be done but the encountering the hard formation or by the trickily clear or shall the decision of the formation will be binding to the contractor as finished by the hydrologist the in charge. The contractor will have to wait 24 hrs. for tube well to be elect logged after 24 hrs. the contractor can continue for the work as per instructions of the D.E.E. Compressor test will have to the carried out of house to till the water becomes sand as per details of (iWSSI3 specification given in item No. X . the decision of the DEE in charge will he final and binding to the contractor. The contractor will not he hold responsorial for hydraulic or chemical failure of the tube well for mechanical failure and defective cement sealing of tube well the contractor will be responsible for leases to the department. I he contractor will he held responsible for the quantity of water met with form the tube well lithe work done satisfactorily. If the he well is declared as failure the contractor shall have to withdraw the pipes from the tube well as per the instructions of the I in charge he will he paid

- as per schedule of rates of the department.

In case of dispute for un unforeseen or overlooked item the decision 01 die I will be final and binding to the contractor.

- Mode of measurements & payment

The rate shall be for a unit of One Job.

#### **ITEM NO.4A**

**Supply of 200 mm dia PVC casing pipe 'CM' type**

**OR**

#### **ITEM NO.4B**

**Supply of 200 mm dia. UPVC casing pipe 'CM' type with slotting.**

**(II) Size: 1.0 mm Regular**

This work shall consist of providing and lowering of PVC casting pipe in over burden strata.

## **MATERIALS**

Best quality of PVC casing pipe made of PVC confirming IS 4985 shall be supplied.

The pipe shall be of best quality and of approved brand and manufacturer.

- 1.1. Specials shall be provided and fitted as per site requirements and shall be of approved brand and manufacturer and of best quality.

## **2.0 WORKMAN SHIP**

2.1. The PVC casing pipe of specified diameter shall be fixed as directed by Engineer in charge.

2.2. Due allowance shall be made for thermal expansion of rigid PVC casing pipe in all pipe lines for any change in length of pipe line which may occur during installation or when pipe line is in service.

2.3. PVC casing pipe line shall be jointed with the use of necessary solutions and fittings or specials as directed by Engineering in charge.

2.4. The joints of the PVC casing pipe lines shall be filled with adhesive solution of approved make as directed by Engineer in charge.

2.5. The PVC casing pipe shall be in full length as per manufacturers specified length.

2.6. All PVC casing pipe shall be lowered in bore in true line and alignment.

2.10 All PVC casing pipe shall have wire ball over carded or cowel when ventilating pipes are carried in pipe shaft the shaft shall be of minimum size of 1 meter If the shaft are also used to give light and air to road the ventilating pipes must be carried out to a horizontal distance at roof line not less than five meter from the site of the shaft.

## **3.0 MODE OF MEASUREMENT & PAYMENT:**

3.1. The unit rate PVC casing pipe shall include the cost of all materials, tools and plant required for mixing, lowering in bore hole in position, all required specials and jointing adhesive compound, finishing as per direction of the Engineer-in-charge and all other incidental expenses for producing pipe line work of specified diameter to complete the structure or its components as shown on the drawings and according to these specifications. They shall also include the cost of making, fixing and removing of all scaffolding and forms required for the work.

The rate of PVC casing pipe line shall include the cost of all labour, materials tools and plant scaffolding and all incidental expenses as described herein above.

3.2. The PVC casing pipe line work shall be measured for its length limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one running meter.

1.3. The payment will be made on **running meter** basis of the finished work.

## **ITEM NO.5**

**Bore clamps made from MS plate with 03 holes on either side with nuts & bolts of standard make & size 900 mm x100 mmx16 mm suitable to 250 mm dia. Pipe**

**Materials& Workmanship :-**The bore clamps mode from M.S Plate and its size should be 900 mm x 100 mm x 16mm plate of best quality with 3 hole M.S clamps should either side with remaining nuts. bolts

washer as required . This M.S clamps should be first of all approved the engineer 1n Chan Ye. The rate includes the cost of materials and labour required for this item.

**- Mode of measurements & payment**

The rate shall be for a unit of One Pair.

**ITEM NO.6**

**Supply of Bore plug having 100 mm height made from M.S. Plate with 3 hole sate qual distance on circumference for nut-bolts type, locking arrangement with nut-bolts & lock nuts of std. Make complete from 5 thick M.S. Plate(For Tap also) suitable for 200 mm dia pipe**

**Bore Plugs :**

Bore plugs shall be manufactured from 05 mm thick MS plate of best quality y suitable to 200 mm and 250 mm dia. size MS ERW pipes as the case may be. Circular MS plate of minimum 05 mm thickness shall be welded properl y at 05 mm thick MS top plate. Overall height of plug shall be 100 mm inclusive of top plate. Bore plug shall have 5/8 “ size 03 holes drilled properly equidistant on circumference (peri phery of plug) and 5/8” size nuts shall be welded onto the hole. 5/8” size 03 numbers of fully threaded bolt of adequate length of standard quality shall be provided with each bore plug. Material shall be coated with red oxide primer to prevent the rusting. Bore plug made of UPVC pipe as per relevant IS of 100 mm height is to be supplied as per site requirement. It shall be manufactured by reputed company & shall be of good quality.

**ITEM NO.7**

**Supply of Bail plug UPVC of standard make suitable for 200 mm dia pipe.**

**General**

This work shall consist of providing and lowering of PVC casting pipe in over burden strata.

**MATERIALS**

Best quality of PVC casing pipe made of PVC confirming IS 4985 shall be supplied.

The pipe shall be of best quality and of approved brand and manufacturer.

- 1.1. Specials shall be provided and fitted as per site requirements and shall be of approved brand and manufacturer and of best quality.

**2.0 WORKMAN SHIP**

2.1. The PVC casing pipe of specified diameter shall be fixed as directed by Engineer in charge.

2.2. Due allowance shall be made for thermal expansion of rigid PVC casing pipe in all pipe lines for any change in length of pipe line which may occur during installation or when pipe line is in service.

2.3. PVC casing pipe line shall be jointed with the use of necessary solutions and fittings or specials as directed by Engineering in charge.

2.4. The joints of the PVC casing pipe lines shall be filled with adhesive solution of approved make as directed by Engineer in charge.

2.5. The PVC casing pipe shall be in full length as per manufacturers specified length.

**2.6.** All PVC casing pipe shall be lowered in bore in true line and alignment.

**2.10** All PVC casing pipe shall have wire ball over carded or cowel when ventilating pipes are carried in pipe shaft the shaft shall be of minimum size of 1 meter If the shaft are also used to give light and air to road the ventilating pipes must be carried out to a horizontal distance at roof line not less than five meter from the site of the shaft.

### **3.0 MODE OF MEASUREMENT & PAYMENT :**

**3.1.** The unit rate PVC casing pipe shall include the cost of all materials, tools and plant required for mixing, lowering in bore hole in position, all required specials and jointing adhesive compound, finishing as per direction of the Engineer-in-charge and all other incidental expenses for producing pipe line work of specified diameter to complete the structure or its components as shown on the drawings and according to these specifications. They shall also include the cost of making, fixing and removing of all scaffolding and forms required for the work.

The rate of PVC casing pipe line shall include the cost of all labour, materials tools and plant scaffolding and all incidental expenses as described herein above.

**3.2.** The PVC casing pipe line work shall be measured for its length limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one running meter.

**1.4.** The payment will be made on **running meter** basis of the finished work.

### **ITEM NO.8**

**Supply of gravels of selected size 4 mm to 6 mm  
- Workmanship**

**The gravel selected for packing tube wells shall consist of hard parts (about 96% SiO<sub>2</sub>) or other suitable material, with an average specific gravity of not less than 2.5. Not more than 10% by weight of the material shall have a specific gravity of less than 2.25. the gravel shall contain not more than 2% by weight of thing flat or elongated pieces. In case of such pieces, the larger dimensions shall not be more than 3 times the smallest dimension. The quartz shall be of sub rounded to rounded grains with minimum angular features.**

**The gravel for use as pack shall be free from impurities, such as shale, mica, feldspar, clay, sand, dirt, loan, hematite and organic materials.**

#### **Porosity**

The porosity of the gravel when laid as a pack shall not be less than 25%.

#### **Gravel Sizes**

The gravel conforming to this standard shall be of the following grades:

Sr. No	Grade	Pack	Particle size Range (mm)	IS Sieves (See IS: 460 – 1962) (mm)
1	A	Fine gravel	Over 2.00 to 3.35	2.0, 3.35
2	B	Fine gravel	Over 3.35 to 4.75	3.35, 4.75
3	C	Medium gravel	Over 4.75 to 6.3	4.75, 6.3
4	D	Medium gravel	Over 6.3 to 8.0	6.3, 8.0
5	E	Coarse gravel	Over 8.0 to 12.5	8.0, 12.5



For determination of the particle size the corresponding sieves, selected from IS : 460 – 1962, shall be used.

### **Particle Size Distribution**

The particle size distribution of gravel shall be determined by screening through standard sieves in accordance with IS: 460 – 1962. The percentage distribution of the sizes shall be determined from a graph in which the percentage of materials passing through each sieve is plotted against the standard aperture of that sieve. Any size, say D20, will thus indicate that the cumulative weight of the grains smaller than this size is 20% of the total weight of the test sample.

The uniformity co-efficient of the gravel, i.e., the ratio of its D-60 to D-10 shall not exceed 2. A material with uniformity co-efficient less than 2 shall be classified as uniform and if greater than 2 it shall be taken as non-uniform.

The limiting sizes given as per above table. The minima and maxima and the stacks containing smaller or bigger size as shown by sieve analysis shall be rejected.

### **Hardness**

The gravel shall have a hardness of not less than 5 Moh's scales.

hardness of not less than 5 Moh's scales.

### **Pack Aquifer Ratio**

The pack aquifer ratio (P / A ratio) is defined as the ratio of 50% size (D50) of the gravel pack to the 50% size of the aquifer. The size of gravel when used as pack in tube wells shall be decided in accordance with the size of the aquifer material proposed to be tapped. The gravel size shall be limited as below:

- ☐ Uniform aquifer with uniform gravel pack - Pack aquifer ratio – 9 to 12.5
- ☐ Non – Uniform aquifer with uniform gravel pack - Pack aquifer ratio – 11 to 15.5

The thickness of gravel pack shall be limited to 13 to 18 cm.

However the artificial gravel pack may not be necessary if the effective size (D10) of the aquifer is greater than 0.3mm & its uniformity co-efficient is greater than 5.

Payment shall be made in m<sup>3</sup> for the gravels actually packed.

**The rate shall be for a unit of One Cubic meter.**

## **ITEM NO.9**

### **Electro logging of pilot bore**

#### **Workmanship**

Department logger as per standard practice conducts this test till the contractor should inform well in advance to Engineer in charge for the above test after completion of 250mm dia pilot bore hole. In no case logging test in pilot bore hole exceeding 300mm dia. Size shall be carried out. The logging electrode must reach at specified depth of bore hole as stated in the schedule. Otherwise logger operator can ask for carried out. The charge for second time logging should be recovered from the contractor, as the full depth of bore hole could not be logged due to not having smooth and clean bore hole as certified by in charge logger operator (Hydrologist/Jr. Geologist). In case of drilling area having sticky/plastic clay strata where contractor has drilled pilot bore of 300 mm dia. R.R. Bit for successful logging operation. Even if the logging is not possible in 300 mm dia. Because of expanding nature of clay, the agency is not required to pay the re-logging charges. The payment for electro logging test as per actual of Government office should be paid by the Contractor.



- Mode of measurements & payment  
The rate shall be for a unit of One Job.

#### **ITEM NO.10**

##### **Geohydrological ground water investigation charges**

###### **- Workmanship**

Materials & Workmanship:-The job of Geohydrological ground water investigation shall be carried out as per G.W.S.S.B manual. The quality of water shall be tested for all the physical, chemical and bacteriological parameters as normally done for any drinking water sample. The representative of the public head Engineering

laboratory shall collect the water sample for bacteriological analysis. The test will be carried out for a 10 hours minimum of till sand free water is available till cleaning of each zone whichever is later. Contractor in clean polythene bottle of 5 liters capacity should collect water sample two numbers after removal of turbid and sand free water. The discharge will be measured during this test by V notch or any other device to be provided by the contractor and as approved by the Engineer -in- charge for carrying out the test. After developing bore any silting observed should be removed from the tube well by contractor without any delay at no extra cost.

**- Mode of measurements & payment**  
**The rate shall be for a unit of One Job.**

#### **ITEM NO.11**

##### **Water sample chemical analysis charges.**

While the details of sampling, testing and analysis are beyond the scope of this handbook, what follows is a general description of the significance of water quality tests usually made.

Testing procedures and parameters may be grouped into physical, chemical, bacteriological and microscopic categories.

- *Physical tests* indicate properties detectable by the senses.
- *Chemical tests* determine the amounts of mineral and organic substances that affect water quality.
- *Bacteriological tests* show the presence of bacteria, characteristic of faecal pollution.

Major Test Conduct as under.

*Physical tests*

*Chemical tests*

*Bacteriological tests*

*Investigative analysis*

*Test case*

*Water treatment methods*

*Primary treatment*

*Secondary treatment*

*Complete treatment*

**- Mode of measurements & payment**

**The rate shall be for a unit of One Number.**

## **SCHEDULE-B-10.2**

### **Pumping Machinery For Borewell**

#### **ITEM NO.1**

**Providing submersible pump set confirming to IS 9283 working at 3 phase , 400 / 440 volt , 50 cs / sec AC supply & 2900 RPM , category 8.0 with discharge : 800 LPM @ 72.0 Mtr head with 25.0 HP including GST**

**1.1. GENERAL** ♣ Pumps should be multistage, centrifugal type, Vertical directly coupled to wet type submersible motor for Pumping ground water from deep wells. ♣ Max. permissible quantity of suspended sand content of 25g/m<sup>3</sup> of water. ♣ Liquid Temperature (min.) 30-40°C ♣ Relativity humidity 60-80% ♣ Pump Sets must comply with the latest E.U and I.S.O. standards. ♣ Manufacturer authorization letter, Certificates of compliance, and ISO or other certificate should be submitted along with bid offer. ♣ Suitable diameter of each pump/motor over the cable for use in 10 & 8 inch diameter Well Casing.

**1.2. PUMP PERFORMANCE** ♣ Pump performance curves should be indicated and clearly seen. ♣ Duty point flow rate and head for each pump must be within application range recommended by manufacturer. ♣ Guaranteed Pump efficiency at design flow should be equal or greater than 65%. ♣ Actual pump operational point should be between 110-80% of BEP. ♣ NPSH required should be less than 4m.

**1.3. MATERIAL OF CONSTRUCTION** ♣ Impellers should be made of abrasion resistant bronze or stainless steel; statically and dynamically balanced. ♣ Main pump body should be made of corrosion resistant, Zinc free, closely grained cast iron or casted stainless steel. ♣ Pump shaft, coupling, suction grid & retaining valves should be made of stainless steel( SS310 /SS316 or higher class SS). Non-returning valve with Strainer incorporated with the pump. ♣ Pump tightening bolts and lock nuts should be made of stainless steel. ♣ If lower grade material is used, it is not acceptable and results in rejection from bid competition.

**1.4. INSTALLATION POSITION:** • Built for vertical installation.

**Mode of measurements & payment**  
**The rate shall be for a unit of One Set.**

#### **ITEM NO.2**

**Providing 21-30 HP ATS starter suitable for local & remote pump control application consisting of MPCB , over load relay and contactors as per type II coordinatio including digital voltmeter , analogue ammeter with selector switch , run hour meter , required protectiv erelays & control accessories including GST.**

##### **A. General Requirements**

1. The starters of shall be of auto transformer type as required suitable for a squirrel cage induction motor 400, 50Hz, 3 phase. The starting steps shall be such that the maximum starting current does not exceed two and half times the motor rated current and tapping of 70%.
2. Each motor shall compromise the following :
  - a. Automatic molded case circuit breaker 50 kA rated short circuit breaking capacity (1.2 of rated capacity), NEMA CLASS 10, provided with adjustable thermal and magnetic trip points
  - b. Starting, bridging, and running contractors as required (AC3 CATEGORY).

- c. Starting auto transformer with 70% trapping.
  - d. All protection and control relays for the pump sets as specified.
  - e. All alarm indication lamps for the pump set as specified.
  - f. Re-settable audible and visible alarm system for all faults.
  - g. Electronic overload relay as specified.
  - h. Delay on timer with range of 0.5 sec to 10 sec.
3. The main step and star contractors shall be selected in accordance with utilization category AC3 at 400 VAC, (100%, 70%, 35% of rated power respectively).
  4. The electronic overload protection relay, of the suitable adjustable range, shall be installed between the running contractor and motor (with or without current TFs According to situation). The overload range shall be approximately from (80%) ~ (120%) of the nominal current rating of the motor.
  5. The starting auto transformer shall be rated to stand a minimum of four starts per hour at an ambient temperature of 50°C.
  6. The motor starter shall incorporate the following protection instruments:
    - Adjustable SOLID STATE electronic overload protection.
    - Dry running protection relay with a sensitivity equals to or more than 100 K-OHM.
    - One power monitor relay which shall trip in case of
      - a- Incorrect phase sequence
      - b- Over voltage +10% of rated voltage.
      - c- Under voltage -10% of rated voltage.
      - d- Phase failure.
    - Motor thermal protection relay, to protect the motor from overheating. Computable with the sensor provided in the motor winding which must be (3-wire) PT100 resistor sensor as following:
      - a- Digital indication.
      - b- Adjustable from 0c to 100c, trip on 70c.
      - c- Two change over contacts.
      - d- Apply on 3-wire resistor sensor.
      - e- Supply voltage 220v-230v, 50Hz.
    - Thermal protection relay with micro thermal Contact, to prohibit starting the motor when the Auto transformer is overheated, and to protect the Auto transformer.
  7. Separate current transformers shall be provided for protection and instrumentation duties. The rated burden shall be as needed by the instrumentation and/or protection, but not less than 10VA.
  8. Fuses and links shall be grouped where appropriate according to these functions and shall be clearly marked both on panels and the associated wiring diagrams.

9. Auto transformer shall have the following features:
  - a- Air cooled design.
  - b- The core and coil shall be twice impregnated under vacuum in high temperature grade.
  - c- It shall be designed and tested to meet the requirements of IEC 292-4 for 50°C ambient temperature.
  - d- Starts per hour 4 times, 10sec. Each.
  - e- Phase :3
  - f- Transformation ratio 400/280 Volts, tapping 70%.
  - g- PTC resistor sensor or Micro-thermal contact shall be interested in the Auto-transformer winding, to protect it against overheating.
  - h- Insulation class: F.
10. The starter shall be fully assembled by the manufacture, and where modifications such as addition of extra protection devices or indications are required, these modifications shall be performed in a similar manner by the original equipment manufactures, In such case full details of modifications and circuit diagrams shall be provided.
11. Each starter shall have its own dry running sensor (installed on the suction of its pump i.e. each pump) and its own dry running relay inside the starter panel. This protection shall be independent from that low water level or dry running installed in the reservoir, which shall be connected in series with them as a protection.
12. All power circuits in the A T ST, shall be protected by molded case circuit breaker (MCB) which has adjustable thermal, magnetic trip units and short circuit breaking capacity not less than 50 kA, unless otherwise specified elsewhere and shall comply with IEC publications 157-1, 292, and 947.  
NEMA CLASS 10.
13. Control circuit in the A.T.S.T shall be protected by miniature circuit breakers (MMCB) with current limiting feature, and I.C not less than 6 kA according to IEC 157-1, P1, (or fuse if approved by WAJ).
14. Complete circuit diagrams shall be provided together with service instructions, and spare parts list for all components used in the starter panel, and they shall be supplied in a transparent plastic case inside a pocket on the backside of the panel door.
15. The manufacturer should conduct the required tests on each starter as per IEC 439-1:1990, and the test should be witnessed by WAJ representative at the supplier workshop/ or factory. The required tested are (but not limited to) the following:
  - a- Visual inspection
  - b- Mechanical inspection
  - c- Operation test
  - d- H.V test: 2.5 kV for 1 min.

e- Insulation (megger) test.

f- Primary injection test.

16. Secondary injection test (for measuring instruments and protection). The manufacturer shall submit with the panels test report (certificate) for each panel showing that the starters were completely tested, and setting of relays were adjusted.
17. All this protection device including the starter shall be labeled comprehensively for all wires, cables, devices, etc with elastic rubber tireless and rigidly-fixed labeled terminal bars for the out going wires out of starters, all in approved execution of the Engineer & WAJ.
18. The supplier shall provide with his bid a detailed list(s) of all components (see please enclosure no. 1), whether major or minor, which shall be incorporated in his offer and in the starter. Failure to provide such list(s) shall result in the rejection of the bid.

#### **B. Starter Construction**

1. The motor starter shall be housed in a suitable factory built assemblies "FBA" complying with IEC 439-1 : 1990, FBA shall be of cubical type the front of which shall have a smooth well finished surface.
2. The FBA shall be manufactured to high standard from steel sheet minimum thickness 2 mm and shall be adequately braced to give a rigid structure. Adequate removable eye bolts for lifting purpose shall be provided.
3. Access to the cubicles compartment for all normal routine maintenance shall be from the front by hinged and lockable doors secured with cam type fasteners and cylinder locks with removable key. Hinges shall be of substantial size and stops shall be provided to prevent doors touching adjacent cubicles. Other access shall be by means of bolted panels. The maximum width of any door shall be 800 mm.
4. Protection category of starters' enclosures shall be at least IP54 according to IEC publication 529-10/91.
5. All cables and piping shall be made through glands in a plate covering the base of the cubicles.
6. The base plate shall be of non magnetic material to avoid electric heating.
7. All the wiring, instruments, devices and all parts of the panel shall be facing the front of the panels, i.e. it shall not be needed to go to the rear of the panels to do anything to it, anytime (for dismantling, maintenance, reinstallation, etc. ).
8. The auto transformer shall be fixed in a way that its longitudinal axis parallel to the rear plate of the panel.
9. Each starter panel shall enclose all related devices (i.e. equipment contactors, relays, controls, etc) no devices related to the started to the starter shall be installed outside the starter enclosure, unless otherwise specified.
10. Unless otherwise mentioned elsewhere or approved by the

engineer, the minimum facial width of the starter shall not be less than (60) cm, and the depth shall not be less than (30) cm. the height shall be approved initially by the Engineer according to the power rating of the starter.

11. Components shall be mounted in a way to prevent mechanical shocks transmitted from large components to small components and there by adversely affecting their roper functions. The components shall be so arranged to give adequate accessibility for maintenance and for removal of any one component with the minimum disturbance to the wiring. All bolts, nuts, hinges, handles, etc., shall of galvanized or stainless steel, cadmium plated steel, or chrome - planted steel as appropriate.
12. The internal wring of all cubicles shall be completed before delivery.
13. interlocks of a substantial mechanical type shall be provided in each cubicle between the door and the door and the circuit breaker so that the door cannot be opened unless the circuit breaker is in the OFF position and all live parts, which can accidentally touched, have been disconnected.
14. The design of each motor control switchboard shall also comply with the requirements of class 3 equipment of BS 5486 (clause N 21.3). The outline of this requirement is as follows:

Class 3 the whole busbars, including the conductor connecting the busbars to each outgoing unit shall be arranged withstand a short circuit at any point.

15. The FBA shall be designed to withstand any external fault. In the event of any internal arcing fault on a function unit, the damage should be confirmed to that unit so that the busbar and all other function units remain fit for further service. However, the conductors connecting the busbar to the outgoing unit might be damaged by the internal arcing fault.
16. Starter's contractor interconnections (wiring). The maximum ampere loading for the power inter - connectors between main, step, and star contactors shall not be rated more than (2.5) amp/mm<sup>2</sup> , (the bigger cable or busbar cross section shall be installed in case the computed cross section is not available).
17. All the input inter- connectors for the main, step (bridging) and star contactors in starters of power (200) kW and above shall e insulated cooper busbars.
18. For starters of power less than (200) kW, the input and output inter- connectors for the contactors (main, step and star) shall be PVC insulated Cu cables.
19. Every starter panel with height less than 1600mm shall have an empty metal base covered from the sides for a height not less than 30cm in which nothing shall be installed. There must be left additional 30 cm over that base to install any connection bar or terminal L bar for cables to the panel C.B. and for the outgoing cables to the motor.

For free standing enclosures with height 1800 mm and above, a 100 mm steel plinth be installed.

### C. Controls, Indication & Alarms:

1. The operating push buttons, switches, or handles of all circuit breakers, motor starters, isolators, etc. shall be located on the doors of the cubicles, and there shall be visual indications of the "ON" and "OFF" position.
2. All operations of fault and alarm circuit shall be clearly and individually indicated on the front of the switchboard by lamp operation.
3. Fault and alarm indication lamps shall remain ON until the cause has been cleared and the system has been manually reset.
4. The front of the starter panels shall contain the following signaling, controls and instruments:
  - a- A set of "ON" and "OFF" push buttons.
  - b- One voltmeter 0-500VAC with selector switch to monitor the 3 phases + neutral voltages.
  - c- Three ammeters "one per phase" with double scale.
  - d- One running hours recorder without resetting facility to record up to 9999 hours.
  - e- Indication lamps to show the following:
    - Motor "ON" and "OFF" and "FAULT".
    - The motor is overloaded.
    - Low water level trip.
    - Motor winding high temperature trip.
    - Auto transformers winding high temperature trip.
    - R-S-T indication lamps (for A.T.ST. 350 kW and above).
  - f- One operating pulses recorder or meter (digital type) for starts count.
  - g- One stay-put push button for emergency stopping.
  - h- One audible alarm Re-settable buzzer for all faults.
5. Indication lamps and push buttons shall be colored as follows:

Indicating Lamp	Color
ON	Green
OFF	Red
Fault	Red
Alarms	Yellow
Heaters	Blue

Push Buttons	Color
Start	Green
Stop	Red
Alarm Accept	Black or White
Emergency Stop	Red
Horn Silencer	Yellow

6. Each indicating lamp shall be of illuminated push-button type, in order to incorporate a push-to-test feature (centralized lamp test is not accepted).
7. For the purpose of remote indication, voltage free contact shall be provided to duplicate the ON, OFF and fault indications. The contacts shall be wired to outgoing terminals

and shall be rated for 2 Amps at 24 volts DC.

**Documentation and Attachments:**

The bidder shall specify relevant standards used in the materials, the major component must be supplied from a manufacture which have an ISO 9001 certificate which should be valid and awarded for not less than one year. The attached details sheet must be completely filled for every item.

**Mode of measurements & payment**  
**The rate shall be for a unit of One No.**

**ITEM NO.3**

**Providing flat PVC copper submersible cable conforming to IS 694 , IEC 60227 / 60228 of size 1 x 3 x 10.0 mm<sup>2</sup>**

Temperature range lies between -15°C to +70°C

**Conductor**

Conductor are made from electrolytic grade with More than 100% conductivity and >99.95% purity copper material. Copper rod is converted into fine wires and annealed for better flexibility, then bunched together at uniform lay length to form circular shape and to meet required resistance as per standards. Conductors are made as per IS 8130-2013 and also compile to IEC 60228 , As per customer requirements tin coated copper conductors also shall be used.

**Insulation**

CWI procures the PVC granules with stringent quality requirements to meets all standard requirements 100% , at any testing laboratories. Insulation material are generally confirms to IS 5831, IEC 60227 standards and insulation process are controlled with automatic feedback system to maintain uniform diameter.

Insulation thickness are provided adequately to meets standard requirements, PVC material ensured for high thermal stability, good electrical and mechanical properties in ageing also. PVC Insulated wire passed through High voltage spark tester to ensure no puncture at insulation process due to foreign material mix up in extrusion or insulation defects due to any other reason

**Sheath**

PVC Insulated core additionally protected with PVC Sheath material (Type -ST1). Sheath also covered with uniformed thickness at entire length, continuously dimension are monitored with laser diameter indicator and controller, based on dimension extrusion will be controlled and dimension uniformity maintained. These cable are fire resistant, cost-effective and also has excellent ageing properties.

**Feature**

1. High conductivity
2. Good Current carrying capacity



3. Low conductor resistance
4. High Insulation resistance
5. High mechanical strength
6. Resistant to oil, chemical
7. Excellent ageing properties
8. Flexible and easy to install

**Application**

These cables are produced with rigid manufacturing, quality control with flexible conductor's to sustain complete immersion in water and protection against rain water which is mainly used in Pump connections, industrial applications.

**Mode of measurement shall be on unit Running Meter base.**

**ITEM NO.4**

**Providing heavy duty UPVC Column pipe as per IS - 1239 with couplings , threaded at both ends of size 80 mm dia.**

*The work shall be carried out as per instruction of Engineer in charge.*

**ITEM NO.5**

**Lowering of submersible pump set complete with required no sand size of column pipe erected by means of proper chain pulley block and pipe wrenches after checking of threads of each pipe and coupling to take the load of the pump set and pipe assembly filled with water up to 90 mtrs.**

Lowering of submersible motor set to be done with proper chain pulley in presence of Engineer-In-Charge. After checking the thread of each pipes with joint the each other for taking the load of motors. Pipe assembly filled up to with water so in future motor or other parts work properly and there is no chances of short circuits with water. Lowering should be done by a skilled labor of lowering pipe.

**Mode of measurement**

**Payment shall be made for each Bore as a Job Item.**

**ITEM NO.6**

**Providing & fitting pipe type earthing having 150 cm long and 25 mm dia G I pipe with coupling & buch buried in specially prepared earth pit complete with necessary 8 SWG G I earth wire including using charcoal / coke and salt in required quantity.**

**1.0 GENERAL**

All the non-current carrying metal parts of the electrical installation and mechanical equipment's shall be earthed properly. The cables armored and sheath, electric panel boards, lighting fixtures, ceiling and exhaust fan and all other parts made of metal shall be bonded together and connected by means of specified earthing system. An earth continuity conductor shall be installed with all the feeders and circuits and shall be connected from the earth bar of the panel boards to the conduit system, earth stud of the switch box, lighting fixture, earth pin of the socket outlets and to any metallic wall plates used. All the enclosures of motors shall be also connected to the earthing system.

**2.0 SCOPE OF WORK**

The scope of work shall cover supply, laying, installation, connecting, testing and comm. of :

Earthing station with G.I / Copper plate of size as given in BOQ.

Earthing G.I / Copper strips from earthing station to equipotential bar.

Earthing G.I / Copper strips / wires from equipotential bar to power panels, DBs, motors etc.

Bonding of Non-current carrying parts, and metallic parts of the electrical installation.

### **3.0 STANDARDS**

The following standards and rules shall be applicable:

- 1) IS: 3043 - 1966 Code of practice for Earthing.
- 2) Indian Electricity Act and Rules
- 3) IEEE 80

All codes and standards mean the latest. Where not specified otherwise the installation shall generally follow the Indian Standard Code of Practice or the British Standard Codes of Practice in absence of Indian standard.

### **4.0 TYPE OF EARTHING STATION**

#### **4.1 PLATE EARTHING STATIONS**

The Equipment neutral earthing shall be with copper plate earthing station and equipment body earthing shall be with hot dip galvanized iron earthing station. The plate electrode shall be 600 x 600 x 3.25 mm copper plate for neutral earthing and shall be of hot dip galvanized iron plate having dimensions 600 x 600 x 6.3 mm thick for body earthing.

The other earth stations shall be as per the standard drawing in IS 3043.

The earth resistance shall be maintained with suitable soil treatment as shown in the drawing.

The collective resistance of each earth station should not exceed 1 ohm.

The earth lead shall be connected to the earth plate through Hot Dip G.I. bolts.

The earthing conductors shall be of copper strip in case of copper earthing and hot dip galvanized iron strip in case of G.I. earthing.

G.I. pipe with funnel of approved quality shall be used for watering the earthing electrodes / stations.

The block masonry chamber with chequered plate shall be provided for housing the funnel and the pipe for watering the earthing electrodes / stations.

The hardware and other consumables for earthing installation shall be of copper/brass in case of copper earthing and shall be hot dip galvanized iron material in case of G.I. earthing.

Test link / test pit cover through chequered plate.

#### **4.2 PIPE ELECTRODE EARTH STATION:**

The earth station shall be as shown on the drawing and shall be used for equipment earth grid and / or street light pole earthing.

The earth electrode shall be 3 M long 50 mm dia class "B", Galvanized steel pipe.

The earth resistance shall be maintained with a suitable soil treatment as shown on the drawing.

The total earth resistance should not exceed 1 ohm.

The earth lead shall be fixed to the pipe with a nut and safety set screws. The clamp shall be permanently accessible.

The earthing grid and the earthing conductor shall be hot dip Galvanized iron strips of the size as shown in the drawing.

G.I. pipe with funnel of approved quality shall be used for watering the earth electrode \ station. Alternatively, maintained type earthing with ground enhancing materials shall be provided to meet the required effective earth resistance value.

The block masonry chamber with chequered plate shall be provided for housing the above referred funnel and pipe.

The hardware and other consumables for earthing installation shall be hot dip Galvanized iron material as shown on the drawing.

**5.0 METHOD OF MEASUREMENT:** Provision of earthing station complete with excavation, electrode, watering pipe, soil treatment, masonry chamber with cast iron cover etc. shall be treated as one unit of measurement.

The following items of work shall be measured and paid per unit length covering the cost of the earth wires / strips, clamps, labor etc.

- a) Main equipment earthing grid and connection to the earthing station.
- b) **Mode of measurement**
- c) **Payment shall be made for each Bore as a Job Item.**

#### **ITEM NO.7**

**Supply & installation of ISI mark C I double flanged hand wheel / cap operated sluice valve (PD type short body ) confirming to IS 14846 of PN 1.0 of 80 mm dia. Size & for supply,**

##### **1 General**

The contractor shall be covering manufacturing, supplying and delivery of: Sluice valve conforming to IS: 2906-1984 & IS: 780-1984 or its latest revision (Specification for sluice valves (50 to 900 mm size) with ISI certification. Flanges shall be machined on faces and edges to ISO 7005, is 6392 or BS 4504.

- a) They shall be non-rising spindle type. The valve shall be furnished bushing arrangement for replacement of packing without leakage .they shall also have renewable channel and shoe linings. The gap between the shoe and channel shall be limited to 1.5 mm.
- b) The gate face rings shall be securely pegged over the full circumference.
- c) Valve of 450mm and above shall be provided with thrust bearing arrangement for case of operation.
- d) Valve of diameter 450 mm and above shall be provided with enclosed gear arrangement for case-of operation. The operation gear of all valves shall be such that they can be opened and closed by one man-against an unbalanced head 15 % in excess of the maximum specified ratio. Valve and any gearing shall be such as to permit manual operation in a reasonable time and not exceed a required rim pull of 400 N.
- e) All valves, spindle and hand wheels shall be positioned to give good access for operational personnel.
- f) All hand wheels shall be arranged to turn in a clockwise direction to close the valve, the direction of rotation for opening and closing being indicated on the hand wheels.

- g) Valves shall be double flanged type and the face shall be parallel to each other and flange face should be at right angles to the valve centerline. Backside of valve flanges shall be machined or spot faced for proper seating of the head and nuts.
- h) Valves buried or installed in underground chamber, where access to a hand wheel would be impracticable, shall be operated by means of extension spindle and/ or keys.
- i) Valves shall be suitable for frequent operation as well as operation after long periods of idleness in either open or closed position.
- j) The valve stem, thrust washer, screws, nuts and all other components exposed to the water shall be of a corrosion resistant grade of stainless steel.
- k) Valves shall be free from sharp projections.
- l) Butterfly, Non return valves and rising spindle sluice valves shall be provided with bypass arrangement. This may be integral with valve or connected between pipes. SUITABLE SPECIALS LIKE TAPER/ DISMANTLING JOINTS FOR VALVE SIZE EQUAL TO 500 MM OR MORE SHALL BE PROVIDED.

## **2 Standards**

The C.I. sluice valves to be manufactured, supplied and delivered under the scope of this contract shall be manufactured in accordance with and conforming to Indian standard specifications as given below with ISI certification mark on each sluice valves.

## **3 Temperature Variation**

All sluice valves manufactured, supplied and delivered shall be subjected to drinking water under variable temperature condition ranging from 4° to 45° C

## **4 Marking**

The legible and in deniable marking upon each valve shall indicate the following:

- (1) ISI certification mark on each sluice valve.
- (2) Manufacture's brand name and/or trade mark.
- (3) Size of valve and nominal pressure of valve.
- (4) Serial number of cast.
- (5) Serial number in punch
- (6) Where a valve has been tested for only open end test, it should be marked 'O' distinctly and permanently.
- (7) Any other important matter that the manufacturer deems fit to be inscribed embossed.

## **5 Test Certificate**

- 5.1 The contractor shall always provide manufacture's test certificate in accordance with every batch/ lot as valves so manufactured and supplied.
- 5.2 The contractor shall also produce; in addition to manufacture's test certificate the inspection certificate issued by the authorized person /agency appointed by Engineer/owner for the same purpose. The inspection charges of the authorized person/agency as fixed by the owner shall have to be borne by the contractor and

the necessary payment to the inspecting agency shall be paid by the contractor as per the terms and condition of the owner.

## 6 Nominal Pressure

6.1 Sluice valves shall be designed by nominal pressure (PN) defined as the maximum permissible gauge working pressure in Mpa as “PN-I” (Mpa= 10 kgf/m<sup>2</sup> approx)

Class of Valve	Working pressure of body	Working pressure for seat
PN 0.6	5 kg/sq.cm	9 kg/sq.cm
PN 1.0	10 kg/sq.cm	15 kg/sq.cm
PN 1.6	16 kg/sq.cm	24 kg/sq.cm

6.2 The nominal size shall refer to the nominal bore at any point, shall not be less than the nominal size required.

## 7 Material:

7.1 The materials for the different component parts of the sluice valve shall confirm to requirements given in Table.

Materials for components parts of sluice valve

Sr. No	Component	Material	Ref. to	Grade or designation
1	Body, bonnet dome, wedge, stool cover, stuffing box, gland thrust plate, cap, hand wheel.	Grey cast iron	210 1978(1)	FG-250
2	Stem	High tensile brass	320-1980(2)	HT - 2
3	Wedge nut	Leaded tin bronze	318-1981 (5)	LTB-2
4	Body seat ring, wedge facing ring	Leaded tin bronze	318-1981 (5)	LTB-2
5	Bolts	Carbon steel	1363-1967(7)	Class 4.6
6	Nuts	Carbon steel	1367-1967(7)	Class 4
7	Bonnet gasket	Compressed fiber Board	2712-1979(8)	C
8	Gland packing	A) Jute & hemp B) Asbestos	5414-1969(10) 4687-1980(11)	-- --

- (1) Specification for grey iron castings (third revision).
- (2) Specification for high tensile brass rods and sections (revised).
- (3) Specification for leaded tin bronze ingots and casting (revised).
- (4) Specification for technical supply condition threaded fasteners (first revision)
- (5) Specification for compressed asbestos fiber jointing (first revision)
- (6) Specification for gland packing, jute and hemp.

7.2 Cast Steel double-flanged sluice valve/butterfly valves with two tailpieces suitable to pipe shall be supplied and carted by the contractor as per latest IS. The rate shall include loading, unloading and stacking at site.

7.3 The sluice valve/butterfly valves and tailpieces shall be examined before laying for cracks and other flows. They shall be undamaged in all respect.

7.4 The sluice valves/butterfly valves shall be operated before laying.

- 7.5 All grits and foreign materials shall be removed from the inside of the valves before placing.
- 7.6 All the four faces shall be thoroughly cleaned and coated with a thin layer of mineral grease.
- 7.7 The tightening of gland shall be checked with a pair of inside-calipers. Clearance between the top of stuffing box and the underside of the gland shall be uniform all the sides.
- 8 **Manufacture:**  
Sluice valve bodies for 80 mm to 900 mm size valves shall be provided with Double flanged ends for connection.
- 9 **Flanges:**  
The flanges and their dimensions of drilling shall be in accordance with the requirements given in I.S. 1538 (Part I to XXII) 1976 (Specification for cast Iron fittings for pressure pipes for water, gas and sewage) or its latest revision.
- 10 **Testing:**
- 10.1 **Hydraulic test:**  
Each valve shall be subjected to hydraulic tests as described in Appendix - B of IS: 2906-1984 to the test pressure for a duration as specified in table - 7 of IS: 2906 and shall show no sign of leakage under these tests.
- 10.2 **Liquid Penetration Test:**  
The forged steel stems shall not show any sign of flaw when subjected to liquid penetration flaw detection test in accordance with IS: 3658-1981

The payment shall be as per One Number.

#### **ITEM NO.8**

**Supply & installation of non slam design CI double flanged single door wing type non return / reflux valve conforming to IS 5312 of PN 1.0 of 80 mm size as per specifications Supply as per Details specification same as per item description and as directed by Engineer-in-charge.**

Detailed Technical Specification as per Directed By engineer in charge.  
The payment shall be as per One Number.

#### **ITEM NO.9**

**Providing & fitting M.S. clamps fabricated from M.S. plate with 03 holes on either side with nuts & bolts of standard make and suitable size of 450 mm x 65 mm x 10 mm flat suitable to 80 mm dia M S / Gipipe**

12.1 SCOPE OF WORK: The work covered by this specification consists of furnishing and erecting of structural steel complete in strict accordance with this specifications and the applicable drawings.

12.2 MATERIALS: 12.2.1 All structural steel shall be of standard sections as marked on the drawings and shall be free of scale, blisters, laminations, cracked edges and defects of any sort. If the structural steel is not supplied by the Department and the Contractor is required to bring such steel, the Contractor shall furnish duplicate copies of all mill orders and/ or also the test report received from the mills, to satisfy the Engineer-in-Charge. 12.2.2 All structural steel and electrodes shall comply in all respects with I.S.S. for structural steel.

**12.3 WORKMANSHIP:** All workmanship shall be of first class quality in every respect to the greatest accuracy being observed to ensure that all parts will fit together properly on erection. All ends shall be cut true to planes. They must fit the abutting surfaces closely. All stiffeners shall be fit tightly at both ends. All butt ends of compression members shall be in close contact through the area of the joints. All holes in plates and section between 12 mm. and 20 mm. thick shall be punched to such diameter that 3 mm. of metal is left all around the hole to be cleaned out to correct size by reamer. The base connection shall be provided as shown on drawings and the greatest accuracy of workmanship shall be ensured to provide the best connections. Figured dimensions on the drawings shall be taken.

**12.4 ERECTION AND MARKING:** Erection and fabrication shall be according to I.S. 800-1984 section-11. During erection, the work shall be securely braced and fastened temporarily to provide safety for all erection stresses etc. No permanent welding shall be done until proper alignment has been obtained. Any parts which do not fit accurately or which are not in accordance with the drawings and specifications shall be liable to rejection and if rejected, shall be at once be made good. Engineer-in-Charge shall have full liberty at all reasonable times to enter the contractors premises for the purpose of inspecting the work and no work shall be taken down, painted or despatched until it has been inspected and passed. The contractor shall supply free of charge all labour and tools required for testing of work.

**12.5 DELIVERY AT SITE :** The contractor shall deliver the component parts of the steel work in an undamaged state at the site of the works and the Engineer-in-Charge shall be entitled to refuse acceptance of any portion which has been bent or otherwise damaged before actual delivery on work.

**12.6 SHOP DRAWINGS:** The shop drawings of structural steel based on contract drawings shall be submitted to the Engineer-in-Charge. The necessary information for fabrication, erection, painting of structure etc. must be furnished immediately after acceptance of the tender.

**12.7 PAINTING:** Painting should be strictly according to I.S. 1477-1971 (Part I- Pre-treatment) and I.S. 1477-1 971 (Part II-painting). Painting should be carried out on dry surfaces free from dust, scale etc. The paint shall be approved by the Engineer-in-Charge. One coat of shop paint (red lead) shall be applied on steel, except where it is to be encased in concrete or where surfaces are to be field welded.

**12.8 WELDING:** Welding shall be in accordance with I.S. 816-1969, I.S. 819-1957, I.S. 1024-1979, I.S. 1261-1959, I.S. 1323-1982 and I.S. 9595-1980 as appropriate. For welding of any particular type of joint, welders shall give evidence of having satisfactory completed appropriate tests as described in any of I.S. 817-1966, I.S. 1393-1961, I.S. 7307 (Part-I)-1 974, I.S. 7310 (Part-I)-1974 and I.S. 7318 (Part-I)-1 974 as relevant. REF NO.CMC.T210024 TECHNICAL SPECIFICATIONS 76

**12.8.1 Welding Consumables:** Covered electrodes shall conform to I.S. 814 (Part-I)-1974 and I.S.814 (Part-II)- 1974 or I.S. 1395-1 982 as appropriate. Filler rods and wires for gas welding shall conform to I.S. 1278-1972. The bare wire electrodes for submerged arc welding shall conform to I.S. 7280-1 974. The combination of arc and flash shall satisfy the requirements of I.S. 3613-1 974. The filler rods and bare electrodes for gas shielded metal, arc welding shall conform to I.S. 6419-1971 and I.S. 6560-1972 as appropriate.

**12.8.2 Types of Welding:** Arc welding (direct or alternating current) or Oxyacetylene welding may be used. Field welding may be used. Field welding shall be by D.C.

**12.8.3 Size of Electrode Runs:** The maximum gauge of the electrodes for welding any work and the size of run shall be based on the following tables. Average thickness of plate or section Maximum gauge or diameter of electrodes to be used. Less than 3/16" 10 S.W.G. 3/16" and above but less than 5/16" 8 S.W.G. 5/16" and above but less than 3/8" 6 S.W.G. 3/8" and above but less than 5/8" 4 S.W.G. 5/8" and above but less than 1" 5/1 6"dia. 1" and above thick section 3/8" dia. Note: On any straight weld the first run shall not ordinarily be deposited with a larger gauge electrode than No. 8 S.W.G. For subsequent runs the electrode shall not be increased by more than two electrode size between consecutive runs.

**12.8.4 Welding Contractors:** The contractor shall ensure that each welding operator employed on fabrication or erection is an efficient and dependable welder, who has passed qualifying tests on the types of welds which will be called upon to make. Sample test shall have to be given by the contractor to the entire satisfaction of the Engineer-in-charge.

**12.8.5 Welding Procedure:** a) Welding should be done with the structural steel in flat position in a down hand manner wherever possible. Adequate steps shall be taken to maintain the correct arc length, rate of travel, current and polarity for the type of electrode and nature of work. Welding plant capacity shall be adequate to carry out the welding procedure laid down. Adequate means of measuring the current shall REF NO.CMC.T210024 TECHNICAL SPECIFICATIONS 77 be available either as a part of the welding plant or by the provision of a portable ammeter. In checking the welding current, a tolerance of 10% or 30 amperes from the specified value whichever is less shall be permitted. b) The welding procedure shall be such as to ensure that the weld metal can be fully and satisfactory deposited through the length and thickness of all joints so that distortion and shrinkage stresses are reduced to the minimum and thickness of welds meet the



requirements of quality specified. 12.9 WORKMANSHIP: 12.9.1 Preparation of Fusion Faces: Fusion faces shall be cut by steaming machine or gas cutting and later dressed by filling or grinding so that they shall be free from irregularities such as would interfere with the deposition of the specified size of weld to cause the defects. Fusion faces and the surrounding surfaces shall be free from heavy slag, oil paint or any substance which might affect the quality of the weld or impede the progress of welding. The welding face shall be free of rust and shall have metal shine surfaces. The parts to be welded shall be brought into as close contact as possible and the gap due to faulty workmanship or incorrect fit up shall not exceed 1/16". If separation of 1/16" or more occurs locally, the size of the fillet weld shall be increased at such position by an amount of equal to the width of the gap. The parts to be welded shall be maintained to their correct position during welding. They shall be securely held in position by means of tack welds, service bolts, clamps or rings before commencing welding so as to prevent and relative movement due to distortion, wind or any other cause. 12.9.2 Step Back Method Should be Used to Avoid Distortion : The minimum leg length of a fillet weld as deposited should not be less than the specified size and the throat thickness as deposited should be not less than that tabulated below: Throat Thickness of Fillet Angle between fusion faces 600-900 910- 1000 1010- 1060 1070- 1130 1140- 1200 Throat thickness in cms. 0.70 0.65 0.60 0.55 0.50 In no case should a concave weld be deposited without the specific approval of the Engineer-in-Charge unless the leg length is increased above the specified length so that the resultant throat thickness is as great as would have been obtained by the deposition of a flat. All welds shall be deposited in a pre-arranged order and sequence taking due account of the effects of distortion and shrinkage stresses. REF NO.CMC.T210024 TECHNICAL SPECIFICATIONS 78 After making each run of welding, all slag shall be removed and final run shall be protected by clean boiled linseed oil till approved. The weld metal, as deposited, shall be free from crack, slag, excessive porosity, cavities and other faults. The weld metal shall be properly fused with the parent metal without overlapping or serious undercutting at the toes of the weld. The surfaces of the weld shall have a uniform and consistent contour and regular appearance. In welds containing crack, porosity or cavities in which the weld metal tends to overlap on the parent metal without proper fusion, the defective portions of the welds shall be out cut and re-welded. Where serious under cutting occurs, additional weld metal shall be deposited to make good reduction. Testing of welded joints shall be done as per relevant IS codes 3600, 3613, 4260, 7205, 7215, 7307, 7310, 7318. 12.10

**MODE OF MEASUREMENT:** All structural steel shall be measured on weight basis in metric tonnes or quintals or kgs. as mentioned in the schedule of quantities. The length or areas of various members including gusset plates shall be measured correct to two places of decimals and the net weight worked out from the standard steel tables approved by Indian Standard Institution. No separate measurements shall be taken for welding, riveting, bolting, field connections etc. The rate shall include cost of all labour, materials, scaffolding, and transport and also cost of welding, riveting and bolting, field connections if any all to complete the job as per specifications.

### **ITEM NO.10**

**Approved make ELCB / RCCB conforming to IS 12640 and having sensitivity of 30 mA and short circuit with stand capacity of 6 KA and suitable for operation on three phase and neutral 415 V having characteristic of quick action and tripping with all advance features and do not incorporate any electronic component for following maximum rating  
40 Amps FP Cat I**

The Residual Current Circuit breaker RCCBs are the safest device to detect and trip against electrical leakage currents, thus ensuring protection against electric shock caused by indirect contacts. These devices must be used in series with an MCB or fuse which protects them from the potentially damaging thermal and dynamic stresses of any over currents. They also act as the main disconnecting switches upstream of any derived MCBs (e.g. domestic consumer unit).

Main benefits

- Safety performances ensured worldwide by international marks approval
- High quality execution and attention to details
- Complete range of products and related accessories



### Main Features

- AC, A, B, AP-R types available to ensure protection against all kinds of earth fault currents
- Rated Currents from 16A up to 125A
- Rated  $I_{\Delta n}$  Sensitivity 10, 30mA, 100mA, 300mA, 500mA and 1A
- 

**The payment shall be as per One Number.**

## **SCHEDULE B-11**

### **CONSTRUCTION OF PROPOSED FLAG POLE , AT KHAMBHAT.**

#### **ITEM NO.1:**

**Excavation for foundation up to 1:5 mt. Depth including sorting out and stacking of useful materials and depositing of the excavated stuff up to 50 meter lead.**

Detailed technical Specification As per Schedule B-1 Item No.1

#### **ITEM NO.2:**

**Filing available excavated earth (excluding rock) in trenches plinth sides of foundations etc. in layers not exceeding 20cm. Consolidating each deposited layer by ramming and watering.**

Detailed technical Specification As per Schedule B-1 Item No.3

#### **ITEM NO.3:**

**Providing and laying cement concrete 1:3:6 (1 Cement : 3 coarse sand : 6 Crushed stone aggregates 20 mm nominal size) and curing complete excluding cost of form work in (A) Foundation and plinth.**

##### **1.0. Materials**

- 1.1. Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Crushed Stone aggregate 20 mm. nominal size shall conform to M-14.

##### **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 stone aggregate shall be one part of cement. 3 parts of coarse sand and 6 parts of **Crushed Stone aggregate** 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 colour 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 all the interstices to be filled with mortar.

**2.6. Curing:**

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

**3.0. Mode of measurement and payment**

**3.1.** The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plans or as directed

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

**ITEM NO.4:**

**Brick work using common burnt clay building bricks having crushing strength not less than 35 kg./Sq.Cm. in foundation and plinth in Cement Mortar 1:6 (1- Cement : 6 -fine sand)(B) Conventional**

Detailed technical Specification As per Schedule B-1 Item No.18

**ITEM NO.5:**

**Providing and laying controlled cement concrete M.200 and curing complete excluding the cost of formwork and reinforcement for reinforced concrete work in (A) Foundations, footings, Base of columns and Mass concrete.**

Detailed technical Specification As per Schedule B-1 Item No.7

**ITEM NO.6:**

**T.M.T Bars**

**Providing and supplying TMT Fe-500 bar steel reinforcement for R.C.C work including bending, binding and placing in position etc. complete**

Detailed technical Specification As per Schedule B-1 Item No.17

**ITEM NO.7:**

**Providing 15mm thick cement plaster in single coat on Rough (Similar)side of single or half brick walls for interior plastering upto floor two level and finished even and smooth in (i) Cement mortar 1:3 (1-cement:3-sand) Extra over items 58 to 64 for finishing with a floating coat of neat cement slurry.**

Detailed technical Specification As per Schedule B-1 Item No.29

**ITEM NO.8:**

**Providing and laying polished Granite tiles 18 mm thick in risers of steps, skirting Dedo and pillars laid on 10 mm thick cement mortar 1 : 3 (1 cement : 3 course sand) and jointed with gray cement slurry mixed with pigment to match the shade of slab including rubbing, polishing, Moulding etc. complete. For Flooring, Doors & Windows Edges.**

Detailed technical Specification As per Schedule B-1 Item No.41

**ITEM NO.9:**

**providing and fixing flag hosting pole made out of minimum dia of 4" hollow pipe with minimum height of 7.60 meter above ground level and anchor in ground at appropriate depth of minimum and labor and transport charges etc complete as directed by engineer in charged**

1. Material:

- The flag pole shall be fabricated from a minimum 4" (100 mm) diameter hollow mild steel pipe of approved quality, free from defects, bends, or cracks.
- The pipe shall be of sufficient wall thickness to withstand wind loads and stresses during operation.

2. Height:

- The pole shall have a minimum overall height of 7.60 meters above ground level.

3. Foundation & Anchoring:

- The pole shall be anchored firmly in the ground with an appropriate depth of embedment (minimum 1.50 m below ground level or as directed by the Engineer-in-Charge, depending on soil conditions).
- The foundation shall be constructed with cement concrete (1:2:4 or as specified) of adequate size and strength to ensure stability against wind pressure.

4. Finish:

- The pole shall be thoroughly cleaned, primed with one coat of anti-corrosive red oxide primer, and finished with two coats of approved enamel paint.

5. Accessories:

- Pulley arrangement at the top for hoisting.
- Nylon rope of adequate strength with hook/clamp.
- Base plate or suitable arrangement for fixing in the foundation.

6. Execution:

- The work shall include all labor, material, tools, plant, scaffolding, and transport charges, etc., complete.
- The work shall be carried out to the satisfaction of the Engineer-in-Charge and as per standard specifications.

**ITEM NO.10: India National Flag 20' X 30' Giant Indian National Flag of size 20' X 30' in 100 % Knitted Polyester, With reinforced super-strong nylon webbing on all 3 sides & eyelets.**

1. Size & Dimensions:

- The flag shall be of 20 feet (6.10 m) x 30 feet (9.15 m) size.
- Dimensions shall conform to the proportions as prescribed in the Bureau of Indian Standards (BIS) for the Indian National Flag (ratio 2:3).

2. Material:

- The flag shall be made of 100% knitted polyester fabric of high durability and outdoor grade, suitable for heavy-duty flagpoles and high wind areas.
- GSM (fabric weight) shall be adequate to ensure longevity and visibility, generally 140–160 GSM or as approved.

3. Construction & Reinforcement:

- All three sides of the flag shall be reinforced with super-strong nylon webbing for tear resistance.
- Eyelets shall be provided on the hoisting side for rope fastening, made of rustproof metal (brass/stainless steel) or heavy-duty reinforced material.
- Stitching shall be double/triple stitched with UV-resistant polyester thread to prevent fraying.

4. Design & Colours:

- The tricolour shall be in saffron, white, and green horizontal bands, with the Ashoka Chakra (24-spoke navy blue wheel) in the centre of the white band, as per the Indian Flag Code.
- The colours and dimensions of the Chakra and panels shall strictly comply with IS standards and Flag Code of India, 2002.

5. Performance:

- Flag shall be all-weather resistant, UV protected, fade-proof, and washable.
- Suitable for giant flag masts (20–30 meters and above).

6. Delivery & Workmanship:

- The flag shall be brand new, unused, and of export quality standard.
- It shall be delivered complete with packing, documentation, and certification of conformity with the Flag Code of India.

**SCHEDULE B-12**  
**PROPOSED GARDENING, HORTICULTURAL & PLANTATION WORK**

**ITEM NO.1:**

**Development of lawn including excavation of area up to 150 to 200 mm depth as per requirement and disposal of same outside premises, removing of weeds, cleaning, spreading garden soil, organic fertilizer and mixing same, applying anti termite insecticides, supplying and laying of carpet lawn, watering. And maintain up to two month.(supplying of required quantity of carpet lawn shall be in the scope of contractor).(With Two Years of Maintenance including Replacement of Damage Plant, lawn Etc With Required insecticides, pesticides, Fertilizer etc Complete as Directed By EIC.)**

1. Development of lawn: This part is covered by following items of price bid (a) Trenching in ordinary soil for 30cm. (b) Supply of good earth (c) supply of manure. (d) Supply of sand (e) Supply of insecticide (f) Development of lawn. (g) Supply of plants.

**1.1. Workmanship:**

1.1.1. Excavation in the soil, sand, gravel or soft hard Murrum, shall be carried out for a depth of 30 cm by the contractor with his own labors and tools necessary for the operation.

1.1.2. The contractor shall have to carry away and dump the rejected excavated material to a place shown by the Engineer-in-charge and the pits shall be refilled with soil mixture as specified.

1.1.3. The soil mixture shall be laid to proper slopes for surface drainage. And it shall be laid as per the contours provided by the Engineer-in-charge.

1.1.4. The soil shall be properly raked and watered thoroughly before plantation of good quality rooted cutting of selected grass.

2.1.1.5. Planting of lawn shall be done 60mm apart square and at each place a minimum 3-4 cuttings 80/90 mm length shall be planted. The cuttings shall be firmly embedded in the ground.

1.1.6. After planting area is to be watered with hose pipe facing the sky. All planting operations must be completed within a period of 7 days from the day the planting operations start at site.

1.1.7. The contractor shall be required to do proper top dressing, rolling and periodical hand cutting or machine mowing as per instructions of Engineer-in-charge in order to bring the lawn in perfect green thick and springy carpet of turf.

- 1.1.8. The contractor shall develop the planted lawn areas for a minimum period of 6 months from the date of planting or till the lawn is properly established as determined by the Engineer-in-charge, whichever is later. After development the area will automatically come under maintenance.

**1.2. Mode of measurement and payment:**

1.2.1. Excavation and refilling labor would be paid under the item head of trenching in ordinary soil item no.1 of part A. The unit of measurement would be in Cubic metre and rate would be for one cubic metre.

1.2.2. Supply of good earth would be under the item no.2 part A. The Unit of measurement would be cubic metre. The quantity of earth measured in stakes shall be reduced by 20% for payment. Rate shall be for a unit of one cubic metre.

1.2.3. Supply of manure would be under the item no.3 part A. The Unit of measurement would be cubic metre. The quantity of manure measured in stakes shall be reduced by 8% for payment. Rate shall be for a unit of one cubic metre.

1.2.4. Supply of sand would be under the item no.4 of part A. The Unit of measurement would be cubic metre. Rate shall be for a unit of one cubic metre.

1.2.5. Supply of Insecticide would be within the scope of contractor.

1.2.6 Supply of plants for lawn would be under the item of Part B of price bid. Quantity would be measured in Square metre and rate shall be for a unit of one square metre.

## 2. Maintenance of lawn:

### 2.1. Workmanship:

2.1.1. Watering to lawn shall be done hose-pipes such that direction hose outlets is towards sky, so as to get falling rain effect. At no time the watering shall be done by flooding method.

2.1.2. Lawn shall be cut regularly depending upon the season. But on an average at an interval of 8 to 10 days.

2.1.3. The adjustment of the cutter shall be done so as to have approximately 2 cms height of grass. Lawn cutting to a shorter level is not advised.

2.1.4. The blades of the lawn mower shall be sharp so as not harm the grass.

2.1.5. Rolling shall be done at least once in fifteen days. Rolling shall be done in same direction as lawn mowing. However cross rolling can be done once in four months.

2.1.6. Lawn mowing shall always be done in same direction, cross cutting is not allowed.

2.1.7. Constant watch shall be kept to keep the lawn clean and free of all weeds. If required weedicides can be used. Weeding should be done once in fifteen days to remove the unwanted grass etc.

2.1.8. Lawn shall be fed with fertilizer once a month to maintain firm structure, texture and color.

2.1.9. Immediately after mowing with lawn mower, grass area edges to be trimmed by shears to maintain a uniform growth and development

### 2.2. Mode of measurement and payment:

2.2.1. The Contractor shall by his own labor cost make for the settlement of soil mixture in all lawn areas by filling in additional quantity of the same as a "top-up" operation. The soil mixture would be paid separately under relevant head as described in 1.2

2.2.2. Only that area which has been maintained well would be paid. The lawn area would be measured in square meter. The rates are for a unit of one square meter.

## **ITEM NO.2:**

**Development of shrubs and flower bed at the location directed by officer in charge including required pit size up to 2\*2\*2 feet as per required disposal of same out side premises ,removing of weed cleaning , filling garden soil ,organic fertilizer mixing the same applying anti termite treatment and planting plants as required ,watering and maintaining the flower beds for period of two months.(supply required quantity of plants and shrubs shall be in scope of contractor).variety of shrubs as per index. (With Two Years of Maintenance including Replacement of Damage Plant, lawn Etc With Required insecticides, pesticides, Fertilizer etc Complete as Directed By EIC.)**

3. Development and maintenance of flower bed / shrubs / creepers / Hedge :

3.1. Development: This part is covered by following items of price bid (a) Trenching in Ordinary soil for 60cm. (b) Supply of good earth (c) supply of manure. (d) Supply of sand (g) Development of lawn. (h) Supply of plants.

3.1.1. Workmanship:

3.1.1.1. Excavation in the soil, sand, gravel or soft hard Murrum, shall be carried out for a depth of 30 cm by the contractor with his own labors and tools necessary for the operation.

3.1.1.2. The contractor shall have to carry away and dump the rejected excavated material to a place shown by the Engineer-in-charge and the pits shall be refilled with soil mixture as specified.

3.1.1.3. The soil mixture shall be laid to proper slopes for surface drainage. And it shall be laid as per the contours provided by the Engineer-in-charge.

3.1.1.4. The soil shall be properly raked and watered thoroughly before plantation.

3.1.1.5. Planting of well grown sapling / seedling or graft of desired species would be carried out.

3.1.1.6. Development period shall be a period of 6 months or till the satisfactory development of saplings, attaining the appropriate height and growth whichever is later from the date of planting. This shall include timely watering, pruning, stacking, weeding, mulching and spraying weedicides, fungicides, applying of fertilizer as and when required. If the plant does not survive, the same will have to be replaced immediately, free of all charges with plant of same species and approximately of same height by the concerned contractor.

3.1.2. Mode of measurement and payment:

3.1.2.1. Excavation and refilling labor would be paid under the item head of trenching in ordinary soil item no.1 of part A. The unit of measurement would be in Cubic metre and rate would be for one cubic metre.

3.1.2.2. Supply of good earth would be under the item no.2 of part A. The Unit of measurement would be cubic metre. The quantity of earth measured in stakes shall be reduced by 20% for payment. Rate shall be for a unit of one cubic metre.

3.1.2.3. Supply of manure would be under the item no.3 part B. The Unit of measurement would be cubic metre. The quantity of manure measured in stakes shall be reduced by 8% for payment. Rate shall be for a unit of one cubic metre.

3.1.2.4. Supply of sand would be under the item no.4 of part B. The Unit of measurement would be cubic metre. Rate shall be for a unit of one cubic metre.

3.1.2.5. Supply of Insecticide would be within the scope of contractor.

3.1.2.6. Supply of plants would be under the item part B of price bid. Quantity would be measured in number and rate shall be for a unit of one number.

3.2. Maintenance:

3.2.1. Workmanship:

3.2.1.1. The maintenance shall include, regular watering, weeding, mulching, soil working, supporting and pruning as required and as applicable to various plants and trees.



3.2.1.2. It shall also include regular checking against insects, pests, fungus attack and taking control measures.

3.2.1.3. Checking against the pH value of the soil and treatment to modify the same shall be the part of the maintenance.

3.2.1.4. Removal of dead branches leaves, flowers, pruning, training, supporting and protection against heat, cold and heavy rains shall be part of the maintenance.

3.2.2. Mode of measurement and payment:

3.2.2.1. The Contractor shall by his own labor cost make for the settlement of soil mixture in all lawn area shrubs /F.B.areas by filling in additional quantity of the same as a "top-up" operation. The soil mixture would be paid separately under relevant head as described in 2.1.2

3.2.2.2. Only those plants/shrubs which have been maintained well would be paid. The unit of measurement would be number of plants, and rate shall be for one number.

### **ITEM NO.3:**

**Plantation of various hedge plants, saplings including excavation trench of 9 inch depth an width, filling with garden soil and organic fertilizer, applying anti termite insecticides as required, plantation of different variety hedge plants at distance of 8 inch to 2 feet between plants (supply of required hedge plants and sapling shall be in the scope of contractor). (With Two Years of Maintanance including Replacement of Damage Plant,laWN Etc With Required insectisides, pestisides, Fertilizer etc Complete as Directed By EIC.)**

### **3. Development and maintenance of flower bed / shrubs / creepers / Hedge :**

3.1. Development: This part is covered by following items of price bid (a) Trenching in Ordinary soil for 60cm. (b) Supply of good earth (c) supply of manure. (d) Supply of sand (g) Development of lawn. (h) Supply of plants.

3.1.1. Workmanship:

3.1.1.1. Excavation in the soil, sand, gravel or soft hard Murrum, shall be carried out for a depth of 30 cm by the contractor with his own labors and tools necessary for the operation.

3.1.1.2. The contractor shall have to carry away and dump the rejected excavated material to a place shown by the Engineer-in-charge and the pits shall be refilled with soil mixture as specified.

3.1.1.3. The soil mixture shall be laid to proper slopes for surface drainage. And it shall be laid as per the contours provided by the Engineer-in-charge.

3.1.1.4. The soil shall be properly raked and watered thoroughly before plantation.

3.1.1.5. Planting of well grown sapling / seedling or graft of desired species would be carried out.

3.1.1.6. Development period shall be a period of 6 months or till the satisfactory development of saplings, attaining the appropriate height and growth whichever is later from the date of planting. This shall include timely watering, pruning, stacking, weeding, mulching and spraying weedicides, fungicides, applying of fertilizer as and when required. If the plant does not survive, the same will have to be replaced immediately, free of all charges with plant of same species and approximately of same height by the concerned contractor.

3.1.2. Mode of measurement and payment:

3.1.2.1. Excavation and refilling labor would be paid under the item head of trenching in ordinary soil item no.1 of part A. The unit of measurement would be in Cubic metre and rate would be for one cubic metre.

3.1.2.2. Supply of good earth would be under the item no.2 of part A. The Unit of measurement would be cubic metre. The quantity of earth measured in stakes shall be reduced by 20% for payment. Rate shall be for a unit of one cubic metre.

3.1.2.3. Supply of manure would be under the item no.3 part B. The Unit of measurement would be cubic metre. The quantity of manure measured in stakes shall be reduced by 8% for payment. Rate shall be for a unit of one cubic metre.

3.1.2.4. Supply of sand would be under the item no.4 of part B. The Unit of measurement would be cubic metre. Rate shall be for a unit of one cubic metre.

3.1.2.5. Supply of Insecticide would be within the scope of contractor.

3.1.2.6. Supply of plants would be under the item part B of price bid. Quantity would be measured in number and rate shall be for a unit of one number.

3.2. Maintenance:

3.2.1. Workmanship:

3.2.1.1. The maintenance shall include, regular watering, weeding, mulching, soil working, supporting and pruning as required and as applicable to various plants and trees.

3.2.1.2. It shall also include regular checking against insects, pests, fungus attack and taking control measures.

3.2.1.3. Checking against the pH value of the soil and treatment to modify the same shall be the part of the maintenance.

3.2.1.4. Removal of dead branches leaves, flowers, pruning, training, supporting and protection against heat, cold and heavy rains shall be part of the maintenance.

3.2.2. Mode of measurement and payment:

3.2.2.1. The Contractor shall by his own labor cost make for the settlement of soil mixture in all lawn area shrubs /F.B.areas by filling in additional quantity of the same as a "top-up" operation. The soil mixture would be paid separately under relevant head as described in 2.1.2

3.2.2.2. Only those plants/shrubs which have been maintained well would be paid. The unit of measurement would be number of plants, and rate shall be for one number.

#### **ITEM NO.4:**

**Supply and plantation of palm and exotic plants and focus variety for including 2\*2\*2 pit filling with garden soil, mix with organic fertilizer and termite pesticides ,watering and maintain up to two months.(supply of require quantity of palm, exotic plants and focus variety in the scope of contractor).plants list as per Index (With Two Years of Maintenance including Replacement of Damage Plant, lawn Etc With Required insecticides, pesticides, Fertilizer etc Complete as Directed By EIC.)**

(1) TREES & PALM plant

Cultivation of the completed soil mix beds shall take place only when the seeding or planting operations can begin immediately after cultivation. No cultivation shall be undertaken in weather or ground conditions in which operations may destroy soil structure or where soil mix has not been approved by the Landscape Architect.

Cultivation shall be by approved mechanical or manual means to a depth of 300mm for Ground Cover and 600mm for Shrubs to provide an even, weed free texture.

After cultivation, stone picking from the surface of soil areas shall be carried out such that all stones and lumps exceeding 50mm in diameter are collected. All stones, weeds and rubbish brought up shall be removed from the site to a tip to be found by the Contractor.

Ground cover, rooted shoot and herbaceous beds are to have 25mm solid conditioner spread over the entire area and well forked in to the top 250mm of soil during cultivation. This operation is separate from the mulching specified.

All plants shall be planted to accommodate the spreading root system of the plant to the same soil depth as in the nursery and shall be well watered before removing them from containers. Plants are to be positioned upright and the soil firmed around the roots.

Planting shall be carried out in accordance with the schedule of plants and drawings supplied. The number of each species and variety shall be evenly distributed over the area as indicated on the drawings.

For large areas the outer rows are to be set out first to ensure the correct shape to the bed is established. The remaining plants are then to be evenly distributed to cover the planting area. The Landscape Architect is to be notified in advance if there are too many or too few plants to fill the area required and an assessment of setting out adjustments will be directed accordingly.

Setting out of plants is to be completed and approved before planting into the soil bed can commence.

Small shrubs, ground cover and herbaceous plants shall be planted in pockets formed by a trowel or spade. The pocket shall be deep enough and wide enough to accommodate the root of the plant. The sides and base of the pocket shall be loosened and the plant roots lightly loosened from the root-ball. The plant shall be placed upright in the pocket and firmed into the ground by backfilling and treading or hand pressure.

The topsoil in areas to receive rooted shoots shall be brought to a fine tilth 75mm deep by approved mechanical means or hand raking. Approved slow release fertilizer shall be applied evenly over the area at a rate of 40gms per square metres and shall be lightly raked into the surface. Rooted shoots shall be firmly bedded into the soil at 75mm centers with each shoot spread on the topsoil surface, separated from adjacent shoots. The area shall be top dressed with finely sifted topsoil/compost mix as approved by the Landscape Architect to lightly cover the rooted shoots after laying. The ground shall then be firmed by lightly treading or hand pressure around the roots, taking care not to damage the shoots, to ensure good contact with the soil. Watering shall take place immediately after planting, using a fine spray. The firmed up area is to be tightly cultivated after completion of this operation to leave an even tilth before mulching. Shrub pits for large and medium shrubs, feature plants and climbers shall be excavated to 150mm wider on either side than the root spread, and to a depth of 150mm deeper than the root depth and shall not be less than 300mm x 300mm x 450mm deep.

The bottom 150mm of the pit is to be forked loose prior to backfilling. Backfill material shall be garden soil mixed with manure in 2:1 proportion for backfilling purposes. The Contractor shall note that for planting into turf areas, where topsoil has not been spread topsoil mix will be required for backfilling purposes.

Climber pits shall be 150 - 200mm away from the supporting structure with the roots spread away from the wall or adjacent supporting structure. The climbing plants shall be trained through the wire mesh with leading shoots directed upwards and tied.

Pits for shrubs and feature plants in planters shall be excavated to 150mm wider on either side than the root spread and to a total depth of the root-ball. The bottom of the pit shall be lightly formed, prior to planting taking care not to damage the terrain layer below.

After planting shrubs the area is to be watered immediately to bed the shrubs in. Once the water has percolated away and left the surface relatively dry the soil area is to be lightly forked to loosen the surface and leave an even soil tilth.

Before backfilling, imported topsoil and sand is to be thoroughly mixed with soil conditioner and organic fertilizer as specified for Topsoil Mix.

The tree pit shall be backfilled with the Soil Mix to a depth which will allow soil, after settlement to match surrounding ground level. The filled pit shall be watered and allowed to settle. After settlement soil levels shall be topped up as required.

The center of the backfilled tree pit shall be excavated large enough to allow placing of the root-ball, and to allow even compaction all round during backfilling. After careful removal of the container or wrapping, the root ball of trees shall be placed carefully in the pit, and soil replaced gradually into the pit. The soil is to be consolidated during backfilling in layers to ensure that the plant is firmly held in the ground and that voids are not left around the roots. Care shall be taken during planting to avoid damage to the root system, branches or leaves.

After careful removal of the container or wrapping, the root-ball of the roots of shrubs and climbers shall be placed carefully and the soil replaced gradually in the pit. The soil is to be consolidated during backfilling in layers to ensure that the plant is firmly held in the ground and that voids are not left around the roots. Care should be taken during planting to avoid damage to the root system, branches or leaves.

Stakes shall always be used when trees when directed by the Landscape Architect. Stakes shall be in sawn timber of an approved type and be carried out according to the size of plant to be supported. The inner ends of the stakes shall extend beyond the tree stem by not more than 150mm and shall not be higher than 300mm below the lowest branch. The tree stem shall be wrapped in gunny sacking at the point where the tree stakes are to be fastened in order to prevent bark damage. The stakes shall be neatly and firmly fastened to the tree stem using rubber hose or cord. String is not be used. The stakes are to be adjusted and the position of the protective wrapping is to be altered up or down every month. The gunny sack wrapping is to be sprayed with an approved horticultural pesticide.

After planting all plants are to be thoroughly watered using enough water to soak the ground all around the root ball. After watering and the water has percolated away leaving the surface relatively dry the soil is to be lightly cultivated to give an even soil tilth.

After completion of planting and watering and light cultivation operations a 50mm deep layer of approved mulch shall be spread and forked in overall cultivated planting areas. Around each tree and palm and around the base of each climber, additional mulch is to be applied to a 50mm depth to a diameter of 600mm. Mulching is to be done within 2 days of completing planting and watering in.

After a period of settling in of at least one month, all pit planted materials shall be fertilized with an approved slow release fertilizer at the rate of:

Trees : 250gm per tree Shrubs/climbers: 50gm per plant

Ground Cover/Herbaceous/ Rooted Shoots: 100gm per square meter spread around the base of the plants

All fertilized areas are to be watered immediately after fertilizer application.

The Contractor shall take all necessary precautions to prevent or eradicate any outbreak of disease or insect attack.

Where planting is to be carried out in areas of turf, the turf shall be carefully cut to the size of the tree or shrub pit, rolled and stored for re-use, being kept moist and in shade. After planting the turf's shall be re-laid around the base of the plant. The Contractor shall replace at his own expense, any turf's which are damaged during planting operations.

The contractor shall be responsible for protecting all planted areas. If it is necessary for the Contractor to erect protective fencing, the Contractor shall be responsible for keeping the fencing in position and in good repair until the end of the maintenance period. Fencing proposals shall be submitted to the Landscape Architect for approval. Post and string fences shall not be acceptable.

After planting and prior to the onset of the maintenance period, the Contractor shall be responsible for carrying out all necessary measures to ensure that the plant material thrives and becomes established and that the landscape areas are kept in a clean and tidy condition.

The Contractor shall allow for carrying out the following maintenance operations when necessary prior to the onset maintenance period:

Replacement of dead/missing plants

Grass cutting around trees

Watering

Cultivation and loosening of soil

Weeding

Pruning and clipping

Firming up and adjusting stakes and ties

Eradication of pest or insect attack

Topdressing and mulching

Fertilizing

The Contractor shall be responsible for replacing any plants which fail to survive as a result of inadequate maintenance operations, poor workmanship or poor quality of plant material prior to completion.

The Completion Certificate will not be issued until all plants scheduled on the Drawings and Schedule of Works are installed in a healthy condition in the manner specified.

The rate includes the cost of all materials, equipment, labour, carting, loading & unloading, removal of debris to local specified within the site, involved in all the operations described above.

Measurement

Measurement for pit preparation of tree and single stemmed palm pits shall be in numbers. Measurement for pit preparation of shrubs and other plants shall be in square metres, accurate to the nearest metre.

Measurement for planting all plants shall be in numbers. Measurement for staking shall be in number of plants staked.

The rate includes the cost of all materials, equipment, labour, carting, loading & unloading, removal of debris to local specified within the site, involved in all the operations described above.

#### 4. Development and maintenance of plants and trees:

4.1. Development: This part is covered by following items of price bid (a) Digging pit 0.6mts x 0.6mts. x 0.06 mts. (b) Supply of good earth (c) supply of manure. (d) Supply of sand (g) Development of lawn. (h) Supply of plants.

##### 4.1.1. Workmanship:

4.1.1.1. Excavation in the soil, sand, gravel or soft hard Murrum, shall be carried out for a pit size of 60 cm x 60 cm x 60 cm by the contractor with his own labors and tools necessary for the operation.

4.1.1.2. The contractor shall have to carry away and dump the rejected excavated material to a place shown by the Engineer-in-charge and the pits shall be refilled with soil mixture as specified.

4.1.1.3. The soil mixture shall be laid to proper slopes for surface drainage. And it shall be laid as per the levels provided by the Engineer-in-charge.

4.1.1.4. The soil shall be properly raked and watered thoroughly before plantation.  
4.1.1.5. Planting of well grown plant or trees of desired species would be carried out.  
4.1.1.6. Development period shall be a period of 6 months or till the satisfactory development of plants, attaining the appropriate height and growth whichever is later from the date of planting. This shall include timely watering, pruning, stacking, weeding, mulching and spraying weedicides, fungicides, applying of fertilizer as and when required. If the plant does not survive, the same will have to be replaced immediately, free of all charges with plant of same species and approximately of same height by the concerned contractor.

4.1.2. Mode of measurement and payment:

4.1.2.1. Excavation and refilling labor would be paid under the item head of trenching in ordinary soil item no.6 of part A. The unit of measurement would be in Cubic metre and rate would be for one cubic metre.

4.1.2.2. Supply of good earth would be under the item no.2 of part A. The Unit of measurement would be cubic metre. The quantity of earth measured in stakes shall be reduced by 20% for payment. Rate shall be for a unit of one cubic metre.

4.1.2.3. Supply of manure would be under the item no 3 of part A. The Unit of measurement would be cubic metre. The quantity of manure measured in stakes shall be reduced by 8% for payment. Rate shall be for a unit of one cubic metre.

4.1.2.4. Supply of sand would be under the item no. 4 of part A. The Unit of measurement would be cubic metre. Rate shall be for a unit of one cubic metre.

4.1.2.5. Supply of Insecticide would be within the scope of contractor.

4.1.2.6. Supply of plants would be under the item part B of price bid. Quantity would be measured in number and rate shall be for a unit of one number.

4.2. Maintenance:

4.2.1. Workmanship:

4.2.1.1. The maintenance shall include, regular watering, weeding, mulching, soil working, supporting and pruning as required and as applicable to various plants and trees.

4.2.1.2. It shall also include regular checking against insects, pests, fungus attack and taking control measures.

4.2.1.3. Checking against the pH value of the soil and treatment to modify the same shall be the part of the maintenance.

4.2.1.4. Removal of dead branches leaves, flowers, pruning, training, supporting and protection against heat, cold and heavy rains shall be part of the maintenance.

4.2.2. Mode of measurement and payment:

4.2.2.1. The Contractor shall by his own labor cost make for the settlement of soil mixture in all plant / trees areas by filling in additional quantity of the same as a "top-up" operation. The soil mixture would be paid separately under relevant head as described in 2.1.2

**4.2.2.2. Only those plants/shrubs which have been maintained well would be paid.**

**The unit of measurement would be number of plants, and rate shall be for one number.**

**ITEM NO.5:**

**Supply and plantation of trees at various garden and places including 2\*2\*2 pit filling with garden soil, mix with organic fertilizer and termite pesticides, watering and maintain up to two months (supply of require quantity of trees in the scope of contractor). Trees lists as per index(Bamboo) (With Two Years of Maintenance including Replacement of Damage Plant, lawn Etc With Required insecticides, pesticides, Fertilizer etc Complete as Directed By EIC.).**

**(1) TREES & PALM plant**

Cultivation of the completed soil mix beds shall take place only when the seeding or planting operations can begin immediately after cultivation. No cultivation shall be undertaken in weather



or ground conditions in which operations may destroy soil structure or where soil mix has not been approved by the Landscape Architect.

Cultivation shall be by approved mechanical or manual means to a depth of 300mm for Ground Cover and 600mm for Shrubs to provide an even, weed free texture.

After cultivation, stone picking from the surface of soil areas shall be carried out such that all stones and lumps exceeding 50mm in diameter are collected. All stones, weeds and rubbish brought up shall be removed from the site to a tip to be found by the Contractor.

Ground cover, rooted shoot and herbaceous beds are to have 25mm solid conditioner spread over the entire area and well forked in to the top 250mm of soil during cultivation. This operation is separate from the mulching specified.

All plants shall be planted to accommodate the spreading root system of the plant to the same soil depth as in the nursery and shall be well watered before removing them from containers. Plants are to be positioned upright and the soil firmed around the roots.

Planting shall be carried out in accordance with the schedule of plants and drawings supplied. The number of each species and variety shall be evenly distributed over the area as indicated on the drawings.

For large areas the outer rows are to be set out first to ensure the correct shape to the bed is established. The remaining plants are then to be evenly distributed to cover the planting area. The Landscape Architect is to be notified in advance if there are too many or too few plants to fill the area required and an assessment of setting out adjustments will be directed accordingly.

Setting out of plants is to be completed and approved before planting into the soil bed can commence.

Small shrubs, ground cover and herbaceous plants shall be planted in pockets formed by a trowel or spade. The pocket shall be deep enough and wide enough to accommodate the root of the plant. The sides and base of the pocket shall be loosened and the plant roots lightly loosened from the root-ball. The plant shall be placed upright in the pocket and firmed into the ground by backfilling and treading or hand pressure.

The topsoil in areas to receive rooted shoots shall be brought to a fine tilth 75mm deep by approved mechanical means or hand raking. Approved slow release fertilizer shall be applied evenly over the area at a rate of 40gms per square metres and shall be lightly raked into the surface. Rooted shoots shall be firmly bedded into the soil at 75mm centers with each shoot spread on the topsoil surface, separated from adjacent shoots. The area shall be top dressed with finely sifted topsoil/compost mix as approved by the Landscape Architect to lightly cover the rooted shoots after laying. The ground shall then be firmed by lightly treading or hand pressure around the roots, taking care not to damage the shoots, to ensure good contact with the soil. Watering shall take place immediately after planting, using a fine spray. The firmed up area is to be tightly cultivated after completion of this operation to leave an even tilth before mulching. Shrub pits for large and medium shrubs, feature plants and climbers shall be excavated to 150mm wider on either side than the root spread, and to a depth of 150mm deeper than the root depth and shall not be less than 300mm x 300mm x 450mm deep.

The bottom 150mm of the pit is to be forked loose prior to backfilling. Backfill material shall be garden soil mixed with manure in 2:1 proportion for backfilling purposes. The Contractor shall note that for planting into turf areas, where topsoil has not been spread topsoil mix will be required for backfilling purposes.

Climber pits shall be 150 - 200mm away from the supporting structure with the roots spread away from the wall or adjacent supporting structure. The climbing plants shall be trained through the wire mesh with leading shoots directed upwards and tied.

Pits for shrubs and feature plants in planters shall be excavated to 150mm wider on either side than the root spread and to a total depth of the root-ball. The bottom of the pit shall be lightly formed, prior to planting taking care not to damage the terrain layer below.

After planting shrubs the area is to be watered immediately to bed the shrubs in. Once the water has percolated away and left the surface relatively dry the soil area is to be lightly forked to loosen the surface and leave an even soil tilth.

Before backfilling, imported topsoil and sand is to be thoroughly mixed with soil conditioner and organic fertilizer as specified for Topsoil Mix.

The tree pit shall be backfilled with the Soil Mix to a depth which will allow soil, after settlement to match surrounding ground level. The filled pit shall be watered and allowed to settle. After settlement soil levels shall be topped up as required.

The center of the backfilled tree pit shall be excavated large enough to allow placing of the root-ball, and to allow even compaction all round during backfilling. After careful removal of the container or wrapping, the root ball of trees shall be placed carefully in the pit, and soil replaced gradually into the pit. The soil is to be consolidated during backfilling in layers to ensure that the plant is firmly held in the ground and that voids are not left around the roots. Care shall be taken during planting to avoid damage to the root system, branches or leaves.

After careful removal of the container or wrapping, the root-ball of the roots of shrubs and climbers shall be placed carefully and the soil replaced gradually in the pit. The soil is to be consolidated during backfilling in layers to ensure that the plant is firmly held in the ground and that voids are not left around the roots. Care should be taken during planting to avoid damage to the root system, branches or leaves.

Stakes shall always be used when trees when directed by the Landscape Architect. Stakes shall be in sawn timber of an approved type and be carried out according to the size of plant to be supported. The inner ends of the stakes shall extend beyond the tree stem by not more than 150mm and shall not be higher than 300mm below the lowest branch. The tree stem shall be wrapped in gunny sacking at the point where the tree stakes are to be fastened in order to prevent bark damage. The stakes shall be neatly and firmly fastened to the tree stem using rubber hose or cord. String is not to be used. The stakes are to be adjusted and the position of the protective wrapping is to be altered up or down every month. The gunny sack wrapping is to be sprayed with an approved horticultural pesticide.

After planting all plants are to be thoroughly watered using enough water to soak the ground all around the root ball. After watering and the water has percolated away leaving the surface relatively dry the soil is to be lightly cultivated to give an even soil tilth.

After completion of planting and watering and light cultivation operations a 50mm deep layer of approved mulch shall be spread and forked in overall cultivated planting areas. Around each tree and palm and around the base of each climber, additional mulch is to be applied to a 50mm depth to a diameter of 600mm. Mulching is to be done within 2 days of completing planting and watering in.

After a period of settling in of at least one month, all pit planted materials shall be fertilized with an approved slow release fertilizer at the rate of:

Trees : 250gm per tree

Shrubs/climbers: 50gm per plant

Ground Cover/Herbaceous/ Rooted Shoots: 100gm per square meter spread around the base of the plants



All fertilized areas are to be watered immediately after fertilizer application.

The Contractor shall take all necessary precautions to prevent or eradicate any outbreak of disease or insect attack.

Where planting is to be carried out in areas of turf, the turf shall be carefully cut to the size of the tree or shrub pit, rolled and stored for re-use, being kept moist and in shade. After planting the turf's shall be re-laid around the base of the plant. The Contractor shall replace at his own expense, any turf's which are damaged during planting operations.

The contractor shall be responsible for protecting all planted areas. If it is necessary for the Contractor to erect protective fencing, the Contractor shall be responsible for keeping the fencing in position and in good repair until the end of the maintenance period. Fencing proposals shall be submitted to the Landscape Architect for approval. Post and string fences shall not be acceptable.

After planting and prior to the onset of the maintenance period, the Contractor shall be responsible for carrying out all necessary measures to ensure that the plant material thrives and becomes established and that the landscape areas are kept in a clean and tidy condition.

The Contractor shall allow for carrying out the following maintenance operations when necessary prior to the onset maintenance period:

- Replacement of dead/missing plants
- Grass cutting around trees
- Watering
- Cultivation and loosening of soil
- Weeding
- Pruning and clipping
- Firming up and adjusting stakes and ties
- Eradication of pest or insect attack
- Topdressing and mulching
- Fertilizing

The Contractor shall be responsible for replacing any plants which fail to survive as a result of inadequate maintenance operations, poor workmanship or poor quality of plant material prior to completion.

The Completion Certificate will not be issued until all plants scheduled on the Drawings and Schedule of Works are installed in a healthy condition in the manner specified.

The rate includes the cost of all materials, equipment, labour, carting, loading & unloading, removal of debris to local specified within the site, involved in all the operations described above.

#### **Measurement**

Measurement for pit preparation of tree and single stemmed palm pits shall be in numbers. Measurement for pit preparation of shrubs and other plants shall be in square metres, accurate to the nearest metre.

Measurement for planting all plants shall be in numbers. Measurement for staking shall be in number of plants staked.

The rate includes the cost of all materials, equipment, labour, carting, loading & unloading, removal of debris to local specified within the site, involved in all the operations described above.

#### **4. Development and maintenance of plants and trees:**

4.1. Development: This part is covered by following items of price bid (a) Digging pit 0.6mts x 0.6mts. x 0.06 mts. (b) Supply of good earth (c) supply of manure. (d) Supply of sand (g) Development of lawn. (h) Supply of plants.

#### 4.1.1. Workmanship:

4.1.1.1. Excavation in the soil, sand, gravel or soft hard Murrum, shall be carried out for a pit size of 60 cm x 60 cm x 60 cm by the contractor with his own labors and tools necessary for the operation.

4.1.1.2. The contractor shall have to carry away and dump the rejected excavated material to a place shown by the Engineer-in-charge and the pits shall be refilled with soil mixture as specified.

4.1.1.3. The soil mixture shall be laid to proper slopes for surface drainage. And it shall be laid as per the levels provided by the Engineer-in-charge.

4.1.1.4. The soil shall be properly raked and watered thoroughly before plantation.

4.1.1.5. Planting of well grown plant or trees of desired species would be carried out.

4.1.1.6. Development period shall be a period of 6 months or till the satisfactory development of plants, attaining the appropriate height and growth whichever is later from the date of planting. This shall include timely watering, pruning, stacking, weeding, mulching and spraying weedicides, fungicides, applying of fertilizer as and when required. If the plant does not survive, the same will have to be replaced immediately, free of all charges with plant of same species and approximately of same height by the concerned contractor.

#### 4.1.2. Mode of measurement and payment:

4.1.2.1. Excavation and refilling labor would be paid under the item head of trenching in ordinary soil item no.6 of part A. The unit of measurement would be in Cubic metre and rate would be for one cubic metre.

4.1.2.2. Supply of good earth would be under the item no.2 of part A. The Unit of measurement would be cubic metre. The quantity of earth measured in stakes shall be reduced by 20% for payment. Rate shall be for a unit of one cubic metre.

4.1.2.3. Supply of manure would be under the item no 3 of part A. The Unit of measurement would be cubic metre. The quantity of manure measured in stakes shall be reduced by 8% for payment. Rate shall be for a unit of one cubic metre.

4.1.2.4. Supply of sand would be under the item no. 4 of part A. The Unit of measurement would be cubic metre. Rate shall be for a unit of one cubic metre.

4.1.2.5. Supply of Insecticide would be within the scope of contractor.

4.1.2.6. Supply of plants would be under the item part B of price bid. Quantity would be measured in number and rate shall be for a unit of one number.

#### 4.2. Maintenance:

##### 4.2.1. Workmanship:

4.2.1.1. The maintenance shall include, regular watering, weeding, mulching, soil working, supporting and pruning as required and as applicable to various plants and trees.

4.2.1.2. It shall also include regular checking against insects, pests, fungus attack and taking control measures.

4.2.1.3. Checking against the pH value of the soil and treatment to modify the same shall be the part of the maintenance.

4.2.1.4. Removal of dead branches leaves, flowers, pruning, training, supporting and protection against heat, cold and heavy rains shall be part of the maintenance.

##### 4.2.2. Mode of measurement and payment:

4.2.2.1. The Contractor shall by his own labor cost make for the settlement of soil mixture in all plant / trees areas by filling in additional quantity of the same as a "top-up" operation. The soil mixture would be paid separately under relevant head as described in 2.1.2

4.2.2.2. Only those plants/shrubs which have been maintained well would be paid.

The unit of measurement would be number of plants, and rate shall be for one number.

**Note : Contractor Will have to Plant Plantation from Above Choice as Required by Nagarpalika as per the Rate Given in the tender.**

## **SCHEDULE B -13: FOR GENERAL ELECTRIFICATION AND INTERCOM SERVICES ETC.**

### **ELECTRIFICATION WORK**

#### **GENERAL ELECTRIFICATION WORK**

##### **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-59008-1970 shall be referred to.

##### **3. Voltage and Frequency of Supply :**

All current consuming devices shall be suitable for frequency of 50 C/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 beforehand by the Executive Engineer Electrical Division.

(ii) Within one month of the taking over the installation, the Contractor shall supply to the Executive 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 Executive 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 1.5 Sq. mm. for point wiring and 2.5 Sq. 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 1.5 Sq. mm. The minimum size of the aluminum conductors for power wiring shall be 4 Sq. 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 of any lump 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 out lets : Points and exhaust fans**

8.1 Inco descent lamps installed in residential and non-residential buildings shall be rated at 60 watts & 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 values of the load are known or specified.

## **9. Tests :**

9.1 Before the installation is commissioned following tests shall 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 lamps in position or both poles of the installation otherwise electrically connected together 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 that it need not exceed. 500 volts for medium voltage circuits where the supp 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 lamps in 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 Megohms measured as above shall not be less than 50 Megohms divided by the number of outlet or when PVC insulated cables are used for wiring 12.5 Megohms divided by number of outlets.

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 1 Megohm is acceptable.

9.2.1.5 A preliminary and similar test be made before lamps, etc. are installed and in this event the insulation resistance to earth should be not less than 100 Megohms divided by the number of outlet or when PVC insulated cables are used for wiring 25 Megohms divided by number of outlets.

9.2.1.6 The term "Outlet" includes every switch except that a switch combined with a socket outlet, appliance or lighting fitting is regarded as one outlet.

9.2.1.7 Control rheostat heating and power appliance and electric sign may, if required, be dis-connected 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 Megohm.

#### 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 throughout & such conductor shall be labeled or marked for connection to the 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 to 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 to 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 Megger Earth Testers containing a direct reading ohm-meter, a hand driven generator and auxiliary electrodes.

9.3 On completion an electric installation (addition and alteration) a certificate shall be furnished by the Contractor countersigned by the certified Supervisor under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as given in Appendix-‘B’ in addition to the test certificate required by Local Electrical Supply Authorities.

#### 10. Joint and looping back :

Unless with the sanction of Executive Engineer Divisions all joints in conductor shall be means of approved mechanical connectors in 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 as 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 5 Amps. 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 10 Amp. and above shall be fitted for back connections and shall be suitably protected.

11.2 All switches and circuit breakers shall be constructed in accordance with the I. S. 4237-1967. General requirement for switchgear and control gear for voltage not exceeding 1000 volts 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 bath rooms, 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 glands or bushing of adopted to receive screwed conduit according to the manner in which cables are run PVC and double flanged bushes 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 completely enclosed 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 connections and at the front between the switchgear mountings and the door.

11.8 Equipments which are on the front of a switch board shall be so arranged that inadvertently personal contact with live parts is unlikely during the manipulation of switch gears, changing of fuses or like operations.

11.9 No holes other than the holes by means of which the panel is fixed shall be drilled closer than 1.3 cms. 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 space 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 switchgears 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 enamel or aluminum paint as required on all sides whenever accessible.

11.15 All switch board 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 switchgear 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 switchgear. 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 switchgear shall be situated as near as practicable to be termination of service line and shall be easily accessible without the use of any external aid.

12.3 On the main switchgear, where the conductor of a two wire system or an earthen neutral conductor of a multi-wire system or a conductor which is to be connected thereto, an indication of a permanent nature shall be provided to identify the earthen neutral conductor. In this connection Rule 32 (1) of Indian Electricity Rules, 1956 (See Appends 'S') 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 : These shall consist of a box made of sheet metal not less than 2 mm. thick and shall be provided with a hinged cover to enable the board to swing open for examination of the wiring at the back. The joints shall be welded. A teak wood board, thoroughly protected both inside and outside with good insulating conforming to IS-347-1952 specification for varnish shellac for general purpose, and of not less than 6.5 mm. thickness, shall be provided at the back for attachment of incoming and outgoing cables. There shall be a clear distance of not less than 2.9 cm. between the teak wood board and the cover, the teak wood board and the cover, the distance being increased for larger boards in order that on closing of the cover, the insulation of the cables is not subjected to damage and no short length of cables is subjected to excessive twisting or bending in any case. The board shall be securely fixed to the wall by means of lag bolts, plugs of wooden Gutties and shall be provided with a locking arrangement and earthing stud. All wires passing through the metal board shall be bunched. Alternatively, hinged type metal boards shall be made of sheet mounted on channel or angle iron frame.

Note :Sub type of boards are particularly suitable for small switch-boards for mounting metal-clad switchgear connected to supply at low voltages.

13.2 Fixed type Metal Boards : These shall consist of an angle of 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 switchboard for mounting large number or switchgears of higher capacity metal clad switchgears or both.

13.3 Teakwood Boards : for small installations connected to a single phase 230 volts supply teak wood boards may be used as main boards or sub-board. These shall be of seasoned teak or other durable wood with solid back impregnated with varnish of approved quality with all joints dovetailed.



13.4 In large size medium voltage installations, before proceeding with actual construction of the boards, a proper drawing showing the detailed dimensions and design including the disposition of the mountings, which shall be symmetrically and neatly arranged for arriving at the overall dimensions, shall be prepared and approved by the Engineer-in-charge.

13.5 Recessing of Boards : Where so specified the switch boards shall be recessed in the wall. The front shall be fitted with hinged panel of teak wood or other suitable materials such as balelite, or with unbreakable glass doors in teak wood frame with locking arrangement, the other surface of the door being flush with the walls. Ample room shall be provided at the back for connection and at the front between the switchgear mountings.

#### 13.6 Arrangement of Apparatus :

(a) Equipment which is on the front of switch board shall be so arranged that inadvertently personal contact with live parts is unlikely during the manipulation of switches, changing of fuses or like operation.

(b) No apparatus shall project beyond any edge of panel. No fuse body shall be mounted within 2.5 cm. 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 cms from any edge of the panel.

(c) The various live parts, unless they are effectively screened by substantial barriers of non-hydroscopic, non-inflammable isolating 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 board 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 of its different terminals may have been connected.

Alternating Current

Three-phase-red

Yellow & Blue

Natural-Black

Direct Current

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 on colour and the other three wires in another colour.

(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.



### 13.8 Main& Branch Distribution Board :

13.8.1 Main and branch distribution boards shall be of any type mentioned in 13.1

13.8.2 Main distribution boards shall be provided with a switch or air circuit breaker on each pole of each circuit a fuse on the phase or live conductor and a link on the neutral or earthed conductor of each circuit. The switches shall always be linked.

#### 13.8.3 Branch Distribution Board :

13.8.3.1 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.

13.8.3.2 In residential installations, lights and fans Amy be wired on a common circuit, such sub, circuit shall not have more than total of ten 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 outlets on each sub-circuits.

13.8.3.3 In industrial and other similar installations requiring the use of group control of switching operation, circuits, for socket outlets amy be kept separate form fans and lights. Normally fans and lights may be wired on a common circuit, however, if need sub-circuit shall not exceed 3000 Watts. In case of new installation, all circuits 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 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 toe centre of the load they are intended to control.

13.9.2 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 exploded 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 interlocked and the metal case is marked 'Danger 415 Volts', or
- (3) Installed in a room or enclosure accessible to only authorized persons.

13.9.5 All distribution boards shall be marked 'Lighting', 'Power', as the case may be and also marked with the voltage and number of phases of the supply. each shall be provided with a circuit list giving details of each circuit which it controls and the current rating of the circuit and size of fuse-element.

13.9.6 Triple pole distribution boards shall not be generally used for final circuit distribution unless specific approval of Engineer-i-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 the number of ways of the boards leaving the spare circuit for future extension.

13.10.2 All connection 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 thereon, avoiding unnecessary crossing.

13.10.3 Cables shall be connected to a terminal only be soldered or welded or crimped lugs using suitable sleeve, lugs or ferrules unless the terminal is of such a form that it is possible to securely clamp them without the cutting away of cable stands.

13.10.4 All bare conductor shall be rigidly fixed in such a manner that clearance of At least 2.5 cms. 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 on independent single pole switch and fuse to the bus-bars of the board.

13.10.6 In a hinged type board, the incoming and outgoing cables shall be fixed at one or more points according to the number of cables on the back of the board leaving suitable 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 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 switchboard 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 circuits 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 1 KW 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 either ends of such holes.

(a) A teak wood box intending 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 cms. air space on three sides, of the casing conductor.

(b) The conductor shall be carried either in a rigid steel conduit conforming to "IS : 1653-1964 specification for Rigid Steel conduits of Electrical wiring (Revised) or a rigid non-metallic conduit conforming to \*IS : 2509-1963 specification for Rigid Non Metallic conduits for Electrical Installations, or in a porcelain tube of such size which permits easy drawing in. The end of conduit shall be neatly bushed with porcelain, wood or other approved material.

(c) Insulated conductors while passing through floors shall be protected from mechanical injury by means of rigid steel conduit (see \* IS 1653-1964) to height not less than 1.5 m. above the floors and flush with the ceiling below. This steel conduit shall be earthed and securely bushed.

15.2 Where a wall tube passes outside a building so as to be exposed to weather, the outer end shall be belt mounted and turned down wards, and properly bushed on the open end.

### **16.0 Fixing to Walls and Ceilings :**

Plugs for ordinary walls or ceilings shall be of well seasoned teak or other approved hardwood not less than 5 cm long 2.5 c. square on the inner end and 2 cm. square on the outer end. They shall be cemented into walls to within 7.5 mm of the surface, the remaining being finished according to the nature of the surface plaster or lime punning.

16.1 Where owing to irregular crossing or other reasons the plugging of the walls or ceiling with wood plugs presents difficulties, the wood casing, wood batten, metal conduit or cleat (as the case may be) shall be attached to the wall or ceiling in an approved in the walls before they are plastered.

16.2 To achieve neatness, plugging of walls or ceiling may be done by an approved type of asbestos, metallic or a fiber fixing plug.

### **17.0 Branch Switches :**

Where the supply is derived from a three-wire of 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 control) caring not more than 15 amperes may be of tumbler type which shall be 'ON' when the handle known is down.

### **18.0 Fittings :**

Where conductors are required t 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 weird the conductors used for the final sub Circuits without removing the boarding, taping or outer covering. As far as possible, all tubes and channels should be of sufficient size to permit 'Looping back' of wires cables and flexible cords other than those designed for high temperature shall not be used for wiring fittings except for portable fittings. All fittings must have not less than a half inch male nipple. Fittings and lamp holders for gas filled lamps shall be adequately ventilated.

18.1 Where light fitting is supported by one or more flexible cords, the maximum weight to which the twin flexible cords may be subjected shall be as follows :

Nominal cross sectional Area cord.	No. & Dia in mm of wires.	Max Permissible Wight Kg. mm2
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 1	28/0.2	14.0

8.2 No inflammable shade shall form a part of light unless such shade is well protected against all risks of fire. Celluloid shade or light fitting shall not be used under any circumstances.

### 8.3 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, the sub-circuit loads shall be terminated in a ceiling zone or connector from which they shall be carried into the fitting.

### 9.0 Lamp Holders :

Lamp holders for use on brackets and the like shall be in accordance with "IS : 1258-1967, specification for Bayonet lamp holder and all those for use flexible panants shall be provided with cord grips. All lamp holders shall be provided with shade carriers. Where centre 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. Outdoor Lamps :

External and road lamps shall have weather proof fittings of approved design 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 weather. In verandahs and similar exposed situations where pendants are used, they shall be of fixed road 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 specification 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 \* IS 374-1960 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 connector 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 unavoidable then such joints shall be screwed to special couplers of 5 cm 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 end 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 tested flat iron to fit in rigidly to the bottom flange of the beam. Care shall be taken during fabrication that the metal does not crack while hammering to shape. Other fan clamps shall be made to suit the position, but in all cases care shall be taken to see that they are rigid and safe.

NOTE :All fan clamps shall be so fabricated that fans revolve steadily.

(c) Canopies on top and bottom of suspension rod shall effectively hide suspensions and connections to fan motors, respectively.

(d) The lead-in-wire shall be nominal cross-sectional area not less than 1.0 mm<sup>2</sup> with copper and 1.5 mm<sup>2</sup> with aluminum and shall be protected from abrasion.

(e) Unless otherwise specified, the clear distance between the ceiling and the floor shall not 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 lag-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 holes as possible by means of a flexible cord, care being taken that the blades rotate in the proper direction.

#### 23.0 Attachment of fittings and accessories :

23.1 In other than conduit wiring, all ceiling crosses, brackets, pendants and accessories attached to walls or ceilings shall be mounted on substantial teak wood block twice varnished after all fixing holes are made in them. Blocks shall be not less than 4 cms. deep. Brass screws only shall be used only shall be used for attaching fittings and accessories to their base blocks.

#### 24.0 Interchangeability :

Similar part of all switches, lamp holders, distribution fuse-boards ceiling roses, brackets, pendants, fans and all other fittings of the same type shall be interchangeable in each installation.

#### 25.0 Conduit Wiring System :

25.1.1 Type and size of conduit - All conduit pipes shall be conforming to \*Is : 1653- 1964, furnished with galvanized or stove enameled surface. All conduit accessories shall be of threaded type and under no circumstances pin grip type or clamp type accessories be used. No steel conduit less than 16 mm. in diameter shall be used. The number of insulated conductors that can be drawn into rigid steel conduit are given in Table II

25.1.2 Bunching of cables - Unless otherwise specified, insulated conductors of AC supply and DC supply shall be bunched in separate conduits.

25.1.3 Conduit - joints : conduit pipes shall be joined by means of screwed couplers accessories only (\*IS L 2667-1964).

#### Specification for Fittings for Rigid Steel Conduits for Electrical Wiring)

: In long distance straight runs of conduit, inspection type couplers at reasonable intervals shall be provided or running threads with couplers and jam-puts (in the latter case the bare threaded portion shall be treated with anti-corrosive preservative) shall be provided. Thread on conduit pipes in all cases shall be between 11 mm to 27 mm long sufficient to accommodate pipes of full threaded portion of couplers or accessories Cut ends of conduit pipes shall have no sharp edges nor any of burrs left to avoid damage to the insulation of conductors while pulling them through such pipes :

**TABLE - II**  
**MAXIMUM PERMISSIBLE NUMBER OF 250-V**  
**GRADE SINGLE CORE CABLES THAT CAN BE DRAWN INTO RIGID STEEL**  
**CONDUIT**

(CLAUSE 6.5.1.1)

Size of cable		Size of conduit (mm.)													
Nominal No. and		16		20		25		32		40		50		63	
:															
Crossect-		:		:		:		:		:		:		:	
Dia. In															
ional area. mm of wires															
S		B	S	B	S	B	S	B	S	B	S	B	S	B	
1.0	1/1.12 5	4	7	5	13	10	20	14	-	-	-	-	-	-	
1.5	1/1.40 4	3	7	5	12	10	20	14	-	-	-	-	-	-	
2.5	1/1.80 3	2	6	5	10	8	18	12	-	-	-	-	-	-	
4	1/2.24 3	2	4	3	7	6	12	10	-	-	-	-	-	-	
	(3/1.06*)														
	(7/0.85)														
6	1/2.80 2	-	3	2	6	5	10	8							
	(7/1.06*)														
10	1/3.55+	-	-	2	5	4	8	7	-	-	-	-	-	-	
	7/1.40*	-	-	2	-	4	3	6	5	8	6	-	-	-	
16	7/1.70	-	-	-	-	2	-	4	3	7	6	-	-	-	
25	7/2.24	-	-	-	-	-	3	2	5	4	7	6	9	7	
35	7/2.50	-	-	-	-	-	2	-	4	3	7	5	8	6	
50	7/3.00+	-	-	-	-	-	-	-	-	2	-	5	4	6	
	19/1.80	-	-	-	-	-	-	-	-	2	-	5	4	6	

For Cu. Conductors only. + For Al. conductor only.

NOTE 1 The cable shows the maximum capacity of conditions for the simultaneous drawing-in of cables. The table applies to 250 volts grade cable. The columns headed 'S' apply to runs of conduit which have distance not exceeding 4.25 M between draw in boxes, and which do not deflect from the straight by angle of more than 150. The columns headed 'B' apply to runs of conduit which deflect from the straight by an angle of more than 150.

NOTE 2 In case of inspection type draw-in box has been provided and if the cables is first drawn through one straight conduit, then through the drawn box, and then through the second straight conduit, such systems may be considered as that of a straight conduit even if the conduit deflects through the straight by more than 150.

25.1.4 Protection against dampness - In order to minimize condensation or sweating inside the tube, all outlets of conduit system shall be property drained and ventilated, but in such a manner as to prevent the entry of insects as far as possible.

25.1.5 Protection of conduit against rust : The outer surface of the conduit pipes, including all bends, unions, tees junction boxes, etc., forming part of the conduit system shall be adequately protected against rust particularly when such system is exposed to weather. In all cases, no bare threaded portion of conduit pipe shall be allowed unless such bare threaded portion is treated with anti-corrosive preservative or covered with approved plastic compound.

25.1.6 Fixing of conduit - Conduit pipes shall be fixed by heavy gauge saddles, secured to suitable wood plugs or any other approved plug with screws in an approved manner at an interval of not more than one meter but on either side of couplers bends or similar fittings. Saddles shall be fixed at a distance of 30 cm. from the centre of such fittings.

25.1.7 Bends in conduit - All necessary bends in the system including diversion shall be done by bending pipes. or insuring suitable solid or inspection type normal bends, elbows or similar fittings; or by fixing cast iron inspection boxes whichever is more suitable. Conduit fitting shall be avoided as far as possible. On conduit system exposed to weather, where necessary, solid type fitting shall be used. Radius of such bends in conduit pipes shall be not less than 7.5 cm. No length of conduit shall have more than the equivalent of four quarter bends from outlet, the bends at the outlets not being counted.

25.1.8 outlets - All outlets for fitting switches etc. shall be boxes of suitable metal or any other approved outlet boxes for other surface mounting or flush mounting system.

25.1.9 Conductor - All conductor used in conduits wiring shall preferably be stranded. No single-core cable or nominal Cross-sectional area greater than 130 mm<sup>2</sup> shall be enclosed in a conduit and used for alternating current.

25.1.10 Erection and earthing of conduit - The conduit of each circuit or section shall be completed before conductors are drawn in. The entire system of conduit after erection shall be tested for mechanical and electrical continuity throughout and permanently connected to earth conforming to the requirements specified under 7 by means of special approved type earthing clamp efficiently fastened to conduit pipe in a workman like manner for a perfect continuity between each wire and conduit Gas or water pipes shall not be used as earth medium. If conduit pipes are liable to mechanical damage they shall be adequately protected.

25.2 Recessed Conduit wiring system with Rigid Steel conduits -

Recessed conduit wiring system shall comply with all the requirements for surface conduit wiring system specified in 6.5.1.1 to 6.5.1.10 and addition, conform to the requirements specified in 6.5.2.1 to 6.5.2.4.

25.2.1 Making of chase - The chase in the wall shall be neatly made and be of ample dimensions to permit the conduit to be fixed in the manner desired. In the case of buildings under construction, chases shall be provided in the wall, ceiling etc., at the time of their construction and shall be filled up neatly after erection of conduit and brought to the original finish of the wall.

25.2.2 Fixing of conduit in chase - The conduit pipe shall be fixed by means of staples or by means of saddles not more than 60 cm. apart. Fixing of standard bends or elbows shall be avoided as far as practicable and all curves maintained by bending the conduit pipe itself with a large radius which will permit easy drawing in of conductors. All threaded joints of rigid steel conduit shall be treated with some approved preservative compound to secure protection against rust.

25.2.3 Inspection boxes - Suitable inspection boxes shall be provided to permit periodical inspection and to facilitate removal of wires, if necessary. These shall be mounted flush with the wall. Suitable ventilating holes shall be provided in the inspection box covers.



25.2.4 Type of accessories to be used - All outlets such as switches and wall sockets, may be either or flush mounting type or surface mounting type.

(a) Flush mounting type : All flush mounting outlets shall be of cast iron mild steel boxes with a cover of approved insulating material or shall be a box made of suitable insulating material. The switches and other outlets shall be mounted on such boxes as would be approved. The metal box shall be efficiently earthed with conduit by an approved means of earth attachment.

(b) Surface mounting type - If surface mounting type outlet box is specified, it shall be of any approved insulating material and outlet mounted in an approved manner.

25.2.5 When crossing through expansion joints in buildings, the conduit sections across the joint may be through flexible conduits of the same size as the rigid conduit.

25.3 Conduit Wiring system with Rigid Non-Metallic Conduits : Rigid Non- Metallic conduits are used for surface, recessed and concealed conduit wiring.

25.3.1 Type and size - All nonmetallic conduits used shall conform to IS : 2509- 1963-The conduit may be either threaded type or plain type as specified in IS : 2509-6913\* and shall be used with the corresponding accessories (See IS : 3419-1965) specification for Fittings for Rigid Non-Metallic Conduits).

25.3.2 Bunching off cables - Conductors of AC supply and DC supply shall be bunched in separate conduits. The number of insulated cables that may be drawn into 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 INTO RIGID NON-METALLIC CONDUITS**

Size of cable Nominal Cross Sectional Area mm <sup>2</sup>	No. & 16 Diameter in mm. of wires	Size of conduit (mm.)					
		20	25	32	40	50	
							(Number of Cables, 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	1/2.24	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	7/300+	-	-	-	-	2	3
	19/1.80						

\* For copper conductors only.



+ For aluminum conductors only.

25.3.3 Conduit joints - Conduit joints shall be joined by means of screwed or plain couplers depending on whether the conduits are screwed or plain. Where there are long runs of straight conduit. Inspection type couplers shall be provided at intervals. For conduit fittings and accessories reference may be made to IS : 3419-1965.

25.3.4 Fixing of conduits - The provision of 25.1.6 shall apply except that the spacing between saddles or supports is recommended to be 60 cms. For rigid non-metallic conduits.

25.3.5 Bends in conduit - Wherever necessary, bends or diversions may be achieved by bending the conduits (See 6.5.3.9) or by employing normal bends, inspection bends, inspection boxes, elbows or similar fittings.

25.3.6. Conduit fittings shall be avoided, as far as possible on outdoor system.

25.3.7 Outlets - All the outlets for fittings, switches, etc., shall be boxes of substantial construction. In order to minim use condensation or sweating inside the conduit, all outlets of conduit system shall be properly drained and ventilated, but in such a manner as to prevent the entry of insects, etc. as far as possible.

25.3.8 For use with recessed conduit wiring system the provisions of 6.5.2.1 to 6.5.2.4 shall apply.

25.3.9 Heat may be used to soften conduit for bending and forming joints in case of plastic conduits. As the material softens when heated, fitting of conduit in close proximity of hot surfaces should be avoided. Caution should be exercised in the use of the conduit in locations where the ambient temperature is 50°C or above. Use of such conduits in place where ambient temperature is 60°C or above is prohibited.

## PVC INSULATED P.V.C. SHEATHED OR T.R.S. WIRING SYSTEM

### 26.0 GENERAL :

This system of wiring, is suitable for low pressure installation, and shall not be used in places exposed to sun and rain nor in damp places, provided they are sheathed in the special approved protective covering and well protected to withstand dampness.

#### 26.1 Attachment to walls and ceiling :

26.1.1 All cables on brick walls, stone or plastered walls ceiling shall be run on well-seasoned, perfectly straight and well varnished on four sides, teak wood or any approved hardwood battens not less than 10 mm finished thick, width of which shall be such as to suit total width of cables laid on the batten, prior correction, these shall be painted with one coat of varnish or approved paint of color to match with surrounding. These battens shall be secured to wall and ceilings by flat head wood screws to raws plug or pill plug at an interval not exceeding 75 cm. Wood plug can be used only with special approval of the Engineer-in-charge. The flat head wood screws shall be counter within wood batten and smoothed down with file. 26.1.2 Where wiring is to be carried out along the face of the rolled steel joints, a wooden batten of adequate width shall first be laid on the same and dipped to it as inconspicuously as possible. The wiring should then be fixed to this backing in the ordinary way. Where wiring passes through structural steel work, the hole shall be suitably bushed to prevent the abrasion of the cables.

26.1.3 Attachment to false ceiling : In no case, the open wiring shall be run above the false ceiling without the approval of Engineer-in-charge

26.2.0 Link dips: Only aluminum alloy clips/joint clips shall be used. The thickness shall be 0.32 mm (30 SWG) for lengths of 25 mm to 40 mm and 40 mm (28 SWG) for lengths of 50 mm to 80 mm. The width

shall not be less than 8 mm in all these cases. Link clips/joint clips shall be so arranged that one single clip shall not hold more than two core or three single core TRS of PVC insulated and PVC sheathed up to 2.5 sw. mm. above while a single clip shall hold a single twin core or two single core cables. The clips shall be fixed on varnished wood batten switch iron pins and spaced at interval of 15 cm both in the case of horizontal and vertical runs.

26.3.0 Bends in wiring : The wiring shall not in any circumstances be bent so as to form an abrupt right angle but must be rounded off at the corners to radius not less than six times the overall diameter of the cable.

26.4.0 Protection of wiring form Mechanical Damage :

26.4.1 In cases where there are chances of any damage to wiring, such wiring shall be drawn complying with the all the requirements of conduit wiring system.

26.4.2 Such protective covering shall in all cases be fitted on all down drops within 1.5 m. from the floor or from floor level up to the switch board whichever is less.

26.5.0 Passing through floors: All cables taken trough floor shall be enclosed in heavy gauge steel conduit extending 1.5 m. above the floor or up to the switch board, whichever is less and flush with the ceiling below or by means of any approved type of metallic covering. The ends of all conduits or pipes shall be neatly bushed with porcelain wood or other approved material. The conduit pipes, shall be security earthed.

26.6.0 Passing through walls: When conductors pass through walls, any one of the following methods shall be employed. Care should be taken to see that wires pass very freely through protective pipe or box and that wires pass through in a straight line without any twist or cross in wires on either ends of such holes.

(a) A box of teak wood or approved hard wood extending through the hole thickness of the wall shall be buried in the wall and casings or conductors shall be carried so as to allow 1.3 cm air space on the three sides of the casing or conductor.

(b) The conductors shall be carried in an approved heavy gauge solid drawn or lap weld conduit or in a porcelain tube of such a size that it permits easy drawing in, the ends conduit shall be neatly bushed with porcelain, wood or other approved material.

26.6.1 Where a wall tube passes outside a building so as to be exposed to weather, the outer end shall be mounted and turned downwards and property bushed on the open end. The conduit shall be neatly arranged so that the cables enter them without bending.

26.7.0 Buried cables: The TRS or PVC sheathed cable shall not normally be buried directly in plaster. Where so specific in the special specification they may be taken in teak wood channeling of ample capacity or conduit pipe buried in the wall.

26.8.0 Stripping of outer covering - While cutting and stripping of the outer covering of the cable care shall be taken that the sharp edge of the cutting instrument does not touch the inner insulation of the conductors. The protective outer covering of the cables shall be stripped off near connecting terminal and this protective covering shall be maintained up to the close proximity of connecting terminals as far as practicable. Care shall be taken to avoid hammering on link clips with any metal instrument after the cables are laid. Where junction boxes are provided they shall be made moisture proof with a plastic compound.

## **27.0 PAINTING WORK IN GENERAL:**

27.1 Paints : Paints, oils varnishes, etc., of approved make in original to the satisfaction of the Engineer-in-charge shall only be used.

27.2 Preparation of surface: The surface shall be thoroughly cleaned and dusted before painting is started. The proposed surface shall be inspected by Engineer-in-charge or his authorized agent and shall have received the approval before painting is commenced.

27.3 Application: Paint shall be applied with brush. The paint shall be spread as smooth & even as possible. Particular care shall be paid to rivets, nuts, bolts and cover lapping. Before drawing cut, it shall be continuously stirred in the smaller containers with a smooth stick while it is being applied. Each coat shall be allowed to dry out sufficiently before a subsequent coat is applied.

27.4 Scope : Painting on old surface in indoor situations will not include primer coat except where specially mentioned in the schedule of work or special specification. However, where rust has formed on iron and steel surfaces the spots will be painted with one anti-rust primer coat.

27.5 Precautions : All furniture fixtures glazing floors, etc., shall be protected by covering. All stains, smears, splashings, dropping of every kind shall be removed. While painting of wiring etc. it shall be ensured that painting of wall ceiling etc., is not spoiled in any way.

27.6 Painting of conduit and accessories: After installation surface of conduit pipes, fittings switch and regulator boxes, etc. shall be painted with two coats of approved enamel paint or aluminum paint as required to match the finish of surrounding wall trussed, etc.

28 Link clip :

The clip for batten wiring shall be of Aluminum conforming to I. S. specification No.2415-1975.

## APPENDIX - 'A'

Important Clauses Of Indian Electricity Rules, 1956 Following Clauses Of Indian Electricity Rules, 1956 Shall In Particular Be Taken Care Of In The Execution Of Electrical Works

Clause No 3.	Subject	Authorization.
29.	Construction, installation, protection, operation and maintenance of electric supply lines and apparatuses.	
31.	Cut-out on consumer's premises.	
32.	Identification of earthed and earthed neutral conductors and position of switches and cut-out therein.	
33.	Earthed terminal on consumer's premises.	
36.	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 workmen 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.	
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 of 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 braking seal.
139.	Penalty for breach of rule 45.
140.	Penalty for breach of rule 82.
141.	Penalty for breach of rules.

## APPENDIX - 'B'

### Form of Completion Certificate

I/We certify that the installation detailed below has been installed by me/us and tested and that to the best of my/our knowledge and belief, it complies with Indian Electricity Rules 1956 as well as the C.P.W.D. General Specification for Electrical Works 1972.

Electrical Installation at \_\_\_\_\_ Voltage.

#### (1) Particulars of Works:

(a) Internal Electrical Installation	No. Total Load	Type of
--------------------------------------	----------------	---------

System of Wiring.

(i) Light point

(ii) Fan point

(iii) Plug point

(a) 3 pin 5 Amp.

(b) 3 pin 15 Amp.

(b) Others:

Description	HO/KW	Type of starting
-------------	-------	---------------------

(a) Motor: (i)

(ii)

(iii)

(c) Other Plants:

(d) if the work involves installation of overhead line/or underground cable :

(a) (i) Type & Description of overhead line.

(ii) Total length & No. of spans.

(iii) No. of street light & its description

(b) (i) Total length of underground cable & its size.

(ii) No. of joint.

End joint:

Tee joint:

St. through joint:

(2) Earthing :

(i) Description of earthing electrode :

(ii) No. of earth electrodes :

(iii) Size of main earth lead :

(3) Test Results :

(a) Insulation Resistance :

(i) Insulation resistance of the whole system of conductors to earth	Megohms
--	---------

(ii) Insulation resistance between the phase conductors and neutral	Megohms
---	---------

Between phase R and neutral	Megohms
-----------------------------	---------

Between phase Y and neutral	Megohms
-----------------------------	---------

Between phase B and neutral	Megohms
-----------------------------	---------

(iii) Insulation resistance between the phase conductors in case of polyphase supply.

Between phase R & phase Y  
Between phase Y & phase B  
Between phase B & phase R

Megohms  
Megohms  
Megohms

(b) Polarity Test:

Polarity of non-linked single pole branch switches.

(c) Earth continuity Test:

Maximum resistance between any point in the earth continuity conductor including metal conduits & main earthing lead. Ohms

(d) Earth Electrode Resistance:

Resistance of each electrode.

(i) ohms

(ii) ohms

(iii) ohms

(iv) ohms

(e) Lighting Protective System:

Resistance of the whole of lighting-protective system to earth before any bonding is effected with electrode and metal in/on the structure.

Signature of Supervisor

Signature of Contractor

Name & Address

Name & Address

## SPECIFICATION

All Specification, 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 its amendments.
- (2) Indian Electricity Rules, 1956 and its amendments.
- (3) Indian Electricity supply Act. 19948.
- (4) Regulation for Electrical Equipment in building by I.E.F. London.
- (5) The Factory Act, 1948 and its amendments.
- (6) I. S.-732-1982 Part-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 1100 volts.
- (10) I.S. : 694 - 1964 Part - II - PVC insulated cable with Aluminum conduits (revised) for voltages up to 1100 volts.
- (11) I.S. : 5908-1970 Electrical installations in buildings method of measurements of.
- (12) I.S. : 4237-1967 General requirement for switchgear and control for voltage not exceeding 1000 volts.
- (13) I.S. 1653-1964 - Rigid steel conduits for electrical wiring (revised)
- (14) I.S. : 2509-1973 - Rigid steel conduits for electrical installation. (First revision)
- (15) I.S. : 1258 - 1967 - Bayonet lamp holders (First revision)
- (16) I.S. : 418-1957 - Tungsten-Filament General service electric lamps (Third revision)
- (17) I.S. : 374-1966 - Fans and Regulators, ceiling type, electric (second revision)
- (18) I.S. : 2667-1964 Fittings for rigid steel conduits for electrical wiring.
- (19) I.S. : 3419-1976 - Fitting for rigid non-metallic conduits (First revision)
- (20) National Electric Code, 1986

## ANNEXURE - I

Abstract of the Wiring Rules of the Institution of Electrical Engineer  
(Referred to in the specification)

DEFINITIONS (See Clause 2 of the Specification)

Systems :

All electrical system in which all the conductor and apparatus are electrically connected to a common source of supply.

(1) Earthed: Effectually connected to the general mass of the earth, Solidly earthed means earthed without the intervention of a fuse, switch, circuit breaker, resistor reactor or solenoid.

(2) Uninsulated Conductor: A conductor without provision, by the interposition of a dielectric or otherwise, for its insulation from earth.

(3) Bare: Not covered with insulating material.

(4) Dielectric: Any material which offers high resistance to the passage of the an electric current.

(5) Bunch Conducted: When more than one conductor is contained within a single duct or groove or when they are run enclosed and not spaced apart from each other.

(6) Points: In wiring as per I.S.: 5908-1970-Method of measurements of electrical installation in buildings.

(7) Switch Board: An assemblage of switchgear with or without instruments, but the term does not apply to a group of local switches in a final sub-circuit where each switch has its own insulating base.

NOTE: In the Electricity (Factories Act) special regulations, 1908 and 1944 the term "Switchboard" includes "Distribution board".

(8) Single pole switch: A switch suitable for closing and or opening a circuit on one phase or pole only.

(9) Linked switches: A switch the blades of which are so linked mechanically as to make or break all poles simultaneously or in a definite sequence.

(10) Fuse Switch: A switch the moving part of which carries one or more fuses.

(11) Three Wire System:

(a) Outer Conductor: Those between which there is the greatest difference of potential. This use of the word outer must not be confused with the use of the work when applied to the external conductor of a concentric main.

(b) Neutral Conductors: The term includes the neutral conductor of a 3 phase 4 wire system, the conductor of a single phase or d. c. installation which is earthed by the supply undertaking (or otherwise at the source of the supply) and the middle wire of common return conductor of a 3 wire D. C. or single phase A.C. system.

(12) Semi enclosed machine: One in which the ventilating openings in the frame are covered with -

(a) Grids expanded metal or wire gauge, with openings of less than 1/4 inch so as to obstruct free ventilation.

(b) Wire gauge, in which the opening are less than 1/4 inch but not less than 3/32 inch (diameter or width)  
:

(c) Screens with smaller openings than the above.



(13) Totally - enclosed Machine: One in which the enclosing case and bearings are dust proof and which does not allow circulation of air between the inside and outside of the case.

(14) Pipe Ventilated Machine: An enclosed machine in which the frame is so arranged that the ventilating air may be conveyed to it through a pipe attached to the frame, the ventilation opening maintained by the fanning action produced by the machine - itself.

(15) Forced draught Machine: An enclosed machine in which the ventilating air supply is maintained by an independent fan external to the machine itself.

(16) Protected Machine: One having end shield bearings and in which there is free access to the interior without opening doors or removing covers.

**SWITCHES AND CIRCUIT BREAKERS**  
**(See clause II of Specifications)**

(17) Switches and Circuit Breakers:

Switches and circuit breakers (rules 2b.36 and 37) whether fixed separately or combined with lamps, holders or fittings, must comply with the following requirements :

- (a) Overt heading must not take place at the point of contact or elsewhere, when the full current flows continuously.
- (b) They must be so constructed or arranged that the contacts cannot accidentally close when left open.
- (c) The basis must be of incombustible, non-conducting and moisture proof material.
- (d) Circuit breaker must be so arranged and placed that no combustible material is endangered by their action.
- (e) Unless placed in an engine room or in a compartment especially arranged for the purpose, they must have their live parts covered. The covers must be of incombustible material and must be either non-conduction or of rigid metal and clear of all internal mechanism. For more than 6 amperes, at pressures exceeding 125 Volts metal covers must be lined with insulating material.
- (f) In positions where they are liable to injury or come into contract with goods, they must be further protected by an open fronted box or other suitable guard.
- (g) Handles must be insulated and so arranged that the hand cannot touch live metal, or be injured through and adjacent fuse blowing.
- (h) Switches having a handle projecting through an open slot in the cover, must not be used.

Signature of Contractor

Chief Officer  
Khambhat Nagarpalika

## **SECTION - D**

### **SECTION F-1A GENERAL REQUIREMENTS**

#### **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 and wiring system for fans, lighting points, clocks, sockets, etc., including fixing of lighting fixtures and fans etc., and miscellaneous points.
- (b) Conduit and wiring system for exhaust fans sockets etc.
- (c) Panel boards, distribution boards.
- (d) Complete power and lighting
- (e) Grounding system.
- (f) Conduits system.
- (g) Street lighting system
- (h) Other miscellaneous electrical

#### **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, whether 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's 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 equipments must comply with the relevant IS-BS specifications.

#### **1.4 Interchangeability:**

All corresponding parts of similar plant and equipment should be interchangeable in every way.

#### **1.5 Tools:**

All special tools required for dismantling and assembly of the equipment covered by the contract shall be supplied as obligation under the contract. A list of items to be supplied by the Contractor should be submitted along with the tender.

**SECTION - E**  
**SECTION F-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 hereto.

**1.3 APPLICABLE RULES AND REGULATIONS :**

1.3.1 Installation shall be carried out in conformity with the regulations for electrical equipment's of buildings, published by the institute of Electrical Engineers London (14th Edition 1966 and as amended up to date) hereinafter referred to as the I.E.E. wiring regulations. Where these specifications or the special specifications for the particular building attached hereto are at variance with the I.E.E. regulations these specifications or special specifications as the case may be, shall be followed. The installation shall also comply with the requirements of the Indian Electricity Act. 1910 as amended up to date and rules issued there under and also the regulations for the electrical equipments of buildings issued by the Bombay Regional Council of Engineer 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 or 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 and wiring diagrams showing the installations as executed shall be supplied by the Contractor along with the completion certificate.

**1.6 MATERIALS :**

All Materials shall be new and of the best quality conforming to the relevant I.S.B.S. specifications. They must be the products of reliable manufacturers of many years of standings. All like parts of materials shall be interchangeable. In case of equipments 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-I Sample of materials wherever required should be approved by the application of suitable paints. The supply of all equipments, switchgears etc. shall be complete with accessories, fittings and mountings as may be required for their proper performance, and as specified in the relevant IS-BS Code of Practice and Standards.

**1.7 WORKMANSHIP :**

1.7.1 Good workmanship and neat finished appearance are the prerequisites for complying with the clauses of these specifications. With a view to ensure fine workmanship the tenderers shall employ licensed

wiremen with an experience of not less than 5 years in the type of work they are engaged. The work should be done under supervision of licensed Electrical Supervisors with good educational qualifications and considerable experience.

1.7.2 Tenderers shall furnish the names of Supervisor and their wiremen who will be engaged in this work with details of their experience.

#### 1.8 CO-OPERATION 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 in reference 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 equipments or accessories. Where the Contractor fails to furnish such information as may be required for the purpose of concealing the equipments etc., they shall be made at his (Contractor) cost and expense. Any alteration to parts of the building shall be carried out with prior permission of the competent authority. All chases of the structural work shall be made good at the contractor's expense and brought to the original shape finish and colour.

#### 1.9 TESTING :

The electrical Contractor shall be completely responsible for the testing and commissioning of those installations covered by these specifications in compliance with the standard procedure, in obtaining permission of the Government Electrical Inspector. Any modification which is demanded by Government Electrical Inspector shall have to be carried out within the scope of the contract. The contractor shall submit four copies of drawings of installations as per regulations for shall be provided by the Contractor for carrying out the installation work. All tests shall be carried out in the presence of the Engineer-in-charge or his authorized representative and his approval obtained for the test results.

#### 1.10 COMPLETION CERTIFICATE AND MAINTENANCE GUARANTEE :

1.10.1 After the completion of the installation and testing, the Contractor should furnish a certificate in the proforma in Appendix-III, at the time of taking over the installation by the Department. The installation shall be guaranteed for period of 12 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 :

1.12.1 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.

#### 1.15 EXTRA ITEMS:

Rates for extra items shall generally be derived from the rates already available in the schedule. Where it is not possible, the rates shall be mutually agreed upon and the Contractor shall furnish a detailed analysis of the rates claimed by him.

### 2. TECHNICAL SPECIFICATIONS :

#### 2.1 Supply System :

The wiring installing shall be suitable for 3 phase 4 wire, 400-400 v 50 cycles system of supply. Colour code of different phase shall be followed as per standard.

#### 2.2 Wring 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 form the switch board together with the controlling switch or push as far as and including the ceiling rose or any other approved connector or socket, outlets. In case of more than one light being controlled by one switch the wiring up to the ceiling rose of the first light including the switch shall be considered as 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.

#### 2.2.3 Conductors :

No conductor for final sub circuit wiring for light and socket outlets shall have a cross section less than that of 2.5 sq. m (aluminium).

#### 2.2.4 Loading :

No final sub-circuit radiating from the fuse board of a sub-distribution board and wires with 25 sq. m. (At.) cable shall carry more than 10 lights. fans or socket outlets or a connected load of 800 wats whichever is greater. The following wattages may be assumed for estimating the load on each sub-circuit unless otherwise know or specified.

Incandescent Lamps	100 watts
Ceiling fans	60 watts
5-A Socket Outlets (lighting)	100 watts
4. ft. fluorescent tube	50 watts
5. ft. fluorescent tubes	100 watts

In each sub-distribution board at least one way preferably two ways shall be left pare 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 board shall accordingly numbered.

#### 2.2.5 Local Control Switches (General) :

Local control switches for circuit carrying not less than 5-A shall be piano type and shall conform to 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, switch box is 1.3 mtr. 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).

#### 2.2.5A Switches (Two way) :

(a) Two way switches shall be piano type single pole, double throw, 250V, suitable for flush mounting and of 5A capacity as per the drawings. All switches shall be recessed in an embedded metal box.

(b) Each box shall have suitable outlet for fixing conduits 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 stairway wiring.

#### 2.2.5.B Switch Boxes (General) :

Electrical circuits shall be written suitably on the cover of all switch boxes, as approved by the Engineer-in-charge (Elect). Whenever different phase are terminated in a switch box bake lite partition shall be provided. Each case shall be provided with a G. I. Earth stud nut and washers for earth connectors.

#### 2.2.6 Ceiling Rose :

Ceiling rose shall be used on circuits having a voltage normally exceeding 200V. Only one flexible cord shall be attached to a ceiling rose. Only 3-pin 5A socket outlet shall be provided in lighting circuits. All socket outlets shall be provided with control switch and they shall be mounted in switch boxes in an approved manner.

#### 2.2.7 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 their form. 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 16 S. W. G.

#### 2.2.8 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.

#### 2.2.9 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 the reinforcement.

#### 2.2.10 Conduits and Earthing :

All conduits feeding lighting and fan circuits shall be provided with earth continuity G.I. conductor as specified for power wiring. All conduits shall be as specified for power wiring.

#### 2.3.1 Point wiring :

Point wiring for power shall be as defined under section 2.2.2 and shall include the switches and sockets.

#### 2.3.2 Loading :

All distribution board for power wiring shall be not less than 15A per way. Loading per way shall not exceed normally 100 watts. The following loads may be assumed if

exact figures are not known :

3-Pin 15A Outlets	1000 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 than 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 of fuse or 1.1/2 time the setting of the circuit breakers but in no case less than No. 8 S.W.G. or 7064 or equivalent cross section of copper. Where practicable, the earth connection 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. Inside switch 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 building 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 pin is in correct position. The grounding pin of the plug shall make the contact first and break the contact 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 weld 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 switch/socket shall be mounted on M. S. bracket enclosed in a box.

### 2.4 Conduit Wiring :

2.4.1 Where conduit wiring is adopted the type and size of the conduit shall be as indicated in the drawing. The minimum of the conduit shall be 19 mm.

2.4.2 The Contractor shall thoroughly study the structural arrangements of the buildings and wherever necessary, shall in consultation with Department's representatives at site, make suitable adjustments in the cable routings, earthing arrangements, and location boxes, fitting etc. with a view to avoid interference with any part of the building, structure, equipment or any other work in the building or to effect any improvement in the arrangement.

### 2.4.3 Protection of conduit against rust :



Conduit shall be given two coats of oxide paint before they are placed in position. All exposed conduit shall be painted after installation with the colour as approved by the Engineer-in-charge. This do not apply to galvanized conduit.

#### 2.4.3 A Protection against insects and damp :

In order to minimize condensation or sweating inside the conduit, system shall be properly drained and ventilated in such a manner as to prevent the entry of insects.

2.4.4 Conduit shall first be installed as a complete system without cables and shall be continuous from outlet to outlet from fitting to fitting and mechanically and electrically connected to all boxes and fittings.

### **2.5 SPECIFICATION FOR POWER CONTROL AND TELEPHONE CABLES :**

#### 1. SCOPE :

- i. The specifications cover the supply and installation of medium voltage power and control cables either in ground or trench depending on the conditions at site including accessories for the same. The work in general, consists of supplying, laying terminating and connecting all. 1.1 KV APLSTS 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, cables markers etc., as required to make the installation work including digging and back filling of the trenches as required.

#### II. SPECIFICATIONS :

- 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 IS BS 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 latest Indian Electricity rules as regards the safety, earthing of equipments and other essential provision specified therein.
- iv. Only approved make of cable be used. ICC and CCI will be preferred.
- v. The cables shall generally be laid as per IS Code of Practice.

#### III. GENERAL RULES FOR CABLE LAYING:

- i. Installation shall be carried out in a neat, workmen like manner by skilled experienced and competent workmen in accordance with the standard practices.
- ii. Cables shall be laid preferably in one piece length to avoid joints. If straight joint 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 kink 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 or other works on 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 Contractor shall also notify the building contractor in writing, for finishing up as required, 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 chambers and in such other situations as the Engineer shall require, the Contractor shall seal cable holes in a manner approved by Engineer-in-charge. Where cables pass through roads, nallahs, etc., cables must be protected by Class 'A' Hume pipe of diameter not less than 6" (15 cm)

vi. The cable route shall be the shortest and there 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 settled by the Engineer-in-charge on the site when the contractor is in a position to commence each portion of the work. The trench shall be not less than 1/2 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 filled 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 1/2 core in multicore cables, the 1/2 core shall be a neutral conductor having reduced section.

xii. For all multicore cables each core and tails shall be brought out, marked and or colored in an approved manner.

xiii. Cables termination shall be done with suitable compression brass glands in the case of PVC cables and cast iron trifurcating boxes in the case of APLSTS cables. The armor should be connected to the right main earth in building with duplicate earth wires as per the relevant IS/BS specifications. The core isolation over each conductor shall however be retained throughout the run of the conductor up to the end where lugs shall be fitted thereon for connections. The lugs shall be fitted by means of approved solder and flux as a lap, and Eyre No. 7 liberally used. The joint shall be mechanically strong and pressure tested.

## 2.6 DISTRIBUTION BOARDS AND PANELS :

### General Requirements :

2.6.1 All distribution panels shall comply with I.E.E. Rules 60-61. A clear distance of 0.91m meter in front of the switch board shall be kept. Where bare connections or 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 furthers outstanding part of any attachment or conductor. If the space behind the switch board exceeds 0.76 main width there shall be a passage way from either end of the switch board clear to height of 1.928 m width 0.299 m. All wiring connection shall be made neatly and securely.

2.6.2 For crocoite's carrying more than 10 Amps. 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 to wiring diagram. Names of the distribution boards shall be painted as directed by the Engineer-in-charge. All the switch fuse units and isolators D.Bs. shall be complete with earthing lugs neutral bar link. H.R.C. fuses and of approved make.

2.6.3 Skeleton type panels shall have rigid framework adequately braced and supported. The switch and distribution boards shall be neatly arranged in the frame. The details of the framework and the arrangement of switches shall be got approved by the Engineer-in-charge before the panel is fabricated.

2.6.4 All cubical type panels shall have rigid supporting frames adequately braced over which sheet metal shall be neatly secured. All switches, distribution boards etc. shall be neatly arranged on the panels and all connections made form the back of switches. The panels shall be rendered dust and vermin-proof. The interior of the panels shall not be accessible to unauthorized persons.

2.6.5 The recess type boards shall be embedded in wall in a cupboard with a metal hinged door with locking arrangement. In all recessed conduit work in distribution boards shall be recessed. Where recessing is not possible, free standing panel may be provided as approved by the Engineer-in-charge.

2.6.6 All individual components i.e. switch fuse units D. Bs. etc. shall be connected by earth continuity wire of appropriate size with the main earth bus of the panel D. B. etc. The panel switches or D.Bs. shall be earthed by not 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 alive 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 or 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) All knockouts for branch circuits, conduit entries shall be drilled in and files as required. For lighting panels the top and bottom cover plates shall be removable type.

(e) Main disconnects device for all panel boards shall be of switches of disconnect type and of the size as indicated. It shall be mounted directly below the panel or through a short thread conduit of required size.

- (f) The main disconnect for all panel boards shall have an entry suitable for PVC armored cable from bottom.
- (g) All panel boards shall be provided with an earthing terminal and plug for connection to the grounding system.
- (h) Temperature rise of all electrical parts shall not be more than 3000 C with full load measured at room temperature.
- (i) Buses shall be securely supported so that ordinary vibrations will not cause any of the parts to become loose.
- (j) All barriers and supports of current carrying parts shall be of moisture resistant insulating material and shall not be adversely affected by arcing.
- (k) The locations of panels shown in the drawings are only tentative. Panels may be located at place approved by the Engineer-in-charge.
- (l) 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 interconnections.
- (n) Panel should be self-supported on angle channel iron framework. It should be preferably of bolted construction in case of transportation and flexibility. The frame shall be of the required size for the mounting of the equipment on it. It shall be bolted or grouted rigidly after leveling and alignment.
- (o) The cupboard and D. B. should be of such size so as to be accommodated in the existing room as per I. S. rules and I. S. codes of practice for installations of medium voltage switchgear.
- (p) Fabrication drawing showing the detailed dimensions and panels and its components indicating the frame work earthing positioning of switches, D. Bs. cable boxes, adopter chambers etc. shall be furnished to 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 anticorrosive paint suitable for humid and salty atmosphere on two coats of primer.

Switch Gears, Powers Panels D. B. and S. F. Us.

2.6.8 The main bus bar shall have continuous current rating as specified with neutral bar having half of full load rating of the phase bus bar. The sizes of the bus bars shall be so selected that the current density in bar does not exceed 150 amps. per sq.mm. for copper. The length of bus-bar chamber should be as suitable length to fix all the switches etc. as per prevailing standards. Clear spacing of two adjacent buses shall be 1.1/2" Minimum bar should be taped all along with color coated 11 KV grade PVC tape. The maximum internal support for each unsupported length shall exceed 600 mm.

The bus bar shall be of copper/aluminum and fabricated to the relevant standards specification. In case aluminum bus bar is used special with high conductivity aluminum bus bar alloy E 91 C frame conforming to E. S. S. 2898 shall be used. The current density shall not exceed 800A per sq. inch. Hylam barriers will be provided over the joints to prevent any short circuit.

The bus bar enclosing shall be made out of not less than 16 gauge M. S. sheets construct on with angle iron support. All interconnections between bus bars S. F. Us. and D. Bs. shall be of adequate size and details of such interconnection shall be furnished to the Engineer-in-charge for his approval.

The bus bar shall be air insulated extensible type rectangular one. The bus bars chamber shall be dust tight by providing gaskets secured properly so as to tender it vermin proof. The Combination Fuse-switch unit should comply with IS 4064 BS 861 and BBS 2510 wherever applicable. It should be suitable to accommodate High Reputing Capacity Cartridge Fuse links complying with IS 2208 or BS 88 and having certified returning capacity of not less than 35 MVA at 440 volts (AC5 duly). The switch gear (panels D. Bs. etc.) shall be installed generally as per IS-Part I 3072 and as specified and shown in drawings.

All fuse switch units shall be provided with non-deteriorating HRC fuse links complying with IS 2208-1962 and having rupturing capacity of 35 MVA at 415 volts oars specified.

All switches above 60 amps. rating shall be provided with suitable size adapter boxes. All switches mounted on the top of the bus bars shall be provided with detachable type reverse entry adapter boxes. Suitably engraved labels shall be provided for each circuit as well as for the board.

A meter with sector switches and LMH meter shall be provided where specifically mentioned. Small wiring for the inter-connecting shall be color coded and provided with numbered figures for easy identification of circuits.

(a) The distribution boards should be totally enclosed metal clad complying with B. S. 214. The M. S. sheet steel enclosures for recessed D. Bs. shall be of not less than 14 gauge.

(b) The D. B. shall be with hinged door and the locking arrangements as approved by the Engineer-in-charge.

(c) All the components shall be enclosed in the enclosure. The mounting of D. B. shall be got approved by the Engineer-in-charge before carrying out the installing.

(d) The D. Bs. shall have proper size cut outs for conduits entry or cable entry or cable entry as required and these shall be made on site.

(e) Adequate spacing shall be provided inside the D. Bs. for easy removal of the fuses and carry out the interconnection.

(f) A set of insulating barriers have to be provided between incoming breakers switches and fuses.

Switch fuse Units :

(a) All the D.P.T.P. and T.P.N. switch fuse units shall be totally enclosed ion clad quick make, quick dreack type to best Indian make conforming to the I.S. or B.S. 3185 specifications. All the switch fuse units shall have mechanical interlock with a door so that the door cannot be opened when the switches are in 'ON' position. The switches should be of double break isolation type to ensure safely.

(b) Eah T.P. & T.P.N. switch fuse unit shall be earthed with two distinct earth connections.

(c) Suitable insulator shall be provided between phase.

(d) There shall be suitable natural link in the fuse box.

(e) All T. P. & T.P.N. switch fuse units shall be rated for 500 volts and D.P. (required for single phase supply) and S.P.N. switches for 250-volts.

(f) The H.R.C. cartridge fuse shall conform to H. S. 88 (1952).

The O.C. Bs. ACB shall be suitable for 400/440 volts 3 phase 50 cycle supply capable of interrupting a fault MVA. of not less than 31. The circuit breaker shall conform to the BSS-936-1940 BSS 3659 with such tripping arrangements as many as required under special specifications for the building. Efficient and fool-proof mechanical interlocking shall be provided for the safe operation and maintenance. The rate shall be inclusive of the first filling of oil.

#### 2.7 Instrumentation:

The instruments and meters wherever shall be housed in special sheet steel box located between switch fuses units and bus bar chambers. The instruments etc. shall be mounted on the hinged cover with their dial flushed. All instruments shall have protective H. R. C. fuse links. All interconnections and small wiring shall be neatly dressed arranged and duly colored for easy identification of circuits. Meters shall be provided as required in the Schedule. Meters shall be dead head and be suitable for 400/440 volt 3 phase 4 wire 50 cycles (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 transformer shall be of 5VA burden and 250V grade. Even unit shall be prewired and interconnected to the system for its required indicating performance. Indicating Lamps shall have independent circuit fuse.

#### 2.8 FIXING OF LIGHTING FIXTURES :

1. Location of fixtures their manner of fixing mounting height etc. indicated in relevant drawing. Actual location and levels shall however be arrived at site in coordination with other services etc. and prior approval of the Engineer-on-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. General arrangement of fixtures layout as 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.
4. The inter-connections wiring from the light outlet point up to the fixture shall be carried out by means of flexible copper wire of section not less than 1.5 mm<sup>2</sup>.
5. All fixtures suspended by means of conduits shall be done with all and socket joints or as per approved design.

#### 2.9 Telephone System :

1. Empty conduits shall be done, recede or exposed to surface along with pull boxes, junction boxes and telephone outlet boxes, in areas and location as indicated in the relevant drawing as per materials and methods as described in regard to conduits under section "Wiring in Conduits" except the G. I. pull wires of gauge not less than 20 SWG shall be kept pulled through conduits in all sections so that in future telephone wires can be pulled easily.
2. Location shown on the drawing are approximate and final location shall be decided in the field by the Engineer-in-charge.

## **SECTION - F**

### **SPECIFICATION FOR EARTHING**

#### **Installation of Earthing Plates :**

All installation of earthing shall conform to Indian Electricity Rules, IS-3043 latest edition and I.E.E. The copper earth plates should be tinned before installation. The earth plates of copper 60 cm x 60 cm x 3.515 mm thick size as mentioned in the schedule should be in separate pits at least 150 cms to 300 cms. away from the building at a depth necessary to reach moist earth surface but with a minimum depth of 2.5 mtr from the finished ground level up to the top vertical dodge of earth electrode. The earth plate shall be thoroughly cleaned to remove all dirt from the surface and be tinned properly for electrical contact with the main ground. Each earth pit should be provided with 38 mm. dia. G.I. pipe 2.5 Mts. long or more depending upon the depth of pit over the vertical edge of earth plate (with top end of pipe provided with a closed to coupler). Alternative layers of salt and coke shall be provided surrounding the plate. The pits shall be filled when the plates are in position and with type approval of Engineer-in-charge.

To facilitate watering the pit, a concrete compartment should be made with funnel with mesh and cover plate as per rules provided in ISI regulations. The masonry enclosures shall be 25 cm x 25 cm (deep) with C. I. lid of 23 cm x 30 cm size. After installation, the earthing resistance of each earth plate should be measured by resistance meggar in the presence of Engineer-in-charge, three days after the completion of earthing work, and the value should conform to regulations.

Signature of Contractor

Chief Officer  
Khambhat Nagarpalika  
Khambhat



**LIST OF APPROVED ELECTRICAL PRODUCTS (FOR THE)**  
**LIST OF APPROVED PRODUCT**

<p>CHAPTER-I WIRING</p> <p>1.1 SHOCKPROOF ACCESSORIES (A) Concealed / Surface Type Any 'I.S.I.' marked switches and accessories approved by the engineer in charge of work. (B) Mini Modular Type</p> <ol style="list-style-type: none"> <li>1. ANCHOR</li> <li>2. VINAY</li> <li>3. ELLE</li> </ol> <p>(C) Modular Type</p> <p>A. CATEGORY - I</p> <ol style="list-style-type: none"> <li>1. ANCHOR</li> <li>2. SG</li> <li>3. ELLEYS</li> </ol> <p>B. CATEGORY - II</p> <ol style="list-style-type: none"> <li>1. MK</li> <li>2. TOYOMA</li> <li>3. LK</li> <li>4. NORTHWEST</li> </ol> <p>1.2 RIGID PVC PIPES / OVAL PIPES &amp; FITTINGS. FIA Approved &amp; ISI marked (Emossed)</p> <ol style="list-style-type: none"> <li>1. VRAJ</li> <li>2. NIHIR</li> <li>3. PRECISION</li> <li>4. SHRINATH</li> </ol> <p>1.3 OVAL / CASING &amp; CAPING &amp; PVC TRUNKING</p> <ol style="list-style-type: none"> <li>1. PRECISION PLASTIC</li> <li>2. CENTUR</li> <li>3. M.K.</li> <li>4. SHREENATH</li> <li>5. TOYOMA</li> <li>6. L.K.</li> </ol> <p>CHAPTER – CHAPTER-II LAMPS &amp; FITTINGS</p> <p>2.1 FILAMENT LAMPS / FLOURESCENT TUBES</p> <p>(A) CAT.I ANY ISI MARKED (B) CATEGORY - II</p> <ol style="list-style-type: none"> <li>1. SURYA</li> <li>2. BAJAJ</li> <li>3. PUSKAR</li> <li>4. OSRAM</li> </ol>	<p>2..2 MERCURY WAPOUR LAMPS</p> <p>(A) CAT - I ANY ISI MARKED (B) CATEGORY - II</p> <ol style="list-style-type: none"> <li>1. SURYA</li> <li>2. BAJAJ</li> <li>3. OSRAM</li> <li>4. MYSORE</li> <li>5. MYNA</li> </ol> <p>(C) CATEGORY - III</p> <ol style="list-style-type: none"> <li>1. PHILIPS</li> <li>2. CROMPTON</li> </ol> <p>2.3 SODIUM WAPOUR LAMPS</p> <p>(A) CATEGORY - I ANY ISI MARKED (B) CATEGORY - II</p> <ol style="list-style-type: none"> <li>1. PUSKAR</li> <li>2. OSRAM</li> <li>3. BAJAJ</li> <li>4. SURYA</li> <li>5. MYNA</li> </ol> <p>(C) CATEGORY - III</p> <ol style="list-style-type: none"> <li>1. PHILIPS</li> <li>2. CROMPTON</li> </ol> <p>2.4 COMPACT FLOURESCENT LAMPS</p> <p>(A) CATEGORY - I ANY OTHER THAN FOLLOWING MAKE (B) CATEGORY - II</p> <ol style="list-style-type: none"> <li>1. ANCHOR</li> <li>2. OSRAM</li> <li>3. SHAH</li> <li>4. ORPAT</li> <li>5. INDOASIAN</li> <li>6. JOY LIGHTING</li> <li>7. DECON</li> <li>8. ARCO</li> <li>9. SAMAY</li> <li>10 MYNA</li> </ol> <p>(C) CATEGORY - III</p> <ol style="list-style-type: none"> <li>1. PHILIPS</li> <li>2. CROMPTON</li> </ol> <p>2.5 METAL HALIDE LAMPS</p> <p>(A) CATEGORY - I ANY ISI MARKED (B) CATEGORY - II</p> <ol style="list-style-type: none"> <li>1. PUSKAR</li> <li>2. SURYA</li> </ol>
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(C) CATEGORY - III 1. PHILIPS 2. CROMPTON	3. OSRAM 4. BAJAJ MYNA (C) CATEGORY – III 1. PHILIPS 2. CROMPTON
2.6 ENERGY SAVING FLOURESCENT TUBE FITTINGS (Box Type / Industrial Type /Mirror Optic / Mirror Light / street Light) (A) CATEGORY - I ANY OTHER THEN FOLLOWING MAKE (B) CATEGORY - II 1. DECON 2. SHAH 3. HAVELLS 4. ASIAN 5. SHAKTI 6. MYNA (C) CATEGORY - III 1. PHILIPS 2. CROMPTON 2.7 FLOURESCENT TUBE FITTINGS [ ELECTRONICS BALLAST] (Box Type / Industrial Type / Mirror Optic / Mirror Light / Street Light) (A) CATEGORY - I ANY OTHER THEN FOLLOWING MAKE (B) CATEGORY - II 1. SURYA 2. ARCO 3. ANCHOR 4. SHAKTI 5. DECON 6. HAVELLS 7. SHAH 8. FIXOLITE 9. MYNA 10 JOYLIGHTING 11 PRESTOLITE (C) CATEGORY - III 1. PHILIPS 2. CROMPTON 2.8 MERCURY VAPOUR LAMP FITTINGS (POST TOP LANTERN / STREET LIGHTS) (A) CATEGORY - I	(C) CATEGORY - III 1. PHILIPS 2. CROMPTON 2.9 SODIUM VAPOUR LAMP FITTINGS (POST TOP LANTERN / STREET LIGHTS) (A) CATEGORY - I 1. KUMAR 2. GLOLUX 3. G-LITE (B) CATEGORY - II 1. SURYA 2. ARCO 3. SHAKTI 4. BAJAJ 5. CANARA 6. FIXOLITE 7. MYNA 8. JOYLIGHTING 9 HAVELL'S 10 PRESTOLITE (C) CATEGORY - III 1. PHILIPS 2. CROMPTON 2.10 FLOOD LIGHTS WITH BC / ES/ /MV / SV / MH / LAMPS (POST TOP LANTERN / STREET LIGHTS) (A) CATEGORY - I 1. ARCO 2. GLOLUX 3. G-LITE 4. TWINKLE 5. KUMAR (B) CATEGORY - II 1. SURYA 2. FIXOLITE 3. DECON 4. SHAKTI 5. BAJAJ 6. JOYLIGHTING 7 HAVELL'S 8. PRESTOLITE (C) CATEGORY - III 1. PHILIPS

<p>ANY OTHER THEN FOLLOWING MAKE</p> <p>(B) CATEGORY - II</p> <ol style="list-style-type: none"> <li>1. SURYA</li> <li>2. ARCO</li> <li>3. SHAKTI</li> <li>4. DECON</li> <li>5. HAVELLS</li> <li>6. BAJAJ</li> <li>7. FIXOLITE</li> <li>8. MYNA</li> <li>9. JOYLIGHTING</li> </ol>	<ol style="list-style-type: none"> <li>2. CROMPTON</li> </ol> <p>2.11 TABLE FANS</p> <p>(A) CATEGORY - II</p> <ol style="list-style-type: none"> <li>1. DECON</li> <li>2. BAJAJ</li> </ol> <p>(B) CATEGORY - III</p> <ol style="list-style-type: none"> <li>1. PHILIPS</li> <li>2. CROMPTON</li> </ol> <p>2.12 ELECTRONIC BALLAST</p>
<p>10. PRESTOLITE</p>	<p>(A) CATEGORY - I</p> <ol style="list-style-type: none"> <li>1. KUMAR</li> <li>2. MARVEST</li> <li>3. KELTRON</li> <li>4. JOYLIGHTING</li> </ol>
<p>2.12 (B) CATEGORY - II</p> <ol style="list-style-type: none"> <li>1. ANCHOR</li> <li>2. SHAH</li> <li>3. ASIAN</li> <li>4. OSRAM</li> <li>5. OPAL</li> <li>6. HAVELL'S</li> <li>7. ACON</li> </ol> <p>(C) CATEGORY - III</p> <ol style="list-style-type: none"> <li>1. PHILIPS</li> <li>2. CROMPTON</li> </ol> <p>CHEPTER-III</p> <p>SWITCHGEARS &amp; DISTRIBUTION BOARDS</p> <p>3.1 CAST IRON CLAD SWITCHES WITH REWIREBLE FUSE</p> <p>(A) CATEGORY - I</p> <p>ANY OTHER THEN FOLLOWING MAKE</p> <p>(B) CATEGORY - II</p> <ol style="list-style-type: none"> <li>1. NEW</li> <li>2. MODI</li> <li>3. SUPER</li> <li>4. PEW</li> </ol> <p>(C) CATEGORY - III</p> <ol style="list-style-type: none"> <li>1. KEW</li> <li>2. STENLY</li> </ol> <p>3.2 METAL CLAD SWITCHES WITH REWIREBLE FUSE (63A - 100 A)</p> <p>(A) CATEGORY - I</p> <ol style="list-style-type: none"> <li>1. SIGMA</li> </ol> <p>(B) CATEGORY - II</p> <ol style="list-style-type: none"> <li>1. MODI</li> <li>2. HPL</li> <li>3. SUPER</li> </ol>	<p>(B) CATEGORY - III</p> <ol style="list-style-type: none"> <li>1. L&amp;T</li> <li>2. SIEMENS</li> <li>3. C&amp;S</li> <li>4. GE</li> <li>5. HAVELLS</li> </ol> <p>3.4 MOULDED CASE CIRCUIT BREAKERS</p> <p>(A) CATEGORY - II</p> <ol style="list-style-type: none"> <li>1. HAVELLS</li> <li>2. CROMPTON</li> <li>3. STANDARD</li> </ol> <p>(B) CATEGORY - III</p> <ol style="list-style-type: none"> <li>1. L&amp;T</li> <li>2. C&amp;S</li> <li>3. G.E.</li> <li>4. SIEMENS</li> <li>5. BCH</li> </ol> <p>3.5 AIR CIRCUIT BREAKERS</p> <p>(A) CATEGORY - III</p> <ol style="list-style-type: none"> <li>1. G.E.</li> <li>2. SIEMENS</li> <li>3. L&amp;T</li> <li>4. CROMPTON</li> <li>5. C&amp;S</li> </ol> <p>3.6 CHANGE OVER SWITCHES</p> <p>(A) CATEGORY - I</p> <ol style="list-style-type: none"> <li>1. MODI</li> <li>2. SIGMA</li> </ol> <p>(B) CATEGORY - II</p> <ol style="list-style-type: none"> <li>1. STANDARD</li> <li>2. HAVELLS</li> <li>3. SUPER</li> <li>4. KEW</li> <li>5. C&amp;S</li> </ol>

4. TRISUL 5. KEW 6. STANDARD (C) CATEGORY - III 1. HAVELLS 2. L&T 3. CROMPTON 3.3 METAL CLAD SWITCHES WITH HRC FUSE (A) CATEGORY - II	6. HPL (C) CATEGORY - III 1. L&T 2. CROMPTON 3. G.E. 4. SIEMENS 3.7 MCB & MCB DISTRIBUTION BOX
1. STANDARD 2. SUPER 3. CROMPTON 4. KEW 5. HPL	(A) CATEGORY - I 1. SIGMA 2. BALKAM 3. S.G.
3.7 (B) CATEGORY - II 1. HAVELLS 2. STANDARD 3. HPL 4. KEW 5. INDO-ASIAN 6. AECO-MEFA 7. SUPER 8. ANCHOR 9. ELECON-CLIPSAL (C) CATEGORY - III 1. L&T 2. MDS 3. G.E. 4. CG SNEIDER 3.8 ELCB & RCCB (A) CATEGORY - I 1. S.G. 2. SIGMA (B) CATEGORY - II 1. STANDARD 2. ANCHOR 3. SUPER 4. INDO-ASIAN 5. AECO-MEFA 6. HPL 7. ELECON-CLIPSAL (C) CATEGORY - III 1. L&T 2. MDS 3. HAVELLS 4. G.E. 5. C.G.SNEIDER 3.9 TIME SWITCHES 1. L&T 2. MDS 3. INDO-ASIAN	CHEPTER-IV CABLES & WIRES 4.1 ALLUMINIUM & COPPER XLPE CABLES (ALL Type) 1. UPTO 35 SQ.MM ANY ISI MARKED 4.2 ALLUMINIUM & COPPER XLPE CABLES (ALL Type) ABOVE 35 SQ.MM & UP TO 185 SQ.MM 1. CAPCAB 2. DICABX 3. FINOLEX 4. R R CABLE 5. POPULAR 6. POLYCAB 7. AVOCAB 8. HMT 9 LOOKMAN 10 POWERCAB 4.2 ALLUMINIUM & COPPER XLPE CABLES (AL Type) ABOVE 185 SQ.MM 1. DICABS 2. AVOCAB 3. POLYCAB 4. CCI 5. INCAB 6. HMT 7. R R CABLE CHEPTER-V FANS 5.1 CEILING FANS & TABLE FANS 1. LAZER 2. ANCHOR

4. C&S 3.10 ENERGY METER 1. HPL 2. L&T 3. G.E.	3. POWERPACK 4. CROMPTON 5. BAJAJ 6. ORIENT 7. ALMONDARD 8. KHAITAN 9. INOVA 10 CINNI 11 USHA 12 GEC 13 REMI 14 ORIENTS 5.2 EXHAUST FANS, BRACKET FANS & PEDESTAL FANS (A).CATEGORY - I 1. LAZER 2. POWERPACK 3. ANSU
4. C&S 5. ANCHOR 6. HAVELLS 7. INDO-ASIAN	4. EPC 5. NOVA 6. REMI 7. KHAITAN 8. ORIENT 9 USHA
(B) CATEGORY - II 1. CROMPTON 2. G.E.C. 3. BAJAJ 4. ALMONARD CHAPTER-VIII AIRCONDITIONERS, WATER COOLERS & WATER HEATERS 8.1 SERVO CONTROLLED VOLTAGE STABILIZER & ELECTRONICS POWER CONDITIONERS 1. SUVIK 2. KELTRON 3. KEPREJ 4. GELCO 5. RIDER 6. TOCONSI 8.2 ON LINE UPS 1. SUVIK 2. KELTRON 3. KEPREJ 8.3 WATER HEATERS A. CATEGORY - I 1. LAZER 2. POWERPACK 3. BAJAJ 4. USHA	3. TULLU 4. HARSHA 5. AUE 6. SAGA (B) CATEGORY III 1. CROMPTON 2. KIRLOSKAR 3. SIEMENS 9.4 OPEN WELL TYPE HORIZONTAL MONO BLOCK PUMPS (A) CATEGORY - I 1. TOPLAND 2. PRIME 3. SABAR (B) CATEGORY - II 1. UNEEL 2. LUBI 3. KIRLOSKAR 4. CROMPTON 5. PRIMA 9.5 STARTER PANELS 1. L& T 2. SUECO 3. SAMUDRA 4. SUN 5. LUBI 6. BCH 9.6 SUBMERSIBLE PUMPS

<p>B. CATEGORY - II</p> <p>1. SPHEREHOT</p> <p>2. RECOLD</p> <p>3. VENUS</p> <p>CHEPTEr-IX</p> <p>MOTOR PUMPS</p> <p>9.1 MOTOR PUMP STARTERS &amp; STARTER ACCESSORIES</p> <p>A. CATEGORY - II</p> <p>1. CROMPTON</p> <p>2. JYOTI</p> <p>3. HAVELLS</p> <p>4. ANCHOR</p> <p>5. PECO</p> <p>B. CATEGORY - III</p> <p>1. L &amp; T</p> <p>2. SIEMENS</p> <p>3. BHARITA CUTTLER HAMMER</p> <p>4. ALSTHOM</p> <p>5. C &amp; S</p> <p>9.2 PANNEL ACCESSORIES</p> <p>1. STANDARD</p> <p>2. L&amp;T</p> <p>3. MEW</p> <p>4. KAYCG</p> <p>5. ANCHOR</p> <p>6. UNIVERSAL</p> <p>7. IMP</p>	<p>(A) CATEGORY - I</p> <p>1. TOPLAND</p> <p>2. AROMA</p> <p>3. JASCO</p> <p>4. SABAR</p> <p>5. PRIMA</p> <p>(B) CATEGORY - II</p> <p>1. CROMPTON</p> <p>2. CALAMA</p> <p>3. AMRUT</p> <p>(C) CATEGORY - III</p> <p>1. KSB</p> <p>2. UNEEL</p> <p>3. KIRLOSKAR</p> <p>4. LUBI.</p> <p>CHEPTEr-X</p> <p>SUBSTATION EQUIPMENTS</p> <p>10.1 (A) CATEGORY - II</p> <p>1. VOLTAMP</p> <p>2. SKP</p> <p>3. YULE</p> <p>(B) CATEGORY - III</p>
<p>9.3 SINGLE PHASE MONO BLOCK PUMPS</p> <p>(A) CATEGORY - II</p> <p>1. LUBI</p> <p>2. PRIME</p>	<p>1. ALSTOM</p> <p>2. CROMPTON</p> <p>3. KIRLOSKAR</p> <p>4. L&amp; T</p>

**GENERAL MATERIAL SPECIFICATIONS BRAND NAMES TO BE USED FOR  
THE EXECUTION WORKS (MAKE LIST) FOR ROOFTOP SOLAR WORK**

<b>Materials</b>	<b>Brands</b>
LED Street Light	Bajaj Electricals, Philips, Havells India, Wipro Lighting, Syska LED
SMC Junction Box	Sintex, Indo SMC Privet Ltd, Dudhi Industries, EPP Composites Pvt Ltd, Sadhrish (Medha Composites)
Cabel work	Polycab India Ltd, Havells India Ltd, KEI Industries Ltd, RR Cables, Universal Cables Finolex Cables Ltd, Avocab.
DWC Pipe	Astral Pipes, Finolex Industries, Dutron Group, Gamson India Pvt Ltd, Tirupati Plastomatics Pvt Ltd
Solar panel	Waaree Energies, Adani Solar, Tata Power Solar Systems Ltd, Vikram Solar, Renewsys India Pvt Ltd, Pahal Solar
Solar Inverter	Luminous Power Technologies, Microtek, UTL Solar, Servotech Renewable Power System Ltd, K Solar Inverter

### **Approved Vendor List of LED Lights & Cable**

	<b>LED Lights List</b>	<b>Cable List</b>
<b>1</b>	Phillips	Finolex
<b>2</b>	Havells	R.R. Cable
<b>3</b>	Osram	Anchor
<b>4</b>	Eveready	Polycab
<b>5</b>	Wipro	
<b>6</b>	Oreva	
<b>7</b>	Bajaj	
<b>8</b>	SYSKA	
<b>9</b>	Charlston	
<b>10</b>	Moserbaer	
<b>11</b>	NTL Lemnis ( Pharox)	
<b>12</b>	Surya	
<b>13</b>	Fiem	
<b>14</b>	GE	
<b>15</b>	HPL	
<b>16</b>	Halonix	
<b>17</b>	C&S	
<b>18</b>	Crompton & Greaves	
<b>19</b>	Delta	
<b>20</b>	Sujana	
<b>21</b>	Usha Lexus	
<b>22</b>	Dynel	
<b>23</b>	MIC	
<b>24</b>	Reiz	
<b>25</b>	Giltz	
<b>26</b>	Orient ( Birla)	

નોંધ: ઉપરોક્ત કંપની મેક એલ.ઇ.ડી. અને કેબલ પૈકી ખંભાત નગરપાલિકા જે કંપનીની એલ.ઇ.ડી અને કેબલ સપ્લાય કરવાનું જણાવશે તે કંપનીની એલ.ઇ.ડી. સપ્લાય કરવાની રહેશે. આ બાબતે કોઈપણ પ્રકારના વિવાદ કરવાના રહેશે નહીં. જેની ખાસ નોંધ લેવી

**Signature of Contractor**

**Chief Officer  
Khambhat Nagarpalika  
Khambhat**

## **SCHEDULE-B-14**

### **PROVIDING SUPPLYING AND FIXING FURNITURE ITEMS KHAMBHAT MUNICIPAL BUILDING AT KHAMBHAT.**

#### **ITEM NO.1:**

Providing and supplying and arranging table Top and side of overall thickness 38 mm made from 18 mm thick MR grade plywood with 1 mm thick decorative laminate on exposed faces and specified thick glass on top by EIC and 0.8 mm thick laminates as liner with TW border patti . legs to be made from 50mm x 50mmx 1.6 mm thick CRC Square pipe and supporting pipe 50mm x 25mm x 1.6mm with 50 micron epoxy powder coating with levelar.appron to be made from 18mm thick MR grade plywood and finish with 1mm thick laminate sheet on both side. drawer unit 450 mm X 550 mm X 600 mm (3 Nos.) & storage unit 450 mm X 550 mm X 600 mm (H) having all structure 18 mm thick MR grade plywood and finish with 1mm thick decorative laminate on exposed faces and 0.8 mm thick balancing laminate as liner of specified size drawer slides on ebco make telescopic channel with locking arrangement the item includes all materials, labour, taxes & consumable etc.Complete as per drawing and instruction of engineer-in charge . Size 0.90 mt. X 1.80mt. X 0.75 mt.(H)

#### **1. Tabletop & Sides**

- Overall thickness: 38 mm
- Core: 18 mm thick MR Grade Plywood
- Finish: 1 mm thick decorative laminate on exposed surfaces; 0.8 mm balancing laminate on liner faces
- TW border patti on edges
- Specified thickness glass on top (as per Engineer-in-Charge)

#### **2. Frame / Legs**

- Main legs: 50 × 50 × 1.6 mm CRC square pipe
- Support members: 50 × 25 × 1.6 mm CRC pipe
- Surface finish: Epoxy powder coating (50 micron)
- Fitted with levellers

#### **3. Apron / Modesty Panel**

- Material: 18 mm thick MR Grade plywood
- Finish: 1 mm laminate sheet on both sides

#### **4. Drawer Unit (3 Nos.)**

- Size: 450 × 550 × 600 mm (H) each
- Material: 18 mm thick MR Grade plywood
- Finish: 1 mm decorative laminate on exposed faces; 0.8 mm balancing laminate as liner
- Hardware: Ebco make telescopic drawer slides with locking arrangement

#### **5. Storage Unit**

- Size: 450 × 550 × 600 mm (H)
- Same structure as drawer unit (plywood + laminates)

#### **Inclusions:**

- All materials, labor, consumables, and taxes
- Fabrication, assembly, and finishing as per drawing & Engineer-in-Charge's instructions

Detailed technical specification as per directed by engineer in charge on site.

#### **ITEM NO.2:**

Providing and supplying and arranging modified office table Top and side of overall thickness 38 mm made from 18 mm thick MR grade plywood with 1 mm thick decorative laminate on exposed side and 0.8 mm thick laminates as liner with TW border patti apron



to be made from 18mm thick MR grade plywood and finish with 1mm thick laminate sheet on both side. legs to be made from 50mm x 50mmx 1.6 mm& other framing work of 50mm x 25mm x 1.6mm size CRC MS PIPE with 50 micron epoxy powder coating. the item includes all materials, labour, taxes & consumable etc.Complete as per drawing and instruction of engineer-in charge . Size 0.90 mt. X 2.15 mt. X 0.75 mt.(H)

**Specifications:**

1. Tabletop & Sides

- Overall thickness: 38 mm
- Core: 18 mm thick MR Grade Plywood
- Finish: 1 mm thick decorative laminate on exposed surfaces; 0.8 mm thick balancing laminate as liner
- TW border patti on edges

2. Apron / Modesty Panel

- Material: 18 mm thick MR Grade plywood
- Finish: 1 mm laminate sheet on both sides

3. Frame / Legs

- Main legs: 50 × 50 × 1.6 mm CRC MS square pipe
- Other framing: 50 × 25 × 1.6 mm CRC MS pipe
- Surface finish: Epoxy powder coating (50 micron)

**Inclusions:**

- All materials, labour, consumables, and taxes
- Fabrication, assembly, and finishing as per drawing & Engineer-in-Charge's instructions

**Detailed technical specification as per directed by engineer in charge on site.**

**ITEM NO.3:**

**Providing and supplying and arranging table Top and side of overall thickness 38 mm made from 18 mm thick MR grade plywood with 1 mm thick decorative laminate on exposed side and 0.8 mm thick laminates as liner with TW border patti apron to be made from 18mm thick MR grade plywood and finish with 1mm thick laminate sheet on both side. legs to be made from 50mm x 50mmx 1.6 mm& other framing work of 50mm x 25mm x 1.6mm size CRC MS PIPE with 50 micron epoxy powder coating. the item includes all materials, labour, taxes & consumable etc.Complete as per drawing and instruction of engineer-in charge . Size 0.90 mt. X 1.80mt. X 0.75 mt.(H)**

**Specifications:**

1. Tabletop & Sides

- Overall thickness: 38 mm
- Core: 18 mm thick MR Grade Plywood
- Finish: 1 mm thick decorative laminate on exposed surfaces; 0.8 mm thick balancing laminate as liner
- TW border patti on edges

2. Apron / Modesty Panel

- Material: 18 mm thick MR Grade plywood
- Finish: 1 mm laminate sheet on both sides

3. Frame / Legs

- Main legs: 50 × 50 × 1.6 mm CRC MS square pipe
- Other framing: 50 × 25 × 1.6 mm CRC MS pipe
- Surface finish: Epoxy powder coating (50 micron)

**Inclusions:**

- All materials, labour, consumables, and taxes
- Fabrication, assembly, and finishing as per drawing & Engineer-in-Charge's instructions

**Detailed technical specification as per directed by engineer in charge on site.**

**ITEM NO.4:**

Providing , supplying and placing fully glazed openable door unit of size Width 890 x Depth 520 x Height 1980 mm having back, sides and door to be made from 0.7 mm(+ or - 0.07mm )made up with Durable cold-rolled steel plate construction and Powder-coated to resist corrosion. and 4 mm thick float plain glass door, lever cam lock , SS handle to be provided & having 4 nos of adjustable full shelves of uniformly distributed load capacity of 40.00 kg and each shelf shall be A4 size Box File ( 85 w x 345 H X 285 D ) & clear space above 5th shelf shall be 220 mm. Whole unit shall be Epoxy polyester powder coated of 50 micron thickness. Overall Glass book Storage size 890 mm X 520 mm X 1980 mm(H).

**Specifications:****1. Construction**

- Back, sides, and door made from 0.7 mm ( $\pm 0.07$  mm) durable cold-rolled steel plate
- Powder-coated to resist corrosion
- Whole unit epoxy polyester powder coated, thickness 50 micron

**2. Door**

- Fully glazed with 4 mm thick float plane glass
- Fitted with lever cam lock and stainless steel handle

**3. Shelves**

- 4 adjustable full shelves provided
- Each shelf load capacity: 40 kg (uniformly distributed load)
- Shelf designed to accommodate A4 size Box File (85 mm W  $\times$  345 mm H  $\times$  285 mm D)
- Clear space above the 5th shelf: 220 mm

**4. Finish**

- Epoxy polyester powder coated with minimum thickness of 50 micron

**Inclusions:**

- All materials, labour, consumables, and taxes included
- Complete as per drawing & Engineer-in-Charge's instructions

**Detailed technical specification as per directed by engineer in charge on site.**

**ITEM NO.5:**

Providing & Supplying Wooden Cub Board for File Storage of 1750 (L) X 450 (W) X 760 (H) mm using 19mm thick WP plywood & 25 X 12, 50 X 12mm teak wood patti, formica, magnet, stopper, handles, fixtures & fastenings, including cost of all material & Labours, with one coat primer & two coats Oil Painting inside etc., complete as per detail approved drawing & as directed by the Purchase Authority.

Overall Size: 1750 mm (L)  $\times$  450 mm (W)  $\times$  760 mm (H)

**Specifications:****1. Construction**

- Made using 19 mm thick WP plywood
- Teak wood patti: 25  $\times$  12 mm and 50  $\times$  12 mm sizes
- Fitted with formica finish

**2. Fittings & Accessories**

- Magnet and stopper provided
- Suitable handles, fixtures, and fastenings

**3. Finish**

- One coat of primer and two coats of oil painting on the inside

**Inclusions:**

- All materials, labor, consumables, and taxes included
- Complete as per approved detailed drawing & as directed by the Purchase Authority

**Detailed technical specification as per directed by engineer in charge on site.**

**ITEM NO.6:**

**Providing and supplying tea table made from 37mm x 37 mm Indian teakwood leg and top frame made from 37mmx 75mm Indian teakwood having 18mm thick Ply and 4mm thick Veneer with melamine polish on top and 0.8m thick balancing laminate on bottom. All teakwood surface to be melamine polish Including all materials and labour ect. Complete as per drawing and instruction of engineer-in charge. overall size 900mm x 600mm x 450mm (H)**

**Overall Size:** 900 mm (L) × 600 mm (W) × 450 mm (H)

### **1. Table Frame & Legs**

- **Legs:** Made from 37 mm × 37 mm Indian teakwood, solid and straight-grained for structural stability.
- **Top Frame:** Made from 37 mm × 75 mm Indian teakwood, mortise and tenon joints or dowel joints as per drawing.
- All wooden members shall be seasoned, free from cracks, knots, and defects.

### **2. Tabletop Construction**

- **Core Material:** 18 mm thick commercial plywood (BWR/Marine grade as per requirement).
- **Top Finish:** 4 mm thick natural veneer applied over plywood with **melamine polish**, providing a smooth, durable surface resistant to scratches and stains.
- **Bottom Finish:** 0.8 mm thick balancing laminate to prevent warping and maintain dimensional stability.
- Edges of tabletop shall be finished with teakwood or matching veneer strips, polished with melamine.

### **3. Teakwood Finish**

- All exposed teakwood surfaces, including legs and frame, shall receive **melamine polish** for protection and aesthetic finish.
- Polishing shall include proper sanding, application of sealer, and finishing coats to ensure smooth surface and long-lasting durability.

### **4. Joinery & Fixing**

- Joints shall be made using high-quality wood adhesives, screws, and fasteners concealed wherever possible.
- Table shall be stable, level, and free from wobbling.
- All joints to be finished neatly with no visible gaps.

### **5. Inclusions**

- All materials including plywood, teakwood, veneer, laminates, polish, adhesives, fasteners, and consumables.
- Skilled labour for fabrication, assembly, finishing, and installation.
- All taxes and duties applicable.
- Complete work as per approved drawing and as directed by the Engineer-in-Charge.

**Detailed technical specification as per directed by engineer in charge on site.**

#### **ITEM NO.7:**

Providing and supplying fix chair structure CRC M.S. pipe of 20mm dia and 16 guage with 50 micron powder coating frame seat and back 40 density PU foam covered with fabric of approved shade and texture ( MiNi-250 RS. Mtr.)with one year replacement warranty. Wooden armrest as per approved design. Complete chair should be in suitable shape Including all materials and labor ect.Complete as per drawing and instruction of engineer-in charge.

### **Technical Specification: Fixed Chair**

**Item:** Providing & Supplying Fixed Chair

**Type:** Steel Frame Chair with PU Foam Seat and Back

#### **1. Chair Frame**

- **Material:** CRC Mild Steel (M.S.) pipe
- **Dimensions:** 20 mm dia, 16 gauge thickness
- **Surface Finish:** 50 micron epoxy/polyester powder coating to resist corrosion and ensure durability
- Frame structure designed for stability and ergonomic support

#### **2. Seat and Backrest**

- **Cushioning:** 40 density PU foam for comfort and long-term shape retention
- **Upholstery:** Fabric of approved shade and texture (MiNi-250 RS/meter)
- Seat and backrest ergonomically shaped for suitable posture and support

#### **3. Armrests**

- **Material:** Solid wood
- **Design:** As per approved drawing and site requirement
- Finished smoothly to match chair aesthetics and user comfort

#### **4. Warranty**

- Chair shall include **one-year replacement warranty** against manufacturing defects

#### **5. Inclusions**

- All **materials, labour, consumables, and taxes** included
- Complete fabrication, finishing, and installation as per approved drawing and Engineer-in-Charge's instructions
- Chair shall be delivered **ready-to-use**, fully assembled or as per site instructions
- **Detailed technical specification as per directed by engineer in charge on site.**

#### **ITEM NO.8:**

**Supplying and Arranging Low Back Chair with SEAT/BACK ASSEMBLY:** The seat and back are made up of 1.2 cm thick hot pressed plywood, upholstered with fabric and moulded Polyurethane foam. The complete back is contoured to provide the needed lumbar support for long seating hours. The seat is made up of moulded foam, upholstered with fabric. Foam density 45 +/- 5 kg/m<sup>3</sup> and Hardness = 14+/-2 on Hampden machine at 25% compression. **ARMRESTS:** The Arm rest is injection moulded in Polypropylene fitted to the seat base **SYNCHRO MECHANISM:** The mechanism installed for this chair is a Synchro-1 mechanism. This mechanism provides you with the utmost comfort while leaning backwards. There is a displacement in the ratio of 1:3 between seat and back respectively The Synchro mechanism is designed with 360 Degree

revolving feature, Tilt tension adjustment and Upright locking. **PNEUMATIC HEIGHT ADJUSTMENT:** The pneumatic height adjustment has an adjustment stroke of 12 cm. **TELESCOPIC BELLOW ASSEMBLY:** The bellow is 3 piece telescopic type and injection moulded in black Polypropylene. **PEDESTAL ASSEMBLY:** The pedestal is made of nylon with glass reinforcement and fitted with 5 nos. twin wheel castors. (castor wheel dia. 5.0cm.) **TWIN WHEEL CASTORS:** The twin wheel castors are injection molded in 30% Glass Filled black Nylon. Back size 44cm W X 47cm H Seat Size 52 cm W X 48 cm D Effective back ht 47 cm. as per drawing / Photograph at site of work as required & directed etc. complete.

## 1. Seat & Back Assembly

- **Material:** 1.2 cm thick hot-pressed plywood
- **Upholstery:** Fabric of approved shade and texture
- **Foam:** Moulded polyurethane foam
  - **Density:**  $45 \pm 5 \text{ kg/m}^3$
  - **Hardness:**  $14 \pm 2$  on Hampden machine at 25% compression
- **Design:**
  - Contoured backrest to provide lumbar support
  - Moulded foam seat for comfort during long seating hours

### Dimensions:

- Back: 44 cm (W) × 47 cm (H)
- Seat: 52 cm (W) × 48 cm (D)
- Effective Back Height: 47 cm

## 2. Armrests

- **Material:** Injection-moulded Polypropylene
- **Fitting:** Fixed to seat base as per approved design

## 3. Mechanism: Synchro-1

- **Functionality:**
  - Provides comfort while leaning backwards
  - Seat-to-back displacement ratio: 1:3
  - 360° revolving feature
  - Tilt tension adjustment
  - Upright locking mechanism

## 4. Pneumatic Height Adjustment

- **Adjustment Stroke:** 12 cm
- **Operation:** Smooth height adjustment for ergonomic seating

## 5. Telescopic Bellow Assembly

- **Type:** 3-piece telescopic
- **Material:** Injection-moulded black Polypropylene

## 6. Pedestal Assembly

- **Material:** Glass-fiber reinforced nylon
- **Design:** Fitted with 5 twin-wheel castors

## 7. Twin Wheel Castors

- **Material:** 30% glass-filled black nylon
- **Diameter:** 5 cm
- **Design:** Smooth rolling and durable

## 8. Inclusions

- All **materials, labour, consumables, and taxes** included
- Complete assembly and installation as per **approved drawing or photograph on site**
- Fully functional and ready for use
- **Detailed technical specification** as per directed by engineer in charge on site.

### ITEM NO.9:

**Supplying and Arranging Medium Back Chair with SEAT/BACK ASSEMBLY:** The seat and back are made up of 12 mm thick hot pressed plywood, upholstered with fabric and molded Polyurethane foam. The complete back is contoured to provide the needed lumbar support for long seating hours. The seat is made up of molded foam, upholstered with fabric. Foam density 45 +/- 5 kg/m<sup>3</sup> and Hardness = 14+/-2 on Hampden machine at 25% compression. **ARMRESTS:** The Arm rest is injection molded in Polypropylene fitted to the seat base. **SYNCHRO MECHANISM:** The mechanism installed for this chair is a Synchro-1 mechanism. This mechanism provides you with the utmost comfort while leaning backwards. There is a displacement in the ratio of 1:3 between seat and back respectively The Synchro mechanism is designed with 360 Degree revolving feature, Tilt tension adjustment and Upright locking.

**PNEUMATIC HEIGHT ADJUSTMENT:** The pneumatic height adjustment has an adjustment stroke of 12 cm. **TELESCOPIC BELLOW ASSEMBLY:** The bellow is 3 piece telescopic type and injection molded in black Polypropylene. **PEDESTAL ASSEMBLY:** The pedestal is made of nylon with glass reinforcement and fitted with 5 nos. twin wheel castors.(castor wheel dia. 5.0cm.)

**TWIN WHEEL CASTORS:** The twin wheel castors are injection molded in 30% Glass Filled black Nylon. Back size 49cm W X 63cmH Seat Size 48 cm W X 47 cm D

**Effective back ht 50cm. as per drawing / Photograph at site of work as required & directed etc. complete**

**Item:** Supplying & Arranging Medium Back Chair

**Application:** Ergonomic seating for long working hours

## 1. Seat & Back Assembly

- **Material:** 12 mm thick hot-pressed plywood
- **Upholstery:** Fabric of approved shade and texture
- **Foam:** Moulded Polyurethane foam
  - **Density:** 45 ± 5 kg/m<sup>3</sup>
  - **Hardness:** 14 ± 2 on Hampden machine at 25% compression
- **Design:**
  - Contoured backrest for lumbar support
  - Molded foam seat for comfort and ergonomic posture

### **Dimensions:**

- Back: 49 cm (W) × 63 cm (H)

- Seat: 48 cm (W) × 47 cm (D)
- Effective Back Height: 50 cm

## 2. Armrests

- **Material:** Injection-moulded Polypropylene
- **Fitting:** Fixed to seat base as per approved design

## 3. Synchro-1 Mechanism

- Ensures comfort while leaning backwards
- Seat-to-back displacement ratio: 1:3
- **Features:**
  - 360° revolving capability
  - Tilt tension adjustment
  - Upright locking

## 4. Pneumatic Height Adjustment

- **Adjustment Stroke:** 12 cm
- Smooth height adjustment for ergonomic seating

## 5. Telescopic Bellow Assembly

- **Type:** 3-piece telescopic
- **Material:** Injection-molded black Polypropylene

## 6. Pedestal Assembly

- **Material:** Glass-fiber reinforced nylon
- Fitted with 5 twin-wheel castors

## 7. Twin Wheel Castors

- **Material:** 30% glass-filled black nylon
- **Diameter:** 5 cm
- Smooth rolling, durable, and suitable for office flooring

## 8. Inclusions

- All materials, labour, consumables, and taxes included
- Complete assembly and installation as per approved drawing or on-site photograph
- Chair delivered fully functional and ready-to-use.
- Detailed technical specification as per directed by engineer in charge on site.

### Item No.10

Providing and supplying three seater wooden sofa made of Indian teak wood with melamine polish.seat made from 4 inch thick 40 desity foam with 1" super soft HD covered for softness.seat to be capt on Heavy density naylon elastic belt.inside Framing 2"x 1.6"support.Outer frame 3" x 1.6". Back 3" thick 40 density foam with 12mm super soft HD covered for softness seat and back covered with high quality fabric (Basic Rate : 400 RS/Rmt.)as approved shade. Including all

materials and labour ect. Complete as per drawing and instruction of engineer-in charge. overall size : 1900 mm X 750 mm X750 mm

**Item:** Providing & Supplying Three-Seater Wooden Sofa  
**Overall Size:** 1900 mm (L) × 750 mm (W) × 750 mm (H)

### 1. Frame Construction

- **Material:** Indian teakwood
- **Finish:** Melamine polish for durability and aesthetic appeal
- **Inner Frame (Seat Support):** 2" × 1.6" teakwood members
- **Outer Frame:** 3" × 1.6" teakwood for strength and rigidity

### 2. Seat Assembly

- **Foam:** 4-inch thick, 40 density foam for comfort
- **Additional Cushioning:** 1" supersoft HD foam layer for softness
- **Support:** Heavy-density nylon elastic belt
- **Upholstery:** High-quality fabric (basic rate: 400 RS/Rmt) of approved shade and texture

### 3. Backrest Assembly

- **Foam:** 3" thick, 40 density foam
- **Additional Cushioning:** 12 mm supersoft HD foam layer for softness
- **Upholstery:** Same high-quality fabric as seat

### 4. Finish & Aesthetics

- All teakwood surfaces polished with **melamine polish**
- Cushion fabric neatly upholstered with stitching and padding as per approved design
- Sofa shall be ergonomically designed for comfort and aesthetic appeal

### 5. Inclusions

- All **materials, labour, consumables, and taxes** included
- Complete fabrication, assembly, and finishing as per approved drawing and Engineer-in-Charge instructions
- **Detailed technical specification as per directed by engineer in charge on site.**

### Item No.11

Providing and erecting Inverter based approved make split air-conditioning unit consisting of condensing unit with variable speed fan motor, inverter type hermetically sealed rotary compressor with accessories etc. duly connected separately erected evaporating unit and blower motor with its accessories by means of extra supplied proper insulated copper tubing, drain PVC pipes suitable for ( cost includes Eco Friendly green gas charging and 15A plug top & Remote Control & MS Stand) with necessary core cutting.

**For 4/5 Star Rating of current year  
for 1.5 ton capacity- Premium Cat.**



## Technical Specification: Premium 1.5 Ton Inverter Split Air-Conditioning Unit

**Item:** Providing and Erecting Inverter-Based Split AC Unit

**Capacity:** 1.5 Ton

**Star Rating:** 4/5 Star (current year)

**Category:** Premium

### 1. Air-Conditioning Unit

- **Type:** Split Air-Conditioner with inverter technology
- **Make:** Approved brand/manufacturer
- **Compressor:** Inverter-type, hermetically sealed rotary compressor
- **Fan Motor:** Condensing unit equipped with variable speed fan motor
- **Energy Efficiency:** 4/5 Star rating compliant with latest standards

### 2. Evaporator Unit

- **Type:** Wall-mounted or as per site requirement
- **Blower:** Motor with all necessary accessories for uniform airflow
- **Connection:** Properly connected with insulated copper tubing and fittings supplied extra

### 3. Refrigerant & Gas

- **Gas Type:** Eco-friendly, green refrigerant
- **Charge:** Complete refrigerant charging included in cost

### 4. Piping & Drainage

- **Copper Tubing:** Properly insulated and routed for efficiency
- **Drainage:** PVC pipes for condensate water disposal

### 5. Accessories & Installation

- **Electrical:** 15A plug-top included
- **Controls:** Remote control for operation
- **Support:** MS stand for outdoor condensing unit
- **Core Cutting:** Necessary wall/structure cutting included for installation

### 6. Premium Features

- Energy-efficient inverter operation for reduced electricity consumption
- Silent operation with precise temperature control
- Durable construction suitable for long-term use

### 7. Inclusions

- All **materials, labour, consumables, and taxes** included
- Complete erection, connection, testing, and commissioning as per manufacturer instructions and Engineer-in-Charge directions
- AC unit shall be fully operational after installation
- **Detailed technical specification as per directed by engineer in charge on site.**

### **Item No.12**

**FULL HEIGHT OPEN STORAGE UNIT FOR RECORD/STATIONARY ROOM)** Providing storage unit of size 2.5 mt x0.30 mt x2.10 mt(Lx DxH) of ¾” thick BWP Plywood with 1.0mm thick horizontal laminate expose sides and 1.0mm thick vertical laminate. the shelves shall be provided @ 15”c/c or equal in height with enamel painting in recessed surfaces. The storage unit will have all necessary hardware, laminate band and 0.45 mt X0.45 mt teakwood/partial wood beading / molding. Recessed skirting (¾”) finished with 1.0mm thick laminate is present etc. complete

**Item:** Providing and Supplying Full Height Open Storage Unit

**Overall Size:** 2.5 m (L) × 0.30 m (D) × 2.10 m (H)

#### **1. Material & Construction**

- **Plywood:** ¾” thick BWP (Boiling Water Proof) plywood for structural panels
- **Laminate Finish:**
  - Horizontal exposed sides: 1.0 mm thick laminate
  - Vertical exposed sides: 1.0 mm thick laminate
- **Shelves:** Provided at 15” center-to-center spacing (or as per approved design)
  - Recessed surfaces enamel painted for durability

#### **2. Hardware & Accessories**

- All necessary hardware for assembly and functionality included
- Laminate bands for edges as required
- Teakwood/partial wood beading or molding of size 0.45 m × 0.45 m for decorative and structural support

#### **3. Skirting & Finishing**

- Recessed skirting: ¾” thick, finished with 1.0 mm thick laminate
- Smooth edges and corners with proper finishing
- Unit to be rigid, durable, and suitable for long-term use

#### **4. Inclusions**

- All materials, labor, consumables, and taxes included
- Complete fabrication, assembly, and finishing as per approved drawing and instructions of Engineer-in-Charge
- Fully functional and ready for storage of records and stationery
- Detailed technical specification as per directed by engineer in charge on site.

### **Item No.13**

**Providing and fixing eco-friendly light weight calcium silicate false ceiling tiles having Tegular edge & 15 mm Thick Densified edges on the Tile Periphery for Extra Strength The Light weight calcium silicate ceiling tiles shall have , light reflection 85% non-combustible as per B.S. 476 part IV, 100% humidity resistance and also having thermal conductivity0.043° w/m KC.for the best thermal Insulation . The Light weight calcium Silicate tile shall be of approved texture Fine fissured/ Spintone/Cosmos having NRC value of 0.5 & Globe having NRC value of 0.75 NRC or equivalent of size 595 X 595 mm to be laid on true horizontal level suspended inter locking metal grid of hot dipped galvanized steel sections (galvanizing @120 grams per sqm including both side) consisting of main ‘T’**

runner suitably spaced at joints to get required length and size of 24X38mm made from 0.30 mm thick (minimum) sheet, 1200mm centre to centre, and cross 'T' of size 24X28mm made out of 0.33mm (Minimum) sheet spaced 1200mm along spaced between main 'T' at 600mm centre to centre to form agrid of 1200X600mm and secondary cross 'T' of length 600mm and size 24x28mm made of 0.30 mm thick (Minimum) sheet to be interlocked at middle of the 1200X600mm panel to form grid of size 600X600mm resting on periphery walls/partitions on a perimeter wall angle precoated steel of size (24X24X3000mm made of 0.40mm thick (minimum) sheet with the help of rawl plugs at 450mm center to center with 25mm long drywall screws @ 230mm interval and laying 15mm thick Densified edges light weight calcium silicate ceiling tiles of approved texture (Fine Fissured/Cosmos/Spintone) in the grid including, cutting /making opening for services like diffusers, grills, light fittings, fixtures, smoke detectors etc

**Item:** Providing and Fixing Eco-Friendly Lightweight Calcium Silicate False Ceiling Tiles

**Tile Size:** 595 mm × 595 mm

**Tile Thickness:** 15 mm with densified edges on the periphery

### 1. Tile Material & Properties

- **Material:** Eco-friendly, lightweight calcium silicate
- **Edge Design:** Tegular edge with 15 mm densified edges for extra strength
- **Fire Resistance:** Non-combustible as per B.S. 476 Part IV
- **Humidity Resistance:** 100% resistant
- **Thermal Conductivity:** 0.043 W/m K for effective thermal insulation
- **Light Reflection:** 85%
- **Texture:** Approved texture – Fine Fissured / Spintone / Cosmos
- **Noise Reduction Coefficient (NRC):** 0.5 (Fine Fissured / Spintone / Cosmos), 0.75 (Globe)

### 2. Grid Framework

- **Material:** Hot-dipped galvanized steel (galvanizing  $\geq 120$  g/m<sup>2</sup> both sides)
- **Main 'T' Runner:**
  - Size: 24 mm × 38 mm, sheet thickness 0.30 mm (minimum)
  - Spacing: 1200 mm centre-to-centre
- **Cross 'T':**
  - Size: 24 mm × 28 mm, sheet thickness 0.33 mm (minimum)
  - Spacing: 1200 mm along main 'T', intermediate spacing 600 mm centre-to-centre
- **Secondary Cross 'T':**
  - Size: 24 mm × 28 mm, sheet thickness 0.30 mm (minimum)
  - Interlocked at the middle of 1200 × 600 mm panel to form a grid of 600 × 600 mm
- **Perimeter Wall Angle:** Pre-coated steel 24 × 24 × 3000 mm, thickness 0.40 mm (minimum), fixed with rawl plugs at 450 mm centres and 25 mm long drywall screws @ 230 mm intervals

### 3. Installation

- Tiles shall be laid on the **true horizontal level** suspended interlocking metal grid
- Cutting and openings shall be made as required for:
  - Air diffusers
  - Grills
  - Light fittings
  - Fixtures

- Smoke detectors and other services

#### 4. Inclusions

- Supply and fixing of all tiles, grid framework, perimeter angles, screws, rawl plugs, and accessories
- Labor for installation, cutting, leveling, and alignment
- Complete work as per approved drawing and Engineer-in-Charge instructions
- Tiles to be properly interlocked and leveled, providing a neat, uniform false ceiling finish
- **Detailed technical specification as per directed by engineer in charge on site.**

##### **Item No.14**

**Providing and fixing sign board made of acrylic sheet and fixing on door wall in first or second alphabet as instructed in radium material .Including all materials and labor etc. Complete as per detail drawing and instruction of engineer-in charge.**

##### **Technical Specification: Acrylic Sign Board**

**Item:** Providing and Fixing Acrylic Sign Board

**Application:** Door/Wall Signage

##### **1. Material**

- **Board Material:** High-quality acrylic sheet of approved thickness and color
- **Lettering:** Radium material for first or second alphabet as instructed
- **Finish:** Smooth, durable, and resistant to fading or discoloration

##### **2. Fixing & Installation**

- Sign board to be **fixed on door or wall** as per approved drawing and instructions of Engineer-in-Charge
- Fixing shall ensure proper alignment, stability, and aesthetic appearance
- All necessary adhesives, screws, or fasteners shall be provided

##### **3. Inclusions**

- All **materials, labour, consumables, and taxes** included
- Complete fabrication, cutting, finishing, and installation as per approved drawing
- Sign board to be **fully functional and visually neat**
- **Detailed technical specification as per directed by engineer in charge on site.**

##### **Item No.15**

**Providing and placing S.S Nickle crome plated Dustbin having 254 mm dia & 356 mm height with perforated S.S sheet including all necessary fixture, fastners, fittings , labor material machinery etc complete as selected and directed by Engineer In charge. Approved Make**

**Item:** Providing and Placing Dustbin

**Size:** Diameter 254 mm × Height 356 mm

##### **1. Material**

- **Body:** Stainless Steel (S.S.) Nickel Chrome Plated
- **Design:** Perforated sheet for ventilation

- **Finish:** Smooth, corrosion-resistant, durable, and aesthetically polished
- **Make:** Approved brand/manufacturer

## 2. Installation & Fixing

- Dustbin to be securely placed at the designated location as directed by Engineer-in-Charge
- All necessary **fixtures, fasteners, fittings** shall be provided
- Ensuring proper stability and alignment

## 3. Inclusions

- All **materials, labor, consumables, and machinery** required for fabrication, finishing, and installation
- Complete work as per approved drawings and instructions of Engineer-in-Charge
- Dustbin shall be fully functional and ready for use

### **Item No.16**

Providing fixing And arranging Multiflex rack/Library rack of size 1830(H) x 1300 (W) x 448(D) mm made high strength CR/HR steel confirming to IS 5986:2002/ IS 2062 :2006 by using steel confirming to is 5986- with minimum yield strength of 255 MPa vertical angels of size 35x35x1.6mm with holes Slotted of flanges of pitch 19.05 mm provided for adjusting loading levels which are made up of 5 bend pannels of 1300 x 448 x 1.25 mm size with bend border mounted on and C bends at all end with all Endge finished with Trigular support plate 75X75X1.25 mm and all nuts and bolts etc finish and all the components having powder coating with thoroughly anti rust treatment including all necessary fixture, fastners, fittings, labour material machinery etc complete as per photograph as selecte and directed by Engineer Incharge Overall size : 1830(H) x 1300 (W) x 448(D)

**Item:** Providing, Fixing, and Arranging Multiflex/Library Rack  
**Overall Size:** 1830 mm (H) × 1300 mm (W) × 448 mm (D)

### 1. Material

- **Steel Type:** High-strength CR/HR steel conforming to IS 5986:2002 / IS 2062:2006
- **Minimum Yield Strength:** 255 MPa
- **Vertical Angles:** 35 × 35 × 1.6 mm, slotted holes on flanges at 19.05 mm pitch for adjustable shelf levels
- **Panels:** Five bend panels of size 1300 × 448 × 1.25 mm with bend borders
- **End Bends:** C bends at all ends with triangular support plates 75 × 75 × 1.25 mm
- **Coating:** Powder coating on all components with thorough anti-rust treatment

### 2. Assembly & Fixing

- All panels to be mounted on vertical angles with adjustable slots for different shelf heights
- Edges of panels to be finished neatly to avoid sharp corners
- Complete assembly using **nuts, bolts, and fasteners** as required
- Rack to be stable, durable, and suitable for library or office storage

### 3. Inclusions

- All **materials, labor, consumables, and machinery** required for fabrication, finishing, and installation
- Installation as per **approved photograph or site instruction** by Engineer-in-Charge
- Rack shall be fully functional and ready for use
- **Detailed technical specification as per directed by engineer in charge on site.**

#### **Item No.17**

**PROJECTOR SYSTEM FOR CONFERENCE ROOM** Providing supplying and installing 5000 lumens projector with full HD laser with 150" Diagonal 16:9 Screen (ViewSonic LS 740HD) along with audio system for conference including 1 Amplifier, 1 Chairman Unit and 8 Delegate Units inclusive of all cable connections, installation and training. 1 65" TV to project also included.

**Item:** Providing, Supplying, and Installing Projector System with Audio Setup

#### **1. Projector**

- **Type:** Full HD Laser Projector
- **Lumens:** 5000 lumens for bright and clear projection
- **Projection Screen:** 150" diagonal, 16:9 aspect ratio
- **Model:** ViewSonic LS740HD (or approved equivalent)
- **Features:** High contrast, accurate color reproduction, suitable for conference room presentations

#### **2. Audio System**

- **Amplifier:** 1 unit, compatible with all microphones and speakers
- **Chairman Unit:** 1 unit for conference control
- **Delegate Units:** 8 units for participants
- **Connectivity:** All necessary cable connections included for proper operation

#### **3. Display TV**

- **Size:** 65"
- **Type:** Full HD/4K LED TV for alternate projection/display
- **Connectivity:** Compatible with projector and conference system

#### **4. Installation & Setup**

- Complete mounting and installation of projector and screen
- Audio system setup including all amplifier, chairman, and delegate units
- Cable management for clean and safe installation
- Training to the staff on usage and operation of projector and audio system

#### **5. Inclusions**

- All **materials, equipment, labour, consumables, and taxes** included
- Installation as per approved layout and instructions of Engineer-in-Charge
- Fully operational system after commissioning, ready for conference use
- **Detailed technical specification as per directed by engineer in charge on site.**

**SCHEDULE-B-15**

**SUPPLY, INSTALLATION, TESTING, COMMISSIONING OF 50KW GRID CONNECTED  
ROOFTOP SOLAR PROJECT AT NAGARPALIKA BUILDING KHAMBHAT , AT KHAMBHAT  
DIST. ANAND**

**As per Separate Sheet attached.**

**SCHEDULE-B-16**

**FIRE FIGHTING SYSTEM WORKS FOR KHAMBHAT MUNICIPALITY BUILDING,  
KHAMBHAT**

**As per Separate Sheet attached.**

## **SCHEDULE FOR TESTING OF MATERIALS**

**For ensuring quality control and workmanship, various tests prescribed below for materials shall Be taken at periodical intervals as stipulated below.**

<b>Sr. No.</b>	<b>Brief Description of Materials to be tested (2)</b>	<b>Qty. of Materials (3)</b>	<b>Prescription of test which shall be carried</b>	<b>Frequency @ which test shall be carried out</b>	<b>Total No. of Test 'to betaken.</b>
<b>1</b>	25 to 90 H. B.Metal 40 to 63 H. B.Metal 40 to 50 M. C.Metal 20 to 50 M. C.Metal Kapachi		- Gradation Test - Impact Value - Flakiness Index - Water absorption test - Sp. gravity	1 to 100 Cmt. - 1 Test 100 to 500 Cmt. - 3 Test 500 to 1500 Cmt. - 5 Test 1500 to 5000 Cmt. - 7 Test	
<b>2</b>	Grit		- Stripping Value, gradation, Water absorption, Sp. gravity	One test per work	
<b>3</b>	Murum		- P. I. Value - C.B.R.	One test per work	
<b>4</b>	Quarry spall		- C.B.R. - Gradation	One test per work	
<b>5</b>	Asphalt		- Penetration Test as per Specification	<b>Tanker          Test</b> 1                      1 2to15              2 16to50            3	
<b>6</b>	Tack Coat		- Binder temperature for application - Rate of spread of binder	Irregular close in intervals Two test per day.	
<b>7</b>	Carpet & Seal coat mix		- Grading - temperature of binder in boiler, aggregates in the dryer and mix at the time of laying and rolling (Binder content vide 45 IMD 2172) Rate of Spreaded mix materials.	One test on individual constituents and mixed aggregates from the dryer for each 100 tons of mix subject to minimum of Two tests per plant per day. One Test for each 100 tons of mix subjects to mini. of Two per day plant. Regular control through checks on layer thickness.	
<b>8</b>	Bricks		- Water absorption - Effloresce - Size - Compressive Strength	1 Test @ 50,000 Bricks	
<b>9</b>	Cement		Consistency - Compressive Strength - Initial & Final setting time - Fineness - Soundness - Specific Gravity - Chemical analysis	1 Test / 50 M.T. 2 Tests / 100 M.T. 3 Tests / 200 M.T. 4 Tests / 400 M.T. 5 Tests / 500 M.T. 6 Tests / 600 M.T.	
<b>10</b>	Steel (TMT / M.S.)		- Tensile strength - Yield Stress - Elongation - Size - Bend - Rebend	1 Test / 40 M.T. 1 Test / 40 M.T. 1 Test / 40 M.T. 1 Test / 40 M.T. 1 Test / 20 M.T. 1 Test / 20 M.T.	
<b>11</b>	C.C. Cube in M-150 M-200, M-250, M-300,		- Compressive Strength	1 to 5 C.mt. -1 Set 6 to 15 C.mt. 2 Sets 16 to 20 C.mt. - 3 Sets 20 to 50 C.mt. - 4 Sets 51 above - 4 One	



	M-350 Grade			additional sample for each 100 C.mt. / or.	
<b>12</b>	Coarse Sand		C.B.R., silt content, sieve analysis	One Test per work	
<b>13</b>	Sand (For concrete work)		<ul style="list-style-type: none"> <li>- Specific Gravity</li> <li>- Alkali Reactivity</li> <li>- Petrography Exa.</li> <li>- Gradation</li> <li>- Silt Content</li> <li>- Water absorption test</li> </ul>	2 Tests per season or change of river	
<b>14</b>	Crushed stone Aggregate (For concrete work)		<ul style="list-style-type: none"> <li>- Gradation</li> <li>- Water absorption</li> <li>- Impact Value</li> <li>- Abrasion Value</li> <li>- Soundness Test</li> </ul>	1 Sample / 150 Cum. or 2 Sample / Season each source.	
<b>15</b>	Water for all item pertaining to water		<ul style="list-style-type: none"> <li>- Portability</li> <li>- Salinity</li> <li>- Chemical analysis</li> </ul>	One sample for each source of supply	
<b>16</b>	Earthwork for Embankment		<ul style="list-style-type: none"> <li>- Sand content</li> <li>- Atterberg's limit</li> <li>- Density test</li> <li>- Moisture content</li> <li>- C.B.R.</li> </ul>	2 Test / 8000 Cum 2 Test / 8000 Cum 2 Test / 8000 Cum 1 Test / 250 Cum. 1 Test / work	
<b>17</b>	Cement concrete		- Mix design	One time test for each concrete grade beyond M-200	

## **LIST OF REGISTERS TO BE MAINTAINED AT SITE**

### **ANNEXURE – 1**

#### **FOLLOWING DOCUMENTS/REGISTERS TO BE MAINTAINED AT SITE FOR ENSURING PROPER QUALITY CONTROL OF WORK IN PROGRESS.**

1. A complete set of Contract Documents
2. A Complete set of drawings (tender drawings and Good for Execution Drawings)
3. A complete set of change in specification or scope if any and approval thereof.
4. Master Test Register for Material for field Test.
  - i) Lab Report
  - ii) Lab/Field Test.
5. Register for bricks testing. Lab/Field
6. Concrete Pouring Card
7. Bitumen Test Register
8. Paint Register
9. Empty Bags Of Cement Shall Be Deposited On Monthly Basis At Store Of Khambhat Nagarpalika Khambhat And Same Shall Be Recorded In Store Register For Cement.
10. Register for approval of samples for various materials.
11. Site Order Book.
12. Register showing defects noticed during execution of work and compliance reports.
13. Hindrance Register

**APPROVED LIST OF MATERIALS**  
**LIST OF APPROVED MAKE / MANUFACTURER/ BRAND OF MATERIALS FOR CIVIL**  
**ITEMS**

The following are approved brand makes/manufacture's makes listed below. In case it is established that material as listed below is not available in the market, approved equivalent material and finished of any other specialized brand names/ manufacturer's makes may be used as per approval of Architect.

Material certificate: Material tests as required by the Engineer, if any, shall be carried out by the Contractor from the approved laboratories and the tests reports shall be submitted in the required formats before use of such material. The Engineer shall have the right to reject any material or work, if he finds that the quality of material used/intended to be used and work are not satisfactory. The Contractor shall make good such defective material or the works at his own cost (within the contract price) and without causing any delay to the completion time as specified in the TENDER.

No	Item	Approved make
1	Cement	Ambuja, Ultratech, JK Laxmi, Jaypee, Sanghi, Siddhee, ACC or approve by Architect/EIC
2	White Cement	Birla, J.K
3	Sand	Locally available & as approved sample
4	Aggregates	Vadagam or approved by Client
5	Bricks	As per approved sample by Client
6	Reinforcement bar/TMT Bars	Sail ,Tata, Rinl, Jindal , Vizag , GUJ NRE, Kamdhenu, National Electotherm, ASR Thermax, Gallant, Sanghi, Friends, Vinayak, Varsana, Utkarsh, Aditya, Grace, God
7	Structural steel	Sail ,Tata, Rinl, Jindal, Essar, Vizag, Asian, Appolo
8	Paver blocks	Vyara, Super, Sona tiles, Asian or equivalent
9	Shuttering plywood	Kitply, Anchor, Green, Pragati or equivalent
10	Anti-termite treatment	Pest control India, Bayer-Premise, Rallis India-Termex, Item Secure
11	Waterproofing compound	Pidilite, Sikka, Balendura, Fosroc, Kerakoll, BASF, Sunanda Chemical
12	Weather sealant	Kerakoll, Down corning, Fosroc, Sikka, Dr. Fixit(Pidilite), Bostik, Wacker
13	Joint Filler / silicon paint	Wacker, Dowcorning, Sika, Chokshi, Saudal.
14	Tile adhesive	Saint gobain - Weber, Balendura , Kerakoll, Pidilite , Roff , Myk Laticrete
15	Epoxy grouting	Myk Laticrete, Dubond, Kerakoll, Bal Endura, Fosroc ,Saint Gobain –Weber, Pidilite
16	Paint, primer	Jotun, Asian, Berger, Nerolac, Indigo, ICI
17	Putty	Birla , Berger, Asian
18	Polish	MRF, Asian, ICI, Taralac
19	Water stops	Arti Cables, Fixopan

20	Granite	As per approved sample
21	Vitrified tiles/ Glazed tiles/ Ceramic tiles	Varmora, Sunheart, Nitco, Kajaria, Somany, Asian, Simpolo, Motto, Silon, Johnson
22	Glass Mosaic	Pavit, Italia, Bissaza , Piccolo
23	Auto sensor Door	Dorma, Geze , Ozone
24	Glass door hardware & fittings	Dorma, Geze, Haffle, Enox, Kitch
25	Door Window & Furniture Hardware	Kitch, EPPW, Dorma, Palladium, Ozon, Magnum, Yale.
26	Adhesives	Fevicol, Kitcol, Araldite, BAL.
27	Anchor fastener / bolts	Hilti. Fischer, Mungo
28	Linseed oil	Saffola
29	Floor spring	Ozone, Everite, Hemco, Godrej, Hyper, Starling, Dorma , Enox
30	Door closer	Godrej, Dorma, Enox , Efficient Gadget, Yale
31	Locks	Godrej, Dorset, Yale, EPPW, Dorma, Kitch.
32	Glass	Modiguard, Saint-Gobain, Asahi, HNG
33	Wood	Teak, Sal sycamore, Merandi
34	Flush door- decorative / non decorative	Greenly-door, century- door, Archidply - door, Eurodoor, Nippon, Duro
35	MS Rolling shutter	Sarvottam, Suryoday, Gandhi, Sagar
36	Ply (BWP - IS 710 & BWR 303)	Green ply, Euro ply, Nippon, Duro, Century, Silicon(evoke)
37	Laminate	Greenlam, Century, Merino, Euro, Royal touch, Formica, Nippon
38	Veneer	Greenlam, Century ply, Euro ply, Timex, Natural Decowood
39	MDF	Nuwood ,Maftalal, Duratuff
40	Prelam particle board	Novapan, Bhutan. (exterior grade only)
41	Cement bonded particle board	NCL (Bison board), Everest (Eternite), Shera
42	Compact sheet	Vir, Bloom, Formica.
43	Aluminium heavy duty section	Jindal, Domal series, Hindalco, Banco, Gujarat Extrusion
44	Sanitary vessels	Kohler, Jaquar, Hindware, Cera, Parryware , Johnson
45	Sanitary accessories	Kohler, Jaquar, Hindware, Cera, Parryware, Johnson
46	Hand drayer	Euronics , Cera, Jaquar
47	Toilet Cubical	Marino, Greenlam, Matalium, T-Line
48	CPVC & UPVC , PVC pipe	Prince, Supreme, Astral, Finolex, Ashirvad flow guard,
49	Polycarbonate sheet	Makrolon, Lexan, Bayer, Dunpalon, Sabic, Coxwell
50	Anchor fastener and bolts	Hilti, Fischer
51	Gypsum board false ceiling	Saint gobain, USG Boral, Ecotone, Hilux
52	Grid ceiling	Aerolite, Saint gobain, Armstrong, Anutone
53	Accoustic Ceiling	Armstrong , Anutone , Aerolite, Saint gobain
54	Metal ceiling	Metalium , Supersill , USG Boral, Aerolite
55	ACP	Aludecor, Alucobond, Alston, Alstrong, Eurobond ,

		VIVA
56	Acoustic paneling	Artois, Ecotone, Aerolite
57	Glass film	3M, Avery , Garvey,
58	Modular Glass Partition	Sonic, Kubik, Otic , Ozone
59	Carpet flooring	Welspun, Unitex, Ecosoft, Tarkett Flotex, Solarbrite Rosetta, Dubond Sorona
60	Wooden flooring	Vista, Pergo , Armstrong, Mikasa, Ecosoft, Quick step
61	Roller blinds	Vista, Hunterdouglas, Ferrari
62	Hardware & fittings	Hettich, Haffle, Enox, Ebco, kitch
63	Aluminium profile handles & frames	Olive, Hettich, Haffle, Enox, Ebco, kitch
64	Door hardware & accessories	Geze ,Haffle, Enox, Dorma, Kitch, Ozone, kitch
65	PVC edge beading	Rehau , Dolken
66	Furniture	Monarch, Amardeep , HOFF, Godrej , Wipro
67	Glass wool/ synthwool	Rockwool, Twiga , AcoSonic
68	Compactor	Kompress , Wipro , Godrej , HOFF
69	Artificial stone	Emcer , Kalinga, CMC, AGL , Johnson
70	Vinyl	Welspun , Solarbrite , Tarkett, Unitex, Responsive, LG
71	Window locks cum handle	Alualpha, Giessee or equivalent.
72	Filler rubber of glass panel	EPDM quality only
73	Wool felt/weather strip	Anand, red-diplex ltd or equivalent
74	Rust Remover	Feovert (Krishna Conchem), Roff Rust Clear (Pidilite Industries)
75	Polymer bonding agent	Monobond (Krishna Conchem), Roff Bond Repair (Pidilite Industries)
76	Non-shrink grout	Polygrout -HS (Krishna Conchem), Roff Grout GP (Pidilite Industries)
77	Super plasticizer for jacketing	Supercon-100 (Krishna Conchem), Roff Plast 330 / Concrete Master
78	Rebar and Anchor Fasteners	Hilti or Fischer OR Mungo.
79	Acrylic SBR base bonding agent	Mono-bond SBR (Krishna Conchem), CICO, BASF, Pidilite
80	Epoxy Bonding	EPI bond 21 LP (Krishna Conchem), Roff Concrete Bond (Pidilite)
81	Modular Kitchen	Timbor Home, Tiara furniture system, Godrej interio
82	PVC Sleeve	Supreme / Astral / Prince
83	Expansion Board	Capcell HD Board
84	Expansion Joint	Pidilite / Roof/Laticrete or mentioned in BOQ
85	Expansion Joint System	3R as per Item description
86	Water Proofing	BASF/ Fosroc / Sika or mentioned in BOQ
87	Overdeck Insulation	BASF/ Fosroc / Sika or mentioned in BOQ
88	PVC spacer	BAL Endura / Kerakoll / BASF
89	PVC Flooring	Armstrong, Gerflor, Tarkett
90	Self Levelling Chemicals	Ardex / BASF / Cico / Sika

91	Anti-bacterial Paint	Sikka / Liquid Plastic/SSK/Viessmann/artilin / BASF /Huntsman
92	Galvalume roofing sheet	Jindal,Mansha,Eashar
93	Pre coated Sheet	J.S.Eng., Fielders, Rama, Shree Precoated, S.Kumar
94	Floor stamping	Ultratech, Vyara, Flexstone or Equivalent
95	WPC door	Alstone , Flexibond or equivalent
96	Roofing shingles	Saint Gobain , Malarkey , Technonicol , Docke or equivalent
97	Fiber Cement sheet board	Ecopro, Everest , Shera , CK Birla Group
98	Roof Gutter	Saint Gobain , Malarkey , Technonicol or equivalent

## **PLUMBING MAKE LIST**

Sr.No.	Item	Approved Make
1.	SWR PVC PIPE & FITTINGS 6 KG CM <sup>2</sup> ; FITTINGS : 6 KG CM <sup>2</sup>	ASTRAL / SUPREME/PRINCE/FINOLEX
2.	ECO. DRAIN PIPE & FITTINGS	SUPREME/ ASTRAL
3.	GULLY TRAP	GIRCO / TIRUMALA / SONIA/ SUPREME/ASTRAL
4.	STONE WARE PIPES FOR INTERNAL UNDER GROUND DRAIN PIPE	GIRCO / TIRUMALA / SONIA
5.	RCC HUME PIPES EXTERNAL MAINUNDER GROUND PIPE	INDIAN HUME PIPE / PRANALI
6.	M.S/G.I. PIPES FOR WATER SUPPLY	TATA / JINDAL/ SWASTIK
7.	ASTM/CPVC PIPE & FITTINGS FORWATER SUPPLY	ASTRAL / SUPREME/ASHIRWAD / FINOLEX
8.	COMPOSITE PLUMBING PIPE & COMPOSITE FITTINGS	KITEC OR EQ
9.	G.I. PIPES FITTINGS WATER SUPPLY	DRP-M / R-BRAND / ZOLOTO
10.	GI TO GI JOINTS	CHAMPION / EQUIVALENT
11.	SOLVENT CEMENT	SUPREME / KISSAN / FINOLEX
12.	BALL VALVES	LEADER / ZOLOTO / AUDCO
13.	WHEEL VALVES	LEADER / ZOLOTO/AUDCO
14.	DCV / NRV	ZOLOTO/SPIREX/AUDCO
15.	TAR	SHALIBIND / TIKIBOND-BS
16.	SELF PRIMING SEWAGE PUMPS	HBD / GRUNDFOS
17.	VALVES	AUDCO/ZOLOTO / R.B. / KBL / KSB
18.	PUMPS	KIRLOSKAR / GRUNDFOSS/XYLEM
19.	STARTER	SIEMENS / L&T
20.	PRESSURE GAUGE	BELLS / H GURU
21.	BOTTLE TRAP & WASTE COUPLING	JAQUAR / HINDWARE/KOHLER
22.	DEWATERING PUMPS	GRUNDFOSS/KIRLOSKAR/ KSB
23.	HYDROPNEUMATIC SYSTEM	GRUNDFOSS OR EQUIVALENT
24.	EOT CRANE WITH HOIST	INDEF / ELECTROMECH / SAFEX / WH- BRADY / EQUIVALENT
25.	METALLIC BELLOWS	BELLOW FLEX / PRICISION / DHRUV / B.D.ENGR.
26.	ELECTRIC GEYSER	A-O SMITH/ RACOLD/SPHERHOT
27.	HOT WATER GENERATOR	THERMAX/A.O.SMITH / KEPL OR EQUIVALNET

No	Item	Approved Make
<b>LT PANELS,LT CABLES SWITCHGEAR &amp; ACCESSORIES</b>		
1	ENCLOSURE MANUFACTURER	ACTIVE ENGINEERS, ELMEX, AD ENTERPRISE, ACCESS CONTROL PANELS.
2	MCB/ELCB/RCCB/ELMCB	LEGRAND, ABB,HAGER,SCHNEIDER,C&S, L&T,SEIMENS
3	MCCB/ACB	LEGRAND, ABB, SCHNEIDER,SIEMENS,L&T
4	DISTRIBUTION BOX	LEGRAND, ABB,HAGER,SCHNEIDER,C&S, L&T,SEIMENS
5	CHANGEOVER SWITCH	HH ELECON,L&T, ABB, HPL,C&S
6	CAPACITOR	L&T, EPCOS,CONZERV,DATAR,POWERMATRIX,ABB
7	PUSH BUTTON	SIEMENS,ABB,L&T,SCHNEIDER
8	INDICATING LIGHT	SIEMENS,ABB,L&T
9	TIMERS	L&T,SIEMENS,ABB,CONZERV
10	SELECTOR SWITCH	L&T,SEIMENS,KAYCEE
11	AUTOMATIC TRANSFER SWITCH	L&T,HPL,CUMMINS,HAVELLS
12	CTs	KAPPA,L&T,AREVA,MAXWELL
13	PTs	KAPPA,L&T,AREVA,MAXWELL
14	CONNECTORS	L&T, SCHINDER,SEIMENS,ABB
15	PROTECTION RELAY	AREVA,L&T,ABB,SEIMENS
16	ANALOG/DIGITAL METER/LOAD MANAGER/MFM	CONSERV,L&T,SCHNEIDER/ABB/HPL
17	IRON CLAD SWITCH WITH REWIREABLE FUSE/SFU	KEW, TRISHUL,SUPER,C&S
18	METALCLAD SWITCH WITH REWIREABLEFUSE/SF U	HAVELLS, KEW,C&S, INDOASIAN
19	MAIN LT CABLE	AVOCAB,FINOLEX,PRIMECAB,POLYCAB,DIA MOND POWER,RRCABLE,HAVELLS
20	CABLE GLANDS	COMET, HMI, DOWELLS, SIEMENS,CROMPTON,HEX
21	CABLE LUGS	DOWELLS,JOHNSON,HEX



22	BUSDUCT	L&T,SCHNEIDER,C&S,SEIMENS,LEGRAND
<b>INTERNAL WIRING, FIXTURES &amp; ACCESSORIES</b>		
1	RIGID FR PVC CONDUIT	NIHIR,PRECISION,POLYCAB,BEC, Power Flow
2	ACCESSORIES OF CONDUIT	NIHIR,PRECISION,POLYCAB,BEC
3	COPPER FLEXIBLE WIRES	AVOCAB,FINOLEX,POLYCAB,RRCABLE,HAVELLS ,Caliplast
4	TISSINO TYPE SWITCHES & SOCKETS	POINTER-TRUMP, SSK-TOPLINE PC, ANCHOR-PENTA CHEERY
5	MODULAR TYPE SWITCHES & SOCKETS	LEGRAND-MYRIUS, MK-WRAP ROUND, ANCHOR-WOODS,HAVELLS-CRABTREE-ATHENA
6	PVC TAPE	STEEL GRIP,ANCHOR
7	M.S. CONDUIT	BEC,AKG,STEEL CRAFT
8	LIGHT FIXTURES & LAMPS	OSRAM, XAL WIPRO, PHILIPHS, NIRVANA, GE, CG, , JAQUAR ,ENDO , TISVA ,LT
9	CEILING FAN & EXHAUST FAN	USHA,CG,ORIENT,HAVELLS
10	CALL BELL	ANCHOR/ORPAT/MAX
11	WATER COOLER	VOLTAS,USHA,BLUESTAR
12	GEYSER	RECOLD,HAVELLS,BAJAJ,SPHEREHOT
13	MOTOR PUMP SET	CROMPTON,AMRUT,KSB,UNEEL,KIRLOSKAR
<b>CABLE TRAY, RACEWAY &amp; ACCESSORIES</b>		
1	CABLE TRAY	INDIANA,RUSHABH,PROFAB
2	ALUMINIUM FLOOR RACEWAY	MK OR APPROVED BY CONSULTANTS
3	GI FLOOR RACEWAY	MK OR APPROVED BY CONSULTANTS
4	PVC WALL RACEWAY	MK, PROFAB,LEGRAND
<b>UPS &amp; INVERTER</b>		
1	UPS	NUMERIC,EATON,APC, BPE
2	INVERTER	SUVIK,SUKAM,MEGATECH
3	SMF BATTERY	PANASONIC,EXIDE,GLOBAL (YUASA)
4	RACK	FABRICATED
<b>STREETLIGHT POLES, FIXTURES &amp; ACCESSORIES</b>		
1	GI POLES	FABRICATED
2	MS POLES	FABRICATED
3	SMC PRESS MOULDED JUNCTION BOX	SYNTEX OR AS APPROVED BY CONSULTANTS

LIGHTNING PROTECTION & EARTHING SYSTEM		
1	AIR TERMINAL	MAP, LPI, INDESCO
2	SUPPORTING GAYED MAST	MAP, LPI, INDESCO

3	LIGHTNING STROKE RECORDER	MAP, LPI, INDESCO
4	COPPER BONDED ROD & CHEMICAL COMPOUND	MAP, LPI, INDESCO
5	ELECTROLYTIC/CHEMICAL EARTHING KIT	GRESLO, GALAXY EARTHING
<b>ELV SYSTEM &amp; ACCESSORIES</b>		
1	FIRE ALARM PANEL & DISPLAY PANEL	ESSER, EDWARD, NOTIFIER, SIEMENS, GST
2	REPEATER PANEL	ESSER, EDWARD, NOTIFIER, SIEMENS, GST
3	ADDRESSABLE & CONVENTIONAL SMOKE DETECTORS	ESSER, EDWARD, NOTIFIER, SIEMENS, GST
4	INTELLIGENT SMOKE & HEAT DETECTORS	ESSER, EDWARD, NOTIFIER, SIEMENS, GST
5	ADDRESSABLE & CONVENTIONAL HEAT DETECTORS	ESSER, EDWARD, NOTIFIER, SIEMENS, GST
6	ADDRESSABLE & CONVENTIONAL BEAM DETECTORS	ESSER, EDWARD, NOTIFIER, SIEMENS, GST
7	FAULT ISOLATOR	ESSER, EDWARD, NOTIFIER, SIEMENS, GST
8	RESPONSE INDICATOR	ESSER, EDWARD, NOTIFIER, SIEMENS, GST
9	MANUAL CALL POINT	ESSER, EDWARD, NOTIFIER, SIEMENS, GST
10	ADDRESSABLE HOOTER	ESSER, EDWARD, NOTIFIER, SIEMENS, GST
11	FIRE CABLE	RRCABLE, FINOLEX, DELTON, POLYCAB, AVOCAB, Caliplast
12	RJ-45 SOCKET OUTLET (COMPUTER & TELEPHONE)	LEGRAND-MYRIUS, MK-WRAP ROUND, ANCHOR-WOODS, HAVELLS-CRABTREE-ATHENA, PLEXONICS, AECONNECT
13	RJ-11 TELEPHONE SOCKET	LEGRAND-MYRIUS, MK-WRAP ROUND, ANCHOR-WOODS, HAVELLS-CRABTREE-ATHENA, PLEXONICS
14	CAT-6 CABLE	TYCO ELE(AMP), SCHINDER ELE.(DIGILINK), R&M, SYSTIMAX, MOLEX, PLEXONICS, AECONNECT

15	CAT-6E CABLE	TYCO ELE(AMP), SCHINDER ELE.(DIGILINK), R&M,SYSTIMAX,MOLEX, PLEXONICS, AECONNECT
16	TELEPHONE TAG BOX	KRONE
17	TELEPHONE PAIR WIRE	RRCABLE, FINOLEX,DELTON,POLYCAB
18	NETWORK SWITCH	CISCO,HP, PLEXONICS, , D LINK, AECONNECT, NETGEAR
19	ETHERNET SWITCH	CISCO,HP, PLEXONICS , D LINK, , AECONNECT, NETGEAR
20	PATCH CORDS	CISCO,HP, PLEXONICS , D LINK , , AECONNECT, NETGEAR
21	U RACKS	VERO PRESIDENT,VALRACK,SPIDER OR APRROVED BY CONSULTANTS, AECONNECT
22	PUSH BUTTON PHONE	PANASONIC,BEETEL,SONY OR APPROVED BY CONSULTANTS,PRAMODA
23	PROGRAM PHONE	PANASONIC,BEETEL,SONY OR APPROVED BY CONSULTANTS,MAT RIX
24	AMPLIFIER (POWER & BOOSTER)	JBL, AUDIOQUEST,BOSCH,AVTRON
25	AUDIO MIXER	JBL, AUDIOQUEST,BOSCH, AVTRON
26	CD/DVD/FM PLAYER	JBL, AUDIOQUEST,BOSCH, SONY, AVTRON
27	MICROPHONE	JBL, AUDIOQUEST,BOSCH, AVTRON
28	MULTIPLEXER	JBL, AUDIOQUEST,BOSCH, AVTRON
29	CEILING AND WALL SPEAKER	JBL, AUDIOQUEST,BOSCH, AVTRON
30	GOOSENECK MIC	JBL, AUDIOQUEST,BOSCH, AVTRON
31	WIRELESS MIC	JBL, AUDIOQUEST,BOSCH, BEYERDYNAMIC
32	STAND MIC	JBL, AUDIOQUEST,BOSCH
33	SPEAKER CABLE	RRCABLE, FINOLEX,DELTON,POLYCAB,CALIPLAST
34	2 MP HD IR VERIFOCAI CAMERA	AVTRON,HONEYWELL,SONY, SCHNEIDER (PELCO), HIKVISION, CPPLUS

35	2 MP FIX DOME CAMERA	AVTRON,HONEYWELL,SONY, SCHNEIDER (PELCO), HIKVISION, CPPLUS
36	DOME CAMERA	AVTRON,HONEYWELL,SONY, SCHNEIDER (PELCO), HIKVISION, CPPLUS
37	DIGITAL VIDEO RECORDER	AVTRON,HONEYWELL,SONY, SCHNEIDER (PELCO), HIKVISION, CPPLUS
38	NETWORK VIDEO RECORDER	AVTRON,HONEYWELL,SONY, SCHNEIDER (PELCO), HIKVISION, CPPLUS
39	LED/LCD DISPLAY UNIT	SONY, SAMSUNG,PANASONIC,LG

Sr. No.	Description	Make
1	VRF	DAIKIN, O GENERAL, HITACHI, MITSUBISHI, BLUESTAR / TOSHIBA
2	Treated Fresh Air Unit	Zeco / Citizen / Ethos
3	Dx Type Condensing Unit	DAIKIN, O GENERAL, HITACHI, MITSUBISHI, BLUESTAR / TOSHIBA
4	Ventilation Fan	Kruger/Nicotra/System Air
5	Grills/ Jet Nozzel	Caryaire /System Air /Ruskin Titus
6	Nitrile Insulation	K Flex/ Armacell /Areoflex
7	Copper pipes	Maxflow / Mandev
8	Drain Pipe	Prince/Finolex/ Astral
9	GI Sheet	Jindal/Tata
10	Electrical Cables	Polycab/Finolex Eq Approve

Only above said material is to be used as per Schedule “B”

Notes:

The consultant / Nagarpalika reserves the right to select the manufacturers or approved make from the above list and also to make changes (add or delete names of other makes) in this list during the execution of the contract,

Tenderers should quote rates of various items considering supply/ use of first preference make of material selected by him. Second preference make material would be accepted by the consultant if they are satisfied that first preference make material cannot be supplied/ used by Tenderers due to any specific reasons. However, the final decision for accepting second preference makes or accepting only first preference would be that of the consultant.

Note:

All the material/ makes listed above and other than as specified above shall be used after obtaining prior approval from the architect/ Eng. in charge equivalent material listed in complete tender document should only be used in case the specified material or not available the equivalent material should be used after obtaining prior approval from the architect/Eng-in-charge. Any extra item has to be approved in advance and then execute the same else university will not be liable for payment of such item. If any items are not included in the tender and need to do on site then contractor has to give RA (rate analysis) for the same.

TENDERER'S SEAL AND SIGNATURE.

# **FIRE FIGHTING SPECIFICATIONS**

## SCOPE OF WORK:

Work under this section shall consist of furnishing all labor, materials, equipment and appliances necessary and required to completely install Wet riser, Sprinkler, First Aid Fire Protection system as required for all floor as per the drawings and specified here in after or given in the Bill of Quantities. Without restricting to the generality of the foregoing, the fire safety system shall include the following:-

- a) M.S. piping, Down comer, Hose box & accessories
- b) Hose reels, Fire Extinguishers etc.
- c) Pump House & Accessories
- d) Sprinkler System
- e) Suction, Delivery & header pipe, fittings, flanges & valves.
- f) Signage's
- g) Installation water tank with plumbing work and water refilling arrangement

## PIPEWORK:

### GENERAL REQUIREMENT:

All the materials shall be of ISI mark / TAC approved, best quality conforming to the specifications and subject to the approval of the Client or his representative. If so directed, materials shall be tested in an approved testing laboratory & the contractor shall produce the test certificate in original to the Engineer-in-charge & the entire charges for original as well as repeated tests shall be borne by the Contractor.

Before welding, the pipe faces shall be cleared & then shall be welded conforming to IS: 9595 –1980. The electrodes used for welding shall comply with IS: 814. The laying of welded pipe shall also comply to IS 5822 – 1986. The welding joints shall be tested in accordance to IS: 3600, Part 1973.

Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.

Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.

Pipes shall be securely fixed to walls and ceilings by **suitable clamps or supported at every 3 mtrs. & at change of direction as required**. Only approved type of anchor fasteners shall be used for RCC ceiling and walls.

Valve and other apparatus shall be so located that they are easily accessible for operations, repairs and maintenance.

## PIPE AND FITTINGS:



All pipes shall be conforming to IS:1239-1990 (M.S. Heavy class) with screwed flanged or welded joints as specified by the Client's Representative. Pipes (exposed) shall be given two primary coat of Zinc chromate with two coat of compatible epoxy paint give an even look (Fired, shade No.536 as per IS:5). All black steel pipes under floors or below ground shall be provided with protection against corrosion by application of 100/ 150 mm wide and 4mm thick layer of PYPKOTE/MAKPOLYKOTE (IS:10221) over the pipe, as per manufacturer's specifications Checking with holiday testing machine. Excavation of soft soil including backfilling, compacting, watering up to 1.3M depth. Fittings for M.S. / G.I. pipes shall be approved type malleable iron (forged fittings) for tapered screwed joints. Fittings shall be approved type steel fittings conforming to IS:1239-1982 Part – II for screwed joints and welded. All fittings such as bends, tees, etc. for 50mm below shall be standard forged fittings. Cast iron fittings and fabricated fittings shall not be accepted.

All piping laid shall be as follows:

Pipe Size	Material	Joints & Fittings	Sealing Material
Upto 50mm	E.R.W., M.S. Pipe Heavy Class IS:1239/1979	Screwed Fittings  Unions  Raised face Slip-on Flanges	Non-Hardening  Lubricant  3mm, 3-ply Rubber insertion
75mm to 150 mm	E.R.W., M.S. Pipe Heavy Class  IS:1239/1979	Welded Fittings  Raised face Slip-on Flanges  -----	-----  -----  3mm, 3-ply Rubber insertion
200mm to 300 mm	E.R.W. Welded Pipes  (Minimum 6.35 mm Thk.)  IS:3589/1981	Welded  Raised face Slip-on Flanges  -----	-----  3mm, 3-ply Rubber insertion  -----

Pipes shall be provided with electrical resistance welding. Jointing shall be butt welded between pipe and pipe and fittings. Joints between C.I. and M.S./G.I. pipes shall be made by provided a suitable flanged tailor sockets piece and M.S. flanges on the M.S./G.I pipe shall have appropriate number of holes and shall be fastened with nuts, bolts and 1.5 mm thick compressed asbestos gaskets. Tee off connections shall be through reducing tees. Drilling and tapping of the main walls of the main pipe shall not be allowed.

All equipment and valve connections shall be through flanges (Welded or screwed for mild steel). All welded piping is subjected to the approval of the Client's Representative and sufficient number of flanges and unions shall be provided. Tender drawings indicate schematically the size and location of pipes. The Contractor on the award of the work, shall prepare detailed working drawings, showing the cross-section, longitudinal sections, details of fittings, locations of isolating and control valves, drain valves and all pipe support, structural supports. He must keep in view the specific openings in buildings and other structures through which pipes are designed to pass. Drawings to be got approved from Local Fire Authorities. Contractor shall submit the Hydraulic calculation for the system in accordance with Fire Authority By Laws. Piping shall be properly supported on or suspended from stand clamps, hangers as specified and as required. The Contractor shall adequately design all the brackets, saddles, anchors, clamps and hangers, and be responsible for their structural sufficiency. Pipe supports shall be of steel, adjustable for height and primer coated with rust preventive paint and finish coated back. Where pipe and clamps are of dissimilar materials a gasket shall be provided in between. Spacing of pipe supports shall not exceed the following:

Pipe Size	Spacing between Supports
Upto 65mm Dia	3500mm
65 to 100mm Dia	4000mm
100 to 250mm	5000mm

Vertical risers shall be parallel to walls and column lines and shall be straight and plumb. Risers passing from floor to floor shall be supported at each floor by clamps or collars steel structural supports attached to pipe and with a 15 mm thick rubber pad or any resilient material. Where pipes pass through the roof floor, suitable flashing shall be provided to prevent water leakage. Risers shall have a suitable clean out at the lowest point and air vent at the highest point. The Contractor shall coordinate with structural.

Pipe sleeves, 50 mm larger diameter than pipes, shall be provided wherever pipes pass through walls and slabs, and annular space filled with fire proof materials like putty, fire seal etc.

Piping work shall be carried out in workmen like manner, causing minimum disturbance to the existing services, buildings, roads and structure. The entire piping work shall be organized in consultation and coordination with other agencies work so that particular area work shall be carried out in one stretch.

Piping lay out shall take due care for expansion and contraction in pipes.

All pipes using screwed fittings shall be accurately cut to the required sizes and thread in accordance with IS: 554 and burrs removed before lying. Wherever reducers are to be made, eccentric reducers shall be used.

#### **NOZZLE:**

The nozzle shall be of S.S. as specified in BOQ 20 mm in (internal) diameter. The screw threads at the inlet connection shall match with the threading on the branch pipe. The inlet end shall have a hexagonal head to facilitate screwing of the nozzle on to the branch pipe with nozzle spanner.

End Couplings, Branch pipe, and Nozzles shall conform to IS :903-1985.

#### **ORIFICE FLANGES:**

Provide orifice flanges fabricated from 6mm thick stainless steel plate to reduce pressure on individual Hydrants/ sprinkler to restrict the operating pressure to

3.5 Kg/cm<sup>2</sup>. The design of the orifice flanges shall be given by the Contractor as per the location and pressure conditions of each hydrants / hose reel and get approved from Client's Representative before installation.

## **FIRE EXTINGUISHERS:**

Installation of fully charged and tested Fire Extinguishing Hand Appliances Carbon Dioxide (Co<sub>2</sub>) gas type extinguisher of 4.5 kg as per IS 15222, gross weight 16 to 16.5, Control discharge mechanism fitted with 1 Meter Wire Braided Hose & Flat Horn with Diffuser Nozzle for dispersed discharge of CO<sub>2</sub>, Discharge Time 12 Sec, Average Discharge is 95%, Applicable on Class B, C and electrically started Fire, Fire Rating 55B, Internal coating is not applicable & External coatings of enamel spray painting, Powder Coated Handle, Valve Confirm to IS 3224 ISI Marked, CO<sub>2</sub> Cylinder construction: hot spinning by seamless pipes & bearing ISI mark, Body confirms to I:S 7285 and PESO APPROVED, Extinguishers confirmed to IS 15683:2018 and ISI marked.

ABC 6kg powder filled with mono ammonium phosphate powder 50% as IS 4303 stored pressures by these specifications and drawings. Stored Pressure Type, UGTS Pressure Gauge, Gross Weight 8.9 Kg, Empty Weight 2.9 Kg, Can Height 530 mm, Diameter 150 ± 10mm, Discharge Time 24 Sec, Controllable discharge mechanism, Jet Range 5 Meters, Average Discharge is 90%, applicable on Class A, B & C and electrically started Fire, Fire Rating 4A:144B, Can Construction : Deep drawn & CO<sub>2</sub> MiG welded, EPDM Rubber Hose with both end Aluminum clamped, Internal Coating - Epoxy Powder coating, External Coating - Pure Polyester Powder coating (Resistant), Brass forged valves with safety Pin is of SS material, Sheet metal thickness: 1.8 mm, ISI Approved IS 15683:2018.

Fire extinguishers shall conform to the following Indian Standard specifications and shall be with B I S approved stamp as revised and amended up to date.

- a) CO<sub>2</sub> Type: IS:15683
- b) ABC Powder Type: IS:15683

Fire extinguishers shall be installed as per Indian Standard Code of practice for selection, installation and maintenance of portable first aid appliances IS: 2190-1979. Hand appliances shall be installed in readily accessible locations with the Appliance brackets fixed to wall by suitable anchor fasteners.

Each appliance shall be provided with an inspection, testing, change of charge and other relevant data. All appliances shall be fixed in nature work man like man neutrally vertical and at current locations.

The Extinguisher shall be so distributed over the entire floor area that a person has to travel not more than 15 Mtr. to reach the nearest fire extinguishers.

## **MOTORS FOR ELECTRIC DRIVEN PUMPS: MOTOR:**

The motor shall be squirrel cage A.C. induction type suitable for operation on 415 volts 3 phase 50Hz. System. Degree of protection shall be IP 55. The class of insulation shall be F. Temperature rise limit up to class 'B', duty 'S1' the

synchronous speed shall be 1500/2900 RPM as specified. The motor shall be rated for continuous duty and shall have a horse power rating necessary to drive the pump at 150% of its rated discharge with at least 65% rated head. The motor shall conform to I.S.325.

#### MOTOR STARTER:

The motor starter shall be soft or variable frequency drive type conforming to IS: 1822 - 1967. The unit shall include suitable current transformer and ammeter of suitable range on one line to indicate the current. The starter shall not incorporate under voltage no voltage trip overload or SPP.

The starter assembly shall be suitably integrated in the power and control panel for the wet riser system.

#### TESTING OF THE SYSTEM:

All piping shall be tested to hydrostatic test pressure of 6 Kg/Cm<sup>2</sup> for a period of not less than 2 hours. All leaks and defects in joints revealed during the testing shall be rectified to the satisfaction of the Client's Representative.

Piping required subsequent to the above pressure test shall be re-tested in the same manner. System may be tested in sections and such sections shall be securely capped. The Client's Representative shall be notified well in advance by the Contractor of his intention to test as action of piping and all testing shall be witnessed by the Client's Representative. The Contractor shall make sure that proper noiseless circulation of fluid is achieved through the system concerned. If proper circulation is not achieved due to air bound connections, the Contractor shall rectify the defective connections. He shall bear all the expenses for carrying out the above rectification including the tarring-up and re-finishing of floors, walls etc. as required. The Contractor shall provide all materials, tools, equipment, instruments, services and labor required to perform the test, and shall ensure that the plant room and other areas are cleaned up and spillover water is removed. The Contractor shall give the pressure test of head for external yard hydrant at ground level and also for hydrant at terrace level.

All air shall be trapped from the pipeline through hydrants, Hose Reel & air valves. Each section of the pipe shall be slowly filled with the water & allow to stand the water for few hours with the ends closed.

Flushing of underground connections: Underground mains and lead-in connections to system risers shall be flushed before connections made to piping in order remove foreign materials which may have entered the underground during the course of installation. For hydrant system the flushing operation shall be continued until water is clear.

#### COMMISSIONING OF SYSTEM:

Before commissioning, the entire system shall be flushed to ensure that any earth/foreign matters which might have entered during installation are taken out. For this, pump may be operated and valves opened at different locations.

As soon as the work is complete, the system shall be commissioned and made available for use. Requirement of firefighting installations is equally important

during occupation of the building. If the building is to be occupied in part, firefighting system of building completed shall Commissioned by isolating the system of under construction portion of the building.

The fire fighting system shall be maintained and manned from the very first day of its Commissioning.

Any defects noticed during the warranty period shall be promptly attended by the Contractor and availability of the system at all time is too be ensured.

#### ACCEPTANCETEST:

Start terrace pump through pump on/off switch check required flow and pressure.  
Stop pump through pump on/off switch.

All these tests mentioned above shall be repeated after one hour interval. The result of all the tests shall be identical again. After the system has satisfactorily withstood the above tests, it can be taken over from the contractor.

#### START-UP/SYSTEMTESTING:

It will be the responsibility of the tendered to cause interim/stage inspection by the FPCOR/ST.F.O/CFO during execution of the work as and when so called for by the Employer /Architect and shall carry out any rectification / modification as may be suggested by the Tariff Advisory Committee(ST.F.O.)/State Fire Officer(CFO).

Soon after the work is completed, the contractor shall inform the ST.F.O/CFO in writing with a copy to the Architect / Employer for getting the complete system including all sub system and instrumentation, control etc. thoroughly inspected and tested for satisfactory performance. After satisfactory completion of tests of the systems by the ST.F.O / CFO the contractor shall be required to submit inbuilt drawings on tracing cloth to the Architect which have been so approved. In addition to ST.F.O, the contractor shall also be responsible for getting the system and equipment tested and approved by other Statutory Authorities like the Area Fire Officer or the State Fire Services as may be required.

#### HANDINGOVER:

All commissioning and testing shall be done by the Contractor to the complete satisfaction of the Engineer-in-Charge /Consultants, and the job handed over to the Client. Contractor shall also hand over to the Client all maintenance and operation manuals and all items as per the terms of the contract.

## EQUIPMENT SPECIFICATION

### 1.0 FIRE PUMP SETS:

Fire system consists of the following pump sets:

1. 1650 LPM at 70M WC Motor Driven Main pump set 1 Nos. (1 for Hydrant main) in pump house in basement The suction of the above pump sets will be connected to a tank of capacity 2,00,000 Ltrs.(effective and available capacity).

2.

The Delivery of these pump sets are connected to a common manifold and further this manifold will be connected to a ring main around the buildings. The pump shall be of horizontal end suction, centrifugal pump. The speed of motor driven pump shall be 2900 RPM and the Engine driven pump shall be 1800 RPM. Pump shall preferably be designed to have the best efficiency at the specified duty point. The pump shall be suitable for continuous operation at any point within the "Range of Operation" i.e. 0% to 150% of rated capacity. The pump shall be driven by drive unit directly coupled. A heavy duty coupling along with coupling guard shall be provided between the pump and drive unit. The pump shall be capable of furnishing not less than 150% of rated capacity at a head of not less than 65% of the rated head. The shut off head shall not exceed 120% of rated head. The drive unit power rating shall be the maximum of the following requirements. 15% margin over the pump shaft input power at the rated duty point.

li. 5% margin over the pump shaft input power required to drive the pump at 150% of its rated discharge. The pump set shall be securely mounted on a robust base frame and shall be free from vibration at all variations of load.

The pump shall also be linked to recirculation pipeline required for minimum flow through the pump during its operation without any discharge through headers.

The pump shall be provided with a name plate indicating delivery head, capacity and RPM. The material of construction of pump shall be as under:

Casing: Cast Iron, IS:210, Gr 20

li. Impeller: Bronze IS:318, Gr LTB1 lii. Wearing Rings: Bronze

Iv. Shaft Sleeve: S/S type AISI

V. Stuffing Box: Cast Iron, IS:210, Gr 20 Vi. Gland: Cast Iron, IS:210, Gr 20

Vii. Gland packing: Teflon as best as available

Viii. Shaft: Stainless Steel AISI 40ix.

Base frame: Fabricated M.S

2.0 The pump shall be horizontal end suction, centrifugal pump the pump shall be of mono **block type**. The pump base frames shall be fabricated and should be very rigid. The base frame shall accommodate both the pump and the motor. The pump shall be suitable for automatic operation.

Jockey pump drive motor shall be suitable for frequent start/stop operations as required by the system. The pump shall be provided with a name plate indicating delivery head, capacity and RPM.

The material of construction of pump shall be as under:

Casing: Cast Iron, IS:210, Gr 20 li. Impeller: Cast Iron

lii. Base frame: Fabricated M.S

MOTORS:

The motors for the Stand by hydrant & jockey pumps shall be of general purpose, constant speed, and sized for the maximum output at an ambient temperature of 40 Deg C. The motors for the Jockey pump shall be of TEF type and for firefight in pump it

shall be SPDP type. The motors shall be wound of class 'F' insulation. The windings shall be vacuum impregnated with heat and moisture resisting varnish and preferably glass fiber insulated to withstand tropical conditions. The motors shall be rated for continuous duty. They shall also be suitable for long period of inactivity. The operating speed for the Standby Hydrant pump/Jockey pump motor shall be of 2900 RPM. The motors shall be suitable for electric supply of 440V, 3 phase, 50Hz and shall run continuously at rated in put over the entire range of voltage and frequency variations as under:

RANGE OF VARIATION:

Voltage: 10%

ii. Frequency: 5%

iii. Combined voltage frequency: 10% (Absolute sum)

Motors shall be designed for startle as starting.

Motors shall be effectively grounded and shall be provided with two separate and distinct ground in g pads, each complete with tapped hole galvanized bolt and washer for connection to station ground conductors.

### 3.0 **Fire Fighting:**

#### 3.1 **Codes and Standards**

- |                 |   |
|-----------------|---|
| 1) IS 1239-1979 | ERW Mild Steel Tubes & Tubular and Fittings up to 150 NB.           |
| 2) IS 3589-1981 | ERW steel pipes for gas, water and Sewerage over 150NB.             |
| 3) IS 1984      | Copper alloy gate, globe and check Valves.                          |
| 4) IS 1537-1976 | Vertically cast iron double flanged Pipes                           |
| 5) IS 7181-1986 | Horizontally cast-iron double flanged pipes                         |
| 6) IS 7634      | Code of practice for plastic pipe work for portable water supplies. |

**Pipes & Fittings:**

Pipes shall conform to the following schedule:

NB	Pipe (mm)		Material
	Min.OD	Thickness	
25	33.3	4.05	ERW Heavyclassmildsteel tube to IS-1239-79 Part I
40	47.9	4.05	
50	59.7	4.50	
65	75.3	4.50	
80	88.0	4.85	
100	113.1	5.40	
150	163.9	5.40	ERWpipe to IS 3589-1981
200	219.1	6.00	
250	273.0	6.00	
300	323.9	6.00	
350	355.6	7.00	
450	406.4	7.00	



All pipes shall be factory fabricated.

All pipes shall be new and from standard manufacturers.

All bends upto 65 mm NB shall be hydraulically formed with a minimum R/D of three unless space restrictions inhibit, in which case long radius elbows may be used with the approval of the Engineer-in-charge. For sizes upto 40 mm NB, socket weld fittings shall be used. For larger sizes upto 150-mm dia butt welding wrought steel fittings to BS 1965 and matching with the straight pipe wall thickness shall be used. In the case of larger sizes, the bends shall be fabricated from the same stock of pipe and in at least 4 sections with a radius equal to  $\pm 1.5$  times the diameter. Branch connections to pipes upto 100 dia shall be through suitable weldable fittings. In higher sizes, the branch pipe shall be set – on type made with a suitable profile cutting of the main and branch pipes.

Flanges shall be slip-on carbon steel with plain faces conforming to IS 6392- 1971. Flange shall be rated for 1.0 N/mm<sup>2</sup> or twice the system pressure whichever is higher and drilled to suit the equipment or valve flange if already drilled. All bolts & nuts shall be carbon steel and gasket 3-mm fiber reinforced PTFE.

All pipe joints shall be welded except where flange joints are specified. Pipes upto 40 mm NB shall use socket-weld fittings with fillet welding and larger sizes use butt-welding type single V 35 deg weld preparation. Flange joints shall be provided at the following positions

- i) Pair of flanges for isolation of equipment
- ii) Mating flanges for equipment flange connections
- iii) Mating flanges for valves, strainers as the case may be
- iv) Pair of flanges at every 30 m continuous run of piping

**Valves:**

All valves and the flanges shall be suitable for 2.0 N/mm<sup>2</sup> cold non-shock working pressures or twice system pressure whichever is high.

Valves upto 50 mm NB shall be full bore ball valves with forged body and polished hard chrome plated ball with PTFE seal.

Higher size valves shall be butterfly type. Butterfly valves shall have a fine grain cast iron body with mirror smooth finished cast steel disc and spindle of stainless steel AISI 410. The valve shall be of wafer-type and should be fitted with two slip on type pipe flanges. The valve shall have an easily replaceable molded EPDM sleeve which shall bring about 100% tight shutoff at the

design working pressure. Shaft bottom shall have an axial bearing.

**Supports & Clamps:**

Pipe supports shall be standard factory made galvanised systems or fabricated from steel structural galvanised after fabrication. Supports shall be spaced as follows:

Size	Horizontal	Vertical
Upto 15 mm	1.25 m	1.8 m
20 to 25 mm	2.00 m	2.5 m
32 to 125 mm	2.50 m	3.0 m
150 & over	3.00 m	3.0 m

Additional supports shall be provided at the bends, at heavy fittings like valves, near equipment and as directed by the Engineer-in-charge. Pipe hangers shall be from galvanized structural steel, steel inserts in concrete or anchor fasteners, wall brackets or floor supports as decided by the Engineer-in-charge depending upon the location of the support. Hangers shall not be secured to light weight roof, wall, false ceiling or any other member which is not structurally meant for such loading. Hangers from structural steel shall be from suitably designed clamps or attachments and in no cases should drilling or punching of such steel members be allowed. All pipe supports shall be capable of being adjusted in height to the tune of 50mm. All supports suspenders and hangers shall be galvanised after fabrication.

Pipe clamps shall be specially fabricated fittings for pipes. All clamps shall be of galvanized mild steel. Clamps shall take into account pipe movement owing to temperature variations & anchors, and in no case shall the clamping arrangement induce stresses beyond the safe load limits of the pipe under fully filled conditions.

Vertical pipe risers shall be supported at each floor and in addition, the riser shall have a duck-foot support at the lowest point.

All pipe joints shall be welded except where flange joints are specified. Pipes upto 40 mm NB shall use socket-weld fittings with fillet welding and larger

sizes use butt-welding type single V 35 deg weld preparation. Flange joints shall be provided at the following positions:

- i) Pair of flanges for isolation of equipment
- ii) Mating flanges for equipment flange connections
- iii) Mating flanges for valves, strainers as the case may be

Where valves, strainers, NR valves adjoin, there is no need for additional mating flanges and valve flanges may be used to mate with the other valves, strainers etc.

All supports and clamps for sprinkler piping shall be flexible to allow for vibration and movement of the pipe during discharges. All such support systems shall be clearly shown on shop drawings.

### **Pipe Installation:**

#### **In - building**

All pipes shall be of approved make and best quality without rust marks. Pipes and fittings shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc. Pipes and fittings shall be fixed truly vertical / horizontal or in slope as required in an art workman like manner. Pipes shall be securely fixed to walls and ceilings by suitable support at intervals specified.

All in building pipes shall be heavy quality galvanised steel tubes to IS 1239 using malleable or wrought steel heavy duty screwed or weldable fittings. All welded joints shall be painted with zinc rich paint. Flanged joints shall be provided to mate with valves and other equipment or at every 40m run of straight pipe for maintenance and repair. All flanges shall be slip on type and rated for 2.0 N/mm<sup>2</sup> or twice the system pressure and shall have 3mm reinforced Teflon gasket.

Sprinkler piping shall be supported using slings or clevis type hangers so as to take the vibrations during sprinkler discharges. Floor tapping from vertical risers shall be through a union or a flanged joint. Similarly flow switches shall have unions or flanges on both sides.

All pipes shall be adequately supported from ceiling or walls through structural

supports fabricated from steel structural e.g. rods, channels, angles and flats generally as shown on drawings. Fasteners shall be shear type anchor fasteners in concrete walls and ceilings and wrought steel

spikes of at least 75mm long in brick walls. All pipes supports shall be painted with 1 coat of red oxide primer and two coats of black enamel paint. Pipe supports shall be as follows:

Upto	50 mm	nominal bore	1.75m
	63 mm to 100 mm	nominal bore	2.0 m
Over	100 mm	nominal bore	2.5 m

### **External**

Pipes buried underground shall be galvanised or ungalvanised heavy duty steel tubes or corrosion by wrapping with "pypcoat" as per manufacturer's specification. Fittings shall be weldable wrought iron fittings suitable for butt-welding and 10% of the welded joints shall be radio-graphically tested and found in order. The Wele joints shall be random selected for testing in consultation with the Engineer. All flanges shall be slip-on welded flanges rated for 2.0w / sq.mm to Is 6392 and have a 3mm fiber-reinforced Teflon gasket.

Underground mains shall be laid not less than 750 mm below the ground level and shall be at lest 2m away from the building face and supported on concrete pedestals at every 3.5 m and held on with galvanised iron clamps. Concrete thrust anchors shall be provided at all bend sand tees as show non drawing and as directed. All excavation for pipe laying shall be carried out with sufficient width form a king proper joint. Back filling shall be done only after the piping is hydro-statically pressure tested. Piping shall be constantly kept clean till tested.

Underground M S Pipes shall be wrapped with 'Pypcoat' or equivalent polymer-based corrosion protection tape. The pipe shall be wire brushed to removemilscaleandanapprovedprimerappliedat250gm/sqm. The tape is spirally wound, after coating becomes tacky, with an overlap of 15mmand them of used with the pipe including the overlap.

All valves shall be housed in brick masonry chambers over 150mm cement concrete (1:3:6) foundation. The brick walls of the chamber shall be plastered inside and outside with 20mm cement sand plaster 1:4 with a floating coat of neat cement. Chambers shall be 650 x 650 mm clear for depths upto 900mm and 1000x1000mm for depths beyond. Each chamber shall have a cast iron surface box approved by the local Fire Brigade.

#### **Painting:**

All exposed piping for firefighting shall be distinctly painted 'Fire Red' shade 536 to IS:5-1978. Pipes shall first receive two coats of red oxide primer uniformly applied and two coats of oil paint applied thereafter. All pipes supports shall be painted black.

#### **Testing & commissioning:**

All piping after installation shall be tested for a hydrostatic test pressure of 20 Kg/Sqcm maintained for 24 hours. All joints and valves shall be checked for leaks and rectified and retested. During testing all valves except drain & air valves shall be kept fully open.

Hydrant system shall be tested by opening all topmost hydrants and record pump starting. Likewise test the top most hose reels and record starting of Jockey pumps.

Sprinklers shall be tested by opening the farthest branch valve and record pump starting. Similarly the drain connection shall be cracked open to record jockey pump starting.

Hydrant and jockey pumps shall be started through pressure switches and records. All tests shall be witnessed by the project engineer and recorded. Test results shall form part of the handing over documents.

Tests shall also conducted as required by the Fire Office and readings recorded.

### **SPRINKLER SYSTEM**

#### **Scope of work**

The scope of work shall cover supply, installation, testing and commissioning of

the sprinkler system covering the following:

- 1) Sprinkler pumps, electric driven as shown in the equipment schedule.
- 2) Jockey pumps
- 3) Installation valve/s with motor-gong.
- 4) Sprinklers
- 5) Sprinkler piping
- 6) Branch flow switches and tamper switches connected to the building fire alarm system

### **Standards**

The sprinkler installation shall conform to and meet with the requirements set out by the following:

- 1) IS1648-1961                      Code of practice for fire safety of buildings.
- 2) Guide lines for Automatic sprinkler Installation - Tariff Advisory Committee rules.
- 3) Local Fire Brigade and Fire Engineering Authorities.

### **Pumps**

The sprinkler pump shall be single or double suction centrifugal type with split casing/ end suction or multistage and direct driven by electric motor or diesel engine as specified. The pump rating and performance shall conform to the Equipment Schedule and meet the TAC duty requirements.

Pump shall have a bronze impeller and pump casing shall be of close grained cast iron. The shaft sleeve shall be brass or S.S 304 and the trim shall be brass or bronze.

Pump shall be capable of delivering 150 % of the rated capacity at 65 % of the rated head and the no-delivery head shall be not more than 120% of the rated delivery head for horizontal pumps and 140% for vertical turbine pumps. The pump casing shall withstand 1.5 times the no-delivery pressure or 2 times of the duty pressure whichever is higher.

The pump shall be electrically driven with direct flexible coupling.

The electric drive motor shall be squirrel cage induction conforming to IS 328-1978 and rated for continuous duty (S1). Motor shall have not less than class B insulation and minimum enclosure of IP22. The starter shall be air cooled fully automatic star delta or auto transformer type. Starters shall conform to IS 8544 and rated for AC-3 duty conditions.

Drive Motor rating shall be based on the largest of the following:

- 1) Rated pump discharge at rated head
- 2) 150 % of rated discharge @ 65 % of rated head
- 3) Maximum power absorbed by the pump in its operating range i.e. no-delivery to free discharge.

#### **Jockey Pump**

Jockey pump shall be similar to the sprinkler pump but need not have split casing.

#### **Accessories**

The sprinkler and jockey pump shall be complete with the following accessories:

- i. Suction and discharge eccentric reducers & flexible.
- ii. pump coupling & guard
- iii. Common base frame, fabricated mild steel or cast iron.
- iv. suction and discharge isolation

### **Installation Valve**

The sprinkler system shall incorporate one or more (as shown on drawings) installation valve assemblies comprising:

- i. A main gate valve
- ii. IN and out pressure gauges
- iii. Test connection of adequate size with valve and orifice plate with pressure connections.
- iv. Water motor and gong with necessary piping, isolating valve and strainer and drain.

The installation valve shall be straight through type suitable for wet pipe sprinkler systems. Valves shall be of cast iron with gun metal internals and suitable for vertical or horizontal installation. The valve clack shall be of castgunmetalwithneoprenesealandretainingringandshallincorporatea suitable non-return device to compensate for pressure fluctuations which should not mal-operate the clack. The gun metal internals shall provide for smooth waterways for:

- i. Water valve through a retard chamber
- ii. Test connection and drain

There shall be two pressure gauges, one for the mains side and another for the installation side. Each gauge shall have pressure damping brass piping with gun metal gauge and drain.

A test connection of adequate size as shown on drawings or as approved shall be provided with a shut-off gate valve, an orifice plate with pressure connections. The discharge from the test connection outlet shall be led to the nearest sump or drain as shown on drawings or as directed.



The mains water motor and gong shall preferably be of cast gun metal body and internals. The valve shall have an associated gun metal gate valve, strainer preceding the water motor. The water motor and gong shall be located on the discharge lead as directed.

Flow switches shall be as specified under 'Fire Hydrant System'. Tamper switches shall be provided for tap off valves as shown on drawings.

Sprinklers shall be temperature-sensitive glass-bulb actuated type and be standard products from an established firm of repute and standing and approved by an appropriate authority for firefighting duty.

All sprinklers shall be brass castings polished chrome or white (polyester) unless stated otherwise and rated for 12.0 bar and factory tested for 34.0 bar. Sprinklers shall be pendant or side wall type as specified and show non drawings. All sprinklers shall be provided with an adjustable escutcheon finished same as the sprinkler head. Wherever shown and specified, sprinklers shall be recessed type.

Temperature classification of sprinklers in each space shall be as shown on the drawings. Sprinklers shall be selected for the coverage shown on the drawings and ordinarily be 15/10 mm with K factor of 115 (metric). Wherever the specified sprinkler is not adequate, the tenderer may offer appropriate size required.

### **Piping**

All piping shall be mild steel heavy class as specified under "Piping for Fire Fighting". Necessary line flushing valves shall be provided as shown on drawings or as required to.

### **Testing**

The entire sprinkler piping shall be tested, with the sprinkler in position, to a hydrostatic test pressure of 8.0 kg/sqcm for a period of 48 hours at the end of which there shall be no loss in pressure.

Test valves in each sprinkler installation shall be opened (with temporary drain connection) and the following observations recorded:

- i. Start-up of jockey pump
- ii. Start-up of sprinkler pump
- iii. Operation of water motor gong
- iv. Operation of flow switches in the appropriate branch.
- v. Alarm for the standby pump when the sprinkler main pump is deliberately kept off electrically.

All branches shall be so tested and witnessed and attested by the Engineer-in-charge. All the operating tests shall be carried out in the presence of any local authority, Fire Brigade or Insurance Company.

### **PAINTING:**

All surfaces to be painted shall be thoroughly cleaned with wire brush to remove complete rust and other extraneous substances. Over the cleaned surfaces one coat of red oxide primer shall be applied completely covering the exposed surfaces. A finish coat of painting shall be applied one day after the prime coat, after ensuring that the paint is dry. The second coat shall be done before the installation is handed over and after approval to do so from the Project Manager. Hydrant line and Sprinklers Fire Red

## **FIRE HYDRANT SYSTEM**

### **Scope of work:**

The scope of work shall cover supply, installation, testing and commissioning of the fire hydrant system covering the following:

- 1) Fire pumps, electric as shown in the equipment schedule and drawings.
- 2) Booster pumps at terrace or jockey pump, electric driven as shown in the equipment schedule and drawings.
- 3) Starters & isolators for the pump sets.
- 4) Hydrant mains, external ring and yard hydrants.
- 5) Wet risers in the building as specified and shown on drawings.
- 6) Landing valves, hose reels, hose cabinets etc.
- 7) Fire brigade breaching, Siamese connections and connections to pumps and appliances.

### **Standards:**

The fire hydrant installation shall conform to and meet with the requirements set out by the following:

- 1) IS : 1648-1961 Code of practice for fire safety of buildings (General) Fire Fighting Equipment and its maintenance.
- 2) IS : 3844-1989 Code of practice for installation of internal fire hydrant in multi- storeyed building.

- 3) Compliance with the local fire brigade and the fire enforcing authorities.

**Fire Pump:**

The fire pump shall be single or double suction centrifugal type with split casing / end suction or multi stage and direct driven by electric motor or diesel engine as specified. The pump rating and performance shall conform to the Equipment Schedule and meet the TAC duty requirements.

Pump shall have a bronze impeller and pump casing shall be of close grained cast iron. The shaft sleeve shall be brass or S.S 304 and the trim shall be brass or bronze. Pump shall be capable of delivering 150 % of the rated capacity at 65 % of the rated head and the no-delivery head shall be not more than 120 % of the rated delivery head for horizontal pumps and 140% for vertical turbine pumps. The pump casing shall withstand 1.5 times the no-delivery pressure or 2 times of the duty pressure whichever is higher.

The pump shall be either electrically driven or diesel driven with direct flexible coupling.

The electric drive motor shall be squirrel cage induction conforming to IS 325 - 1978 and rated for continuous duty (S1). Motor shall have not less than class B insulation and minimum enclosure of IP22. The starter shall be air cooled fully automatic star delta or auto trans former type. Starters shall conform to IS 8544 and rated for AC-3 duty conditions.

Drive Motor rating shall be based on the largest of the following:

- i. Rated pump discharge at rated head
- ii. 150 % of rated discharge @ 65 % of rated head
- iii. Maximum power absorbed by the pump in its operating range i.e. no- delivery to free discharge. The diesel engine shall be naturally aspirated (non-tubo charged) and electrically started. The engine shall have a speed governor to regulate the rated rpm within 5 % of its rated speed. The engine shall be complete with starting batteries full-wave selenium rectifier charger, isolator, leads, mounting frame etc. Engine rating shall be same as for the electric motor.

Pumps and prime movers shall be truly aligned by suitable instruments. Record of such alignment shall be recorded in the handing over documents. Contractor shall provide necessary test certificates, performance curves of all the pumps

All the pumps shall be provided with approved type of Mechanical seals.

On the suction and delivery lines, double flanged reinforced neoprene flexible connectors shall be provided. Connectors shall be suitable for maximum working pressure of each pipe line on which it is mounted and tested to a test pressure of 1.5 times the operating pressure.

### **Accessories:**

The fire and jockey pumps shall be complete with the following accessories:

- 1) suction and discharge eccentric reducers and flexibles.
- 2) pump coupling guard.
- 3) common base frame, fabricated mild steel or cast iron.

Each pump shall have independent set of pressure switches. The pressure switch shall be snap action SP DT switch rated 10A @ 220 V operated through a stainless steel diaphragm. The switch shall have a pointer for manual adjustment of set point, and all electrical connections shall be terminated in a screwed terminal connector. The entire unit shall be

encased in a cold drawn steel enclosure. The diaphragm shall be designed for maximum operating pressure of the system. Each pressure switch shall be provided with a pressure gauge in parallel as shown on the drawing and all gauges and pressure switches shall be mounted in an instrument panel with necessary control piping and drainage facility.

Flow switches shall be paddle type SPDT snap acting contacts rated 10 A @ 220 V. The paddle shall be made of either brass or phosphor bronze terminated in a screwed terminal connector. The entire unit shall be encased in cold drawn steel enclosure and the maximum operating pressure of the parts in contact with the liquid shall be consistent with the system pressure.

### **System Operation and Control Panels**

The fire pump shall be started automatically on loss of pressure and the operation sequence of the booster and fire pumps shall be as follows:

- i. Booster or jockey pump shall start when the system pressure drops by 0.35 Kg/cm<sup>2</sup> and stop when the system pressure is re-established.
- ii. The fire pump shall start when the system pressure drops by 1.0 Kg/cm<sup>2</sup> and shall continue to run until manually switched off.
- iii. Booster/jockey and fire pump starting shall be indicated on the panel with an indication lamp. It should also be indicated on the MF ACP.

The motor starters (direct on line or star-delta) shall consist of electrically actuated contactors. The starter shall be complete with ON-OFF push buttons, timers and auxiliary contacts and shall be fully automatic. There shall be an indicating lamp with each of the pumps and an ammeter and selector switch with the fire pumps. Fire pump starting shall be annunciated through the MFACP. A remote start stop facility shall be provided in the Fire Control Room.

The starter along with isolator shall be housed in a 14 SWGM. S box duly rust inhibited through a process of degreasing and phosphating.

All cabling to and from the pumps to starter and control switch shall be carried out through armoured PVC (FRLS) cables of approved makes. Cables shall be laid in accordance with section "M V CABLING". The pump motors and panel shall be double earthed in accordance with IS 3043-1966

Hydrants shall be provided internally and externally as shown on the drawings. Internal hydrants shall be provided at each landing of an escape staircase and additionally depending on the floor area as shown on drawings. Landing valve shall be single headed gun metal valve with 1-63 mm dia outlets and 100 mm inlet conforming to IS 5290-1969. Landing valve shall have flanged inlet and instantaneous type outlets and mounted at 1.0 m above the floor level. Instantaneous outlets for fire hydrants shall be of standard pattern approved and suitable for 63 mm dia fire brigade hoses. Wherever necessary, pressure reducing orifices shall be provided so as to limit the pressure to 3.5 kg/sqcm or any other rating as required by the local fire brigade.

Each landing valve shall have a hose reel cabinet of 1800 x 900 x 450 mm housing or as shown on drawings or as approved.

- i) Landing valve with single 63 mm dia capped outlets and one 100 mm inlet.
- ii) First-aid hose reel with 30 m long 20 mm dia high pressure Dunlop hose & 20 mm dia ball valve.
- iii) 2-15 m long 63 mm dia canvas hoses reinforced rubber lined wire wound with instantaneous couplings.
- iv) One copper branch pipe with bronze rings to take the nozzles at one end and fitting to the instantaneous coupling at the other.
- v) One leaded-tin-bronze nozzle of 25 mm dia.

The first aid hose shall conform to IS 884-1969 and be wound on a heavy-duty circular hose reel with a cast iron bracket. The hose shall be permanently connected on one end to the standpipe through a 20 mm ball valve with necessary hose adapter and a gunmetal nozzle at the other end. The reel shall swing out by 270°.

Canvas hoses shall be in two lengths of 15.0 m each, of reinforced rubber lined wire wound canvas type with instantaneous couplings, neatly rolled into bundles and held in position with steel brackets. Canvas hoses shall be tested and certified by the manufacturers, to withstand an internal water pressure of not less than 35 kg/sqcm without bursting. The hose shall also withstand a working pressure of 7 kg/sqcm without leakage or undue sweating.

The hose cabinet shall be fabricated from 2 mm mild steel sheet duly rust inhibited through a process of degreasing and phosphating. The cabinet shall have double flap hinged doors with 4 mm clear glass and shall have necessary openings for riser main and brackets for all internals. The cabinet shall receive two coats of red oxide primer both inside and outside before two after coats of final paint of approved colour shade. The design and size of the cabinet shall be got approved before fabrication.

External Hydrants shall be stand post type over-ground unless shown otherwise. All external hydrants shall be single or twin headed oblique valves with 80mm or 100mm inlet connection. Hydrants shall be located at least 2 m away from and within 15 m from the building wall.

Each hydrant shall be provided with a hose cabinet containing 2 x 15 m 63 dia flax canvas or controlled percolation hoses with couplings. Wherever shown, the cabinet may contain a branch pipe and nozzle. The cabinet shall be 900x600x400 fabricated out of 2 mm mild steel sheet duly rust inhibited through a process of degreasing, phosphating etc. The cabinet shall receive two coats of red oxide primer, inside and outside, before 2 coats of final painting of approved shade. The cabinet shall be wall- mounted or free standing with its own steel legs depending on the site conditions.

A fire service connection to the fire tank and a fire service inlet to the hydrant main shall be provided. These connections shall consists of one or two twin-headed 63mm dia gunmetal oblique outlets enclosed in a 2mm thick sheet steel painted box on a suitable stand and 150dia outlet. Service inlettothehydrantmainshallhavea150dianon-returnvalve.

## Testing & Commissioning

All hydrant piping shall be tested for a hydrostatic test pressure of 20 kg/sq cm or 1.5 times the working pressure (whichever is less) for a period of 24 hours at the end of which there shall be no loss in pressure.

The booster & fire pump starting and stopping shall be tested by opening the test valve and record the following:

- 1)     Booster pump start /stop
- System pressure at startup                                 :     kg/sq cm
- stop                                 :     kg/sqcm
- Time elapsed from start to stop     =     seconds

- 2) Hydrant Pump start
- System pressure at startup : kg/sqcm

Maintained system pressure while



discharging the landing valve at the highest point.

- |                          |   |         |
|--------------------------|---|---------|
| i) Pump end              | : | kg/sqcm |
| ii) Highest outlet       | : | kg/sqcm |
| iii) Intermediate points | : | kg/sqcm |

All the operating tests shall be carried out in the presence of any local authority, Fire Brigade or Insurance Co.

### **Makes or Materials**

All materials and equipment used shall be approved products of the Tariff Advisory Committee and ISI stamped. The list of makes of materials below is indicative of the quality standards expected.

### **EQUIPMENT DATA**

- |     |                     |         |           |
|-----|---------------------|---------|-----------|
| 1.0 | <b><u>PUMPS</u></b> | Hydrant | Sprinkler |
| 1.1 | Make                |         |           |

- |     |               |                |
|-----|---------------|----------------|
| 1.2 | Type & Speed  | (rpm)          |
| 1.3 | Discharge (1) | lpm@ mWg       |
|     | (2)           | lpm@ mWg [150% |
|     |               | of(1)]         |
|     | (3) Zero lpm@ | mWg            |

- |     |                                 |
|-----|---------------------------------|
| 1.4 | No delivery Head                |
| 1.5 | Drive Motor (direct drive)      |
|     | i) Make                         |
|     | ii) Type                        |
|     | iii) KW input @ 1.3(1) KW input |
|     | @ 1.3 (2) KW input              |
|     | maximum                         |
|     | iv) KW rating of motor          |
|     | v) Enclosure                    |

- |     |   |
|-----|---|
| 2.0 | <b><u>JOCKEYPUMP</u></b>                  |
| 2.1 | Make, Type & Speed                        |
| 2.2 | Discharge lpm@ mWg                        |
| 2.3 | Drive Motor Make, Type, Speed & Enclosure |

- 2.4 KW input @2.2
- 2.5 Starter Type, Make & Enclosure

### 3.0 **PRESSURESWITCHES**

- 3.1 Make
- 3.2 Ampere rating                      amps @220V

### 4.0 **PRESSUREGAUGES**

- 4.1 Make
- 4.2 Diameter                      mm
- 4.3 Range(Kg/sqcm)

### 5.0 **AIRVESSELS**

- 5.1 Size                      diammm
- 5.2 Height                      mm
- 5.3 Sheet Thickness      mm

Pendant    Upright    Sidewall

### 6.0 **SPRINKLERS**

- 6.1 Type
- 6.2 Temp. rating              oC
- 6.3 Make
- 6.4 Size                      mm/mm
- 6.5 Rate of flow              @\_\_\_\_\_bar  
   @\_\_\_\_\_bar
- 6.6 Coverage
  - a) Standard              (m)
  - b) Extended              (m)

### 7.0 **INSTALLATIONVALVE**

- 7.1 Type
- 7.2 Make

7.3	Diameter	mm
7.4	Max. Time to alarm valve	(min.) operate

## **8.0 FIRE DOOR DETAILS**

### **8.1 MATERIAL**

Door Frames and Leaves are made from Galvanized Steel.

### **8.2 DOOR LEAVES**

Constructed from 1.0 MM thick galvanized steel sheet press formed to provide a 48MM thick fully flush, double skin door shell with seamless welding joints at stile edges. Internal Reinforcements are provided at top, Bottom and Stile Edges for Fire Rating. The internal construction of the door is a specially designed Honey comb structure with reinforcement at top, bottom and stile surrounds. The internal construction of the door varies with the degree of Fire Rating as tested. For doors having overall height in the excess of 2300mm the shutters shall essentially have double latching.

### **8.3 DOOR FRAMES**

Produced from 1.6 MM thick galvanized steel sheet press formed to single rebate profile of size 100 x 57MM (+/- 0.3MM) with a maximum bending radius of 1.4 MM. Frames may be fixed on plastered openings with the help of Metallic Expansion shield with counter sunk screw. Door Frames are supplied to knock-down form with butt joints for bolted assembly at site.

### **8.4 VISION GLASS**

Fire Rated Vision Glass with 6 MM thick clear glass can be provided for a maximum of 2 hours fire rating. The Vision Glass can be provided in 380 MM dia, Rectangular in standard dimensions of 200 MM x 300 MM.

### **8.5 FINISH**

The door frames and door shutters are primed with Zinc-Phosphate Stoving Primer and finished with Polyurethane Paint of approved shade (60-80 mir cons).

### **8.6 IRON MONGERY HINGES**

Stainless Steel Ball Bearing Butt Hinges (Dorma) 100x75x3MM thick are fixed flush to the frame & shutter.

#### **8.7 LOCK**

Shaft Lock, Mortice Lock with Lever Handles, Dead Lock, Baby Latch etc. (As per specifications).

#### **8.8 Door Closer**

TS-73 with std arm (Dorma) / As per specifications.

#### **8.9 Concealed Flush Bolts (For Double Shutter Doors)**

300 mm long for Doors Upto 2100 mm ht. and 600 mm long for Doors up to 2400 mm ht.

List of Makes for 'Fire Fighting System' at Khambhat

S.No	NAME OF MATERIAL	MAKE S
1	Pumps	Kirloskar/Lubi OR Equivalent
2	Pump Panel	As per Standard
3	M.S. Pipe Heavy Duty	Asian/Suryaprakash/Jindal/Zenith OR Equivalent
4	Hydrant Valve	Onspot/Similar
5	CI Butterfly valves	Hammer/Sant OR Equivalent
6	CI Non Return Valve	Hammer/Sant OR Equivalent
7	Pressure Relief Valve	As Per Standard
8	Alarm Valve	Kiddey/HD Fire/Safex OR Equivalent
9	Fire Hose	On spot/Similar OR Equivalent
10	Hose Cabinet	On spot/Similar OR Equivalent
11	Hose Reel Drum	On spot/Similar OR Equivalent
12	Two / Four way fire bridge inlet	On spot/Ronak OR Equivalent
13	Branch Pipe & Nozzle	On spot/Similar OR Equivalent
14	Foot Valve and Strainer	Sant/Normax OR Equivalent
15	Air release Valve	As Per Standard OR Equivalent
16	Pressure switch	Danfoss OR Equivalent
17	Pressure Gauge	Arbuda/Similar OR Equivalent
18	SS Ball Valve	As Per Standard OR Equivalent
19	Fire Extinguishers	Kanex/Safex/Minimax OR Equivalent
20	Cables	Polycab/KEI OR Equivalent
21	Conventional Zone Panel/ Annunciation Panel/Conventional MCP/Conventional HOOTER	Jain Instruments/N.K.Techno fab./RSS OR Equivalent
22	On- Off Switch	As per standard
23	Pipe Fittings	As per standard
24	Paint	Asian OR Equivalent
25	Sprinklers	Tyco/HD Fire/Unique OR Equivalent
26	Flexible Drops	Safex/AG Flex/HD Fire OR Equivalent
27	Wrapping & Coating	Rans/Pypecoat OR Equivalent
28	Signages	Autoglow/Glowlite/Prolite OR Equivalent

**Scope of work:-**

Vendor will appoint the MEP consultant and provide the required deliverables as follows:-

- 1) Prepare the complete layout of services and get approved from the client.
- 2) **Note–Kindly take the prior approval from client of any material before delivery on site. Material should as per the list of approved makes or equivalent to them.**

# TECHNICAL SPECIFICATIONS FOR LIFTS

## PART -V

### 1.0 SCOPE

This specification covers the requirements of design, manufacture, assembly, testing, delivery, installation & commissioning of Passenger lift with machine room requirement At Khambhat Nagarpalika

### 2.0 SITE CONDITIONS

Temperature	:	Maximum 45 Deg. C
Minimum 10 Deg. C		
Humidity	:	Not more than 80% at maximum temperature.
Rainfall	:	1000 - 1500mm Per Annum

### 3.0 ELECTRICAL SUPPLY SPECIFICATIONS

3.	System voltage		
	Nominal voltage	:	415 V
4.	Voltage variation limits	:	+/- 10%
5.	No. of phases	:	3
6.	Frequency	:	50 c/s
7.	Frequency variation limits	:	+3% or -5%
8.	Fault level	:	Not exceeding 50 KA at 415 V
9.	Neutral earthing on LV side	:	Solidly earthed

### INSTALLATION

a). The LIFT shall be installed as per IS : 1860.

Wiring and earthing shall be extended from the electrical shaft & lift shaft as per requirement.

Power cable & earthing point will be made available at power panel at one location for each lift by other agencies.

b). All openings at the various landings shall be temporarily guarded during installation.

c). All safety procedures associated with lifting of heavy equipment, operation of electrical tools & earthing should be strictly complied with.

d.) All electrical wiring shall have flame resisting moisture proof insulation and will be run in heavy gauge metal conduit/ casing.

The trailing cable between the car and lift well will be multicore type designed for lift services and will have flame resisting moisture proof covering.

Cables should conform to relevant IS amended up to date.

The supply and erection of lift shall conform to the latest lift act in force and modern lift practice in all respects.

All wiring and earthing etc. shall conform to IE rules and regulations

**(viii) TESTING**

All equipment included in contractor's scope of supply shall be tested at Manufacturer's Works, before delivery and necessary Test Certificates shall be submitted for approval of Consultants.

The Contractor shall carry out all performance tests after installation, in the presence of the Client / Consultants, as per specification.

The Contractor shall bear all expenses for such tests.

The Contractor shall be responsible for executing the contract as per Indian Electricity Rules, Rules and Regulations of supply authorities and the Rules of the local Electrical Inspectorate.

Any changes/modifications pointed out by the authorities shall be carried out at no extra cost

**(x) OTHER TESTS**

Each elevator shall be tested at site as per IS 4666 & EN 115. Among others, the tests shall include:

- a) Operational tests with functional check on safety devices
- b) Speed of operation at rated load
- c) Overspeed tests.
- d) Leveling accuracy
- e) H V test
- f) Earth resistance.

**TAKING OVER OF INSTALLATION**

The equipment & installation shall be deemed to have been taken over by the Client, when the following are completed:

- (x) The Consultants have certified that all contractual obligations have been fulfilled by the Contractor.
- (xi) All performance tests shall be carried out in the presence of client / consultant and Test Certificates are furnished in requisite copies.
- (xii) The installation is approved by the lift inspectorate.
- (xiii) The 'As Built' Drawings are submitted. ( Hard and soft Copies )

**8.0 COMPONENTS & ACCESSORIES**

The following components & accessories forming a part of the elevator installation shall be supplied and installed.

All the items shall conform to the requirements of the BIS listed above and the specification.

- (e) Guide rails of steel with working surfaces machined for the car and counter weight.
- (f) Spring buffers located in the lift pit.
- (g) Steel car frame with replaceable guide shoes .
- (h) Lift cars fitted with all interiors, false ceiling, flooring, ventilation fan, lights, operator's panel, floor indicator, Lift mirror, Handrails, emergency stop facility etc.
- (i) Motor operated sliding, center opening car doors wherever applicable.
- (j) Motor operated sliding, center opening landing doors wherever applicable.
- (k) Counterweight with guide shoes.

- (l) Safety gears .
- (m) Speed governors.
- (n) Suspension ropes
- (o) Sheaves & pulleys
- (p) Lift machines
- (q) Controllers & wiring materials
- (r) Terminal stopping and final limit switches.
- (s) Leveling devices
- (t) Lifting beam for machines.
- (u) Any other accessories as required.

**Lift Announcement :**

The lift shall be provided with special announcements as follows:-

- (a) When supply is out and lift is working in ARD (Automatic rescue device) announcement shall be "supply is out you may alight from the lift as soon as the door opens"
- (b) When supply is out, ARD is not working, and the lift stops in between floors announcement shall be "ARD" is not working please ask help through intercom"

**General Technical Specification**

**DETAILS OF LIFT WELL**

The lift well shall be as per clause 5 of IS: 14665.

There shall be no other opening in the lift well except for the landing openings.

All landing openings in lift well enclosures shall be protected by doors/ collapsible doors, which shall extend to the full height and width of the landing opening

Light points shall be provided in the lift well at a spacing not exceeding 10m.

All the light points shall have control from the machine room.

Socket outlet may also be provided at a suitable place for use by maintenance staff above the ground floor landing.

**LIFT PIT:**

The lift pit shall be provided proper water proofing treatment so that the same remains dry.

If the lift pit depth is more than 1.6m, a ladder to the height of 0.75m above the lift pit floor shall be provided to reach the lift pit.

The lift pit shall have provision for a separate access.

In case of two lifts in the well, one access to the lift pit shall be adequate.



**d) MACHINE ROOM:**

The load carrying capacity of the floor shall be obtained from the lift manufacturers.

Suitable lifting beams below the machine room shall be provided for lifting any heavy object as per requirement of the lift manufacturer.

Provision for pulley for lifting of heavy items / lift machinery is required which will facilitate inspection and repair.

The machine room shall be properly ventilated.

**9.4 PARTITION IN LIFT WELL**

Where two or more lifts are installed in a common lift well provision shall be made by dividing beam and rigid metal screen to separate each lift from an adjacent lift or its counter weight

**e) GUIDERAILS**

The guide rails shall be as per **IS: 14665**.

Rigid steel guides shall be used for guiding lift car and counterweight throughout its travel.

The strength of the guides, its attachments and the joints shall be sufficient to withstand the forces imposed due to the operation of the safety gear and deflection due to uneven loading of the lift car.

Only machined guide rails shall be provided for passengers and hospital lifts.

The guide tracks shall be supported at suitable intervals and shall be embedded into the walls.

Wood or fiber blocks or plugs shall not be used for securing guide brackets.

**GUIDE SHOES**

Two numbers of guide shoes at the top and two numbers at the bottom shall be provided on the lift car and counter weight.

Guide shoes shall be provided with adjustable mountings and shall be rigidly secured in accurate alignment at the top and bottom on each side of the car sling and counterweight frame construction.

When oil buffers attached to the bottom of the counterweight are used then additional guide shoes shall be provided on each side of the buffer frame.

For passenger lifts and bed-cum-passenger lifts, sliding guide shoes shall be provided for speeds up to 1.5 mps (meter per second.)

Sliding guide shoes for cars shall be flexible.

Solid guide shoes can be used for counter weights for speeds up to 1.0 mps.

When speed exceeds 1.5 mps, roller guide shoes shall be provided for car and the counterweight,

**BUFFERS:**

Buffers shall be provided at the bottom limit of travel for cars and counterweights.

Energy dissipation type buffers shall be used wherever the rated speed of the lift exceeds 1 mps but energy accumulation type buffers shall be preferred if the rated speed of the lift does not exceed 1 mps.

**(v) COUNTER WEIGHT:**

The counterweights shall be of metal and it shall be in the form of multiple sections.

It shall be contained and secured within a steel frame and shall be equal to the weight of the complete car plus approx 50% of the rated load.

At least, four guide shoes, capable of being easily renewed or having renewable linings shall be provided on the counterweight.

**(g) SUSPENSION ROPES**

Cars and counterweights shall be suspended from round strand steel wire ropes of best quality having a tensile strength not less than 12.5 tonnes/cm<sup>2</sup>.

The size and number shall be in accordance with standard Code of practice/BIS specifications.

Lubrications between the strands shall be achieved by providing impregnated hemp core. The nominal diameter of the ropes shall be at least 8mm.

**9.9.1. COMPENSATION ROPES**

For travels over 40 m and/or rated speed of the lift exceeds 2,5 mps, the proven of compensation ropes with tensioning pulleys shall be considered.

For speeds of 2.5 mps or below, quiet operating chains or similar devices shall be used as the means of compensation.

For speeds above 3,5 mps, an anti-rebound arrangement of idler tension pulley shall be provided to prevent the counterweight jumping with the application of the car safety gear.

**(h) CAR CONSTRUCTION**

The lift car construction shall be in conformity with Code of Practices, BIS specifications and IE Rules.

**1. CAR FRAME**

The lift car body shall be carried in a steel car frame sufficiently rigid to withstand the operation of the safety-gear without permanent deformation of the car frame.

The deflection of the members carrying the platform shall not exceed 1/1 000 of their span under static conditions with the rated load evenly distributed over the platform.

**2 CAR ENCLOSURES:**

The whole of the internal face of the car shall be of 1.5 mm thick stainless-steel sheet lined.

A suitable backing shall be used to reinforce the car wall panels.

A stainless steel handrail shall be provided on three sides of the lift car, extended to within 150 mm of all corners and a stainless steel skirting panel approximately 100 mm deep shall be provided.

Stainless steel false ceiling with concealed fluorescent light fitting and ventilating fan complete with metal ceiling diffuser shall be provided.

The car ventilation fan shall be switched off within a period which shall be adjustable from 5 to 15 minutes after the last registered call is answered.

The lift car excluding linings, shall be constructed of non-combustible materials.

The lift car shall have adequate illumination.

The illumination level shall not be less than 150 lux on the lift floor level.

**3 EMERGENCY LIGHTING:**

The lift car shall also be provided with emergency lighting operated by a rechargeable battery supply.

The lighting shall be automatically switched on in the event of failure of normal power supply to the lift.

#### **4 CAR PLATFORM:**

The lift car platform shall be designed on the basis of rated load evenly distributed.

The dimensions shall conform to IS: 14665 unless otherwise specified.

The flooring shall be smooth and non-skid type.

The PVC/rubber flooring of minimum 3mm thickness shall be preferred for passenger and bed-cum-passenger lifts.

The flooring for goods lift shall be strong enough to take the rated load without any deformation or damage.

#### **5 CAR ROOF:**

The car roof shall be solid type and capable of supporting a weight of at least two persons (approx 140 kg) without causing permanent deformation.

Ceiling lights shall be of recessed type and be protected by stainless steel metal bars.

A recessed ceiling fan complete with heavy duty metal diffuser and capable of providing 20 air changes per hour in the car shall be provided.

#### **6 CAR DOORS:**

The doors for passenger lifts shall be of metal and the internal face of the car door shall be suitably lined as the same in the lift car.

The doors shall be in two panels and centre opening with automatic power opening and closing unless otherwise specified.

The car shall be equipped with an electronic door sensor which can detect an obstruction at the car entrances and control the closing of the doors.

The car door shall be provided with an electrical switch which will prevent the lift car from being started or kept in motion unless all car doors are closed.

#### **7 DOOR RE-OPENING DEVICE:**

Door re-opening device shall be fitted to the leading edge of both car door panels, which shall automatically initiate re-opening of the door in the event of a passenger being struck (or about to be struck) by the door in crossing the entrance during the closing movement.

It shall be so designed and installed that for centre opening doors the obstruction of either leading edge when dosing will cause it to function.

#### **8 "DOOR-OPEN" ALARM FOR MANUALLY OPERATED DOORS:**

For manually operated doors and where assisted doors, a 'door open' alarm shall be provided in the car to draw attention to a car or landing door which has been left open for an adjustable period up to 10 minutes.

### **(i) LANDING DOORS**

The car entrance shall be provided with a car door, which shall extend to the full height and width of the car opening.

The opening for the landing doors shall not be wider than that of the lift car.

The top track of the door shall not obstruct the car entrance.

All landing openings in lift well enclosures shall be protected by doors / collapsible doors which

shall extend to the full height and width of the landing opening.

### **1. VISION PANELS**

The landing doors shall be provided with transparent vision panel of minimum thickness 6mm, made of an approved material or glass of a tempered or laminated type.

### **2. LANDING DOOR LOCKING DEVICE**

Every landing door shall be provided with an effective locking device so that it shall not normally be possible to open the door from the landing side unless the lift car door is in that particular landing zone.

It shall not be possible under normal operation to start the lift car or keep it in motion unless all landing doors are in the closed position and locked.

## **(j) TERMINAL STOPPING AND LIMIT SWITCHES**

The lift shall be provided with normal terminal stopping switches and limit switches. They shall be positively operated by the movement of the car.

These switches shall either be mounted on the car frame or in the lift well.

- 9.12.1** The limit switches shall either open directly by mechanical separation of the circuits feeding the motor and brake, and provisions shall be made so that the motor cannot feed the brake solenoid, or open, by an electrical safety device, the circuit directly supplying the coils of the two contactors, the contacts of which are in series in the circuits supplying the motor and brake.

## **(k) SAFETY GEAR**

The lift (except service lift) shall be provided with safety gears capable of operating only in the downward direction and capable of stopping a fully laden car, at the tripping speed of the over-speed governor, even if the suspension devices break, by gripping the guides and holding the car there.

## **(l) OVER-SPEED GOVERNOR**

The car safety shall be operated by speed governor located overhead and driven by governor rope suitably connected to the car and mounted on its own pulley.

Over-speed governor shall operate the safety gear at a speed at least equal to 115% of the rated speed.

For rated speeds up to 1 mps maximum governor tripping speed shall be either 140% of the rated speed or 0.88mps, whichever is higher.

For rated speed exceeding 1 mps, maximum governor speed shall be 115% of the rated speed plus 0.25mps.

The means for adjusting the over-speed governor shall be sealed after setting the tripping speed.

### **1. GOVERNOR ROPES**

The governor ropes shall not be less than 6 mm in diameter and shall be of flexible wire rope.

The rope shall be tensioned by a tensioning pulley and the pulley (or its tension in weight) shall be guided.

The breakage or slackening of the governor rope shall cause the motor to stop by means of an electrical safety device.

The device shall be of bi-stable type requiring manual reset.

#### **(m) OVERLOAD DEVICE AND FULL LOAD DEVICE**

The lift shall be provided with an overload device which shall operate when the load in the car is 10% or more in excess of the rated load of the lift.

The overload device, when in operation, shall:-

- Ø ) prevent any movement of the car,
- Ø ) prevent the closing of any power operated door whether fitted to the car or To the landing at which the car is resting, and
- Ø ) give audible and visible signals inside the car.

The lift shall resume normal operation automatically on removal of the excessive load. The overload device shall be inoperative while the Lift car is in motion.

#### **9.15.1. FULL LOAD DEVICE**

The lift (other than a service lift) shall be provided with a full load device having an adjustable setting range from 80% to 100% of the rated load and when operated, it shall by-pass all landing calls.

When the load in the car is reduced, the car shall stop for landing calls as normal.

#### **EMERGENCY ALARM DEVICE**

An emergency alarm push button together with a buzzer (or an alarm bell) shall be provided in the lift car and connected to the machine room and the main entrance lift lobby and backed up by an emergency supply. The pattern of lift alarms shall be distinguishable from that of fire alarms.

An intercom system connecting the lift car and the machine room /guard room (if manned) shall be provided.

#### **EMERGENCY EXIT**

The lift car shall be provided with an emergency exit in the roof of minimum size 500 mm x 350 mm x 400 mm in diameter.

Panels for emergency exits shall: -

be clear of any apparatus mounted above the roof of the lift car

be capable of being opened, re-closed and re-locked without a key

be provided with an electric safety device which will prevent operation of the lift

When the panel is not locked, operate the buzzers (or alarm bells) and also switch off the car ventilation fan.

## **CONTROL AND INDICATION IN CAR**

The lift car shall have a control faceplate made of stainless steel with thickness of not less than 25mm and comprising :-

- (i) Call buttons with acceptance signals to correspond with the landing served
- (ii) An alarm push button with protection from being operated accidentally
- (iii) "Door open" and "Door close" push buttons
- (iv) Audible and visible signals in connection with the over load device
- (v) light switch, alarm reset switch, fan switch and cleaner's " Stop-switch" keeping the car door open in the form of key switches or housed in a recessed metal box with hinged or sliding lid which will be key-locked,
- (vi) Two- way intercom speaker (optional),
- (vii) The control faceplate shall be fixed onto the car panel by stainless steel screws.

For lifts equipped with attendant control, the control faceplate shall also incorporate a non-stop button for the purpose of bypassing landing calls, but the calls shall remain registered until answered. This button shall be inoperative unless the lift is operated by an attendant.

The car direction and position indicator shall be of digital type display with LED's actuated by solid state circuitry unless otherwise specified. The position indicator shall have a minimum height of 50 mm and easy to read even from distance and properly illuminated.

## **9.19 LIFT MACHINERY FOR ELECTRIC**

### **LIFT 9.19.1 LIFT MOTOR**

The induction motor shall be designed to operate for an unlimited period according to the expected duty of the lift.

The motor may be supplied and controlled by static elements when A.C. variable speed system is specified.

### **MOTOR GENERATOR SET(Not Applicable)**

The motor generator set shall comprise a motor and a generator built as a complete unit directly coupled.

The motor and the generator shall be suitably rated to deal with the load and speed specified.

Controls shall be provided so that the set shall start up on the registration of a landing call or car call and shall continue to run for a period which shall be adjustable from 5 to 15 minutes, after the last registered call is answered.

### **BEARING AND GEAR CASE**

Bearings shall be of the ball bearing type or sleeve ring type with oil ring

bearings Gear cases shall be provided with thrust bearings suitable for the

application.

#### **EMERGENCY OPERATION BY MANUAL DEVICE**

For geared lift machines, the hoisting machine shall be provided with a smooth wheel which may be fitted to the shaft to move the lift car up or down by manual operation. The direction of movement of the car shall be clearly indicated on the machine.

#### **EMERGENCY OPERATION BY ELECTRICAL SWITCH**

For machines where the manual effort to raise the car together with its rated load exceeds 400N, an electrical switch for emergency operation shall be installed in the machine room.

Directional push buttons protected against accidental operation shall be provided in the machine room such that when the emergency electrical switch is operated,

The car can be moved up or down by applying constant pressure on the buttons. The car speed under the emergency operation shall not exceed

0.63 m/s.

The emergency electrical switch and its push buttons shall be so placed that the machine can readily be observed during operation.

#### **ELECTRO-MECHANICAL BRAKE**

Every lift machine shall be provided with a brake which is capable of stopping the machine when the car is traveling at its rated speed and with the rated load plus 25%.

It shall also be fitted with a manual emergency operating device capable of having the brake released by hand while a constant manual pressure is required to keep the brake open.

### **GOODS LIFT**

#### **DETAILS OF THE GOODS LIFT CAR**

The side and rear wall panels shall each be provided with three-equally-spaced full length lateral protective wooden battens of 200 mm wide by 25 mm thick.

The surface of the wooden battens shall be covered with 1.0 mm thick metallic sheet

as required. The top battens shall be fixed at a height of 1100 mm above finished car floor level.

The car roof shall be able to support the weight of two persons without causing permanent deformation.

Ceiling lights shall be of recessed type and be protected by stainless steel metal bars.

A recessed ceiling fan complete with heavy duty metal diffuser and capable of providing 20 air changes per hour in the car shall be provided.

The car floor shall be constructed of metallic sheet of suitable thickness with 2 mm high multi-grip non-slip pattern.

The floor construction shall be in the form of a metal drain pan (optional).

In case of metallic floor being drain type, the rear and side edges shall be folded up by 100 mm from the floor to form the drain pan.

All joints and the comers of the pan shall be welded to prevent water leakage.

The goods lift cars may also be constructed as mentioned above except the floor drain system.

#### **GOODS LIFT CAR DOOR**

The car doors shall be robust, manually operated, horizontally sliding and made of stainless steel / MS sheet. Power operated, automatic, horizontally sliding doors shall be multi-panel of stainless steel construction, similar to those for passenger lifts, but strong enough for goods lift use.

#### **f) SERVICE LIFT**

Neither the internal depth nor the internal width of the car shall exceed 1.00 m. The overall internal height of the car shall not exceed 1.20 m. The rated load shall not exceed 250 kg,

#### **LIFT CAR AND METHOD OF DRIVE:**

Service lift cars shall be of rigid construction and totally enclosed except for service openings and made of wood or metal and reinforced at the point of suspension.

The car shall not be made of inflammable materials. Two pairs of renewable guide shoes shall be fitted. Unless otherwise specified, removable shelves shall be fitted inside the car and be so retained that they shall not be displaced by the movement of the car.

The car shall be constructed with openings on opposite sides and shall be provided with some form of protection to prevent the goods from projecting outside the car. The method of drive for the lift shall be by traction i.e. sheaves and ropes or by positive drive using drum and ropes without counterweights,

#### **GUIDE:**

The car and counterweight shall each be guided by rigid guides.

Guides and their fixings shall be capable to withstand the application of the safety-gear (if provided) when stopping a fully loaded car or counterweight.

#### **BUFFER:**

Buffers shall be provided under all cars and counterweights.

A lift with positive drive shall be provided with additional buffers on the car top to function at the upper limit of travel.

The buffers used shall be one of the following types viz spring, rubber or resilient plastic.

#### **COUNTERWEIGHT**

Counterweights shall be of metal.

A metal frame shall be provided to prevent their displacement. In the case of drum drive, there shall be no counterweight.



## **SUSPENSION**

Cars and counterweights shall be suspended by means of round strand steel

wire ropes. The factor of safety of suspension ropes shall not be less than 10,

The minimum number of ropes shall be two and they shall be independent.

The diameter of sheaves or pulleys shall not be less than 30 times the rope diameter.

## **SAFETY GEAR**

Safety gear tripped by an over-speed governor shall be provided for the car where the rated capacity is 250 kg, accessible spaces exist beneath the lift well or gross car roof area equals to or greater than 0.37 m<sup>2</sup>.

Where there is an accessible space beneath the well, the counterweight shall be equipped with safety gear.

## **LOAD PLATE AND WARNING NOTICE**

A load plate giving the contract load of the lift in kg shall be fixed in a prominent position at each landing entrance.

A warning notice in English, Hindi and local language shall be prominently fixed at each landing entrance.

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## **CAR AND LANDING DOOR**

All landing openings in the lift well shall be protected by doors.

Every car or landing door shall be provided with an electric safety device which shall prevent the lift from being operated when any car or landing door is open.

It shall not be possible during normal operation to open a landing door unless the car is in the unlocking zone.

The landing doors shall be provided with the facility of being unlocked from outside with the aid of a special purpose key provided for use only by a competent lift worker.

### **i. TERMINAL STOPPING SWITCHES**

Service lifts shall be provided with terminal stopping switches to stop the car automatically at or near the terminal service levels.

### **(iii) PAINTING**

All exposed metal parts especially iron parts shall be painted with 2 coats of approved synthetic enamel paint after 2 coats of synchromesh primer after erection and before commissioning the lift.

## **11.0 APPROVAL**

The supplier shall obtain the approval of drawings & installation from the CEIG. Also approval shall be obtained from fire authorities for the features provided.

## **12.0 DOCUMENTATION**

The suppliers shall furnish the following documentation in requisite number of copies (one each group of buildings)

- (f) GA drawing of shaft & lift well giving all details to the civil contractors
- (g) Lifting hook size and locations.
- (h) Rail supporting and wall inserts
- (i) Bracket location, shaft ventilation opening size and location.
- (j) Control schematic GA of controllers
- (k) Operation and maintenance manual
- (l) Test certificates.
- (m) As Built drawings.

## **13.0 EXCLUSIONS**

The following are excluded from the scope of lift suppliers work

- (z) Builders works associated with lift well, pit, and wall inserts. (aa) Lifting beams.
- (bb) Electrical wiring upto the Lift panel with isolator for incoming supply, earthing and lighting in lift shaft.

## **14.0 SCHEDULE OF QUANTITIES**

The prices shall be quoted as per Annexure – I enclosed

## **GUARANTEE**

The equipment supplied and the installation shall be guaranteed for satisfactory performance and workmanship, for a period of 12 months from the date of handing over the entire installation to the client in good working condition and liability of supplier under this guarantee include factored items repair or replacement of all defective parts if any, which may prove faulty during this period including such parts as may be tendered inoperative by wear-and tear but exclude such parts as may be rendered inoperative by vandalism.

The contractor shall replace free of cost all equipment or parts supplied by him and found defective within this period.

In case the contractor fails to replace or render services for defective materials & parts, the client reserves the right to do so, at the contractor's risk and expenses without prejudice.

## **16 . FREE SERVICE**

Periodical Service for the first 12 months will be carried out after the Lift has been handed over or offered for inspection.

The date of commencement of free service will remain unchanged irrespective of any delay in building completion, availability of permanent power supply, inspection, taking over or commencing the use of lift.

The Comprehensive AMC charges applicable for 3 years after warranty period shall be indicated separately.

#### **17 . SCHEDULE OF TECHNICAL PARTICULARS**

The technical particulars called for in **Annexure-II** should be filled and furnished in the same format.

18.     Approved Brand of Lift is as bellow  
       R. & B. Approved Premium Brand:

RECOMMENDED MAKE; OTIS, JOHNSON, KONE,

OTIS / KONE / SCHINDLER/ MITSUBISHI / JOHNSON, OLYMPUS ELEVATOR PVT. LTD

BEACON, OTHER SIMILAR MAKE LIFT MANUFACTURES.

### **APPROVED MAKE FOR ELECTRICAL WORK**

<b>Sr. No.</b>	<b>Materials</b>	<b>Manufacturer/Supplier</b>
1)	HT Cable Termination Kit	Raychem
2)	HT Cable	Fort Gloster / CCI / Torrent/ Finloex/ Asian
3)	LT Power, Control and Signal Cables	/ Finolex/ Polycab / Torrent/ CCI/ Fort Gloster/Asian
4)	LT BUS DUCT	L&T/Godrej
5)	ACB	Siemens/ Crompton/Schneider
6)	MCCB	Siemens/ L&T/Merlin Gerin
7)	MCB	Legrand/Siemens/Hager
8)	Capacitors (APP/Gas filled)	ABB / EPCOS / Siemens
9)	UV / OV/ ELR	Minilec / Prok Devices / AVR Electronics
10)	Cable Glands – Double Compression Type	Dowell /Comet /HMI
11)	Cable Lugs	Dowell / Multi / Uma
12)	Switch Disconnecter Fuse Unit	Siemens / L&T
13)	Load Break Change over SFU / Isolator	Siemens / L&T
14)	HRC Fuses / Fuse Base	Siemens./English Electric/ L & T
15)	Earth Leakage Relay/CBCT	Prok-DVS
16)	PF Relay	EPCOS / ABB / L & T
17)	Protective Relays	L&T / Alsthom / Easun / Siemens
18)	Selector Switches	Kaycee / L&T / Salzer
19)	Meter – Ammeter and Voltmeter (Analog Type)	AE/Meco/Rishab
20)	Indicating Lamps / Push Buttons:	Technik / Vaishno / ABB / Schneider / Siemens
21)	CT'S – Resin Cast	Voltamps / Kappa / Kalpa
22)	Contactors / Overload Relays/MPCB'	Siemens/ L&T
23)	Indicating True RMS Meter(DIGITAL TYPE)	Conzerv / HPL Socmac / Rishab
24)	Industrial Power Socket Outlets (Metal Clad)	Crompton/ MDS /Cuttler Hammer

25)	MCB Distribution Boards	Legrand / L&T-Hager
26)	Domestic Switches & Sockets / Fan Regulators (MODULAR TYPE) Sample to be approved	MK/Anchor –Roma/Crabtree
27)	Telephone & LAN Sockets	D-Link/Tyco
28)	Light Fittings(Industrial / Commercial	Philps / Wipro / Bajaj/Crompton
29)	Light Fittings (Decorative / Architectural	Artlite / Pasolite.Thorn / Reiz / K-Lite / Havells
30)	Ceiling Fans 5 star rated	Usha / Bajaj / Havells
31)	Exhaust Fan	Crompton/Almonard
32)	Wall Mounted Fans	Almonard/Crompton
33)	FRLS Wire	Finolex / Polycab
34)	FRLS PVC Conduits & Accessories(Heavy duty only)	VIP /National / Nelco
35)	MS Conduits & Accessories	GI Bharat / Supreme/Javeri /BEC/BIS approved
36)	Perforated & Ladder type Cable Trays	Elcon / Profab / Patni
37)	Raceways / PVC Trunking	Schneider / Honeywell / Legrand
38)	Batteries SMF Type	Exide
39)	Battery Charger	Universal / Abhay Electric
40)	Telephone Connector Terminal Box	KRONE.
41)	Telephone Cables Jelly filled Armored Paired Cables	Delton / Finolex/Polycab/Havell
42)	Telephone cabling system	TATA Telecom/ Siemens/ Lucent /D-Link /Adonix/Molex
43)	LAN Data cabling system	Tyco
44)	RJ45 Patch Panel	Tyco
45)	Communication Rack	APW – President
46)	Street Light Pole	Baja/Metal Coats(K-LITE)
47)	PA System	Philips/Ahuja
48)	Safe Earth Electrode	Aslok Safe Electrode Type T-39Z
49)	Flameproof /Increased Safety Switchgear & lighting fixtures	Flameproof Equipments P Ltd/ Sudhir Switchgear/CEAG/Baliga
50)	Steel	TATA/Vizag/Jindal

#### General

- 1) Detail submittals in the form of catalogues specification sheets, and samples were called for, shall be submitted one week from the date of order and approvals shall be obtained on the type of accepted make before procurement are made.
- 2) Out of the approved makes of materials mentioned above, the make of materials to be used on the work shall be as decided by the Consultant/Client jointly.
- 3) In respect of materials for which approved makes are not specified above, the material makes to be decided by the Consultant/Client jointly and as per sample approved before procurement
- 4) Equipments approved and supplied shall have local servicing facilities available in the region.
- 5) In case of non availability of the first indicated makes, the contractor shall opt for the other makes after getting approval from the Consultant/Client jointly. If the difference of amount is on the lower side, the same shall be passed on to the Clients.

## **DETAILED TECHNICAL SPECIFICATION**

### **SCHEDULE-B-15**

#### **ESTIMATE FOR SUPPLY, INSTALLATION, TESTING, COMMISSIONING OF 65 KW GRID CONNECTED ROOFTOP SOLAR PROJECT WITH 05 YEAR O & M AT NEW MUNICIPALITY BUILDING , TA. KHAMBHAT DIST. ANAND**

##### **ITEM NO.1:**

**Supply, Installation, Testing & Commissioning of following size of Grid Tied Solar Power Plant with Solar Panels (ALMM approved): Frame Material : Anodized Aluminum alloy Frame With Twin Wall Profile, Front Cover : High Transmission Low-Iron Tempered Glass (AR Coated), High efficiency and positive power tolerance Pmax: 0/+5, Module Efficiency should be approx. 19.5%-22%, Normal operating temperature 45°C, Junction Box with Waterproof IP67 & MC4 Compatible and Enclosed with Bypass diodes, 100% Electroluminescence test to ensure error free Modules, Thep. temp. co-efficient of the PV module shall equal or better than -0.45%/degree C. Solar PV modules of minimum fill factor 75% to be used. Unit Production:- More than 4.5 Unit /kw /day (Actual)(1Year Avg) With 10 year Product warranty and 25 year Linear Power Warranty includes all mechanical and electrical parameters of the Solar panel. Modules must be complied to the DCR(Domestic content requirements). The Ration of AC to DC is 5:6 for the Installation capacity which are given in AC KW.**

Providing, Supplying, Installing, Testing and Commissioning of Grid-Tied Solar Photovoltaic (PV) Power Plant of specified capacity (in AC kW) complete in all respects, including Solar PV Modules (ALMM approved), Grid-Tied Inverter, mounting structures, wiring, earthing, protections, metering, and all associated accessories as per latest standards and guidelines.

##### **Technical Specifications of Solar PV Modules:**

- Modules shall be ALMM (Approved List of Models & Manufacturers) compliant and meet DCR (Domestic Content Requirement) norms.
- Frame Material: Anodized Aluminium Alloy Frame with Twin Wall Profile.
- Front Cover: High transmission, low-iron tempered glass with Anti-Reflective (AR) coating.
- Module Efficiency: Minimum 19.5% to 22%.
- Power Output Tolerance (Pmax): 0 to +5 W (positive tolerance only).
- Nominal Operating Cell Temperature (NOCT): Approximately 45°C.
- Temperature Coefficient: Equal to or better than  $-0.45\% / ^\circ\text{C}$ .
- Fill Factor: Minimum 75%.
- Junction Box: IP67 rated, weatherproof, with MC4 compatible connectors and integrated bypass diodes.
- Quality Assurance: 100% Electroluminescence (EL) testing to ensure crack-free and defect-free modules.

**Performance Requirement:**

- The system shall deliver minimum average generation of 4.5 units per kW per day (annual average under standard conditions).
- Proper design shall ensure optimal tilt, orientation, and minimal shading losses.

**Warranty Requirements:**

- Product Warranty: Minimum 10 years.
- Performance Warranty: Minimum 25 years linear power warranty, covering all mechanical and electrical parameters.

**System Design Criteria:**

- The system shall be designed based on AC capacity (kW) as specified.
- DC to AC Ratio: 5:6 (i.e., DC capacity shall be approximately 1.2 times AC capacity).
- String sizing and inverter selection shall ensure maximum efficiency and compatibility.

**Scope Includes:****1. Supply:**

- Solar PV Modules (ALMM approved, DCR compliant)
- Grid-tied inverters
- Module mounting structures (hot-dip galvanized / aluminium)
- DC & AC cables, connectors, combiner boxes
- Earthing system, lightning protection
- ACDB/DCDB, switchgears, protection devices
- Net meter / bidirectional meter (if required)

**2. Installation:**

- Erection of module mounting structure
- Installation of modules, inverter, wiring and protections
- Proper cable routing with protection conduits/trays
- Earthing and lightning arrestor installation

**3. Testing & Commissioning:**

- Insulation resistance test, continuity test, and earthing test
- Performance testing of inverter and system
- Synchronization with grid and commissioning

**Solar Inverter: MPPT Range: 80-1000 V , Max efficiency: 97.5% - 98.9%, O/p Frequency: 50/60Hz, Operating Altitude (m) ≤4000, O/p Power Factor: ~1, O/P THDi: <3%, Operating Temperature Range: -25~60°C, Integrated protection of Inverter are Anti-islanding Protection, Input Reverse Polarity Protection, Insulation Resistor Detection, Ground fault protection, Residual Current Monitoring Unit, Output Over Current Protection, Output Short Circuit Protection, Output Over Voltage Protection, PV array string fault Protection. Protection Degree: IP65, User Interface LCD & APP, Datalogger & Communication: GPRS / Wi-Fi.**



Providing, Supplying, Installing, Testing and Commissioning of Grid-Tied Solar Inverter of suitable capacity compatible with the Solar PV system, complete with all required accessories, protections, communication systems, and interconnections for efficient and safe operation.

**Technical Parameters:**

- Type: Grid-connected, transformer less inverter with MPPT technology
- MPPT Voltage Range: 80 V to 1000 V
- Maximum Efficiency: 97.5% to 98.9%
- Output Frequency: 50 / 60 Hz
- Operating Altitude: Up to 4000 meters
- Output Power Factor: Approximately unity (~1)
- Output THDi: Less than 3%
- Operating Temperature Range: -25°C to +60°C

**Protection Features:**

The inverter shall be provided with the following inbuilt protections:

- Anti-islanding protection
- Input reverse polarity protection
- Insulation resistance detection
- Ground fault protection
- Residual Current Monitoring Unit (RCMU)
- Output over-current protection
- Output short-circuit protection
- Output over-voltage protection
- PV array/string fault protection

**Mechanical & Environmental Requirements:**

- Degree of Protection: Minimum IP65, suitable for outdoor installation
- Robust construction for long-term operation under harsh environmental conditions

**User Interface & Monitoring:**

- Inverter shall be equipped with an LCD display for real-time system parameters
- Provision for mobile APP-based monitoring

**Data Logging & Communication:**

- Inbuilt data logger for recording operational data
- Communication facility through:
  - GPRS
  - Wi-Fi

**Installation, Testing & Commissioning:**

- Proper installation with all AC/DC connections and safety provisions
- Testing of inverter performance and grid synchronization
- Successful commissioning and integration with monitoring system

**Standards & Compliance:**

- Shall comply with relevant IS / IEC standards and MNRE guidelines
- Suitable for grid connectivity as per local DISCOM regulations

**Integrated, Input Reverse Polarity Protection Integrated, Insulation Resistor Detection Integrated, Residual Current Monitoring Unit Integrated, Output Over Current Protection Integrated, Output Short Circuit Protection Integrated, Output Over Voltage Protection Integrated, Protection Degree: IP65, User Interface LCD & APP, Datalogger & Communication: GPRS / Wi-Fi, Module Mounting Structure:** The mounting (Rectangular pipe / square pipe / circular pipe) with requisite cross bars, nuts and bolts, etc. shall be Hot deep galvanized with minimum 80micron coating. The Rectangular / square /circular hollow pipe section used for the structure should have a minimum thickness of 2.0 mm. other than above, the material thickness should be minimum 2.5 mm. A certificate of a structural engineer certifying the strength and stability of the mounting structure to withstand the weight and wind speed of 150 km/hour throughout the life span of 25 years of the system, shall be submitted by the vendors. Hot Dipped Galvanized steel coils. suitable arrangement for base plate for foundation , solar panel mounting, the structure should be suitable for carry the load of solar panel,wiring, sprinkler system etc. with necessary foundation work/wall mount, j bolt, anchor fastner etc. the nut bolt used for installation of stucture should be (SS 304) quality.The ground clearance of the bottom most edge of solar panel shall not be less than 300 mm to 1200 mm or as per site's technical/feasibility requirement.

a. Column –The minimum section (thickness) should be 60MM\*40MM

b. Rafter - The minimum section (thickness) should be 60MM\*40MM

c. Purlin - The minimum section (thickness) should be 40MM \* 40MM Balane of System with necessary Switchgears (Suitabel size and protection of ACDB & DCDB), inter connecting wiring, earthing system as per the CEIG drawing approval, lightning arrester system as per the CEIG drawing approval, all liasoning work with various gov. dipartment like state nodal agency,DISCOM & CEIG is included in agency scope

Providing, Supplying, Installing, Testing and Commissioning of Solar PV System components including inverter integrated protections, module mounting structure, and complete Balance of System (BoS) with all accessories, approvals, and liaisoning, as per applicable standards and site requirements.

**1. Inverter – Integrated Protections & Features**

The solar inverter shall be provided with the following **inbuilt protections and features:**

**Integrated Protections:**

- Input Reverse Polarity Protection
- Insulation Resistance Detection
- Residual Current Monitoring Unit (RCMU)
- Output Over Current Protection
- Output Short Circuit Protection
- Output Over Voltage Protection

**Ingress Protection:**

- **Degree of Protection:** Minimum **IP65** (suitable for outdoor use)

**User Interface & Monitoring:**

- Inbuilt **LCD display** for system parameters
- Mobile **APP-based monitoring system**

**Data Logging & Communication:**

- Integrated **data logger**
- Communication via:
  - **GPRS**
  - **Wi-Fi**

**2. Module Mounting Structure (MMS)**

Providing and fixing of **Module Mounting Structure** made of **Hot Dip Galvanized (HDG) Steel**, complete with all accessories.

**Material & Coating:**

- Structure shall be made from **rectangular / square / circular hollow sections**
- **Minimum galvanization:** 80 microns (Hot Dip Galvanized)
- Base material: Hot dipped galvanized steel coils

**Thickness Requirements:**

- Hollow sections (rectangular/square/circular): Minimum **2.0 mm thickness**
- Other structural members: Minimum **2.5 mm thickness**

**Section Sizes:**

- **Column:** Minimum **60 mm × 40 mm**
- **Rafter:** Minimum **60 mm × 40 mm**
- **Purlin:** Minimum **40 mm × 40 mm**

**Fasteners & Accessories:**

- All nuts and bolts shall be of **SS 304 grade**
- Structure shall include:
  - Base plates
  - J-bolts
  - Anchor fasteners
  - Necessary clamps and fixtures

**Design & Strength:**

- Structure shall be designed to withstand:
  - Wind speed up to **150 km/hr**
  - Load of solar panels, wiring, and associated systems (including sprinkler system if any)
- Vendor shall submit **Structural Stability Certificate** from a qualified structural engineer ensuring:
  - Strength
  - Stability
  - Minimum design life of **25 years**

**Installation Requirements:**

- Suitable for **RCC foundation / rooftop / wall mounting** as per site condition
- Proper alignment, tilt angle, and orientation shall be maintained

**Ground Clearance:**

- Minimum clearance from ground level to lowest edge of panel:
  - **300 mm to 1200 mm** (or as per site feasibility)

**3. Balance of System (BoS)**

Providing complete Balance of System including all electrical and safety components required for proper functioning.

**Includes:**

- **AC Distribution Board (ACDB)** – with suitable rating and protections
- **DC Distribution Board (DCDB)** – with string monitoring and protections

- **Interconnecting Wiring:**
  - DC & AC cables of appropriate size
  - Cable trays/conduits and protection systems
- **Earthing System:**
  - As per approved drawings and standards
  - Separate earthing for equipment, structure, and lightning protection
- **Lightning Protection System:**
  - Lightning arrester as per approved design and CEIG requirements

#### **4. Approvals & Liaisoning**

The contractor/agency shall carry out all necessary **liaisoning and approval works**, including:

- State Nodal Agency approvals
- DISCOM approvals (Net metering / Grid connectivity)
- CEIG (Chief Electrical Inspector to Government) approvals
- Submission of drawings, test reports, and compliance documents

#### **5. Standards & Compliance**

- Entire system shall comply with relevant **IS / IEC / MNRE guidelines**
- Installation shall be as per **approved CEIG drawings**
- All materials shall be of approved make and quality

#### **6. Mode of Measurement & Payment**

**As Per Schedule-B**

#### **ITEM NO.2:**

**The all-inclusive comprehensive annual maintenance contract cost covers yearly maintenance of solar Pv Modules, Inverter, wiring, earthing, switchgears, etc with material and labour cost including preventive maintenance. The cost covers entire installation. AMC also includes monthly site visit and inspection of project with submission of inspection and solar generation report. All parts should be replaced/repaired if found faulty within specified time. Agency has to provide necessary licencing work for warranty, power, Bidirectional meter etc.**

Providing all-inclusive Comprehensive Annual Maintenance Contract (AMC) for complete Solar Photovoltaic (PV) System including Solar PV Modules, Inverters, AC/DC wiring, earthing system, switchgears, mounting structures, junction boxes, and associated components. The AMC shall cover both material and labour costs required for proper operation and maintenance of the system.

Scope Includes:

1. Preventive Maintenance:
  - Routine inspection, testing, and servicing of all system components.
  - Cleaning of Solar PV Modules at regular intervals to maintain efficiency.
  - Checking tightening of electrical connections and terminations.
  - Inspection of earthing system and ensuring proper resistance levels.
  - Inspection of inverter performance, alarms, and fault logs.

2. Corrective Maintenance:

- Repair/replacement of any defective or non-performing components including:
  - Solar PV Modules
  - Inverters
  - Cables and wiring
  - Switchgears and protection devices
  - Earthing system
- All replacements shall be of equivalent or higher specifications as approved by the Engineer-in-charge.

3. Site Visits & Reporting:

- Minimum one site visit per month for inspection and maintenance.
- Submission of:
  - Monthly inspection report
  - Solar power generation report
  - Fault/rectification report (if applicable)

4. Performance Monitoring:

- Monitoring system performance and ensuring optimal generation.
- Identifying underperformance issues and taking corrective actions.

5. Licensing & Compliance:

- Contractor shall handle all necessary documentation and coordination related to:
  - Net metering / Bidirectional meter
  - DISCOM approvals
  - Warranty claims with manufacturers
  - Any statutory or regulatory requirements

6. Breakdown Response Time:

- Faults shall be attended within 24–48 hours.
- Critical components like inverter shall be repaired/replaced within a specified time as approved.

7. Tools & Equipment:

- Contractor shall provide all necessary tools, tackles, testing instruments, and manpower required for maintenance.

Mode of Measurement & Payment:

**As Per Schedule-B**

# **SECTION - 6**

## **FORM OF BID**

## FORM OF BID

Description of the Works:

-----  
-----  
-----

BID

To :

Address :

1. We offer to execute the Works described above and remedy any defects therein in conformity with the conditions of Contract, specification, drawings, Bill of Quantities and Addenda for the sum (s) of

-----  
-----

(-----)

2. We undertake, if our Bid is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Engineer's notice to commence, and to complete the whole of the Works in the Contract within the time stated in the document.
3. We agree to abide by this Bid for the period of 120 Days from the date fixed for receiving the same, and it shall remain binding upon it and may be accepted at any time before the expiration of that period.
4. Unless and until a formal Agreement is prepared and executed this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.
5. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this ----- day of ----- 20

Signature ----- in the capacity of -----

----- Duly authorized to sign bids for and on behalf of -----

-----

-----

(in block capitals or typed)

Address

---

---

Witness

---

---

Address

---

---

Occupation

---

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**SECTION - 7**  
**BILL OF QUANTITIES**

# **INDEX**

## **BILL OF QUANTITIES**

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## **1. BILL OF QUANTITIES Preamble to Price Schedules**

**NAME OF PROJECT: CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA.** The bill of Quantities shall be read in conjunction with the Instructions to Bidder, Conditions of Contract, Technical Specifications and Drawings.

1. The quantities given in the Bill of Quantities are estimated and provisional, and are given to provide a common basis for bidding. The basis of payment will be the actual quantities of work ordered and carried out, as measured by the Contractor and verified by the Engineer and valued at the rates and prices tendered in the priced Bill of Quantities, where applicable, and otherwise at such rates and prices as the Engineer may fix within the terms of the Contract.
2. The rates and prices tendered in the priced Bill of Quantities shall, except in so far as it is otherwise provided under the Contract, include all constructional plant, layout, supervision, materials, erection, maintenance, insurance, profit, taxes and duties, together with all general risks, liabilities and obligations set out or implied in the Contract.
3. The rates and prices shall be quoted entirely in Indian Currency.
4. A rate or prices shall be entered against each item in the Bill Quantities, whether quantities are stated or not. The cost of Items against which Contractor has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities (in case of Item rate contract).
5. The whole cost of complying with the provisions of the Contract shall be included in the items provided in the priced Bill of Quantities, and where no Items are provided the cost shall be deemed to be distributed among the rates and prices entered for the related items of Work.
6. General direction and descriptions of work and materials are not necessarily repeated or summarized in the Bill of Quantities. References to the relevant sections of the contract documentation shall be made before entering rates or prices against each item in the Bill of Quantities.
7. The method of completed work of payment shall be in accordance with the specification for Road and Bridge works. For building works specifications for building are to be followed.
8. Errors will be corrected by the Employer for any arithmetic errors pursuant to Clause 29 of the Instructions to Bidder.
9. Rock is defined as all materials which, in the opinion of the Engineer, required blasting, or the use of metal wedges and sledgehammers, or the use of compressed air drilling for its removal, and which cannot be extracted by ripping with a tractor of at least 150 kw with a single rear mounted heavy duty ripper.
10. Break Up Of Schedule Of Payment As per Schedule-B
11. The rates and prices shall be submitted in the electronic formats given by n-procure which is called Schedule B, rates and prices received in any other formats will be rejected and the Bids will be disqualified.
12. It will be entirely at the discretion of the Employer to accept or reject the bidder's proposal, without giving any reasons whatsoever and the bidder shall not be permitted to withdraw his bid on this account.

13. Price Schedule-A gives the Schedule showing approximately the materials to be free supplied from the by client.
14. In Schedule-B the Bidder shall quote prices for the items on lump sum / unit rate as called for against the BOQ item.
15. In Price Schedule-B, bidder shall quote his price for entire work. Prices quoted in Schedule-B only will be considered for price evaluation & shall form a part of the Contract Agreement.
16. In the Price Schedule-B bidder shall furnish breakup of his prices quoted in Price Schedule-B and shall be carried forward to Schedule-B for comparison and evaluation.
17. The total shall be carried forward to Schedule-B for comparison and evaluation.
18. Wherever for a particular item the quantities have been specified payment shall be on unit rate basis and unit variation in quantity will be paid with pro rata basis.
19. Each item is to be individually priced online and the amounts shall be added up to arrive at the "Total of each Price Schedule". No column in the Schedules of prices shall be left blank except where the item description requires the item to be priced on "as applicable" basis. The item shall not be priced if it is "not applicable" to the bidder's design, in which case the bidder shall add the words "NOT APPLICABLE". The wording in the item description is for subject matter guidance only; clause references are indicative only and all other relevant clauses shall also be referred to. The prices shall allow for all the works covered under the bid and all liabilities and contractual obligations whether separately specified or not. Items against which no prices are quoted shall not be separately paid for and the bidder shall be deemed to have covered the cost of execution of such items (according to the requirements of the bid document) in the prices quoted for other items.
20. Items not specifically listed in his Price Schedules, but required to be executed for satisfactory working/safety of the system as specified, will not be separately paid for by the Employer when executed and shall be deemed to be already covered by other items and rates listed in the price sheets No extra payment shall be given for any item which is required to complete and perform the project.
21. The total of the item prices in Price Schedule-B shall be equal to the price quoted by the bidder in Price Schedule B and shall be firm and fixed, during the pendency of the Contract. In case of any discrepancy noted in the various price schedules, those in Schedule B will be considered and binding on the Contractor. The prices in Price Schedule B of the successful bidder shall be corrected accordingly. Only Price Schedule-B after carried over and arithmetic corrections if any will be considered for financial evaluation of the bid.
22. Schedule 'D gives the basis of interim payment for construction of civil works.
23. The bidder shall be deemed to have allowed in his price for provision, maintenance and final removal of all temporary works of whatsoever nature required for construction including temporary bunds, diverting water, pumping, de-watering etc. for the proper execution of works. The rates shall also be deemed to include any works and setting out that may be required to be carried out for laying out of all the works involved.
24. Prices shall be filled online only.
25. The Price Schedules are to be read in conjunction with the Conditions of Contract, the Specifications and

other sections of these bid documents and these documents are to be taken as mutually explanatory of one another.

26. The bidder shall interpret the data furnished and carry out any additional survey work, or investigation work required at his own cost.
27. The prices quoted shall also include the cost of materials utilized for testing.
28. The bidder should acquaint himself with the site conditions including the access to Work site. The successful bidder shall have to make suitable access to work sites at his own cost. These accesses will be used by the other contractors working for Khambhat Nagarpalika.
29. The item descriptions in price schedule are for subject matter guidance only and the prices shall include all the equipment's / materials / accessories and services required as per the specifications. The bidder shall fill in the price schedule furnished.
30. General Conditions of Contract, Clause No. 1, and Security Deposit.
31. 1% of the value of work will be deducted from the Running bill against labour cess which is nonrefundable.
32. Third Party Inspection/CSC agency will be deployed by KHAMBHAT NAGARPALIKA and charges of the same will be borne by Bidder.
33. Any expenditure incurred by inspection/ CSC agency for the work misinformed by the contractor and charges of inspection/ CSC agency without any work due to misinformation shall be recovered from the contractor.
34. The prices shall be quoted inclusive all taxes, royalties and duties prevailing at the time of submission of the bids. Statutory variation if any during the currency of contract shall have to borne by the agency which shall be not be reimbursed.
35. The rates to be quoted by the contractor are inclusive of sales GST & all other taxes. No extra payment on this account will be made to the contractor.
36. The rates quoted shall be Inclusive of GST, and inclusive of all other taxes, duties which shall not be paid extra. While GST will be Payable for admissible part of actual work done at the approved tender rates and tender conditions of price variations. GST shall be paid as per prevailing rates at the time of payment. The TDS shall be deducted at source as per provision of IT rules and policy.
37. Goods and Service Tax (GST TDS) Amount as per Government Rules and Regulation will be Deducted from Contractors / Bidder Running Bill / Final Bill by Nagarpalika Stage / Bill Wise. (as per resolution GST/1017/1097/GST Cell dated 15/09/2018)
38. The Ministry of Finance and Company Affairs, Department of Revenue, Government of India has issued a notification No. 6/2007-Central Excise Circular No. 6/2007, dated 1th March 2007 regarding the Central Excise Duty Exemption. By this notification, the notification 659/50/2002 dated 6th September, 2002 has been amended and the earlier notification 26/2009 dated 4th December, 2009 has been amended and the Items of materials, instruments, apparatus and appliance, ancillary equipment's and their components/parts, etc. for setting up of Water Treatment Plants and the Pipes needed for delivery of water from its source to the Plant and from there to the Storage facility (as mentioned in notification No.6/2007) are exempted from Central Excise Duty subject to the Certification by the Collector/ District

Magistrate/ Deputy Commissioner of the District, regarding its use on such Projects. Necessary Project Authority Certificate shall be made available to the Contractor, as per the prevailing rules, to facilitate him to avail the benefit in terms of Exemption of Central Excise. (Circulars attached here with)

39. Royalties: The contractor shall be liable to pay the royalty of the quarried materials/ minerals used in the construction of works at the rates specified in the Narmada Water Resources, Water Supply & Kalpsar Dept. Resolution No. GEN-2010-595-(6)-M.I. Cell ( K-1) Dt. 29-4-2011 ( Gujarati Version Copy enclosed) and shall be recovered from the running bills of the work from time to time and remaining amount if any shall be recovered from the final bill before releasing the security deposit of the work. The contractor shall furnish the statement showing the quantity of quarried materials / minerals from whom purchased ( with full address of the seller) and copies of the bills for purchase to the Executive Engineer of the in charge of the work. The contractor shall also furnished such additional information as regards royalty payment to the competent authority.
40. Agency shall have to take Insurance policy and intimate to Khambhat Nagarpalika along with the evidence within time limit. In case of noncompliance entire responsibility shall be rest with the agency and required amount shall be recovered from any due amount of the agency.
41. Khambhat Nagarpalika can recover penalty amount from the agency for not taking the insurance. Though the penalty amount is recovered, responsibility of the agency for taking insurance shall be continued and will not be escaped from the responsibility.
42. The contractor shall apply fair means of stock maintenance and shall adopt accounting standard as may be prescribed under GST Act as applicable in the state of Gujarat. For arriving at the difference in procurement prices due to introduction of GST it will be open for the Board to ask for original invoices, lorry receipt, weigh bridge slips, payment details and such other documents as may be required for the purpose.
- The claim of contractor regarding GST shall have to be backed by documentary evidence substantiating the actual payment of tax duly certified by the competent tax authority. The final decision regarding the quantum of claim amount to be recovered or reimbursed shall be of the competent authority and shall be binding on the contractor.
43. To facilitate bidder during the bidding stage, department has provided the indicative quantities in the minimum BOQ, which are meant to appraise the bidder about magnitude of the work and these are likely to vary on the basis of detailed survey and geotechnical investigation depending upon land/ ROU availability during execution and the contractor shall have no objection to such minor or major changes or deletion or addition of the item/ items. The sizing indicated in the drawing and minimum BOQ is binding to contractor and size smaller/ lower than this may not be permitted. However, in case higher/ larger size is required as per detailed survey and geotechnical investigation based detailed Design for execution, quantity variation beyond 10% on upward side will be adjusted on pro rata basis. Quantity variation on lower side will be adjusted, irrespective of the variation. This being turnkey tender, any item specifically not mentioned in the BOQ, but required for approval of the competent authority is deemed to be covered in the project. Payment towards various items indicated in minimum BOQ for shall be made on the prorata basis i.e. in case estimate is X and approved contract rate is Y, then ratio of X/Y would be applicable for making the payment towards the item executed. For the item indicated in the minimum BOQ is not executed by the contractor, payment shall not be made towards that particular item.

Signature of Contractor

CHIEF OFFICER  
KHAMBHAT NAGARPALIKA KHAMBHAT

## **2. BID FORM**

**Bidders are required to fill up all the blank spaces in this Bid Form.**

**To,  
CHIEF OFFICER  
KHAMBHAT NAGARPALIKA  
KHAMBHAT**

Dear Sir,

**SUB: : CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA**

1. Having visited the site and examined the Bid Documents, Drawings, Conditions of Contract, Specifications, Schedules, Annexure, Preamble to Price Schedules, Price Schedules etc. including Addenda / Amendments to the above, for the execution of the above Contract, we the undersigned offer to Design, Engineer, Procure, Construct, Complete, Commission, operate, maintain and Run the whole of the said works for 18 Months from the date of commissioning including defects liability period as given in Conditions of Contract and in conformity with the drawings, conditions of Contract, specifications, Preamble to Price Schedules, Price Schedules, Annexure, Bidding Documents, including Addenda Nos.\_\_\_\_\_ (insert numbers) for Lump sum fixed price of Rs.\_\_\_\_\_.

(Rupees\_\_\_\_\_ ) for Construction including free trial run for three months or such other sum as may be ascertained in accordance with the conditions.

2. I / We agree that

(a) If we fail to provide required facilities to the Employer's representative or any other person / Agency by the Employer to perform on his behalf for carrying out the inspection and testing of materials and workmanship.

Or

(b) If we incorporate into the Works, materials before they are tested and approved by the Engineer's representative

Or

(c) If we fail to deliver pure water of required quantity according to the conditions / stipulations of the Contract, the Engineer will be at liberty to take any action including termination of Contract and impose at his absolute discretion any penalties, and / or reject the work.

3. We undertake, if our Bid is accepted, to complete and deliver the works in accordance with the Contract within 18 Months, inclusive of monsoons, from the date or receipt of Letter of Acceptance issued to us by you.

4. We agree to abide by this Bid for a period of  $120+45=165$  days from the last date of submission of bid and it shall remain binding upon us and may be accepted at any time before the

expiry of that period.

5. In the event of our Bid being accepted, we agree to enter into a formal Contract Agreement with you incorporating the conditions of Contract thereto annexed but until such agreement is prepared this Bid together with your written acceptance thereof shall constitute a binding Contract between us.

6. We agree, if our Bid is accepted, to furnish performance Security in the forms and of value specified in the General Conditions of Contract.

7. We have independently considered the amounts of liquidated damages shown in Appendix to Bid and agree that they represent a fair estimate of the damages likely to be suffered by you in the event of the work not being completed by us in time.

8. We understand that you are not bound to accept the lowest or any bid you may receive.

Dated this \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_\_

(Signature) \_\_\_\_\_

(Name of the person) \_\_\_\_\_

(In the capacity of)

Company Seal \_\_\_\_\_(Name of firm)

Duly authorized to sign Bid for and on behalf of  
(Fill in block capitals)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Witness:

Signature \_\_\_\_\_

Name \_\_\_\_\_



KHAMBHAT MUNICIPALITY, KHAMBHAT			
BID DOCUMENT FOR CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA.( YEAR: 2025-26) GRANT ( SECOND ATTEMPT).			
GENERAL SUMMARY.			
Sr. No.	Description	Amount	
1	Ground Floor - Main Building.	Rs.	11416500.00
2	First Floor - Main Building.	Rs.	8293500.00
3	Second Floor - Main Building.	Rs.	8103300.00
4	Third Floor - Main Building.	Rs.	1612400.00
5	Fourth Floor - Lift Machine Room.	Rs.	451400.00
6	Plumbing and Sanitary - Main Building.	Rs.	390700.00
7	Parking Area Development - Paver Block Paving.	Rs.	600900.00
8	Compound Wall with MS Gate.	Rs.	1747300.00
9	8/10 Passenger Lift with G+3 Floor Provision.	Rs.	1385000.00
10	General Type Rain Water Harvesting System.	Rs.	661400.00
11	Proposed Flagpole.	Rs.	105510.00
12	Proposed Gardening, Horticultural & Plantation Work.	Rs.	228500.00
	<b>Total Rs.</b>		<b>34996410.00</b>
13	For General Electrification and Intercom Services etc.	Rs.	3505000.00
14	For Furniture Works, Sound System with Projector for Conference Hall, Name Plates, Logo, Title Board etc.	Rs.	6988600.00
15	Supply, Installation, Testing, Commissioning Of 65 Kw Grid Connected Rooftop Solar Project With 05 Year O & M At New Municipality Building At Khambhat Dist. Anand	Rs.	4660400.00
16	For Designing and Constructing Fire safety works Provision with all Service Components and UG Sump.	Rs.	2960300.00
	<b>Grand Total Rs.</b>		<b>53110710.00</b>
	<b>Deduct Credit of Material obtained after Dismantaling of Existing Nagarpalika Building ( Salvage Value of Material)</b>	Rs.	<b>1800000.00</b>
	<b>Grand Total Rs.</b>		<b>51310710.00</b>
	Add 2% for Contengencies Chargs Rs.		1026214.20
	Add 1% for Q.C. Charges Rs.		513107.10
	Add 18 % GST Rs.		9235927.80
	<b>Total Rs.</b>		<b>62085959.10</b>
	<b>Say, As.</b>		<b>62086000.00</b>
I / We am/are willing to carry out the work at _____ % above / below (percent should be written in figure and in words) of the estimated rates mentioned above. Amount of my/our tender works out as under.			
( In words ) _____ percentage above / below the estimated rate.			
Estimated Amount put to tender		Rs.	<b>62086000.00</b>
Deduct _____ % below Rs.		Rs.	
Net Amount		Rs.	
( In words ) _____			
Estimated Amount put to tender		Rs.	<b>62086000.00</b>
Add _____ % above Rs.		Rs.	
Total Amount		Rs.	
( In words ) _____			
*( Please strike out whichever is not applicable)			
Note :1	All work shall be carried out as per Public Works Department Hand Book and other specifications of Division or as directed.		
Note :2	Rates quoted include clearance of site (prior commencement of work and its close) in all respects and hold good for work under.		

Note : 3	1/ We have read the conditions mentioned in this tender and agree to abide by the same.
Note : 4	In all R.C.C. Items in Rate Analysis Standard Cement Consumption has been taken as per Govt. G.R.: PRC-10/2017 Cement Consumption/16/C Date:11/05/2017 as stated in S.O.R. therefore in R.C.C. items where there is a change as per actual mix design the cost of difference of cement consumption have been deducted from the rate of original item at the rate of input rate mentioned in all the tender.

Signature of Contractor

President  
Khambhat Nagarpalika  
Khambhat

Chief Officer  
Khambhat Nagarpalika  
Khambhat

**KHAMBHAT MUNICIPALITY, KHAMBHAT****CONSTRUCTION OF MUNICIPALITY BUILDING, AT KHAMBHAT.****GROUND FLOOR****SCHEDULE-B1**

<b>Item No.</b>	<b>Qty.</b>	<b>Description</b>	<b>Total Rate</b>	<b>Unit</b>	<b>Amount</b>
1	591.00 Cmt.	Excavation for Foundation upto 1.5 m. Depth including sorting out and stacking of useful materials and disposing of excavated stuff upto 50 Meter lead (A) (loose or soft soil)	122.94	Cmt.	72657.54
2	285.50 Cmt.	Excavation for Foundation from depth 1.5 m. to 3.0 m. including sorting out and stacking of useful materials and disposing of excavated stuff upto 50 Meter lead (A) (loose or soft soil). For column.	136.30	Cmt.	38913.65
3	876.50 Cmt.	Filling available excavated earth (excluding Rock) in trenches. Plinth, sides of foundations etc. in layers not exceeding 20cm. In depth consolidating each disposed layer by ramming and watering.	136.92	Cmt.	120010.38
4	74.50 Cmt.	Filling in foundation and plinth with murrum or selected soil in layers of 20cm thickness including watering, ramming and consolidating etc. complete.	294.38	Cmt.	21931.31
5	683.00 Smt.	Applying general insecticide pest control treatment to floors, cupboards etc including labour materials etc. complete. Using Imidacloprid 20 EC As Per 6113 pests Concentration Weight 0.50 percent is recommended on litre chemical emulsion dilute with 39 liter of water will give. Total dilute concentration with will be 40 litre inclusive of one litre chemical emulsion application 0.5 litre chemical /Sqm of surface is recommended as per I.S.	91.63	Smt.	62583.29
6	77.50 Cmt	Providing and laying cement concrete 1:3:6 (1 Cement, 3 coarse sand, 6 crushed stone aggregates 20mm nominal size) and curing complete excluding cost of formwork in Foundation and Plinth. Do For PCC.	3095.25	Cmt.	239881.88
7	169.50 Cmt.	Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in Column footings.	4627.82	Cmt.	784415.49

8	27.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork But Excluding the cost of reinforcement for reinforced concrete work in Column upto Plinth Level having any cross section area.	6071.11	Cmt.	163919.97
9	60.50 Cmt.	Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in Columns having any cross section area for all floors.	6198.37	Cmt.	375001.39
10	6.00 Cmt.	Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in RCC WALL having any cross section area for all floors.	8140.60	Cmt.	48843.60
11	59.50 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Ground Beam having any cross section area.	5999.40	Cmt.	356964.30
12	7.50 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in coping.	6212.51	Cmt.	46593.83
13	8.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Lintel/Chajjas for all floor.	7786.09	Cmt.	62288.72
14	109.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Slab having any thickness for all floors.	6457.94	Cmt.	703915.46
15	60.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Beams having any cross section area for all floors.	5886.28	Cmt.	353176.80
16	5.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Stairs for all floors.	7792.15	Cmt.	38960.75
17	54950.00 Kgs.	<b>T.M.T. Bars</b> Providing ISI Mark TMT Bar Fe-500 Reinforcment for R.C.C work including bending, binding and placing in position etc. complete for all Floors.	77.29	Kg.	4247085.50

18	59.50 Cmt.	Providing and Laying brick work using common burnt clay building bricks (Conventional) having crushing strength not less than 35 Kg./Sq. Cm. in foundation and plinth in Cement Mortar. (1:6) (1 Cement : 6 fine sand). (up to Plinth Level)	4214.33	Cmt.	250752.64
19	155.50 Cmt.	Providing and Laying Brick work using common burnt clay building bricks (Conventional) having crushing strength not less than 35 Kg./Sq. Cm. in Super Structure Above Plinth level in Cement Mortar (1:6) (1 Cement : 6 fine sand) etc. complete for any Height.	4496.05	Cmt.	699135.78
20	37.50 Smt.	Providing, laying and constructing half brick masonry work in super structure having crushing strength not less than 35 Kg./Sq. Cm. in cement mortar (1:4) (1 Cement : 4 Coarse sand) etc. complete for All Floors.	672.27	Smt.	25210.13
21	32.50 Smt.	Providing and fixing 35mm thick flush door shutters, solid core construction with frame of first class hardwood with cross band and face veneer or plywood face panels, including anodised alluminium butt hinges with necessary screws. (A) Decorative type and bright finished M.S. Piano hinges of Nickel plated piano hinges in flush door shutters.	2753.56	Smt.	89490.70
22	22.00 Smt.	Providing and fixing window having extruded alluminium color powder coated section frame main outer size 95.00mm x 24.00mm x 1.17mm (of jindal Section no: 2459 @ wt. 0.738 Kg/Rmt.), horizontal three track member size 92.0 mm x 31.75mm x 1.30mm (of jindal Section no: 8688, @ Wt. 0.1.07Kg./Mt.), vertical member of size 92mm x 31.75mm x 1.50mm (of jindal section no: 8933@ Wt. 1.06 Kg/mt.) with sliding shutters of horizontal member size 40mm x 18mm x 1.29mm (of Jindal section no: 8947@ Wt. of 0.456 Kg./Mt) vertical member of size 40mm x 18mm x 1.29mm (of jindal Section No : 8949, @ Wt. 0.456 Kg/mt. with 5mm thick transparent bronze colour tinted float glass with powder coated alluminium fittings & fixtures and transperent silicon sealent glass fixing to frame as per details etc. Complete for Window.	1591.87	Smt.	35021.14
23	22.00 Smt.	Providing and fixing rolling shutters of approved make made of 80 mm wide M.S. laths inter-locked together through their entire length and jointed together at the ends by end locks mounted on specially designed pipe shaft with bracket plates, guide channels and arrangements for inside and outside locking with push-pull operation including the cost of hood cover and spring etc. complete.(A) Shutters having width below 3.5 M.	3554.40	Smt.	78196.80

24	2.50 Smt.	Providing and fixing glazed louvered glass windows and ventilators with teakwood frame 10cm x 7cm size including 3 Coats of oil painting to wood work etc. complete.	4202.12	Smt.	10505.30
25	16.00 Smt.	Providing and fixing standard extruded of alluminium section of size 63.50 x 38.10 x 1.95mm (of jindal section no : 4605, @ Wt. 1.094 Kg/ Rmt with color powder coated alluminium frame with 5mm thick transperent bronze color tinted float glass as details etc. complete for Fix Windows/Glazing.	1301.82	Smt.	20829.12
26	25.00 Rmt.	Supplying and fitting Stainless Steel railing 3" pipe as hand rail with & S304 grade including required accessories or as directed by engineer in charge etc. complete.	555.50	Rmt.	13887.50
27	2055.00 Kgs.	Providing and fixing M. S. grills of required pattern to wooden frames of window etc. with M. S. flats at required spacings and frame alround square or round bars with round headed bolts and nuts or by screws. (A) Plain Grills.	106.23	Kg.	218302.65
28	42.00 Smt.	Applying Priming Coat on new steel and other metal surface by throughly cleaning, oil, grease and scoured with brushes fine steel wood, scrapers and sand paper with ready mixed priming paint brushing red lead and Painting two coats with synthetic enamel paint, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.	105.49	Smt.	4430.58
29	927.00 Smt.	Providing 15mm thick cement plaster in single coat on brick/concrete wall for interior plastering and finished even and smooth in cement mortar 1:4 (1 cement : 4 sand) and finishing with a floating coat of neat cement slurry upto floor two level.	232.68	Smt.	215694.36
30	617.00 Smt.	Providing 10mm thick cement plaster in single coat on ceilings and soffits of stairs for interior plastering and finished even and smooth in. Cement Mortar 1:4 ( 1 Cement : 4 Sand) and finishing with a floating coat of neat cement slurry for all floors.	213.15	Smt.	131513.55

31	758.00 Smt.	Providing 20 mm thick double coat mala cement plaster on interior brick/ concrete work for plastering comprising of base coat of 12 mm thick cement plaster in cement mortar (1 Cement : 4 coarse sand) in rough finishing and 8 mm thick top coat of cement mortar 1:2 ( 1 Cement : 2 coarse sand) finished with trowel including scaffolding curing etc. complete. Do for Texture Plaster.	283.95	Smt.	215234.10
32	379.00 Smt.	Providing and Applying Textured Plaster of approved design/sample with all kinds of material, labor, taxation charges. Complete. As directed on site by EIC or any concern authority.	404.00	Smt.	153116.00
33	1544.00 Smt.	Applying two coats of putty & 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.	40.59	Smt.	62670.96
34	927.00 Smt.	Distempering (Three Coat) with oil bound washable distemper of approved brand and manufacture and of required shade on wall surfaces to give an even shade over and including a primer coat with alkali resistance primer of approved brand after thoroughly brushing the surface free from other foreign matter and also including preparing the surface even and sand papered smooth.	104.07	Smt.	96472.89
35	617.00 Smt.	Distempering (Three Coat) with oil bound washable distemper of approved brand and manufacture and of required shade on Ceiling & Sloping Roof surfaces to give an even shade over and including a primer coat with alkali resistance primer of approved brand after thoroughly brushing the surface to give and free from other foreign matter and also including preparing the surface even and sand papered smooth.	115.77	Smt.	71430.09
36	758.00 Smt.	Finishing wall with weather proof exterior emulsion paint on wall surface (two coats) to give an required shade even shade after thoroughly brushing the surface to remove all dirt, and remains of loose powdered materials.etc complete	120.26	Smt.	91157.08
37	259.00 Smt	P & L 24" x 24" vitrified 8 mm thick tile flooring over 20 mm (average) base of cement mortar 1:6 ( 1 cement: 6 coarse sand) on new surface or fixing on existing flooring by adhesive material including dismantling of existing flooring and jointed with color cement slurry including finished with flush pointing & cleaning the surface etc. complete for light shade	1311.18	Smt	339595.62

38	42.00 Smt	Providing and Laying 24" x 24" 8mm thick Antiskid Vitrified tiles flooring over 20mm (average) base of cement mortar 1:6 (1 cement : 6 coarse sand) on new surface including dismantling of existing flooring and jointed with color cement slurry including finished with flush pointing and cleaning the surface etc. complete.	1467.72	Smt	61644.24
39	38.00 Smt	Providing and laying 24"x24" Vitrified 8 mm to 10mm thick tiles flooring over 20 mm (average) base of cement mortar 1:3 (1 Cement : 3 Coarse Sand) and jointed with colour cement slurry including finished with flush pointing and cleaning the surface etc. complete. For Skirting./Wall Tiles/Dedo	1467.72	Smt	55773.36
40	68.00 Smt	Providing and Laying coloured glazed tiles of the size 300mm x 200mm x 8mm/300mm x 450mm x 8mm in skirting, riser of steps and dedo on 10mm thick cement plaster 1:3 (Cement : 3 coarse sand) and jointed with matching colour cement slurry.	1488.24	Smt	101200.32
41	77.00 Smt	Providing and laying polished Granite tiles 18 mm thick in risers of steps, skirting Dedo and pillars laid on 10 mm thick cement mortar 1 : 3 (1 cement : 3 coarse sand) and jointed with gray cement slurry mixed with pigment to match the shade of slab including rubbing, polishing, Moulding etc. complete. For Flooring, Doors & Windows Edges.	1633.17	Smt	125754.09
42	308.00 Smt	Providing and fixing PVC Printed pain colour false ceiling with grid type with alluminium frame consisting of 600mm x 600mm 3mm thick plain PVC sheet used as panel insert in a frame work made using anodized alluminium T section of size 1 x 1 (235 x 25mm, 19 gauge or 1 mm thick) in square pattern of grid sizes of 2 x 2 (600 x 600mm) The alluminium frame work is supported from the cceiling with the help of G.I. hook and G.I. wire/6mm M.S. rods of required sizes to maintain proper level etc. The aluminium frame work is supported on side wall with the use of alluminium L section of size 1 x 1 (25 x 25mm) angles etc. complete as per direction of Engineer in charge. Manufactures specification and drawing.	773.66	Smt	238287.28
43	56.00 Smt	Supplying and fixing Board & Sinages with 3mm thick exterior grade ACP of Aludecore, Alstrong or Eurobond brand with Vinyl letters [Non Reflective] including propore M.S. Structure of 45x45mm Hollow square box section of 20guage with one coat of Anticorrossive paint and two coat of oil paint with required anchoring fastners etc. complete as per directed.	2525.00	Smt	141400.00



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Providing,Supplying & Fixing The Terracotta Jali of the size 8.5" X 8.5" X 2.5" INIGMA JALI & 8.5" X 8.5" X 2.5" PANAMA JALI. Including Transportation & Loading Unloading Charges Excluding labour Charges Etc. Complete. As directed on site by EIC or any concern authority.

**1313.00 For 8.5" X 8.5" X 2.5" INIGMA JALI**

55.55 Nos. 72937.15

**1313.00 For 8.5" X 8.5" X 2.5" PANAMA JALI.**

45.45 Nos. 59675.85

Total Rs. 11416463.14

**Say, As. 11416500.00**

**KHAMBHAT MUNICIPALITY, KHAMBHAT**

**CONSTRUCTION OF MUNICIPALITY BUILDING, AT KHAMBHAT.**

**FIRST FLOOR**

**SCHEDULE-B2**

<b>Item No.</b>	<b>Qty.</b>	<b>Description</b>	<b>Total Rate</b>	<b>Unit</b>	<b>Amount</b>
1	48.50 Cmt.	Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in Columns having any cross section area.	6239.49	Cmt.	302615.27
2	4.00 Cmt.	Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in RCC WALL having any cross section area for all floors.	8181.72	Cmt.	32726.88
3	11.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Lintel/Chajjas for all floor.	7827.21	Cmt.	86099.31
4	109.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Slab having any thickness for all floors.	6499.06	Cmt.	708397.54
5	71.50 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Beams having any cross section area for all floors.	5927.40	Cmt.	423809.10
6	5.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Stairs for all floors.	7833.27	Cmt.	39166.35
7	<b>T.M.T. Bars</b>				
	31400.00 Kgs.	Providing ISI Mark TMT Bar Fe-500 Reinforcement for R.C.C work including bending, binding and placing in position etc. complete for all Floors.	78.03	Kg.	2450142.00

8	147.50 Cmt.	Providing and Laying Brick work using common burnt clay building bricks (Conventional) having crushing strength not less than 35 Kg./Sq. Cm. in Super Structure Above Plinth level in Cement Mortar (1:6) (1 Cement : 6 fine sand) etc. complete for any Height.	4538.48	Cmt.	669425.80
9	105.00 Smt.	Providing, laying and constructing half brick masonry work in super structure having crushing strength not less than 35 Kg./Sq. Cm. in cement mortar (1:4) (1 Cement : 4 Coarse sand) etc. complete for All Floors.	726.70	Smt.	76303.50
10	28.50 Smt.	Providing and fixing 35mm thick flush door shutters, solid core construction with frame of first class hardwood with cross band and face veneer or plywood face panels, including anodised alluminium butt hinges with necessary screws. (A) Decorative type and bright finished M.S. Piano hinges of Nickel plated piano hinges in flush door shutters.	2753.56	Smt.	78476.46
11	38.00 Smt.	Providing and fixing window having extruded alluminium color powder coated section frame main outer size 95.00mm x 24.00mm x 1.17mm (of jindal Section no: 2459 @ wt. 0.738 Kg/Rmt.), horizontal three track member size 92.0 mm x 31.75mm x 1.30mm (of jindal Section no: 8688, @ Wt. 0.1.07Kg./Mt.), vertical member of size 92mm x 31.75mm x 1.50mm (of jindal section no: 8933@ Wt. 1.06 Kg/mt.) with sliding shutters of horizontal member size 40mm x 18mm x 1.29mm (of Jindal section no: 8947@ Wt. of 0.456 Kg./Mt) vertical member of size 40mm x 18mm x 1.29mm (of jindal Section No : 8949, @ Wt. 0.456 Kg/mt. with 5mm thick transparent bronze colour tinted float glass with powder coated alluminium fittings & fixtures and transperent silicon sealent glass fixing to frame as per details etc. Complete for Window.	1591.87	Smt.	60491.06
12	9.50 Smt.	Providing and fixing FRP frame size 125 x 65 mm and 35 mm thick FRP shutter with wood grain raised panneled design finish shutter having extra reinforcement on side & edges in Gel coat finish. The core of the shutter & frame is to be filed up with injected polyurethane foam done in situ alongwith embedded wooden pieces for stiffening & also taking hinges & fintures. The whole FRP frame & Shutter is to be water proof weather proof, termite proof & resistance to mild acid/alkhli. Rates are to be inclusive of S.S.hinges with fastener Sleeve & alluminium fixtures & fastenings.	2019.98	Smt.	19189.81
13	3.00 Smt.	Providing and fixing glazed louvered glass windows and ventilators with teakwood frame 10cm x 7cm size including 3 Coats of oil painting to wood work etc. complete.	4202.12	Smt.	12606.36

14	60.00 Smt.	Providing and fixing standard extruded of alluminium section of size 63.50 x 38.10 x 1.95mm (of jindal section no : 4605, @ Wt. 1.094 Kg/ Rmt with color powder coated alluminium frame with 5mm thick transperent bronze color tinted float glass as details etc. complete for Fix Windows/Glazing.	1301.82	Smt.	78109.20
15	10.00 Rmt.	Supplying and fitting Stainless Steel railing 3" pipe as hand rail with & S304 grade including required accessories or as directed by engineer in charge etc. complete.	555.50	Rmt.	5555.00
16	945.00 Kgs.	Providing and fixing M. S. grills of required pattern to wooden frames of window etc. with M. S. flats at required spacings and frame alround square or round bars with round headed bolts and nuts or by screws. (A) Plain Grills.	106.23	Kg.	100387.35
17	38.00 Smt.	Applying Priming Coat on new steel and other metal surface by throughly cleaning, oil, grease and scoured with brushes fine steel wood, scrapers and sand paper with ready mixed priming paint brushing red lead and Painting two coats with synthetic enamel paint, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.	105.49	Smt.	4008.62
18	1503.00 Smt.	Providing 15mm thick cement plaster in single coat on brick/concrete wall for interior plastering and finished even and smooth in cement mortar 1:4 (1 cement : 4 sand) and finishing with a floating coat of neat cement slurry upto floor two level.	281.63	Smt.	423289.89
19	855.00 Smt.	Providing 10mm thick cement plaster in single coat on ceilings and soffits of stairs for interior plastering and finished even and smooth in. Cement Mortar 1:4 ( 1 Cement : 4 Sand) and finishing with a floating coat of neat cement slurry for all floors.	235.03	Smt.	200950.65
20	391.00 Smt.	Providing 20 mm thick double coat mala cement plaster on interior brick/ concrete work for plastering comprising of base coat of 12 mm thick cement plaster in cement mortar (1 Cement : 4 coarse sand) in rough finishing and 8 mm thick top coat of cement mortar 1:2 ( 1 Cement : 2 coarse sand) finished with trovel including scaffolding curing etc. complete. Do for Texture Plaster.	283.95	Smt.	111024.45
21	2358.00 Smt.	Applying two coats of putty & 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 paped smooth.	40.59	Smt.	95711.22

22	1503.00 Smt.	Distempering (Three Coat) with oil bound washable distemper of approved brand and manufacture and of required shade on wall surfaces to give and even shade over and including a primer coat with alkali resistance primer of approved brand after thoroughly brushing the surface free from other foreign matter and also including preparing the surface even and sand papered smooth.	104.07	Smt.	156417.21
23	855.00 Smt.	Distempering (Three Coat) with oil bound washable distemper of approved brand and manufacture and of required shade on Ceiling & Sloping Roof surfaces to give and even shade over and including a primer coat with alkali resistance primer of approved brand after thoroughly brushing the surface to give and free from other foreign matter and also including preparing the surface even and sand papered smooth.	115.77	Smt.	98983.35
24	391.00 Smt.	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	120.26	Smt.	47021.66
25	196.00 Smt.	Providing and Applying Textured Plaster of approved design/sample with all kinds of material, labor, taxation charges. Complete. As directed on site by EIC or any concern authority.	404.00	Smt.	79184.00
26	613.00 Smt	Providing and laying 24" x 24" Vitrified 8 mm to 10mm thick tiles flooring over 20 mm (average) base of cement mortar 1:6 (1 Cement : 6 Coarse Sand) and jointed with colour cement slurry including finished with flush pointing and cleaning the surface etc. complete. For Flooring.	1311.18	Smt	803753.34
27	63.00 Smt	Providing and laying 24" x 24" Vitrified 8 mm to 10mm thick tiles flooring over 20 mm (average) base of cement mortar 1:6 (1 Cement : 6 Coarse Sand) and jointed with colour cement slurry including finished with flush pointing and cleaning the surface etc. complete. For Flooring (Antiskit).	1467.72	Smt	92466.36
28	34.00 Smt	Providing and laying 24"x24" Vitrified 8 mm to 10mm thick tiles flooring over 20 mm (average) base of cement mortar 1:3 (1 Cement : 3 Coarse Sand) and jointed with colour cement slurry including finished with flush pointing and cleaning the surface etc. complete. For Skirting./Wall Tiles/Dedo	1467.72	Smt	49902.48

29	221.00 Smt	Providing and Laying coloured glazed tiles of the size 300mm x 200mm x 8mm/300mm x 450mm x 8mm in skirting, riser of steps and dedo on 10mm thick cement plaster 1:3 (Cement : 3 coarse sand) and jointed with matching colour cement slurry.	1488.24	Smt	328901.04
30	81.00 Smt	Providing and laying polished Granite tiles 18 mm thick in risers of steps, skirting Dedo and pillars laid on 10 mm thick cement mortar 1 : 3 (1 cement : 3 coarse sand) and jointed with gray cement slurry mixed with pigment to match the shade of slab including rubbing, polishing, Moulding etc. complete. For Flooring, Doors & Windows Edges.	1633.17	Smt	132286.77
31	680.00 Smt	Providing and fixing PVC Printed pain colour false ceiling with grid type with alluminium frame consisting of 600mm x 600mm 3mm thick plain PVC sheet used as panel insert in a frame work made using anodized alluminium T section of size 1 x 1 (235 x 25mm, 19 gauge or 1 mm thick) in square pattern of grid sizes of 2 x 2 (600 x 600mm) The alluminium frame work is supported from the cceiling with the help of G.I. hook and G.I. wire/6mm M.S. rods of required sizes to maintain proper level etc. The aluminium frame work is supported on side wall with the use of alluminium L section of size 1 x 1 (25 x 25mm) angles etc. complete as per direction of Engineer in charge. Manufactures specification and drawing.	773.66	Smt	526088.80
					<b>Total Rs. 8293490.83</b>
					<b>Say, As. 8293500.00</b>

**KHAMBHAT MUNICIPALITY, KHAMBHAT**

**CONSTRUCTION OF MUNICIPALITY BUILDING, AT KHAMBHAT.**

**SECOND FLOOR**

**SCHEDULE-B3**

<b>Item No.</b>	<b>Qty.</b>	<b>Description</b>	<b>Total Rate</b>	<b>Unit</b>	<b>Amount</b>
1	48.50 Cmt.	Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in Columns having any cross section area.	6280.60	Cmt.	304609.10
2	4.00 Cmt.	Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in RCC WALL having any cross section area for all floors.	8222.83	Cmt.	32891.32
3	10.50 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Lintel/Chajjas for all floor.	7868.32	Cmt.	82617.36
4	109.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Slab having any thickness for all floors.	6540.17	Cmt.	712878.53
5	71.50 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Beams having any cross section area for all floors.	5968.51	Cmt.	426748.47
6	5.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Stairs for all floors.	7874.38	Cmt.	39371.90
7	<b>T.M.T. Bars</b>				
	31375.00 Kgs.	Providing ISI Mark TMT Bar Fe-500 Reinforcment for R.C.C work including bending, binding and placing in position etc. complete for all Floors.	79.08	Kg.	2481135.00

8	136.00 Cmt.	Providing and Laying Brick work using common burnt clay building bricks (Conventional) having crushing strength not less than 35 Kg./Sq. Cm. in Super Structure Above Plinth level in Cement Mortar (1:6) (1 Cement : 6 fine sand) etc. complete for any Height.	4580.91	Cmt.	623003.76
9	43.50 Smt.	Providing, laying and constructing half brick masonry work in super structure having crushing strength not less than 35 Kg./Sq. Cm. in cement mortar (1:4) (1 Cement : 4 Coarse sand) etc. complete for All Floors.	690.57	Smt.	30039.80
10	31.50 Smt.	Providing and fixing 35mm thick flush door shutters, solid core construction with frame of first class hardwood with cross band and face veneer or plywood face panels, including anodised alluminium butt hinges with necessary screws. (A) Decorative type and bright finished M.S. Piano hinges of Nickel plated piano hinges in flush door shutters.	2753.56	Smt.	86737.14
11	43.50 Smt.	Providing and fixing window having extruded alluminium color powder coated section frame main outer size 95.00mm x 24.00mm x 1.17mm (of jindal Section no: 2459 @ wt. 0.738 Kg/Rmt.), horizontal three track member size 92.0 mm x 31.75mm x 1.30mm (of jindal Section no: 8688, @ Wt. 0.1.07Kg./Mt.), vertical member of size 92mm x 31.75mm x 1.50mm (of jindal section no: 8933@ Wt. 1.06 Kg/mt.) with sliding shutters of horizontal member size 40mm x 18mm x 1.29mm (of Jindal section no: 8947@ Wt. of 0.456 Kg./Mt) vertical member of size 40mm x 18mm x 1.29mm (of jindal Section No : 8949, @ Wt. 0.456 Kg/mt. with 5mm thick transparent bronze colour tinted float glass with powder coated alluminium fittings & fixtures and transperent silicon sealent glass fixing to frame as per details etc. Complete for Window.	1591.87	Smt.	69246.35
12	6.50 Smt.	Providing and fixing FRP frame size 125 x 65 mm and 35 mm thick FRP shutter with wood grain raised panneled design finish shutter having extra reinforcement on side & edges in Gel coat finish. The core of the shutter & frame is to be filed up with injected polyurethane foam done in situ alongwith embedded wooden pieces for stiffening & also taking hinges & fintures. The whole FRP frame & Shutter is to be water proof weather proof, termite proof & resistance to mild acid/alkhli. Rates are to be inclusive of S.S.hinges with fastener Sleeve & alluminium fixtures & fastenings.	2019.98	Smt.	13129.87
13	2.50 Smt.	Providing and fixing glazed louvered glass windows and ventilators with teakwood frame 10cm x 7cm size including 3 Coats of oil painting to wood work etc. complete.	4202.12	Smt.	10505.30



14	60.00 Smt.	Providing and fixing standard extruded of alluminium section of size 63.50 x 38.10 x 1.95mm (of jindal section no : 4605, @ Wt. 1.094 Kg/ Rmt with color powder coated alluminium frame with 5mm thick transperent bronze color tinted float glass as details etc. complete for Fix Windows/Glazing.	1301.82	Smt.	78109.20
15	10.00 Rmt.	Supplying and fitting Stainless Steel railing 3" pipe as hand rail with & S304 grade including required accessories or as directed by engineer in charge etc. complete.	555.50	Rmt.	5555.00
16	1080.00 Kgs.	Providing and fixing M. S. grills of required pattern to wooden frames of window etc. with M. S. flats at required spacings and frame alround square or round bars with round headed bolts and nuts or by screws. (B) Plain Grills.	106.23	Kg.	114728.40
17	44.00 Smt.	Applying Priming Coat on new steel and other metal surface by throughly cleaning, oil, grease and scoured with brushes fine steel wood, scrapers and sand paper with ready mixed priming paint brushing red lead and Painting two coats with synthetic enamel paint, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.	105.49	Smt.	4641.56
18	1164.00 Smt.	Providing 15mm thick cement plaster in single coat on brick/concrete wall for interior plastering and finished even and smooth in cement mortar 1:4 (1 cement : 4 sand) and finishing with a floating coat of neat cement slurry upto floor two level.	308.86	Smt.	359513.04
19	869.00 Smt.	Providing 10mm thick cement plaster in single coat on ceilings and soffits of stairs for interior plastering and finished even and smooth in. Cement Mortar 1:4 ( 1 Cement : 4 Sand) and finishing with a floating coat of neat cement slurry for all floors.	256.92	Smt.	223263.48
20	430.00 Smt.	Providing 20 mm thick double coat mala cement plaster on interior brick/ concrete work for plastering comprising of base coat of 12 mm thick cement plaster in cement mortar (1 Cement : 4 coarse sand) in rough finishing and 8 mm thick top coat of cement mortar 1:2 ( 1 Cement : 2 coarse sand) finished with trovel including scaffolding curing etc. complete. Do for Texture Plaster.	283.95	Smt.	122098.50
21	2033.00 Smt.	Applying two coats of putty & 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.	40.59	Smt.	82519.47

22	1164.00 Smt.	Distempering (Three Coat) with oil bound washable distemper of approved brand and manufacture and of required shade on wall surfaces to give and even shade over and including a primer coat with alkali resistance primer of approved brand after thoroughly brushing the surface free from other foreign matter and also including preparing the surface even and sand papered smooth.	104.07	Smt.	121137.48
23	869.00 Smt.	Distempering (Three Coat) with oil bound washable distemper of approved brand and manufacture and of required shade on Ceiling & Sloping Roof surfaces to give and even shade over and including a primer coat with alkali resistance primer of approved brand after thoroughly brushing the surface to give and free from other foreign matter and also including preparing the surface even and sand papered smooth.	115.77	Smt.	100604.13
24	430.00 Smt.	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	120.26	Smt.	51711.80
25	215.00 Smt.	Providing and Applying Textured Plaster of approved design/sample with all kinds of material, labor, taxation charges. Complete. As directed on site by EIC or any concern authority.	404.00	Smt.	86860.00
26	675.00 Smt	Providing and laying 24" x 24" Vitrified 8 mm to 10mm thick tiles flooring over 20 mm (average) base of cement mortar 1:6 (1 Cement : 6 Coarse Sand) and jointed with colour cement slurry including finished with flush pointing and cleaning the surface etc. complete. For Flooring.	1311.18	Smt	885046.50
27	42.00 Smt	Providing and laying 24" x 24" Vitrified 8 mm to 10mm thick tiles flooring over 20 mm (average) base of cement mortar 1:6 (1 Cement : 6 Coarse Sand) and jointed with colour cement slurry including finished with flush pointing and cleaning the surface etc. complete. For Flooring (Antiskit).	1467.72	Smt	61644.24
28	32.00 Smt	Providing and laying 24"x24" Vitrified 8 mm to 10mm thick tiles flooring over 20 mm (average) base of cement mortar 1:3 (1 Cement : 3 Coarse Sand) and jointed with colour cement slurry including finished with flush pointing and cleaning the surface etc. complete. For Skirting./Wall Tiles/Dedo	1467.72	Smt	46967.04

29	126.00 Smt	Providing and Laying coloured glazed tiles of the size 300mm x 200mm x 8mm/300mm x 450mm x 8mm in skirting, riser of steps and dedo on 10mm thick cement plaster 1:3 (Cement : 3 coarse sand) and jointed with matching colour cement slurry.	1488.24	Smt	187518.24
30	81.00 Smt	Providing and laying polished Granite tiles 18 mm thick in risers of steps, skirting Dedo and pillars laid on 10 mm thick cement mortar 1 : 3 (1 cement : 3 coarse sand) and jointed with gray cement slurry mixed with pigment to match the shade of slab including rubbing, polishing, Moulding etc. complete. For Flooring, Doors & Windows Edges.	1633.17	Smt	132286.77
31	680.00 Smt	Providing and fixing PVC Printed pain colour false ceiling with grid type with alluminium frame consisting of 600mm x 600mm 3mm thick plain PVC sheet used as panel insert in a frame work made using anodized alluminium T section of size 1 x 1 (235 x 25mm, 19 gauge or 1 mm thick) in square pattern of grid sizes of 2 x 2 (600 x 600mm) The alluminium frame work is supported from the cceiling with the help of G.I. hook and G.I. wire/6mm M.S. rods of required sizes to maintain proper level etc. The aluminium frame work is supported on side wall with the use of alluminium L section of size 1 x 1 (25 x 25mm) angles etc. complete as per direction of Engineer in charge. Manufactures specification and drawing.	773.66	Smt	526088.80
					<b>Total Rs. 8103207.55</b>
					<b>Say, As. 8103300.00</b>

**KHAMBHAT MUNICIPALITY, KHAMBHAT**

**CONSTRUCTION OF MUNICIPALITY BUILDING, AT KHAMBHAT.**

**THIRD FLOOR**

**SCHEDULE-B4**

<b>Item No.</b>	<b>Qty.</b>	<b>Description</b>	<b>Total Rate</b>	<b>Unit</b>	<b>Amount</b>
1	5.50 Cmt.	Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in Columns having any cross section area.	6321.72	Cmt.	34769.46
2	2.50 Cmt.	Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in RCC WALL having any cross section area for all floors.	8263.95	Cmt.	20659.88
3	2.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Lintel/Chajjas for all floor.	7909.44	Cmt.	15818.88
4	8.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Slab having any thickness for all floors.	6581.29	Cmt.	52650.32
5	8.50 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Beams having any cross section area for all floors.	6009.63	Cmt.	51081.86
6	<b>T.M.T. Bars</b> 3600.00 Kgs.	Providing ISI Mark TMT Bar Fe-500 Reinforcment for R.C.C work including bending, binding and placing in position etc. complete for all Floors.	80.13	Kg.	288468.00
7	42.00 Cmt.	Providing and Laying Brick work using common burnt clay building bricks (Conventional) having crushing strength not less than 35 Kg./Sq. Cm. in Super Structure Above Plinth level in Cement Mortar (1:6) (1 Cement : 6 fine sand) etc. complete for any Height.	4623.34	Cmt.	194180.28

8	5.50 Smt.	Providing, laying and constructing half brick masonry work in super structure having crushing strength not less than 35 Kg./Sq. Cm. in cement mortar (1:4) (1 Cement : 4 Coarse sand) etc. complete for All Floors.	696.87 Smt.	3832.79
9	5.50 Smt.	Providing and fixing 35mm thick flush door shutters, solid core construction with frame of first class hardwood with cross band and face veneer or plywood face panels, including anodised alluminium butt hinges with necessary screws. (A) Decorative type and bright finished M.S. Piano hinges of Nickel plated piano hinges in flush door shutters.	2753.56 Smt.	15144.58
10	0.00 Smt.	Providing and fixing standard extruded of alluminium section of size 63.50 x 38.10 x 1.95mm (of jindal section no : 4605, @ Wt. 1.094 Kg/ Rmt with color powder coated alluminium frame with 5mm thick transperent bronze color tinted float glass as details etc. complete for Fix Windows/Glazing.	1301.82 Smt.	0.00
11	830.00 Kgs.	Providing and fixing M. S. grills of required pattern to wooden frames of window etc. with M. S. flats at required spacings and frame alround square or round bars with round headed bolts and nuts or by screws. (A) Plain Grills.	106.23 Kg.	88170.90
12	6.00 Smt.	Applying Priming Coat on new steel and other metal surface by thoroughly cleaning, oil, grease and scoured with brushes fine steel wood, scrapers and sand paper with ready mixed priming paint brushing red lead and Painting two coats with synthetic enamel paint, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.	105.49 Smt.	632.94
13	53.00 Smt.	Providing 15mm thick cement plaster in single coat on brick/concrete wall for interior plastering and finished even and smooth in cement mortar 1:4 (1 cement : 4 sand) and finishing with a floating coat of neat cement slurry upto floor two level.	336.09 Smt.	17812.77
14	60.00 Smt.	Providing 10mm thick cement plaster in single coat on ceilings and soffits of stairs for interior plastering and finished even and smooth in. Cement Mortar 1:4 ( 1 Cement : 4 Sand) and finishing with a floating coat of neat cement slurry for all floors.	278.81 Smt.	16728.60
15	356.00 Smt.	Providing 20 mm thick double coat mala cement plaster on interior brick/ concrete work for plastering comprising of base coat of 12 mm thick cement plaster in cement mortar (1 Cement : 4 coarse sand) in rough finishing and 8 mm thick top coat of cement mortar 1:2 ( 1 Cement : 2 coarse sand) finished with trowel including scaffolding curing etc. complete. Do for Texture Plaster.	283.95 Smt.	101086.20

16	113.00 Smt.	Applying two coats of putty & 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.	40.59	Smt.	4586.67
17	53.00 Smt.	Distempering (Three Coat) with oil bound washable distemper of approved brand and manufacture and of required shade on wall surfaces to give and even shade over and including a primer coat with alkali resistance primer of approved brand after thoroughly brushing the surface free from other foreign matter and also including preparing the surface even and sand papered smooth.	104.07	Smt.	5515.71
18	60.00 Smt.	Distempering (Three Coat) with oil bound washable distemper of approved brand and manufacture and of required shade on Ceiling & Sloping Roof surfaces to give and even shade over and including a primer coat with alkali resistance primer of approved brand after thoroughly brushing the surface to give and free from other foreign matter and also including preparing the surface even and sand papered smooth.	115.77	Smt.	6946.20
19	356.00 Smt.	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	120.26	Smt.	42812.56
20	178.00 Smt.	Providing and Applying Textured Plaster of approved design/sample with all kinds of material, labor, taxation charges. Complete. As directed on site by EIC or any concern authority.	404.00	Smt.	71912.00
21	21.00 Smt	Providing and laying 24" x 24" Vitrified 8 mm to 10mm thick tiles flooring over 20 mm (average) base of cement mortar 1:6 (1 Cement : 6 Coarse Sand) and jointed with colour cement slurry including finished with flush pointing and cleaning the surface etc. complete. For Flooring.	1467.72	Smt	30822.12
22	2.00 Smt	Providing and laying 24"x24" Vitrified 8 mm to 10mm thick tiles flooring over 20 mm (average) base of cement mortar 1:3 (1 Cement : 3 Coarse Sand) and jointed with colour cement slurry including finished with flush pointing and cleaning the surface etc. complete. For Skirting.	1467.72	Smt	2935.44

23	0.00 Smt	Providing and laying polished Granite tiles 18 mm thick in risers of steps, skirting Dedo and pillars laid on 10 mm thick cement mortar 1 : 3 (1 cement : 3 course sand) and jointed with gray cement slurry mixed with pigment to match the shade of slab including rubbing, polishing, Moulding etc. complete. For Flooring, Doors & Windows Edges.	1633.17	Smt	0.00
24	700.00 Smt	Providing and Laying Broken China Mosaic flooring for Terrace using 12mm Broken pieces of glazed tiles to be laid over cement mortar 1:3 to plain or slope and to be tempered to bring mortar cream out up to surface using white cement including rounding off junctions and extending them up to 15cm long the wall, clearing with water and oxalic acid etc. as directed.	779.70	Smt	545790.00
25	0.00 Smt	Providing and fixing PVC Printed pain colour false ceiling with grid type with alluminium frame consisting of 600mm x 600mm 3mm thick plain PVC sheet used as panel insert in a frame work made using anodized alluminium T section of size 1 x 1 (235 x 25mm, 19 gauge or 1 mm thick) in square pattern of grid sizes of 2 x 2 (600 x 600mm) The alluminium frame work is supported from the cceiling with the help of G.I. hook and G.I. wire/6mm M.S. rods of required sizes to maintain proper level etc. The aluminium frame work is supported on side wall with the use of alluminium L section of size 1 x 1 (25 x 25mm) angles etc. complete as per direction of Engineer in charge. Manufactures specification and drawing.	773.66	Smt	0.00
			<b>Total Rs.</b>		<b>1612358.16</b>
			<b>Say, As.</b>		<b>1612400.00</b>

**KHAMBHAT MUNICIPALITY, KHAMBHAT**

**CONSTRUCTION OF MUNICIPALITY BUILDING, AT KHAMBHAT.**

**LIFT ROOM (FOURTH FLOOR)**

**SCHEDULE-B5**

<b>Item No.</b>	<b>Qty.</b>	<b>Description</b>	<b>Total Rate</b>	<b>Unit</b>	<b>Amount</b>
1	4.00 Cmt.	Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in Columns having any cross section area.	6362.84	Cmt.	25451.36
2	1.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Lintel/Chajjas for all floor.	7950.56	Cmt.	7950.56
3	5.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Slab having any thickness for all floors.	6622.41	Cmt.	33112.05
4	4.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Beams having any cross section area for all floors.	6050.75	Cmt.	24203.00
5	1925.00 Kgs.	<b>T.M.T. Bars</b> Providing ISI Mark TMT Bar Fe-500 Reinforcement for R.C.C work including bending, binding and placing in position etc. complete for all Floors.	80.13	Kg.	154250.25
6	11.00 Cmt.	Providing and Laying Brick work using common burnt clay building bricks (Conventional) having crushing strength not less than 35 Kg./Sq. Cm. in Super Structure Above Plinth level in Cement Mortar (1:6) (1 Cement : 6 fine sand) etc. complete for any Height.	4623.34	Cmt.	50856.74
7	2.00 Smt.	Providing and fixing 35mm thick flush door shutters, solid core construction with frame of first class hardwood with cross band and face veneer or plywood face panels, including anodised aluminium butt hinges with necessary screws. (A) Decorative type and bright finished M.S. Piano hinges of Nickel plated piano hinges in flush door shutters.	2753.56	Smt.	5507.12



8	2.00 Smt.	Providing and fixing window having extruded alluminium color powder coated section frame main outer size 95.00mm x 24.00mm x 1.17mm (of jindal Section no: 2459 @ wt. 0.738 Kg/Rmt.), horizontal three track member size 92.0 mm x 31.75mm x 1.30mm (of jindal Section no: 8688, @ Wt. 0.1.07Kg./Mt.), vertical member of size 92mm x 31.75mm x 1.50mm (of jindal section no: 8933@ Wt. 1.06 Kg/mt.) with sliding shutters of horizontal member size 40mm x 18mm x 1.29mm (of Jindal section no: 8947@ Wt. of 0.456 Kg./Mt) vertical member of size 40mm x 18mm x 1.29mm (of jindal Section No : 8949, @ Wt. 0.456 Kg/mt. with 5mm thick transparent bronze colour tinted float glass with powder coated alluminium fittings & fixtures and transperent silicon sealent glass fixing to frame as per details etc. Complete for Window.	1591.87	Smt.	3183.74
9	45.00 Kgs.	Providing and fixing M. S. grills of requiried pattern to wooden frames of window etc. with M. S. flats at requiried spacings and frame alround square or round bars with round headed bolts and nuts or by screws. (B) Plain Grills.	106.23	Kg.	4780.35
10	2.00 Smt.	Applying Priming Coat on new steel and other metal surface by thoroughly cleaning, oil, grease and scoured with brushes fine steel wood, scrapers and sand paper with ready mixed priming paint brushing red lead and Painting two coats with synthetic enamel paint, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.	105.49	Smt.	210.98
11	51.00 Smt.	Providing 15mm thick cement plaster in single coat on brick/concrete wall for interior plastering and finished even and smooth in cement mortar 1:4 (1 cement : 4 sand) and finishing with a floating coat of neat cement slurry upto floor two level.	336.09	Smt.	17140.59
12	25.00 Smt.	Providing 10mm thick cement plaster in single coat on ceilings and soffits of stairs for interior plastering and finished even and smooth in. Cement Mortar 1:4 ( 1 Cement : 4 Sand) and finishing with a floating coat of neat cement slurry for all floors.	278.81	Smt.	6970.25
13	74.00 Smt.	Providing 20 mm thick double coat mala cement plaster on interior brick/ concrete work for plastering comprising of base coat of 12 mm thick cement plaster in cement mortar (1 Cement : 4 coarse sand) in rough finishing and 8 mm thick top coat of cement mortar 1:2 ( 1 Cement : 2 coarse sand) finished with trowel including scaffolding curing etc. complete. Do for Texture Plaster.	283.95	Smt.	21012.30
14	76.00 Smt.	Applying two coats of putty & 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.	40.59	Smt.	3084.84

15	51.00 Smt.	Distempering (Three Coat) with oil bound washable distemper of approved brand and manufacture and of required shade on wall surfaces to give and even shade over and including a primer coat with alkali resistance primer of approved brand after thoroughly brushing the surface free from other foreign matter and also including preparing the surface even and sand papered smooth.	104.07	Smt.	5307.57
16	25.00 Smt.	Distempering (Three Coat) with oil bound washable distemper of approved brand and manufacture and of required shade on Ceiling & Sloping Roof surfaces to give and even shade over and including a primer coat with alkali resistance primer of approved brand after thoroughly brushing the surface to give and free from other foreign matter and also including preparing the surface even and sand papered smooth.	115.77	Smt.	2894.25
17	74.00 Smt.	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	120.26	Smt.	8899.24
18	37.00 Smt.	Providing and Applying Textured Plaster of approved design/sample with all kinds of material, labor, taxation charges. Complete. As directed on site by EIC or any concern authority.	404.00	Smt.	14948.00
19	24.00 Smt	Providing and laying 24" x 24" Vitrified 8 mm to 10mm thick tiles flooring over 20 mm (average) base of cement mortar 1:6 (1 Cement : 6 Coarse Sand) and jointed with colour cement slurry including finished with flush pointing and cleaning the surface etc. complete. For Flooring.	1397.83	Smt	33547.92
20	2.00 Smt	Providing and laying 24"x24" Vitrified 8 mm to 10mm thick tiles flooring over 20 mm (average) base of cement mortar 1:3 (1 Cement : 3 Coarse Sand) and jointed with colour cement slurry including finished with flush pointing and cleaning the surface etc. complete. For Skirting.	1467.72	Smt	2935.44
21	2.00 Smt	Providing and laying polished Granite tiles 18 mm thick in risers of steps, skirting Dedo and pillars laid on 10 mm thick cement mortar 1 : 3 (1 cement : 3 course sand) and jointed with gray cement slurry mixed with pigment to match the shade of slab including rubbing, polishing, Moulding etc. complete. For Flooring, Doors & Windows Edges.	1633.17	Smt	3266.34

- 22      28.00      Providing and Laying Broken China Mosaic flooring for Terrace  
Smt      using 12mm Broken pieces of glazed tiles to be laid over cement  
mortar 1:3 to plain or slope and to be tempered to bring mortar  
cream out up to surface using white cement including rounding  
off junctions and extending them up to 15cm long the wall,  
clearing with water and oxailic acid etc. as directed.

779.70      Smt      21831.60

**Total Rs.      451344.49**

**Say, As.      451400.00**

**KHAMBHAT MUNICIPALITY KHAMBHAT**

**CONSTRUCTION OF PLUMBING & SANITARY AT MUNICIPALITY BUILDING, AT KHAMBHAT.**

**(PLUMBING AND SANITARY)**

**SCHEDULE-B6**

<b>Item No.</b>	<b>Qty.</b>	<b>Description</b>	<b>Total Rate</b>	<b>Per</b>	<b>Amount</b>
1	15.00 Nos.	Providing and fixing wash down water closet (European type W.C. Pan) with internal P or S trap including jointing the trap with soil pipe in cement mortar 1:1 ( 1 cement : 1 fine sand). Rates including providing and fixing plastic seat cover with C.P. brass hinges and rubber buffers, Jet spray heavy duty with S.S. braided hose 60 cm long and chromium plates brass half turn flush cock of approved quality etc. complete as directed.	2220.99	No.	33314.85
2	40.00 Nos.	Providing and fixing 15mm. Dia Chromium Plated Brass screw down bib tap of approved quality in pipeline and testing etc. complete as directed by Engineer-in-charge.	186.83	No.	7473.19
3	15.00 Nos.	Providing and fixing gun metal check or non return fullway wheel valve of 25 mm Dia.	420.63	No.	6309.52
4	15.00 Nos.	Providing and fixing gun metal check or non return fullway wheel valve of 40 mm Dia.	663.43	No.	9951.43
5	40.00 Nos.	Providing and fixing PVC SWR Nahni trap IS 14735 for drain - 100 mm 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.	586.27	No.	23450.99
6	30.00 Nos.	Providing and fixing S.W. gully trap with C.I. grating brick masonry chamber and water tight C.I. cover with frame of 300mm x 300mm size (inside) with standard weight.(i) Square mouth traps. (A) 100mm x 100mm size P type.	1292.19	No.	38765.82

7	6.00 Nos.	Constructing brick masonry chamber for underground C.I. Inspection chamber and bends with bricks having crushing strength not less than 35Kg/Cm <sup>2</sup> in C.M. 1:5 C.I. cover with frame (Light duty) 455mm x 610mm internal dimensions total weight of cover with frame to be not less than 38Kg. (Wt. of cover 23 Kg.) and Wt. of frame 15Kg. ) (R.C.C. top slabe with 1:2:4 mix (1-cement :2- coarse sand :4-graded stone aggregate 20mm size) foundation concrete 1:5:10 inside plaster 15mm thick with cement mortar 1:3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete.(ii) Inside dimensions 500mm x 700 mm and 450mm deep for pipe line with one or two inlets.	3660.76	No.	21964.53
8	4000.00 Lits.	Providing erecting and fixing double coated ISI mark water tank of required capacity with all necessary fittings & connection etc. complete on terrace	3.95	Lit.	15796.40
9	20.00 Nos.	Providing and fixing white vitreous china flat back wash basin of 550mm x 400mm size with single hole for pillar tap with C.I. or M.S. brackets painted white including cutting holes and making good the same. Rates including providing and fixing 32mm dia C.P. Brass waste couplin, 32mm dia M.I. Fisher unit, Brass screw down stop tap of 15mm dia pillar tap capstan head, screw down high pressure with screws, shanks, back nuts, PVC pipe & 32mm dia flexible waste pipe up to Nani Trap etc. complete as directed by engineer in charge.	2188.67	No.	43773.40
10	50.00 Rmt.	Providing and laying (To level or slopes) and jointing with stiff mixture of cement mortar in proportion 1:1 salt glazed stone ware pipes including testing of pipes and joint complete. (B) 150 mm Dia	317.47	Rmt.	15873.67
11	8.00 Nos.	Providing and fixing 600 mm x 450 mm bevelled edge mirror of superior glass mounted on 6 mm thick A.C Sheets or plywood sheet and fixing to wooden pluge with C.P. brass screws and washers.	859.41	No.	6875.27
12	60.00 Rmt.	Providing and fixing concealed center point to wall ceiling & floor CPVC (SDR 13.5) PIPE having National Sanitation Foundation (NSF) seal for portable water of following dia. Nominal bore tube fitting and clamps including making good the wall, ceiling and floor etc. complete. For 40mm Dia.	447.72	Rmt.	26863.37

13	75.00 Rmt.	Providing and fixing concealed center point to wall ceiling & floor CPVC (SDR 13.5) PIPE having National Sanitation Foundation (NSF) seal for portable water of following dia. Nominal bore tube fitting and clamps including making good the wall, ceiling and floor etc. complete for 25mm.	253.82	Rmt.	19036.73	
14	50.00 Rmt.	Providing and fixing concealed center point to wall ceiling & floor CPVC (SDR 13.5) PIPE having National Sanitation Foundation (NSF) seal for portable water of following dia. Nominal bore tube fitting and clamps including making good the wall, ceiling and floor etc. complete for 15mm dia	170.36	Rmt.	8517.84	
15	60.00 Rmt.	Providing and Fixing to wall ceiling and floor 110 mm Dia 6.kg. F/Cm2 working Pressure polythene pipes of the following outside Dia. Low density, complete with special flange compression type fitting, wall clips etc. including making good the wall ceiling and floor.	339.05	Rmt.	20342.81	
16	80.00 Rmt.	Providing, laying and jointing in true line and level 110 diameter U.P.V.C (Type B) conforming to IS 13592-1992 with one end plain and other end socketed with rubber ring, & fittings conforming to ISI 14735-1999 of approved make for drainage system pipe line, pipe shall be jointed with each other with rubber lubricant, pipe shall be fixed on wall using of PVC clamp of the size 110 mm diametre x 149 mm length x 145 mm heigh at every 2000 mm center to center or shall be concealed in walls as directed including necessary fittings such as bends, shoes etc. including testing of pipes and joints and jointed with adhesive solvent cement including cost of all materials.	876.90	Rmt.	70152.18	
17	9.00 Each	Providing and fixing Urinal of approved quality including connection with trap and with integral longitudinal flush pipe.(A) Squating plate pattern white earthenware 550mm x 300mm.	1618.51	Each	14566.63	
18	5.00 Each	Providing and fixing washbasin with single hole for pillar tap with C.I. or M.S. brackets painted white including sutting holes and making good the same but excluding fittings.(A) Vitreous China:(ii) Flat Back washbasin 550 mm x v 400mm size. (i) In white colour.	1526.65	Each	7633.23	
					<b>Total</b>	<b>390661.86</b>
					<b>Say, Rs.</b>	<b>390700.00</b>

**KHAMBHAT NAGARPALIKA KHAMBHAT****CONSTRUCTION OF PAVER BLOCK AT MUNICIPALITY BUILDING, AT KHAMBHAT.****SCHEDULE-B7**

<b>Item No.</b>	<b>Qty.</b>	<b>Description</b>	<b>Total Rate</b>	<b>Unit</b>	<b>Amount</b>
1	60.00 Cmt.	Box Cutting the Road Surface to proper slope and camber for making a base for road work including removing the excavated stuff and disposing to road slope as directed all lead and lift etc. complete upto 50 mt. Lead	109.41	Cmt.	6564.60
2	60.00 Cmt	Providing and laying cement concrete (1:4:8) (1 Cement, 4 Coarse sand, 8 Crushed stone aggregate 40 mm nominal) and curing complete excluding cost of formwork in foundation and plinth. (more than 10 ton)	2769.69	Cmt.	166181.40
3	400.00 Smt	Providing and fixing pre-cast Rubber Dye inter locking concrete block 60mm thick with grade of concrete M300 pneumatic compressed / Vibrated mechanically as per approved design confirming to IS 15658 : 2006 including 35mm sand layer for levelling and filling the joint with sand in proper line and level etc complete as per guidelines of IRC : SP 63 - 2018.	706.93	Smt	282772.00
4	1600.00 Rmt	Providing cement vata (10cm.x10cm.size) quarter round in cement mortar 1:1 including neat cement finishing, watering etc. complete.	24.28	Rmt	38848.00
					<b>Total, Rs. 494366.00</b>
					<b>Add :- 18% GST Rs. 88985.88</b>
					<b>Total, Rs. 583351.88</b>
					<b>Add :- 2% of Contingency Charges Rs. 11667.04</b>
					<b>Add :- 1% of Quality Controll Rs. 5833.52</b>
					<b>Total, Rs. 600852.44</b>
					<b>Say, Rs. 600900.00</b>

**KHAMBHAT MUNICIPALITY, KHAMBHAT**

**CONSTRUCTION OF COMPUND WALL AND ENTRANCE M.S. GATE**

**SCHEDULE-B8**

<b>Item No.</b>	<b>Qty.</b>	<b>Description</b>	<b>Total Rate</b>	<b>Unit</b>	<b>Amount</b>
1	227.00 Cmt.	Excavation for foundation up to 1:5 mt. Depth including sorting out and stacking of useful materials and depositing of the excavated stuff up to 50 meter lead.	117.08	Cmt.	26576.98
2	42.00 Cmt.	Excavation for foundation from depth 1:5 mt. to 3.0 mt. Depth including sorting out and stacking of useful materials and depositing of the excavated stuff up to 50 meter lead. (a) Loose or soft soil.	129.81	Cmt.	5451.82
3	189.00 Cmt.	Filing available excavated earth (excluding rock) in trenches plinth sides of foundations etc. in layers not exceeding 20cm. In depth consolidating each deposited layer by remming and watering.	130.39	Cmt.	24643.90
4	25.00 Cmt.	Providing and laying cement concrete 1:4:8 (1-Cement : 4-fine sand : 8-graded birck aggregates 40 mm nominal size) and curing complete excluding cost of form work in (a) Foundation and plinth.	2660.45	Cmt.	66511.28
5	40.00 Cmt.	Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in Column footings.	4775.28	Cmt.	191011.20
6	6.00 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork But Excluding the cost of reinforcement for reinforced concrete work in Column upto Plinth Level having any cross section area.	7680.04	Cmt.	46080.24
7	6.00 Cmt.	Providing and Laying controlled cement concrete M-250 and curing complete, including the cost of formwork but excluding the cost of reinforcement for reinforced concrete work in Columns having any cross section area upto floor two level.	9244.53	Cmt.	55467.18
8	9.50 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for reinforced concrete work in Ground Beam having any cross section area.	6228.67	Cmt.	59172.37



9	6.50 Cmt.	Providing and laying controlled cement concrete M-250 and curing complete including the cost of formwork and excluding the cost of reinforcement of reinforced concrete work in COPING	6228.67	Cmt.	40486.36
10	6850.00 Kgs.	<b>T.M.T. Bars</b> Providing and supplying TMT Fe-500 bar steel reinforcement for R.C.C work including bending, binding and placing in position etc. complete	76.21	Kgs.	522070.01
11	62.00 Cmt.	Brick work using common burnt building bricks having crushing strength not less than 35 Kg./cm <sup>2</sup> in super structure for Ground Floor in C.M. (1:6) (1 Cement, 6 fine sand) racking out joints curring etc. complete directed by Engineer-in-charge.	4295.99	Cmt.	266351.67
12	210.00 Smt	20 mm thick sand faced cement plaster on walls up to height 10 metres above ground level consisting of 12 mm thick backing coat of C:M 1:3 (1-cement :3-sand) and 8mm thick finishing coat of C:M 1:1 (1-cement :1-sand) etc complete.	300.66	Smt.	63137.93
13	210.00 Smt	Finishing wall with water proof exterior emulsion apex paint of on wall surfaces (two coats) to give an approved brand and manufacture and of required slope even shade after thoroughly brushing the surface to remove all dirt and remains of loose powered materials. etc completed.	114.53	Smt.	24052.14
14	3380.00 Kgs.	Providing and fixing M.S. grills of required pattern to wooden frames of windows etc. with M.S. flats at required spacings and frame around, square or round bars with round headed bolts and nuts or by screws (A) Plain Grill.	104.04	Kgs.	351655.54
15	46.00 Smt.	Painting two coats (Including Priming Coat) on new steel and other metal surface with synthetic enamel paint, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.	99.990	Smt.	4599.54
Total Amount					1747268.13
Say, Rs.					<b>1747300.00</b>

KHAMBHAT MUNICIPALITY KHMBHAT						
Construction Work Of Proposed Passanger Lift At Municipality Building At Khambhat.						
SCHEDULE-B9						
SR	REF. NO.	DESCRIPTION	QTY	UNIT	RATE	AMOUNT
		<b>GENERAL DESCRIPTION OF LIFTS,13-1</b>				
1		Supplying, Erecting, Testing & Commissioning the passenger / stretcher lift having following main features:				
		[1] GEAR LESS LIFT DRIVE (MRL) comprising of High Starting torque Lift 3 phase 440 V A. C. Permanent Magnet Synchronous motor of proper rating with high efficiency shall be used.[2] Micro processor based / PLC, ACVVVF, vector control drive with encoder feedback closed loop system shall be used for lift car and door operation which shall be full collective selective operation hall call demand response, UP/DOWN hall stops, Main, Up/ Down Contactor with overload and phase reversal relay and safety controls.				
		[3] Car with M S platform with bracings of adequate size and to sustain the impact load cabin + passenger with safety factor of fire for steel and side panels of Stainless steel of sheet of grade 304 duty. Car ceiling will be S.S. finishes with aesthetic appearance with LED ceiling lights. Car flooring shall be of anti skid PVC with choice of colour of engineer in charge. Car doors shall be of stainless steel grade 304, hairline finish with centre opening / telescopic automatic doors. Car panel will also be S.S. 304 finished with emergency stop device, mechanical door safety device, facility of auto/ attended mode. All car panel buttons and all floor switches must be with brail language as per lift act.				
		[4] All landing doors must be fire rated for 2 hour shall be fully automatic centre opening/ telescopic opening made of hairline finish steel grade of 304 with key holes and infrared curtains with Unlocking facility from outside. [5] Appropriate battery operated emergency light in the car along with alarm switch shall be provided. Also, Emergency Light & Fan should start immediately without any Time Delay as soon as power fails. [6] Digital scrolling indicator system for up-down arrow along with floor position indicator shall be provided inside the car and at all floors. [7] Full height infra red curtain with multiple cross / crossing light beams shall be provided.[8] Automatic Rescue Device (ARD) shall be provided accordingly of passenger capacity with Manual Rescue Operation ( Manual Cranking Facility). [9] Audio visual indication in the lift car showing over loading shall be provided such that doors kept open till excess load is removed.				
		[10] Spring buffers/PU Buffers shall be provided. [11] Car fan as per passenger capacity with automatic sleep timer shall be provided. [12] Voice annunciator with suitable music shall be provided in lift car. [13] Self diagnostics system for operational and safety parameters shall be provided in control panel. [14] Mechanical over speed governor with governor calibration as per actual site parameters and submission of calibration certificate submission, door key holes in the floor doors, fireman switch shall be provided. [15] Lift machine hoisting arrangement in the lift machine room and monkey ladder for lift pit should be provided by the lift agency, along with the other steel structure works, foundations for the machine etc.. [16] In the hoist way fascia plate shall be provided without any extra cost, where ever required as / if directed by engineer in charge.				
		[17] Permanent wiring with necessary safety devices like RCCB in all circuit, Over Voltage Under Voltage protection and THD eliminator in circuit for lift machine room and lift well with proper numbers of light points, with fixtures, exhaust fan and plug points shall be provided by the agency. Only 3 phase Power Supply shall be made available by department in lift machine room. Necessary Earthing as per Lift Act/Rules shall be arranged by Lift Agency. [18] Any civil/ electrical works for additional and alteration in lift shaft and machine room related to erection of lift shall be made by lift agency without any extra cost. (granite/marble fixing around all landing door openings are not in lift agency's scope.) [19] Agency has to provide all working drawings and documents and liaison services for obtaining all necessary permission from lift inspector and other authorities. [20] acrylic transparent licence/display A4 size holder in lift car				

	<p>[20A] As per statutory requirement of Govt. Of Gujarat lift &amp; escalator act 2000, lift agency has to provide</p> <p>1. Car top safety barricade</p> <p>2. Push &amp; talk communication system.</p> <p>3. Fireman's switch operation at Ground Floor.</p> <p>4. carrying out third party lift inspection during/after lift erection and provide report by third party authorized by concern licensing authority</p> <p>5. agency has to provide third party insurance upto completion of free maintenance period and submit the document for the same.</p>					
	<p>[21] Car Panel Operating Buttons with floor position indicator/buttons must be of Auto Glow type clearly visible when view from inside cabin.</p> <p>[22] For Physically Handicapped person Full Length Handrails of hairline finish steel grade of 304 should be provided at appropriate height on the Rear &amp; Side Wall Panels in Lift Car.</p>					
	13-1-S	8/10 Passengers, Ground plus 3 upper floors with Rated Speed of 1.0 m/sec.,(B) With General Specification attached herewith. Cat.II	1.00	Each	1335269.49	1335269.49
2	13-2-1.	<p>Supplying &amp; erecting approved make Lift Announcing solid state system in the Passenger/ Stretcher lifts having AC2/ACVV/ACVF drives &amp; automatic doors only. The system comprising following features &amp; facilities.</p> <p>(i) Announcing floor message, message to close period.(ii) Announcing 'Emergency Message' when lift is stuck between floors due to power failure or any other reason.</p> <p>(iii) Instrumental Music between floor announcing.(iv) Announcement in English / Hindi &amp; Gujarati Languages..</p> <p>(v) Flexible to accommodate special per-programmed message such as name of the building /office.(vi)Volume adjustment control</p>	1.00	Each	17119.50	17119.50
3	13-2-2.	<p>Providing &amp; erecting approved make overload non-start feature &amp; overload warning Indicator system in the lift with making use of sound isolated floating platform &amp; micro switches on SI frame to get sensation of live load inside lift cage at any given moment, with provides new fixtures of overload warning inside lift cage with new relay in the existing control panel to activate 'Overload Non-Start Function with carrying out additional wiring including laying of new travelling cable, include minor civil work &amp; without changing the existing capacity speed stops, travel &amp; operation of the desired lift</p>	1.00	Each	32527.05	32527.05
					Total Amount	1384916.04
					Say, Rs.	1385000.00

**KHAMBHAT MUNICIPALITY KHAMBHAT  
PROVIDING GENERAL TYPE RAIN WATER HARVESTING SYSTEM IN MUNICIPALITY  
BUILDING ,AT KHAMBHAT.**

**SCHEDULE-B 10**

**GENERAL SUMMARY**

<b>No.</b>	<b>Description</b>	<b>Amount</b>
SCH-B 10.1	General Type Rain Water Harvesting System	Rs. 318500.00
SCH-B 10.2	Drilling of Deep Tube Well	Rs. 238800.00
SCH-B 10.3	Pumping Machinery for borewell	Rs. 104100.00
<b>Total Rs.</b>		<b>661400.00</b>

**KHAMBHAT MUNICIPALITY KHAMBHAT****PROVIDING GENERAL TYPE RAIN WATER HARVESTING SYSTEM IN MUNICIPALITY BUILDING ,AT  
KHAMBHAT.****SCHEDULE-B 10**

<b>Item No.</b>	<b>Qty.</b>	<b>Description</b>	<b>Total Rate</b>	<b>Unit</b>	<b>Amount</b>
1	6.50 Cmt.	Excavation for pipe line trenches for water supply, sewerage line, manhole, etc. all with shoring and strutting if required as per required gradient and line including safety provisions using site rails and stacking excavated stuff including up to all required lead cleaning the site etc. complete for all lifts and strata as specified in (A) Soft Soils and Soft Murrum 0 to 1.5m	102.35	Cmt.	665.28
2	1.00 Cmt.	Providing and casting in situ mass cement concrete in grade M - 10 (approx. corresp. To prop. 1:3:6) using granite quartzite trap metal of size 12mm to 25mm incl. consolidation curing with form work etc. complete.	5441.80	Cmt.	5441.80
3	6.50 Cmt.	Providing and Laying brick work using common burnt clay building bricks (Conventional)having crushing strength not less than 35 Kg./Sq.Cm in foundation and plinth in Cement Mortar. (1:6) (1 Cement : 6 fine sand)- (A)Conventional.	4214.33	Cmt.	27393.15
4	30.00 Rmt.	Providing & supplying ISI standard NP3 class R.C.C. Pipes (of sulphate resisting Cement) in standard lengths of following class and diameter suitable for either collar joints or rubbing ring joints including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyence to departmental stores, stacking etc. complete including lowering, laying & jointing of RCC pipes in C:M 1:1.5 in position, grade alignment as directed by engineer in charge including conveyence from stores to site of work, labour, giving hydraulic testing as per ISI code - 250mm dia NP3	630.24	Rmt.	18907.20

5	30.00	Providing, Supplying, Lowering and Laying in standard Rmt. length ISI mark rigid unplasticised PVC pipes suitable for potable water with ring fit joint including cost of rings, as per IS Specification no. 4985/1988 including all local and central taxes, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to the departmental stores and including cost of jointing material etc. complete.75 MM	110.41	Rmt.	3312.30
6	1.00	Testing of Recharge Pit by emptying a tanker of 8000 L Nos. and measuring the time as per the specifications and reporting of the same	707.00	Nos.	707.00
7	5.00	Filling in foundation and plinth with murrum or selected Cmt. soil in layers of 20cm. Thickness including watering, ramming and consolidating etc. complete (Upto 10 ton)	294.38	Cmt.	1471.90
8	3.00	Providing and fixing pre-cast Rubber Dye inter locking Smt. concrete block 60mm thick with grade of concrete M300 pneumatic compressed / Vibrated mechanically as per approved design confirming to IS 15658 : 2006 including 35mm sand layer for levelling and filling the joint with sand in proper line and level etc complete as per guidelines of IRC : SP 63 - 2018.	706.93	Smt	2120.79

- |    |      |   |      |   |           |      |           |
|----|------|---|------|---|-----------|------|-----------|
| 9  | 1.00 | For Genreal Area :- Horizontal Filtration Module is   | Nos. | Precast Modular Step well of M25 grade, designed to capture sediments primarily from surface runoff water. This Octagonal shape structure has a circumscribing diameter of approximately 918mm and a height of 1614mm. A part of the top module of is usually kept above the ground however same can be flushed with ground.100 / 150 mm are the available height options in case part of it has to be kept above the ground level. Top module accommodates indigenously designed 2-nos Array Filters to capture sediment effectively within the Horizontal Filtration Module. This easily removable array filters can be cleaned within or outside the module using pressurized water. Total filtration area of thisfilter is approximately 3000 cm2. Filtration capacity is 8m3 to 10m3 per hour. These module is installed prior to the Sand Filtration Module.The inlet and outlet of is 110mm diameter UPVC pipes connected with Sand Filtration Module.         | 104030.00 | Nos. | 104030.00 |
|    |      |   |      |   |           |      |           |
| 10 | 1.00 | For Genreal Area :- Sand Filtration Module M-25 grade | Nos. | cement concrete system for rainwater harvesting with SS 304 screen and natural filters. It consists of single module with internal volume of approximately 0.8 cubic metres that is to be fixed below ground level. The module is of an octagonal shape with a diameter of approximately 1000 mm below ground level. Total height of the system is 1614 mm. Filtration capacity & testing upto 8m3 to 10m3 per hour from modular systems only.The inlet and outlet of the system is 90mm diameter UPVC pipes. Module holds a filter media in the form of sand bed around a continuous slot fine aperture stainless screen (420 mm diameter and 240 or 300 mm length). Screen is fixed to the bottom slab and is fully covered by 0.10 cubic meter filtration sand with 40mm graded gravels. Screen creates entry points for the filtered water. This module is used for Surface water and the filtered water to get into is finally connected with the Recharge well. | 104030.00 | Nos. | 104030.00 |

11	1 Job	Submission and approval of survey, Hydrogeological investigations at number of locations in Dahod City, working Drawings including all layout sections, typical details, shop drawings, As-built drawings and submission of working drawings and implementation schedule as per priority given by Engineer-In-Charge for approval, etc. complete. Including 1) Detailed VLF profiling Survey work in a grid pattern2) Detailed Geophysical Resistivity Test &sub-surface micro-level VES Investigation work SelectedVLF anomalous point for pinpointing the most feasible location for Recharge& Roof Top Rain waterrecharge to be constructed in premises .3) G.P.S marking of each location by G.P.S. instrument4) Preparation & Submission of its completely detailed draft report showing recharge potential in theprescribed area along with their interpretations specification & designs with feasiblelocation,Physiography,drainage,Geological,Hydrological,Climate month wise details ,rainfalldata of last 20 years with drilling location,lithological cross section & submit its final reportMETHODS OF INVESTIGATION :- (1) Geophysical Investigation Method using Schlumberger configuration by Resistivity meter Model No SSR-MPL-1 Micro-processor(2) VLF instrument(3) Remote Sensing Method.(4) Geo-Electrical Resistivity Method by newly developed latest IXID software for more accuracy.(5) Geohydrological Micro-level Investigation.	18493.10	Job.	18493.10
12	1.00 Job.	Jobwork for cleaning of modules for every Premonsoon for once in years with inbuilt intergral ladder at 1125mm with safety by water cleaning system ,labours , hand bucket , lari & other tools i.e. Trikam , Pavda , Rassa , Battery , G.T. Salia etc.with disposing silt as shown places. Nothing extra to be paid for any insurance or depreciation of tools etc.	16160.00	Job.	16160.00
13	12.90 Smt.	Providing, fixing and fabricating of G.I. Chain Link Jali 10 Gauge Fencing with necessary fittings and having angle support of 50x50x6 mm thick and c/c. distance 6.00 between two column with loading, unloading, lead and lift. Including all labour and fitting work.	1219.07	Smt.	15726.003
			<b>Total Rs.</b>		<b>318458.51</b>
			<b>Say, As.</b>		<b>318500.00</b>



**KHAMBHAT MUNICIPALITY KHAMBHAT****Drilling of 250 mm dia X 60 meters deep bore by DR rig.****SCHEDULE-B 10.1**

<b>Item No.</b>	<b>Qty.</b>	<b>Description</b>	<b>Total Rate</b>	<b>Per</b>	<b>Amount</b>
1	60.00	Drilling pilot bore hole of size 250 / 300 mm at above village site in all strata by mud flush direct rotary rig	865.57	Mtr	51934.20
2	60.00	Reaming of 250 / 300 mm dia pilot bore hole to size 550 mm dia. including assembling, jointing, lowering of housing casing screen pipes & other assembly items with gravel packing and clay balls packing etc	535.30	Mtr	32118.00
3	1.00	Development of bore by air compressor of 600 cfm / 150 LS psi capacity for minimum 06 hours or up to the availability of sand free discharge	22427.05	LS	22427.05
4.A	42.00	Supply of 200 mm dia PVC casing pipe 'CM' type	1458.44	Mtr	61254.48
		Mtr			
4.B	18.00	Supply of 200 mm dia. UPVC casing pipe 'CM' type with slotting.	1458.44	Mtr	26251.92
		(II) Size: 1.0 mm Regular			
5	1.00	Bore clamps made from MS plate with 03 holes on either side with nuts & bolts of standard make & size 900 mm x 100 mm x 16 mm suitable to 250 mm dia. Pipe	2037.91	Pair	2037.91
		Pair			
6	1.00	Supply of Bore plug having 100 mm height made from M.S. Plate with 3 hole sate qual distance on circumference for nut-bolts type, locking arrangement with nut-bolts & lock nuts of std. Make complete from 5 thick M.S. Plate (For Tap also) suitable for 200 mm dia pipe	782.57	No.	782.57
		No.			
7	1.00	Supply of Bail plug UPVC of standard make suitable for 200 mm dia pipe.	830.27	No.	830.27
		No			

8	6.50	Supply of gravels of selected size 4 mm to 6 mm Cmt.	2049.29	Cmt.	13320.39
9	1.00	Electrologging of pilot bore Job	12120.00	Job	12120.00
10	1.00	Geohydrological ground water investigation charges No	14428.86	No	14428.86
11	2.00	Water sample chemical analysis charges. No	606.00	No	1212.00
					<b>Total, Rs. 238717.64</b>
					<b>Say, As. 238800.00</b>

**KHAMBHAT MUNICIPALITY KHAMBHAT**

Pumping Machinery For Borewell

**SCHEDULE-B 10.2**

DESCRIPTION	QTY.	UNIT	Total Rate	AMOUNT
<b><u>Item No. 1</u></b> Providing submersible pump setc onfirming to IS 9283 working at 3 phase , 400 / 440 volt , 50 cs / sec AC supply & 2900 RPM , category 8.0 with discharge : 800 LPM @ 72.0 Mtr head with 25.0 HP including GST	1.00	Set	40280.82	40280.82
<b><u>Item No. 2</u></b> Providing 21-30 HP ATS starter suitable for local & remote pump control application consisting of MPCB , over load relay and contactors as per type II coordinatio nincluding digital voltmeter , analogue ammeter with selector switch , run hour meter , required protectiv erelays & control acessories including GST.	1.00	No	24518.76	24518.76
<b><u>Item No. 3</u></b> Providing flat PVC copper submersible cable confirmaing to IS 694 , IEC 60227 / 60228 of size 1 x 3 x 10.0 mm <sup>2</sup>	50.00	Mtr	195.94	9797.00
<b><u>Item No. 4</u></b> Providing heavy duty UPVC Column pipe as per IS - 1239 with couplings , threaded at both ends of size 80 mm dia.	39.00	Mtr	403.66	15742.61
<b><u>Item No. 5</u></b> Lowering of submersible pump set complete with required no sandsize of column pipe erected by means of proper chain pulley block and pipe wrenches after checking of threads of each pipe and coupling to take the load of the pump set and pipe assembly filled with water up to 90 mtrs.	1.00	Job	707.00	707.00
<b><u>Item No. 6</u></b> Providing & fitting pipe type earthing having 150 cm long and 25 mm dia G I pipe with coupling & buch burried in specially prepared earth pit complete with necessary 8 SWG G I earth wire inclduing using charcoal / coke and salt in required quantity.	1.00	Job	994.85	994.85
<b><u>Item No. 7</u></b> Supply & installation of ISI mark C I double flanged hand wheel / cap operated sluice valve (PD type short body ) confirming to IS 14846 of PN 1.0 of 80 mm dia. Size & for supply,	1.00	Job	3509.80	3509.80
<b><u>Item No. 8</u></b> Supply & installation of non slam design CI dobule flanged single door wing type non return / reflux valve confirming to IS 5312 of PN 1.0 of 80 mm size as per specifications Supply as per	1.00	Job	4536.75	4536.75

**Item No. 9**

Providing & fitting M.S. clamps fabricated from M.S. plate with 03 holes on either side with nuts & bolts of standard make and suitable size of 450 mm x 65 mm x 10 mm flat suitable to 80 mm dia M S / Gipipe

2.00	Pair	654.47	1308.93
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**Item No. 10**

Approved make ELCB / RCCB conforming to IS 12640 and having sensitivity of 30 mA and short circuit with stand capacity of 6 KA and suitable for operation on three phase and neutral 415 V having characteristic of quick action and tripping with all advance features and do not incorporate any electronic component for following maximum rating

1.00	No.	2637.11	2637.11
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**40 Amps FP Cat I**

<b>Total, Rs.</b>	<b>104033.63</b>
<b>Say, As.</b>	<b>104100.00</b>

**KHAMBHAT MUNICIPALITY, KHAMBHAT****CONSTRUCTION OF PROPOSED FLAG POLE , AT KHAMBHAT.****SCHEDULE-B11**

<b>Item No.</b>	<b>Qty</b>	<b>Description</b>	<b>Total Rate</b>	<b>Unit</b>	<b>Amount</b>
1	4.88 Cmt.	Excavation for base footings upto depth 1.5 m. including sorting out and disposing of the excavated material upto 50 m lead (loose or soft soil)	122.94	Cmt.	599.95
2	2.38 Cmt.	Filling available excavated earth (excluding Rock) in trenches. Plinth, sides of foundations etc. in layers not exceeding 20cm. In depth consolidating each disposed layer by ramming and watering.	136.92	Cmt.	325.87
3	0.71 Cmt.	Providing and laying cement concrete 1:3:6 (1 Cement : 3 coarse sand : 6 Crushed stone aggregates 20 mm nominal size) and curing complete excluding cost of form work in (A) Foundation and plinth.	3095.25	Cmt.	2197.63
4	1.25 Cmt.	Brick work using common burnt clay building bricks having crushing strength not less than 35 kg./Sq.Cm. in foundation and plinth in Cement Mortar 1:6 (1- Cement : 6 -fine sand)(B) Conventional	4496.05	Cmt.	5620.06
5	1.32 Cmt.	Providing and laying controlled cement concrete M.200 and curing complete excluding the cost of formwork and reinforcement for reinforced concrete work in (A) Foundations, footings, Base of columns and Mass concrete	4465.21	Cmt.	5894.08
6	169.50 Kg.	T.M.T. Bars Providing ISI Mark TMT Bar Fe-500 Reinforcement for R.C.C work including bending, binding and placing in position etc. complete for all Floors.	77.29	Kg.	13100.66

7	6.00 Smt.	Providing 15mm thick cement plaster in single coat on Rough (Similar)side of single or half brick walls for interior plastering upto floor two level and finished even and smooth in (i) Cement mortar 1:3 (1-cement:3-sand) Extra over items 58 to 64 for finishing with a floating coat of neat cement slurry.	232.68	Smt.	1396.08
8	6.50 Smt.	Providing and laying polished Granite tiles 18 mm thick in risers of steps, skirting Dedo and pillars laid on 10 mm thick cement mortar 1 : 3 (1 cement : 3 course sand) and jointed with gray cement slurry mixed with pigment to match the shade of slab including rubbing, polishing, Moulding etc. complete. For Flooring, Doors & Windows Edges.	1633.17	Smt.	10615.61
9	1.00 Nos	providing and fixing falg hosting pole made out of minimum dia of 4" hollow pipe with minimum height of 7.60 meter above garound level and anchor in ground at appropriate deptha of minimum and labour and traansport charges ets complete as directed by engineer in charged	10201.00	Nos	10201.00
10	1.00 Ea	India National Flag 20' X 30' Giant Indian National Flag of size 20' X 30' in 100 % Knitted Polyester, With reinforced super-strong nylon webbing on all 3 sides & eyelets.	55550.00	Ea	55550.00
					<b>Total, Rs. 105500.94</b>
					<b>Say, Rs. 105510.00</b>

**KHAMBHAT MUNICIPALITY, KHAMBHAT**

**ESTIMATE FOR PROPOSED GARDENING, HOLTICULTURAL & PLANTATION WORK AT KHAMBHAT**

**SCHEDULE-B-12**

<b>Sr No</b>	<b>Item Description</b>	<b>Qty</b>	<b>Unit</b>	<b>Rate</b>	<b>Total Amount</b>
1	Development of lawn including excavation of area up to 150 to 200 mm depth as per requirement and disposal of same outside premises, removing of weeds, cleaning, spreading garden soil, organic fertilizer and mixing same, applying anti termite insecticides, supplying and laying of carpet lawn, watering. And maintain up to two month.(supplying of required quantity of carpet lawn shall be in the scope of contractor).(With Two Years of Maintenance including Replacement of Damage Plant, lawn Etc With Required insecticides, pesticides, Fertilizer etc Complete as Directed By EIC.)	278.00	Smt	450.00	125100.00
2	Development of shrubs and flower bed at the location directed by officer in charge including required pit size up to 2*2*2 feet as per required disposal of same out sidepremises ,removing of weed cleaning , filling garden soil ,organic fertilizer mixing the same applying anti termite treatment and planting plants as required ,watering and maintaining the flower beds for period of two months.(supply required quantity of plants and shrubs shall be in scope of contractor).variety of shrubs as per index. (With Two Years of Maintenance including Replacement of Damage Plant, lawn Etc With Required insecticides, pesticides, Fertilizer etc Complete as Directed By EIC.)	69.50	Smt	300.00	20850.00
3	Plantation of various hedge plants, saplings including excavation trench of 9 inch depth an width, filling with garden soil and organic fertilizer, applying anti termite insecticides as required, plantation of different variety hedge plants at distance of 8 inch to 2 feet between plants (supply of required hedge plants and sapling shall be in the scope of contractor). (With Two Years of Maintanance including Replacement of Damage Plant,laWN Etc With Required insectisides, pestisides, Fertilizer etc Complete as Directed By EIC.)	120.00	Rmt	250.00	30000.00
4	Supply and plantation of palm and exotic plants and focus variety for including 2*2*2 pit filling with garden soil, mix with organic fertilizer and termite pesticides ,watering and maintain up to two months.(supply of require quantity of palm, exotic plants and focus variety in the scope of contractor).plants list as per Index (With Two Years of Maintenance including Replacement of Damage Plant, lawn Etc With Required insecticides, pesticides, Fertilizer etc Complete as Directed By EIC.)	15.00	Nos	2000.00	30000.00
5	Supply and plantation of trees at various garden and places including 2*2*2 pit filling with garden soil, mix with organic fertilizer and termite pesticides, watering and maintain up to two months (supply of require quantity of trees in the scope of contractor). Trees lists as per index(Bamboo) (With Two Years of Maintenance including Replacement of Damage Plant, lawn Etc With Required insecticides, pesticides, Fertilizer etc Complete as Directed By EIC.).	15.00	Nos	1500.00	22500.00
<b>Total Rs.</b>					<b>228450.00</b>

Say Rs. 228500.00



BALASINOR MUNICIPALITY BALASINOR					
Electrification Work					
SCHEDULE-B13					
Sr No.	Description	Qty	Unit	Total Rate	Amount
1	Point wiring for Light / Bell with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires up to 10 mtr length , in below type of pipe erected with 6A Modular type switch / bell push & accessories and earth continuity of following type, erected on PVC / Metallic/Wooden box, single mounting base frame covered with textured/metallic/white front plate modules erected on / in wall / ceiling as per pipe erected, with necessary Lamp holder/ceiling rose / H.D.Connector as directed. (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete Cat. III	222.00	Pt.	485.81	107849.82
2	Point wiring for Tissino / Modular secondary light point with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires, in below type of pipe to be erected complete with earth continuity and necessary connection with primary light with accessories erected on Metal / PVC / wooden box covered with 3 mm thick PC(Polycarbonate) / Acrylic sheet for open / concealed wiring. with necessary Lamp holder / ceiling rose / H.D.Connector as directed. Note:- Maximum up to 6 mtrs length, excess will be considered as Mains for Secondary Point. (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete	178.00	Pt.	167.66	29843.48
3	Point wiring for FAN with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (Green) both are of .ISI marked 1.1 KV Grade FRLS PVC insulated multi strand copper wires up to 10 mtr length, in below type of pipe erected with 6A Modular type switch and hum free EME step type electronic fan regulator mounted and accessories with earth continuity of following type erected on PVC / Metallic/Wooden box, single mounting base frame covered with textured/metallic/white front plate modules erected on / in wall / ceiling as per pipe erected. with necessary ceiling rose / H.D.Connector as directed. (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete	57.00	Pt.	638.32	36384.24
4	Point wiring for Individual Plug with & earth wire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires up to 10 mtr length, in below type of pipe erected complete with Modular type switch & 5 pin Plug erected on PVC / Metallic/Wooden box covered with appropriate front plate modules erected on / in wall / ceiling as per pipe erected with following type of accessories.				

Sr No.	Description	Qty	Unit	Total Rate	Amount
	[I] For 6A Plug and 6 a switch with 2-1.5 sq.mm Cu. Wire from nearby switchboard/mcb db board (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete	86.00	Pt.	510.05	43864.30
4.1	[II] For 16A Plug and 16 amp switch with 2-2.5 sq.mm Cu. Wire from mcb db board. (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete Cat. III	29.00	Pt.	745.38	21616.02
5	Point wiring for on board Looped Plug with 6A Modular type switch & 5 pin socket erected on PVC / Metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate modules erected on / in wall / ceiling with following type accessories Cat. III	6.00	Pt.	257.55	1545.30
6	Point wiring for Two Way Controlled Light Point with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (green) both are of .ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires erected in below type of pipe with 6A Modular type switches and following type of accessories erected on PVC / Metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate modules erected on / in wall / ceiling as per pipe erected. with necessary batten/angle holder or ceiling rose or H.D.Connector as directed. (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete CAT. III	10.00	Pt.	603.98	6039.80
7	Providing following type of Modular Type Accessories mounted with PVC / metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate , modules erected with necessary connections as per site situation directed by Engineer In charge.				
	(1)One No. SP 6 Amp. Cat.III	38.00	Ea.	151.50	5757.00
7.1	(2) One No 5 pin plug Cat.III	76.00	Ea.	151.50	11514.00
7.2	(3) Two Pin/RJ-11 [A] For One Gang Telephone Socket Cat.III	26.00	Ea.	160.59	4175.34
7.3	(4) TV Co-axial Socket outlet Cat.III	4.00	Ea.	160.59	642.36
7.4	(8) Computer RJ-45 socket Cat.III	38.00	Ea.	160.59	6102.42
7.5	(7) Blank Plate Single Cat.III	5.00	Ea.	25.25	126.25
7.6	(9) 16 Amp. SP one way switch Cat.III	5.00	Ea.	180.79	903.95
7.7	(10) 6/16Amp. Universal socket Cat.III	5.00	Ea.	199.98	999.90
8	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 (h) 25 mm	2750.00	Mtr.	33.33	91657.50

Sr No.	Description	Qty	Unit	Total Rate	Amount
9	Providing and erecting 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	1750.00	Mtr.	62.62	109585.00
9.1	(b) 2 wire 2.5 sq. mm	2160.00	Mtr.	82.82	178891.20
10	Supplying & erecting M.S. Box having 16 Gauge painted with red oxide or Heavy duty PVC box erected flushed on wall or concealed in wall with necessary plastering & finishing as directed of following size. (b) 175 mm x 100 mm x 75 mm(d)	4.00	No.	76.76	307.04
11	Providing and erecting Sheet Steel powder coated MCB distribution board - flush / surface mounted fitted with busbar, neutral link, earth bar and DIN rail, Conforms to IS 8623-1 & 3, IEC 61439-1 & 3 without MCB to house appropriate nos. of MCBs.(The DBs should be used of same company of MCB to be used) suitable for (B) three phase incoming and single phase horizontal type outgoing Per phase isolation type (PPI) (b) sheet steel double door				
	(iv)12 way	2.00	Ea	3874.36	7748.72
11.1	(iii)8 way	9.00	Ea	3412.79	30715.11
12	Providing & erecting Switch board for Computer or electric apparatus consisting of following modular type accessories mounted with PVC / Metallic concealed/open box with single mounting base frame covered with textured/metallic /white front plate,modules erected with necessary connections as directed 1 no. 6A/16A universal plug-switch combined. 3 nos. 6A Switch 3 nos. 6A 5 pin Plug For Modular Type Accessories	38.00	Ea	1133.22	43062.36
13	Supplying & erecting approved make LAN cable of following size in existing pipe as per direction [C] CAT - 6	560.00	Mtr.	47.47	26583.20
14	Supplying & erecting Approved make call bell indicator with buzzing sound and Red light indicating lamp with Red light button to attend the call suitable for 240 v 50 c/s supply to be erected.	10.00	No.	148.47	1484.70
15	Supplying & erecting approved make Telephone Cable electrolytic copper conductor PE insulation twisted in two pairs, & wrapped with FRLS PVC tape & sheathed with FRLS PVC or HFFR outer Jacket suitable for telephone wiring & confirming to C-DOT erected in existing pipe. of following size of conductors & nos.of pairs. With necessary connections. [A] Conductor Size 0.5 mm (2) Two Pairs	450.00	Mtr.	20.20	9090.00
16	Supplying & erecting Electronic Type Cordless Call Bell erected on PVC/Metal board having portable bell push working on D.C. & bell on 230V A.C. supply with cells / battery	15.00	Ea	250.48	3757.20

Sr No.	Description	Qty	Unit	Total Rate	Amount
17	providing and erecting Miniature circuit breaker single pole 6A to 25A 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	162.00	Ea	112.11	18161.82
18	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	13.00	Ea	595.90	7746.70
18.1	(b)40 Amp. Cat.III	10.00	Ea	668.62	6686.20
18.2	(c)63 Amp. Cat.III	11.00	Ea	737.30	8110.30
19	providing and erecting Approved make RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 10 KA and suitable for operation on single phase 240 V,50Hz. 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	15.00	Ea	1969.50	29542.50
19.1	(ii) 40Amps. DP Cat. III	12.00	Ea	2235.13	26821.56
20	Supplying & fixing box for housing RCCB + MCB combination made of 18 SWG sheet steel duly powder coated with gasket, dust & vermin proof bakelite shield two earthing terminals for following type of RCCB. RCCB + MCB [b] For 4 Pole	8.00	Ea	446.42	3571.36
21	Providing and erecting Approved make RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 10 KA and suitable for operation on 3 phase and neutral 415V,50Hz. having characteristic of quick action & tripping with all advance feature & do not incorporate any electronic component for following Max. rating erected as directed. [f] 63A, 4 pole Three Phase Cat. II	8.00	Ea	2834.06	22672.48
22	Supplying and erecting triple pole & neutral 440V/ 500V panel mounting Aluminium Busbars with four equal Nos. of bus having current density not more than 0.8 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 busbar,erected in existing cubical panel with necessary connections. (D) Suitable for 400 Amp. Capacity	3.00	Rn.Mtr	2204.83	6614.49
23	Providing and erecting required size Aluminium strip for earthing of H.T. , OCB / ACB / Transformer, LT panel board, Motors etc. using copper clamp.	10.00	Kg.	225.23	2252.30

Sr No.	Description	Qty	Unit	Total Rate	Amount
24	Supplying & erecting earth pit of minimum bore dia.150mm size approved make Earthing Electrode consisting Pipe-in-Pipe Technology as per IS 3043-1987 made of corrosion free hot dipped G.I.Pipes having Outer pipe dia of 50mm having 80-200 Micron galvanising, Inner pipe dia of 25 mm having 200-250 Micron galvanising, connection terminal dia of 12mm with constant ohmic value surrounded by highly conductive compound with high charge dissipation suitable for following type of applications with chamber and heavy duty cover. (A)(approved make OEM has to submit test certificate including value of earth resistance of installation duly stamped and signed by agency and officer Incharge has to ensure the value of earthing resistance mentioned in test Certificate) & having back filling compound of (B) Inner chemical (CCM Compound)- Resistivity:- 0.2 ohm / meter testing as per IEC 62561-2017, Voltage drop:- < 1 volt at no load & dry form, Sulphur content:- <2%(C) Back fill Compound :- Earthing compound should be capable to retain moisture for long time Necessary test report must be submitted by Agency. (c) For Electrical Installation covering Transformer Neutrals, Lightning arrester Earthing, A.C.Plant & Sensitive Computer System(like Automation, SCADA) i.e independent Earthing in normal soil. Length of Pipe : 3.00 mtrs Back filling Compound :2 nos Bags of 25 Kg.	12.00	Ea.	8636.51	103638.12
25	Providing & erecting 415 V MCB three Pole for Motor & Inductive Load (C Curve) having 10KA breaking capacity & conforms to IS :8828 in existing box having following capacity (b)40 Amp. Cat.III	2.00	Ea.	647.41	1294.82
26	Providing and erecting XLPE(IS:7098)(I)-88 ISI armoured cable multistrand Aluminium conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe of following size of cables				
	(C) 3 1/2 core 50 Sq. mm ( 25 Sq.1/2 mm core)	25.00	Mtr.	284.82	7120.50
26.1	(D) 3 1/2 core 70 Sq. mm ( 35 Sq. mm 1/2 core)	40.00	Mtr.	378.75	15150.00
27	Providing and erecting XLPE(IS:7098)(I)-88 ISI armoured cable multistrand / Solid 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. (C) 4 core 6 Sq. mm	350.00	Mtr.	510.05	178517.50
28	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. (A) 4 core 10 Sq. mm	750.00	Mtr.	676.70	507525.00
29	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 (B) 4 core 6 Sq. mm	150.00	Mtr.	126.25	18937.50

Sr No.	Description	Qty	Unit	Total Rate	Amount
30	Providing and erecting XLPE(IS:7098)(I)-88 ISI armoured cable multistrand Aluminium conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe of following size of cables (F) 3 1/2 core 120 Sq. mm ( 70 Sq. mm 1/2 core)	35.00	Mtr.	540.35	18912.25
31	Making trench in soft soil of suitable width of 90 cm deep for laying cable or locating the fault all over the run and back filling the same and making the surface as normal ground.	20.00	Mtr.	55.55	1111.00
32	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	100.00	Mtr.	62.62	6262.00
33	Supply, Installation, Testing and Commissioning of suitable sweep, BEE 5 Star rated, Ceiling fan with Brush Less Direct Current (BLDC) permanent ferrite magnet Motor, class of insulation: B, Rust free 3 nos.Aluminium blades, 2 nos. canopies, shackle kit with earthing provision, copper winding, Power factor not < 0.9, Service Value (CMM/W) minimum 6.85, Air delivery minimum 215 CMM, 350 RPM,230v (tolerance as per IS : 374-2019), THD < 10%, with remote unit for Speed Control and all remaining accessories including safety pin, nut bolts, washers, temperature rise = 75 degree C (Max.), suitable for 140 to 285 Voltage and rectifier circuit with surge, over current and overload protection , 50 Hz, Single phase AC Supply, earthing etc. Complete as required.[ Make shall be approved by Engineer in Charge] (B) 1200 mm Sweep (48")	60.00	Ea	2885.57	173134.20
34	Supplying & erecting single phase approved make industrial exhaust fan suitable for medium duty ring mounted low noise operation suitable for medium duty having following dia size and maximum speed in RPM [A] 305 mm dia 900 RPM	12.00	Ea	2054.34	24652.08
35	Supplying and erecting 19 / 20 mm. nominal bore Medium Class M.S. Pipe down rod erected duly painted for fan complete <b>with proper insulation without leakage</b> and earthing.	60.00	Ea	108.07	6484.20
36	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.	60.00	Ea.	108.07	6484.20
37	Providing 2.5mm.thick laminated acrylic sheet to cover the fan hook or Fan box.	60.00	Ea	18.18	1090.80

Sr No.	Description	Qty	Unit	Total Rate	Amount
38	Supplying & erecting single phase approved make industrial exhaust fan suitable for medium duty ring mounted low noise operation suitable for medium duty having following dia size and maximum speed in RPM	12.00	Ea	2054.34	24652.08
39	Providing suitable M.S. louver shutter of the Exhaust fan.	12.00	Ea	368.65	4423.80
40	<p>Supply of approved make FRP Pole having following specifications: FRP Light Pole made by CNC filament winding machine using thermoset resin polyester/epoxy resin system) having minimum 62% glass content. The pole should be in one piece and tapered round in shape, having smooth finish and should be totally free from corrosion as well as non conductive &amp; shock proof Pole should be provided with FRP Anchor Base and it should be heavy duty, or MS Material duly painted with Epoxy paint.</p> <p>Pole should be flame retardant as per IS 6746. Resin used shall be UV resistance and pigmented. A highly weather resistant polyurethane coating shall be applied to the pole after applying suitable primer system that ensures proper adhesion of the paint. Minimum coating thickness shall be 80 to 100 micron. Deflection of the pole shall not exceed more than 10% of the length of pole for the given load" Pole should be generally made as per the dimensional data, performance criteria and some interchangeability features of poles as per standard ANSI C 136.20 latest version or ASTM D 4923/01 including cable termination box with necessary accessories . The size of pole and type of installation with foundation as per manufacturer details and site requirement are as below .</p> <p>(1) Suitable for base plate mounting single arm Bracket. [D] Overall length of 4 Mtr. Average Thickness: 7mm.</p> <p>Top/ Bottom OD Dia A/F 89/145 mm <math>\pm</math> 2mm approx. Approx. Weight of Pole 19 kg approx. (Without Base) Anchor Base (Size 250X250 &amp; 12mm th.)</p>	12.00	Ea	9792.96	117515.52
41	<p>Providing 1:2:4 cement concrete foundation &amp; 70 % PCC from bottom including excavation for the pole of size 45 x 45 x 100 cm. Deep in below ground level with plinth of 45 cm x 45 cm (or 45 cm dia x 45 cm) high upper ground level with necessary curing and finishing in approved manner.</p> <p>( for 4 &amp; 6 mtr pole)</p>	12.00	Ea	809.01	9708.12

Sr No.	Description	Qty	Unit	Total Rate	Amount
42	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 160V to 270V, Power Factor more than 0.95, THD < 15%, CCT 3000 K to 6500K, Luminaire efficacy> 85 lumens/watt ,LED LED driver efficiency > 85 % ( 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. (A) Tube Light with integral driver	127.00	Ea	373.70	47459.90
43	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 pressure die cast powder coated and high U.V. & corrosion resistance with diffuser housed in aluminium casted body with company mark/name 160V to 270V,Power Factor more than 0.95, THD < 15 %, CCT 3000 K to 6500K, Luminaire efficacy> 85 lumens/watt , LED driver efficiency > 85 % ( 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.) (A) Square/ Circular shaped Surface/Recessed Mount Downlight with provision for spring				
	(iv) 22-24 watts, Surge-2 KV Cat-III	71.00	Ea	758.51	53854.21
43.1	(ii) 11-15 watts, Surge-2 KV Cat-III	39.00	Ea	427.23	16661.97
43.2	(i) 5-9 watts,Surge-2 KV Cat-III	16.00	Ea	220.18	3522.88
43.3	(B) LED Panel Light with provision for Plane front frame with translucent cover fixed to housing complete.IP20 (vii) from 45 to 48 watts. 24" x 24". Surge-2 KV Cat-III	51.00	Ea	2091.71	106677.21



Sr No.	Description	Qty	Unit	Total Rate	Amount
44	Supplying and erecting LED street light / Flood light fittings with High power White LEDs wattage of 3 Watt and above assembled on single MCPCB, efficiency more than 130 lm/w and corrosion free High pressure die cast aluminum housing with smooth finish powder coated and heat sink extruded aluminium with diffuser and Polycarbonate optics/ lenses, with toughened glass with company mark/name engraved or embossed 160 to 270 V,Power Factor more than 0.95, THD < 10 %, CCT 3000 K to 5700K,Uniformity ratio >0.45, Luminaire efficacy> 100 lumens/watt . LED driver efficiency > 85 %.( fittings required LM-79 & LM-80 certificates)(NOTE: Below description have shown ranges of Wattage capacity of LED fittings.The Engineer incharge may select any wattage capacity between the ranges shown.) (C) Post Top Lantern LED fitting comprises of finish cast aluminum spigot and spun aluminum canopy fixed with opal polycarbonate, pipe arrangement for vertical mounting driver and accessories wired upto terminal block.IP 65 (ii)32-40W Cat-III	12.00	Ea	4819.72	57836.64
45	Providing & erecting weather proof, dust & vermin proof, floor mounted front operated indoor type cubical panel board necessary IP-42 and above protection as per approval from engineer incharge 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 accesories , supporting angles/ flats channel 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, suitable size of inter connecting PVC copper wire / copper-aluminium strips, rubber grommets, rib, bakelite control fuses/MCB for measuring instruments, earth bus & earth bolts, foundation flange - bolts-base Plates, sufficient nos. of hinged doors, handles with locking arrangement and rubber gasket,heavy duty end terminal connection,danger notice board,necessary ventilation,earthing strip 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. (C) The standard companies switch gear shall be used and only manufacturers as per IEC 61439 for beneficial use. (i) with 350mm depth	5.00	Sq.Mtr	16392.30	81961.50
46	Providing and erecting Approved make Four pole moulded case circuit breaker having breaking capacity ICU of 35 KA. and above at 415 V . having normal current rating 250A. with variable thermal & magnetic release suitable to work on A.C.supply 50 c/s. with all internal connections, spreader tinned copper & complete erected in existing 16 G.M.S. housing. ICS=100% of ICU only Cat III	3.00	Ea.	20946.39	62839.17

Sr No.	Description	Qty	Unit	Total Rate	Amount
47	Providing and erecting Approved make Four pole moulded case circuit breaker having breaking capacity ICU of 50 KA and above at 415 V having Normal current rating 400A. with variable Thermal & magnetic release suitable to work on A.C.supply 50 c/s. With all internal connections, spreader tinned copper & complete erected in existing 16 G.M.S. housing. ICS=100% of ICU only Cat III	2.00	Ea.	25228.79	50457.58
48	Providing & Erecting full SS Body (SS 304) Split type water cooler having storage capacity 160 to 175 Ltr.(Tank SS 304) & Cooling capacity 150 ltr. Per hour @ an ambient temp of 350 C.The outlet temp. of the water should drop by 150C within a hour,The water cooler should be comprising of hermetically sealed Reciprocating compressor with R134A, fan motor, Copper Condensing unit with company fabricated Outdoor Unit water tank surrounded by evaporating coil, thermostats, relay etc.complete with necessary copper tube & Insulation, M.S Chancel Stand with Painting for water tank & M.S. Powder Coated Stand for Outdoor unit with Installation. With DPCLCB and 4 Way DB Box with accessory Three core Cord for connection.	2.00	Ea	61115.10	122230.20
49	Supplying & erecting reverse osmosis (RO) water purification system with M.S. powder coated pedestal frame, prefilter housing carbon filter suitable buster DC pump, auto low & high pressure switches with following size of LPH capacity & erected as directed [E] 200 LPH with 1 phase / 3 phase Raw water pump of 1000LPH @ 2.5kg/cm2 (1No - Kirloskar/CRI/Lubi) , Dual media filter 10"x54" (1 No), Micron catridge filter 20" x 2.5" - (1No), High pressure pump 1000LPH @ 10kg/cm2 - (1No - Shinge /CRI /Lubi) , RO Membrane housing with RO membrane of 40*40 - ( 1 No),RO pressure tube 4" x 1E-(1No), 0-1200LPH Rotameter-(2 Nos) Recovery Rate 50%	2.00	Ea	15707.52	31415.04
50	Providing & erecting open well horizontal mono block pump set with cast iron body, complete for three phase submersible motor having [C] For 3 HP 3 phase open well horizontal mono block pump set suitable for 85 LPM to 270 LPM @ 11 mtr to 33 mtr head suitable for 50/65 mm dia delivery pipe Cat-II	1.00	Nos	15707.52	15707.52
50.1	[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	1.00	Nos	18746.61	18746.61
51	Supplying and erecting Direct - On - Line Starter with 18 A. rating contactor and with 3.5 Amp. 18A range directly operated in totally insulated elegant enclosure for single phase operation up to 3 HP as per IS 13947 complete erected on P.W. Block with necessary connection Cat-III	2.00	Nos	2100.80	4201.60
52	Supplying & erecting approved make Automatic liquid level controller 6A. with sensor testing as per instruction of Engineer in charge on site complete with wiring connection with existing wires , with copper conductor from pump to upper and lower tank.	2.00	Nos	2355.32	4710.64

Sr No.	Description	Qty	Unit	Total Rate	Amount
53	Providing and erecting Inverter based approved make split air-conditioning unit consisting of condensing unit with variable speed fan motor, inverter type hermetically sealed rotary compressor with accessories etc. duly connected separately erected evaporating unit and blower motor with its accessories by means of extra supplied proper insulated copper tubing, drain PVC pipes suitable for ( cost includes Eco Friendly green gas charging and 15A plug top & Remote Control & MS Stand) with necessary core cutting. <b>(2) For 4/5 Star Rating of current year, (C) for 1.7 to 2 ton capacity</b>	10.00	Nos	63765.34	637653.40
54	GEB Connection Charge As per GEB Receipts - Agency will not claim extra charges for GEB Connection. and Quoted Rate % Above & Below not Consider in this Charges	1.00	LS		50000.00
		<b>Total Amount</b>			<b>3504975.68</b>
		<b>Say Total Amount</b>			<b>3505000.00</b>

**KHAMBHAT MUNICIPALITY, KHAMBHAT**

**PROVIDING SUPPLYING AND FIXING FURNITURE ITEMS KHAMBHAT MUNICIPAL BUILDING AT  
KHAMBHAT.**

**SCHEDULE-B14**

<b>Item No.</b>	<b>Qty.</b>	<b>Description</b>	<b>Rate With Labour Cess 1 %</b>	<b>Unit</b>	<b>Amount</b>
1	26.00 Nos.	Providing and supplying and arranging table Top and side of overall thickness 38 mm made from 18 mm thick MR grade plywood with 1 mm thick decorative laminate on exposed faces and specified thick glass on top by EIC and 0.8 mm thick laminates as liner with TW border patti . legs to be made from 50mm x 50mmx 1.6 mm thick CRC Square pipe and supporting pipe 50mm x 25mm x 1.6mm with 50 micron epoxy powder coating with levelar.appron to be made from 18mm thick MR grade plywood and finish with 1mm thick laminate sheet on both side. drawer unit 450 mm X 550 mm X 600 mm (3 Nos.) & storage unit 450 mm X 550 mm X 600 mm (H) having all structure 18 mm thick MR grade plywood and finish with 1mm thick decorative laminate on exposed faces and 0.8 mm thick balancing laminate as liner of specified size drawer slides on ebco make telescopic channel with locking arrangement the item includes all materials, labour, taxes & consumable etc.Complete as per drawing and instruction of engineer-in charge . Size 0.90 mt. X 1.80mt. X 0.75 mt.(H)	14400.00	Nos.	374400.00
2	2.00 Nos.	Providing and supplying and arranging modified office table Top and side of overall thickness 38 mm made from 18 mm thick MR grade plywood with 1 mm thick decorative laminate on exposed side and 0.8 mm thick laminates as liner with TW border patti apron to be made from 18mm thick MR grade plywood and finish with 1mm thick laminate sheet on both side. legs to be made from 50mm x 50mmx 1.6 mm& other framing work of 50mm x 25mm x 1.6mm size CRC MS PIPE with 50 micron epoxy powder coating. the item includes all materials, labour, taxes & consumable etc.Complete as per drawing and instruction of engineer-in charge . Size 0.90 mt. X 2.15 mt. X 0.75 mt.(H)	180000.00	Nos.	360000.00

3	15.00 Nos.	Providing and supplying and arranging table Top and side of overall thickness 38 mm made from 18 mm thick MR grade plywood with 1 mm thick decorative laminate on exposed side and 0.8 mm thick laminates as liner with TW border patti apron to be made from 18mm thick MR grade plywood and finish with 1mm thick laminate sheet on both side. legs to be made from 50mm x 50mm x 1.6 mm & other framing work of 50mm x 25mm x 1.6mm size CRC MS PIPE with 50 micron epoxy powder coating. the item includes all materials, labour, taxes & consumable etc. Complete as per drawing and instruction of engineer-in charge . Size 0.90 mt. X 1.80mt. X 0.75 mt.(H)	14000.00	Nos.	210000.00
4	40.00 Nos.	Providing , supplying and placing fully glazed openable door unit of size Width 890 x Depth 520 x Height 1980 mm having back, sides and door to be made from 0.7 mm(+ or - 0.07mm )made up with Durable cold-rolled steel plate construction and Powder-coated to resist corrosion. and 4 mm thick float plain glass door, lever cam lock , SS handle to be provided & having 4 nos of adjustable full shelves of uniformly distributed load capacity of 40.00 kg and each shelf shall be A4 size Box File ( 85 w x 345 H X 285 D ) & clear space above 5th shelf shall be 220 mm. Whole unit shall be Epoxy polyester powder coated of 50 micron thickness. Overall Glass book Storage size 890 mm X 520 mm X 1980 mm(H).	21600.00	Nos.	864000.00
5	21.00 Nos.	Providing & Supplying Wooden Cub Board for File Storage of 1750 (L) X 450 (W) X 760 (H) mm using 19mm thick WP plywood & 25 X 12, 50 X 12mm teak wood patti, formica, magnet, stopper, handles, fixtures & fastenings, including cost of all material & Labours, with one coat primer & two coats Oil Painting inside etc., complete as per detail approved drawing & as directed by the Purchase Authority.	20000.00	Nos.	420000.00
6	5.00 Nos.	Providing and supplying tea table made from 37mm x 37 mm Indian teakwood leg and top frame made from 37mm x 75mm Indian teakwood having 18mm thick Ply and 4mm thick Veneer with melamine polish on top and 0.8m thick balancing laminate on bottom. All teakwood surface to be melamine polish Including all materials and labour etc. Complete as per drawing and instruction of engineer-in charge. overall size 900mm x 600mm x 450mm (H)	8000.00	Nos.	40000.00

7	112.00 Nos.	Providing and supplying fix chair structure CRC M.S. pipe of 20mm dia and 16 guage with 50 micron powder coating frame seat and back 40 density PU foam covered with fabric of approved shade and texture ( MiNi-250 RS. Mtr.)with one year replacement warranty.Wooden armrest as per approved design.complete chair should be in suitable shape Including all materials and labour ect.Complete as per drawing and instruction of engineer-in charge.	2800.00	Nos.	313600.00
8	72.00 Nos.	Supplying and Arranging Low Back Chair with SEAT/BACK ASSEMBLY: The seat and back are made up of 1.2 cm thick hot pressed plywood, upholstered with fabric and moulded Polyurethane foam. The complete back is contoured to provide the needed lumbar support for long seating hours. The seat is made up of moulded foam, upholstered with fabric. Foam density 45 +/- 5 kg/m3 and Hardness = 14+/-2 on Hampden machine at 25% compression. ARMRESTS: The Arm rest is injection moulded in Polypropylene fitted to the seat base SYNCHRO MECHANISM: The mechanism installed for this chair is a Synchro-1 mechanism. This mechanism provides you with the utmost comfort while leaning backwards. There is a displacement in the ratio of 1:3 between seat and back respectively The Synchro mechanism is designed with 360 Degree revolving feature, Tilt tension adjustment and Upright locking. PNEUMATIC HEIGHT ADJUSTMENT: The pneumatic height adjustment has an adjustment stroke of 12 cm. TELESCOPIC BELLOW ASSEMBLY: The bellow is 3 piece telescopic type and injection moulded in black Polypropylene. PEDESTAL ASSEMBLY: The pedestal is made of nylon with glass reinforcement and fitted with 5 nos. twin wheel castors.(castor wheel día. 5.0cm.) TWIN WHEEL CASTORS: The twin wheel castors are injection moulded in 30% Glass Filled black Nylon. Back size 44cm W X 47cm H Seat Size 52 cm W X 48 cm D Effective back ht 47 cm. as per drawing / Photograph at site of work as required & directed etc. complete.	8400.00	Nos.	604800.00
9	2.00 Nos.	Supplying and Arranging Medium Back Chair with SEAT/BACK ASSEMBLY: The seat and back are made up of 12 mm thick hot pressed plywood, upholstered with fabric and moulded Polyurethane foam. The complete back is contoured to provide the needed lumbar support for long seating hours. The seat is made up of moulded foam, upholstered with fabric. Foam density 45 +/- 5 kg/m3 and Hardness = 14+/-2 on Hampden machine at 25% compression. ARMRESTS: The Arm rest is injection moulded in			

Polypropylene fitted to the seat base. SYNCHRO MECHANISM: The mechanism installed for this chair is a Synchro-1 mechanism. This mechanism provides you with the utmost comfort while leaning backwards. There is a displacement in the ratio of 1:3 between seat and back respectively The Synchro mechanism is designed with 360 Degree revolving feature, Tilt tension adjustment and Upright locking.

PNEUMATIC HEIGHT ADJUSTMENT: The pneumatic height adjustment has an adjustment stroke of 12 cm. TELESCOPIC BELLOW

ASSEMBLY: The bellow is 3 piece telescopic type and injection moulded in black Polypropylene. PEDESTAL ASSEMBLY: The pedestal is made of nylon with glass reinforcement and fitted with 5 nos. twin wheel castors.(castor wheel dia. 5.0cm.)

TWIN WHEEL CASTORS: The twin wheel castors are injection moulded in 30% Glass Filled black Nylon. Back size 49cm W X 63cmH Seat Size 48 cm W X 47 cm D

Effective back ht 50cm. as per drawing / Photograph at site of work as required & directed etc. complete

15200.00 Nos. 30400.00

- 10 14.00 Nos. Providing and supplying three seater wooden sofa made of Indian teak wood with melamine polish.seat made from 4 inch thick 40 desity foam with 1" supersoft HD covered for softness.seat to be capt on Heavy density naylon elastic belt.inside Framing 2"x 1.6"support.Outer frame 3" x 1.6". Back 3" thick 40 density foam with 12mm supersoft HD coverd for softness seat and back covered with high quality fabric (Basic Rate : 400 RS/Rmt.)as approved shade.Including all materials and labour ect.Complete as per drawing and instruction of engineer-in charge. overall size : 1900 mm X 750 mm X750 mm

22400.00 Nos. 313600.00

- 11 35.00 Nos. Providing and erecting Inverter based approved make split air-conditioning unit consisting of condensing unit with variable speed fan motor, inverter type hermetically sealed rotary compressor with accessories etc. duly connected separately erected evaporating unit and blower motor with its accessories by means of extra supplied proper insulated copper tubing,drain PVC pipes suitable for ( cost includes Eco Friendly green gas charging and 15A plug top & Remote Control & MS Stand) with necessary core cutting.

(2)For 4/5 Star Rating of current year

(B) for 1.5 ton capacity- Premium Cat.

58731.50 Nos. 2055602.50

12	2.00 Nos.	FULL HEIGHT OPEN STORAGE UNIT FOR RECORD/STATIONARY ROOM) Providing storage unit of size 2.5 mt x0.30 mt x2.10 mt(LxDxH) of ¾" thick BWP Plywood with 1.0mm thick horizontal laminate expose sides and 1.0mm thick vertical laminate. the shelves shall be provided @ 15"c/c or equal in height with enamel painting in recessed surfaces. The storage unit will have all necessary hardware, laminate band and 0.45 mt X0.45 mt teakwood/partal wood beading / moulding. Recessed skirting (3/4") finished with 1.0mm thick laminate is present etc. complete	44000.00	Nos.	88000.00
13	291.50 Smt.	Providing and fixing eco-friendly light weight calcium silicate false ceiling tiles having Tegular edge & 15 mm Thick Densified edges on the Tile Periphery for Extra Strength The Light weight calcium silicate ceiling tiles shall have , light reflection 85% non-combustible as per B.S. 476 part IV, 100% humidity resistance and also having thermal conductivity0.043° w/m KC.for the best thermal Insulation . The Light weight calcium Silicate tile shall be of approved texture Fine fissured/ Spintone/Cosmos having NRC value of 0.5 & Globe having NRC value of 0.75 NRC or equivalent of size 595 X 595 mm to be laid on true horizontal level suspended inter locking metal grid of hot dipped galvanized steel sections (galvanizing @120 grams per sqm including both side) consisting of main 'T' runner suitably spaced at joints to get required length and size of 24X38mm made from 0.30 mm thick (minimum) sheet, 1200mm centre to centre, and cross 'T' of size 24X28mm made out of 0.33mm (Minimum) sheet spaced 1200mm along spaced between main 'T' at 600mm centre to centre to form agrid of 1200X600mm and secondary cross 'T' of length 600mm and size 24x28mm made of 0.30 mm thick (Minimum) sheet to be interlocked at middle of the 1200X600mm panel to form grid of size 600X600mm resting on periphery walls/partitions on a perimeter wall angle pre coated steel of size (24X24X3000mm made of 0.40mm thick (minimum) sheet with the help of rawl plugs at 450mm centre to centre with 25mm long dry wall screws @ 230mm interval and laying 15mm thick Densified edges light weight calcium silicate ceiling tiles of approved texture (Fine Fissured/Cosmos/Spintone) in the grid including, cutting /making opening for services like diffusers, grills, light fittings, fixtures, smoke detectors etc	1648.96	Smt.	480670.76



14	19.00 Nos.	Providing and fixing sign board made of acrylic sheet and fixing on door wall in first or second alphabet as instructed in radium material .Including all materials and labour etc.complete as per detail drawing and instruction of engineer-in charge.	760.00	Nos.	14440.00
15	20.00 Nos.	Providing and placing S.S Nickle crome plated Dustbin having 254 mm dia & 356 mm height with perforated S.S sheet including all necessary fixture, fastners, fittings , labour material machinary etc complete as selected and directed by Engineer Incharge. Approved Make	800.00	Nos.	16000.00
16	30.00 Nos.	Providing fixing And arranging Multiflex rack/Library rack of size 1830(H) x 1300 (W) x 448(D) mm made high strength CR/HR steel confirming to IS 5986:2002/ IS 2062 :2006 by using steel confirming to is 5986- with minimum yield strength of 255 MPa vertical angels of size 35x35x1.6mm with holes Slotted of flanges of pitch 19.05 mm provided for adjusting loading levels which are made up of 5 bend pannels of 1300 x 448 x 1.25 mm size with bend border mounted on and C bends at all end with all Endge finished with Trigular support plate 75X75X1.25 mm and all nuts and bolts etc finish and all the components having powder coating with thoroughly anti rust treatment including all necessary fixture, fastners, fittings, labour material machinary etc complete as per photograph as selecte and directed by Engineer Incharge Overall size : 1830(H) x 1300 (W) x 448(D)	3600.00	Nos.	108000.00
17	1 Job	<b>PROJECTOR SYSTEM FOR CONFERENC ROOM</b> Providing supplying and installing 5000 lumens projector with full HD lase with 150" Diahonal 16:9 Screen (Viesonic LS 740HD) along with audio system for conference including 1 Amplifier, 1 Chairman Unit and 8 Delegate Units inclusive of all cable connections, installation and training. 1 65" TV to project also included.	695000	Job	695000.00
					<b>Total, Rs. 6988513.26</b>
					<b>Say, Rs. 6988600.00</b>

**KHAMBHAT NAGARPALIKA KHAMBHAT**

**ESTIMATE FOR SUPPLY, INSTALLATION, TESTING, COMMISSIONING OF 65 KW GRID CONNECTED ROOFTOP SOLAR PROJECT  
WITH 05 YEAR O & M AT NEW MUNICIPALITY BUILDING AT KHAMBHAT DIST. ANAND**

**SCHEDULE-B15**

Item No. & Description	Qty.	Rate	1% L.C.	Total Rate	Per	Amount
<b>Item No. 1</b>						
<p>Supply, Installation, Testing &amp; Commissioning of following size of Grid Tied Solar Power Plant with Solar Panels (ALMM approved): Frame Material : Anodized Aluminum alloy Frame With Twin Wall Profile, Front Cover : High Transmission Low-Iron Tempered Glass (AR Coated), High efficiency and positive power tolerance Pmax: 0/+5, Module Efficiency should be approx. 19.5%-22%, Normal operating temperature 45°C, Junction Box with Waterproof IP67 &amp; MC4 Compatible and Enclosed with Bypass diodes, 100% Electroluminescence test to ensure error free Modules, Thep. temp. co-efficient of the PV module shall equal or better than -0.45%/degree C. Solar PV modules of minimum fill factor 75% to be used. Unit Production:- More than 4.5 Unit /kw /day (Actual)(1Year Avg) With 10 year Product warranty and 25 year Linear Power Warranty includes all mechanical and electrical parameters of the Solar panel. Modules must be complied to the DCR(Domestic content requirements). The Ration of AC to DC is 5:6 for the Installation capacity which are given in AC KW.</p> <p>Solar Inverter: MPPT Range: 80-1000 V , Max efficiency: 97.5% - 98.9%, O/p Frequency: 50/60Hz, Operating Altitude (m) ≤4000, O/p Power Factor: ~1, O/P THDi: &lt;3%, Operating Temperture Range: -25~60°C, Integrated protection of Inverter are Anti-islanding Protection, Input Reverse Polarity Protection, Insulation Resistor Detection, Ground fault protection, Residual Current Monitoring Unit, Output Over Current Protection, Output Short Circuit Protection, Output Over Voltage Protection, PV array string fault Protection. Protection Degree: IP65, User Interface LCD &amp; APP, Datalogger &amp; Communication: GPRS / Wi-Fi.</p> <p>Integrated, Input Reverse Polarity Protection Integrated, Insulation Resistor Detection Integrated, Residual Current Monitoring Unit Integrated, Output Over Current Protection Integrated, Output Short Circuit Protection Integrated, Output Over Voltage Protection Integrated, Protection Degree: IP65, User Interface LCD &amp; APP,Datalogger &amp; Communication: GPRS / Wi-Fi, Module Mounting Structure: The mounting (Rectangular pipe / square pipe / circular pipe) with requisite cross bars, nuts and bolts, etc. shall be Hot deep galvanized with minimum 80micron coating. The Rectangular / square /circular hollow pipe section used for the structure should have a minimum thickness of 2.0 mm. other than above, the material thickness should be minimum 2.5 mm. A certificate of a structural engineer certifying the strength and stability of the mounting structure to withstand the weight and wind speed of 150 km/hour throughout the life span of 25 years of the system, shall be submitted by the vendors. Hot Dipped Galvanized steel coils. suitable arrangement for base plate for foundation , solar panel mounting, the structure should be suitable for carry the load of solar panel,wiring, sprinkler system etc. with necessary foundation work/wall mount, j bolt, anchor fastner etc. the nut bolt used for installtion of stucture should be (SS 304) quality.The ground clearance of the bottom most edge of solar panel shall not be less than 300 mm to 1200 mm or as per site's technical/feasibility requirement.</p> <p>a. Column –The minimum section (thickness) should be 60MM*40MM b. Rafter - The minimum section (thickness) should be 60MM*40MM c. Purlin - The minimum section (thickness) should be 40MM * 40MM Balane of System with necessary Swichgears (Suitabel size and protection of ACDB &amp; DCDB), inter connecting wiring, earthing system as per the CEIG drawing approval, lightning arrester system as per the CEIG drawing approval, all liasoning work with various gov. dipartment like state nodal agency,DISCOM &amp; CEIG is included in agency scope</p> <p>(Excluding All charges namely GEDA Application fees, Solar connectivity Charges, Meter connectivity Charges, Meter testing Charges and (E) Grid Tied Solar Power System: 51 - 100 kW (3 - phase)</p>						
	65.00	39408.00	394.08	39802.08	Watt	2587135.20
<b>Item No. 2</b>						
<p>The all inclusive comprehensive annual maintance contract cost covers yearly maintainance of solar Pv Modules, Inverter, wiring,earthing,switchgears, etc with material and labour cost including preventive maintainance.The cost covers entire installation. AMC also includes monthly site visit and inspection of project with submission of inspection and solar generation report. All parts should be replaced/repaired if found faulty within specified time. Agency has to provide necessary licening work for warranty,power,Bidirectional meter etc.</p>						

Item No. & Description	Qty.	Rate	1% L.C.	Total Rate	Per	Amount
(D) 51KW-100KW System						
1St year	65.00	3814.00	38.14	3852.14	Watt	250389.10
2nd Year	65.00	3814.00	38.14	3852.14	Watt	250389.10
3Rd Year	65.00	3814.00	38.14	3852.14	Watt	250389.10
4Th Year	65.00	3814.00	38.14	3852.14	Watt	250389.10
5Th Year	65.00	3814.00	38.14	3852.14	Watt	250389.10
<b>Total Amount Rs. ....</b>						<b>3839080.70</b>
Meter connectivity Charges Rs.....						50000.00
Add GEDA Application fees Rs.....						15340.00
Meter testing Charges and system stability/strenthning charges. Rs.....						45000.00
<b>Amount Rs. ....</b>						<b>3949420.70</b>
Add 18% GST Charge Rs.....						710895.73
<b>Net Amount Rs. ....</b>						<b>4660316.43</b>
<b>Say Rs. ....</b>						<b>4660400.00</b>

<b>KHAMBHAT MUNICIPALITY, KHAMBHAT</b>					
<b>NAME OF WORK : FIRE FIGHTING SYSTEM WORKS FOR KHAMBHAT MUNICIPALITY BUILDING, KHAMBHAT</b>					
<b>SCHEDULE-B-16</b>					
<b>SR.NO</b>	<b>Qty.</b>	<b>DESCRIPTION</b>	<b>Total Rate</b>	<b>Unit</b>	<b>TOTAL</b>
<b>Electric Driven Main Pump</b>					
1	1.00	supplying, Installation, Testing & Commissioning of electric driven fire pumps suitable for automatic operation consisting Fire Fighting Pump set with Motor KIRLOSKAR MAKE MAIN ELECTRIC PUMPSET HML MOTOR: 22KW/30HP-2P/3PH, 900 LPM@60 mtr. Make Kirloskar	1,47,000	nos.	1,47,000
2	1.00	Supplying, Installation, Testing & Commissioning of electric Jockey pumps suitable for automatic operation consisting Fire Fighting Pump set with Motor KDS 844++ 7.5 (5.5) MOC: CI- Impeller. 7.5 hp. Make :- Kirloskar	58,000	nos.	58,000
3	1.00	Supplying, installation, testing and commissioning of diesel engine driven main fire pump suitable for automatic operation and consisting of following, complete in all respects, as required: (Diesel Driven Pump) Horizontal type, multistage, centrifugal pump of cast of iron body and bronze impeller with stainless steel shaft, mechanical seal conforming to IS 1520. Suitable HP, 1500 RPM water cooled with radiator, diesel engine conforming to relevant IS standard complete with auto starting mechanism, 12/24 volts electric starting equipment, diesel tank, exhaust pipe extended upto 10 m outside pump house duly insulated with 50 mm thick glass wool with 1.0 mm thick aluminium sheet cladding, residential silencer, instruments and protection as per standard specification, stop solenoid for auto stop in the event of fault with audio indications, painted with post office red colour etc. as required. M.S fabricated, common base plate, coupling, coupling guard, foundation bolts etc. as required. Suitable cement concrete foundation duly plastered and with anti vibration pads. (2.2) 2850 lpm at 70 m Head	6,20,698	nos.	6,20,698
4	1.00	Panel for fire Pumps Panel for fire Pumps Control Panel For Fire Hydrant Pump Electric Panel For Auto System Jockey Pump and Main Pump Common Auto Control Panel suitable for Auto operation of above 2 electrical pumps having ASD starter for main pump. DOL starter for Jockey Pumps having incoming MCCB, Bus bar, Indicating Lamps Push Buttons etc. With low level indicator Make J&T	1,37,500	Set.	1,37,500
5	1.00	Pressure Gauges Burdon type pressure gauges With gauges cock male wares/ Febig 0-14 Rang SS hion dia gauge with siphon waree / Febig/H. Guru SS 4" Dall. Make -Baumer	2,250	nos.	2,250
6	2.00	Pressure Switch: Info's rT: 100 Supply Installation of Pressure Switch approved make & Ranhe 0-10 kg/cm2. Connection size25(*) NB & SS 304 casing, Pressure Switch out put Should be with interface such that fire water/ Diesel Driven Pump and jockey pump can start automatically at set pressures Make:- Denfose	2,600	nos.	5,200
7		CI Double Flanged Type Non Return Valve: Supply Installation testing & commissioning of NRV Valve Heavy duty with necessary, sutaible flanges, gaskets, nuts/bolts laboar work etc. Make- Hammer, L.P. DRP			
	1.00	<b>100 mm Dia</b>	8,840	nos.	8,840
	1.00	<b>80 mm Dia</b>	5,280	nos.	5,280

8		Cl Sluice Valve Non Rising Spindle Type with necessary. suitable flanges, gaskets, nuts/bolts etc Make- Hammer,			
	1.00	<b>100 mm Dia</b>	9,840	nos.	9,840
	1.00	<b>80 mm Dia</b>	6,530	nos.	6,530
9		Foot Valve Ball Type with necessary, suitable flanges, gaskets, nuts/bolts etc Make- Hammer,			
	1.00	<b>100 mm Dia</b>	13,040	nos.	13,040
	1.00	<b>80 mm Dia</b>	9,230	nos.	9,230
10	6.00	Gun Metal Ball Valves 25 MM GSME rising Ball valve with handle as per specification PN: 1.6 rated. Make: Matrix	1,050	nos.	6,300
11		External Piping Work Supply, Installation, Testing & Commissioning of above ground GI Pipe, For Water system Complete with Class "C" Fitting like Nut & Bolts, Gasket,. Make: Asian, Apollo			
	55.00	<b>100 mm C Class</b>	1,930	mtrs.	1,06,150
	15.00	<b>80 mm C Class</b>	1,370	mtrs.	20,550
	8.00	<b>50 mm C Class</b>	910	mtrs.	7,280
	15.00	<b>25 mm C Class</b>	450	mtrs.	6,750
12	78.00	Pipe Line Painting Charges: one coat of primers & one coats of enamel paint of Asian / Eq. male and fire Red cooler	135	mtrs.	10,530
13	1.00	Water Storage Suitable Underground RCC Tank. 50,00 LTR Capacity With Labour Works. (Underground Rcc Tank)	9,45,000	nos.	9,45,000
14	1.00	Tank Foundation Works. For Underground Tank.	8,300	Job.	8,300
15		Butter Fly Valve with necessary, suitable flanges, gasket nuts/bolts etc Make:- DRP, Punit, L.P			
	3.00	100mm	7,460	nos.	22,380
	1.00	80mm	4,390	nos.	4,390
16	6.00	Single Head Hydrant Valve 63 mm Dia ss SS Hydrant Valve Conforming IS 5290 complete with 80NB marching Flange, Downward Pattern ISI Mark. Make: Aashi, Armor	5,840	nos.	35,040
17	6.00	MS Hose Box (Single Door) Ms Hose Box fabricated from 20 swg cold rolled sheet with 3 mm glass front window, painted with powder coated p.o.red out side & white inside Make:- Standerd	2,250	nos.	13,500
18	6.00	Hose Pipe With Instantaneous Coupling Type RRL Type Hose Of 63 mm dia 15 mtrs. Long Fire Hydrant Hose Pipes RRL Type-A as per IS: 636 Size 63 mm dia and 15mtr long with Nn-Controll Precolated, complete with Male-Female Instantaneous coupling and wire binding. Test Pressure 23kg/cm2, Working Pressure 14kg/cm2 Make: Torrent, New Age	5,600	nos.	33,600
19	6.00	Small Bore 3/4 "Dia Hose Reel Drum Set: MS Drum set with 30 mtrs. Rubber Hose GM Shutoff Nozzle Complete set. Make- India, PE, New Engineering	6,650	nos.	39,900
20	6.00	Branch - Pipe Fire Hydrant Short Branch Pipe Nozzle SS With ISI Mark. Make: Aashi, Armor	2,400	nos.	14,400
21	200.00	M.S. Bracket For Above Ground Pipe Lines Structural steel consisting of channel, beam, angle, rod, square tube, U clamps etc for MS support of pipe lines.	105	kg.	21,000
22	1.00	Anchor bolt with washer, Bends Reducers	11,000	Job.	11,000
23	1.00	POWER CABLES Suitable power cable from main panel & motors Wiring Works. Make:- R.R, Polycab	27,000	Job.	27,000
24	1.00	Inlet Valve Siamese Connection For Fire Brigade Inlet: 100 dia Two way fire brigade connection with 63 mm dia instantaneous inlet complete with all necessary fittings. Make:-	9,260	nos.	9,260
25	1.00	Consultancy Charges For Site Supervision, Visits Drawing Preparation, Other Miscellaneous Items reducer, nut bolt etc, With NOC Paper Works Charges.	70,000	Job.	70,000
26	1.00	Fire NOC Mandatory Requirement Signage's signage Bord	5,000	Job.	5,000

		<b>FIRE ALARM SYSTEM CONVENTIONAL TYPE</b>			
27	1.00	Fire Alarm System Make:- Agni, Qutak 04 Zone Main Control Panel With LCD Display Oriel	18,000	nos.	18,000
28	6.00	Manual Call Point Make:- Agni, Qutak	750	nos.	4,500
29	40.00	Smoke Detector With Base Make Agni, Qutak	1,600	nos.	64,000
30	8.00	Hooter Make-Agni, Qutak	1,100	nos.	8,800
31	400.00	Wiring, with material & Labour, Flexible FRLS 1.5 mm 2 core Wire Make-R.R, Polycab (Considering as per actual measurement of used Qty.)	110	Mtrs.	44,000
		<b>FIRE EXTINGUISHER</b>			
32	15.00	ABC 6 kg Fire Extinguisher. ABC 6 Kg Fire Extinguisher Mono Ammonium Phosphate Powder 50, Stored Pressure Type, Pressure Gauge, Controllable discharge mechanism Class A Rating 1A & Class B rating 13B as per IS 15683 ISI MARK (ABC Dry Chemical Powder - MAP 50%) MAHAVIR	1,700	nos.	25,500
33	8.00	Co2 4.5 Kgs. CO2 type Fire Extinguisher of capacity 4.5 kg filled with Co2 Gas as per IS 15222 with controll discharge mechanism fitted with Hose & Hon applicable on Class B fire rating 21B confirms to IS 15683, bearing ISI mark. Co2 Cylinder as per IS 7285 with PESO APPROVED MAHAVIR	5,450	nos.	43,600
		<b>SPRINKLER SYSTEM (Parking Area )</b>			
34	2.00	Sprinkler Alarm valve Assly. With alarm Motor Gong. with necessary, sutaible flanges,gaskets, nuts/bolts etc 100 mm Make- HD	49,000	nos.	98,000
35	2.00	Drain Valve 50 NB with necessary, sutaible flanges,gaskets, nuts/bolts etc Make- Matrix, L.P, Hammer	4,500	nos.	9,000
36		Butter Fly Valve with necessary, sutaible flanges, gaskets, nuts/bolts etc Make- Matrix, L.P, Hammer			
	2.00	100 mm	7,460	nos.	14,920
	2.00	80 mm	4,390	nos.	8,780
37	24.00	Quatzoid Bulb Sprinkler Supply & Installation of Sprinkler plain SS body UL Listed finish with suitable size Pendant type spray with Coupling Nut etc. Make- HD	480	nos.	11,520
38	100.00	M.S. Bracket and C chenal For Above Ground and Ceiling Pipe Lines Structural steel consisting of channel, beam, angle, rod, square tube, U clamps etc for MS support of pipe lines.	105	kg	10,500
39		External Piping Work GI pipe Supply of GI pipe, "C" Class Supply, installation, testing & commissioning of heavy grade piping as per ISI Mark. Make-, Apollo, Asian, Tata			
	12.00	<b>100 mm C Class</b>	1,930	Mtrs.	23,160
	36.00	<b>80 mm C Class</b>	1,370	Mtrs.	49,320
	24.00	<b>50 mm C Class</b>	910	Mtrs.	21,840
	96.00	<b>25 mm C Class</b>	450	Mtrs.	43,200
40	100.00	Pipe Line Painting Charges one coat of primers & 2 coats of enamel paint of Asian / Eq. male and fire Red cooler. Make- Sunlac, Asian	135	Mtrs.	13,500
41	20.00	Tie Road with Washer for Pipe Support	220	nos.	4,400
42	20.00	Universal Clamp with Washer for Pipe Support	150	nos.	3,000
		<b>TOTAL, AMOUNT</b>			<b>2960278.00</b>
		<b>SAY, AMOUNT</b>			<b>2960300.00</b>

**SECTION - 8**

**SECURITIES AND OTHER FORMS**

## BID SECURITY (BANK GUARANTEE)

WHEREAS, ----- (name of Bidder) (hereinafter called the "The Bidder") has submitted his bid Dated ----- (Date) for the construction of ----- (Name of Contractor hereinafter called "the Bid")

KNOW ALL PEOPLE by these presents that We -----  
(name of Bank) of ----- (name of country) having our  
Registered office at ----- (hereinafter called  
"the bank") are bound unto ----- (name of Employer)  
(hereinafter called "The Employer") in the sum of ----- \*  
for which payment well and truly to be made to the said Employer the Bank itself, his  
successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this ----- day of ----- 20

THE CONDITIONS of these obligations are:

(1) If after Bid opening the Bidder withdraws his bid during the period of Bid validity specified in the Form of Bid;

**Or**

(2) If the Bidder has 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 Agreement in accordance with the Instructions to Bidders, if required; or
- B. Fails or refuse to furnish the Performance Security, in accordance with the Instructions to Bidders; or
- C. does not accept the correction of the Bid Price pursuant to Clause 27 (Correction of Errors)

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



This Guarantee will remain in force up to and including the date----- \*\*  
days after the deadline for submission of Bids as such the 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-----

WITNESS -----

SEAL-----

---

(Signature, name and address)

\* The Bidder should insert the amount of the guarantee in words and figures  
denominated in Indian Rupees. This figure should be the same as shown in  
Clause 16.1(Bid Security) of the Instructions to Bidders.

**\*\*45 days** after the **end of the validity period** of the Bid. Date should be inserted  
by the Employer before the Bidding documents are issued.

## PERFORMANCE SECURITY

TO,

----- (Name of Employer)  
----- (Address of Employer)  
-----

WHEREAS ----- (name and address of Contractor) (hereafter called "the Contractor") has undertaken, in pursuance of Contracts No. ----- dates ----- to execute ----- (name of Contract and brief description of Works) (hereinafter called "The Contract")

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligation in accordance with the Contract.

AND WHEREAS we have agreed to give the Contractors such a bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor, up to a total of ----- (Amount of guarantee)\* ----- (in words), such sum being payable in types and proportions of currencies in which the Contract prices is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of ----- (amount of guarantee) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the contractor before presenting is with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract to of the Works to be performed thereunder or of any of the Contract documents which may be made between your and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such charge, addition or modifications.

This guarantee shall be valid until 60 days from the date of expiring of the Defect Liabilities period.

Signature and Seal of the guarantor -----

Name of Bank -----

Address -----

Date -----

---

\*An amount shall be inserted by the Guarantor, representing the percentage the Contract price specified in the Contract denominated in Indian Rupees.

## ADDITIONAL PERFORMANCE SECURITY

[Clause 34.1. (A)]

TO,

----- (Name of Employer)

----- (Address of Employer)

-----

WHEREAS ----- (Name and address of Contractor) (hereafter called "The Contractor") has undertaken, in pursuance of Contracts No. ----- Dates ----- to execute -----  
----- (Name of Contract and brief description of Works) (hereinafter called "The Contract")

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee by a recognized bank for the sum specified therein as security for compliance with his obligation in accordance with the Contract.

AND WHEREAS we have agreed to give the Contractors such a bank Guarantee:

NOW THEREFORE we hereby affirm that we are the Guarantor and responsible to you on behalf of the Contractor, up to a total of -----  
(Amount of guarantee) ----- (in words), such sum being payable in Types and proportions of currencies in which the Contract prices is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of -----  
(Amount of guarantee) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the contractor before presenting is with the demand

We further agree that no change or addition to or other modification of the terms of the Contract to of the Works to be performed thereunder or of any of the Contract documents which may be made between your and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such charge, addition or modifications.

This guarantee shall be valid until **28 days** from the project completion date.

Signature and Seal of the guarantor -----

Name of Bank -----

Address -----

Date -----

## BANK GUARANTEE FOR ADVANCE PAYMENT

TO,

----- (Name of Employer)

----- (Address of Employer)

----- (Name of Contractor)

Gentlemen:

In accordance with the provisions of the Conditions of Contract, sub-clause 51.1 ("Advance Payment") of the above mentioned Contract, -----  
----- (name and address of Contractor) (hereinafter called "the Contractor") shall deposit with (name of Employer) a bank guarantee his proper and faithful performance under the said Clause of the Contract in an amount of ----- (amount of Guarantee)\* -  
----- in words).

We, the ----- (bank of financial institution), as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to -----  
(Name of Employer) on his first demand without whatsoever right of obligation on our part and without his first claim to the Contractor, in the amount not exceeding ---  
----- (amount of guarantee)\* ----- (in words)

We further agree that no change or addition to or other modifications of the terms of the Contractor or Works to be performed thereunder or of any of the Contract documents which may be made between ----- (name of Employer) and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modifications.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until ----- (name of employer) receives full repayment of the same amount from the contractor.

YOUR'S TRULY

Signature and Seal \_\_\_\_\_  
Name of Bank/ Financial Institution \_\_\_\_\_  
Address \_\_\_\_\_  
Date \_\_\_\_\_

\* An amount shall be inserted by that Bank or Financial Institution representing the amount of the Advance Payment, and denominated in Indian Rupees.

**Letter of Acceptance**  
(Letter head paper of the Employer)

\_\_\_\_\_ (date)

To,  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ (Name and address of the Contractor)

Dear Sirs,

This is to notify you that your Bid dated \_\_\_\_\_ for execution of the \_\_\_\_\_ (Name of the contract and identification number, as given in the Instructions to Bidders) for the Contract Price of Rupees \_\_\_\_\_ (\_\_\_\_\_) (amount in words and figures) as corrected and modified in accordance with the Instructions to Bidders\* is hereby accepted by our agency.

You are requested to furnish performance security, in the form detailed in para 34.1 of ITB for an amount equivalent to Rs. \_\_\_\_ Within **10 days** of the receipt of this letter of acceptance up to beyond **60 days** from the date of expiry of defects Liability period i.e. up to \_\_\_\_\_ and the Additional Performance Security for an amount equivalent to Rs. \_\_\_\_ shall be valid beyond 28 (twenty-eight) days of Project Completion Date i.e. up to \_\_\_\_\_ and sign the contract, failing which action as stated in Para 34.3 of ITB will be taken.

Yours Faithfully

Authorized Signature  
Name and title of Signatory  
Name of Employer

---

\* Delete "Corrected and" or and modified if only one of these actions applies. Delete as corrected and modified in accordance with the Instructions to Bidders, if corrections or modifications have not been affected.

**Issue of Notice to proceed with the work**

(Letterhead of the Employer)

----- (date)

To,

\_\_\_\_\_ (Name and address of the Contractor)

\_\_\_\_\_

\_\_\_\_\_

Dear Sirs,

Pursuant to your furnishing the requisite security in ITB Clause 34.1 and  
signing of the Contract for the construction of \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ at a bid Price of Rs.

\_\_\_\_\_.

You are hereby instructed to proceed with the execution of the said works in  
accordance with the contract documents.

Yours faithfully

(Signature, name and title of signatory authorized  
To sign on behalf of Employer)

## AGREEMENT FORM

This agreement, made on the \_\_\_\_\_ day of \_\_\_\_\_ Between  
\_\_\_\_\_ (name and address of Employer) (Hereinafter called "the  
Employer) and \_\_\_\_\_ (name and address of  
Contractor) hereinafter called "the Contractor" of the other part.

Whereas the Employer is desirous that the Contractor execute  
\_\_\_\_\_

Name and identification number of contract (hereinafter called "the works") and the  
employer has accepted the Bid by the Contractor for the execution and completion of  
such works and the remedying of any defects therein, at a cost of Rs.  
\_\_\_\_\_

### NOW THIS AGREEMENT WITNESSETH AS FOLLOWS

1. In this Agreement, words and expression shall have the same meanings as are  
respectively assigned to them in the conditions of contract hereinafter referred to  
and they shall be deemed to form and be read construed as part of this Agreement.
2. In Consideration of the payment to be made by the Employer to the contractor as  
hereinafter mentioned, the Contractor hereby covenants with the Employer to  
executive and complete the works and remedy any defects therein in conformity  
in all aspects with the provisions of the contracts.
3. The employer hereby covenants to pay the Contractor in consideration of the  
execution and completion of the works and the remedying the defects wherein  
contract price or such other sum as may become payable under the provisions of  
the Contract at the times and in the manner prescribed by the contract.
4. The Following documents shall be deemed to form and be ready and construed as  
part of this Agreement viz
  - i ) letter of Acceptance
  - ii ) Notice to proceed with the works:
  - iii ) Contractor's Bid

- iv ) Conditions of contract: General and Special
- v ) Contract Data
- vi) Additional conditions
- vii ) Drawings
- viii ) Bill of Quantities and
- ix ) Any other documents listed in the Contract  
data as forming part of the Contract.

In witness whereof the parties there to have caused this Agreement to be  
executed the day and year first before written

The Common seal of \_\_\_\_\_

Was hereunto affixed in the presence of :

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

\_\_\_\_\_

In the presence of

Binding signature of Employer \_\_\_\_\_

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



## **UNDERTAKING**

**(For Investment)**

I, the undersigned do hereby undertake that our firm M/s  
..... Would invest a minimum cash up  
to **25 %** of the value of the work during implementation of the contract.

\_\_\_\_\_  
(Signed by an Authorized officer of the firm)

\_\_\_\_\_  
Title of officer

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

\_\_\_\_\_  
DATE

## UNDERTAKING (For Validity)

I, the undersigned do hereby undertake that our firm M/s

.....

..... agree to abide by this bid for a period

.....

days

for date fixed for receiving the same and it shall be binding on us and may be  
accepted at any time before the expiration of that period.

\_\_\_\_\_  
\_\_\_\_\_. (Signed  
by an Authorized officer of the  
firm)

\_\_\_\_\_  
Title of officer

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

\_\_\_\_\_  
DATE

**(ON COMPANY'S LETTER HEAD)**  
**LETTER OF SUBMISSION OF BID, ASSURANCE LETTER.**

**To,  
CHIEF OFFICER  
KHAMBHAT NAGARPALIKA  
KHAMBHAT.**

**Respected Sir,**

**SUB: BID DOCUMENT FOR CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA.**

1. With reference to the tender invited by you for the above mentioned work/s, I/We do hereby offer to perform, provide execute complete and maintain the work/s in conformity with the drawings, conditions of tender articles of agreement and conditions of contract, specifications, and bill of quantities for the sum of Total Quoted Amount at the rate quoted in the bill of quantities.
2. I / We have satisfied ourselves as to the location of site, examined the drawings and read of Articles of Agreement, conditions of tender, conditions of contract and specifications etc. and I/We understand that the works are to be completed within\_\_\_\_\_calendar months. I/We agree to finish the whole of the works within\_\_\_\_\_calendar months from the date of commencement of the work fully understanding that the time is the essence of the contract.
3. I/We will carry out various types of Pre and Post total station survey work in Connection with stipulated quantities in Schedule-B for smooth running of project and site layout management.
4. I/We will obtain at various locations for Deciding the Depth of Foundation and other criteria.
5. The Bidder/Contractor will have to Prepare Detailed Structure Design and Drawing on the Basis of Own Design for Component at his own Expanse According to Stages of Payment Given in Schedule-B, The Chief Officer Khambhat Nagarpalika, Khambhat , will not bare any Additional Expanse regarding the same.
6. We have independently considered the amount of liquidity damages as stated in the appendix and the general conditions of the contract and agree that it represents fair estimate of the loss likely to be suffered by THE CHIEF OFFICER KHAMBHAT NAGARPALIKA Khambhat in the event of the works not being completed by us in time.
7. If our tender is accepted, we will, when required, furnish the security deposit for the sum named in the appendix to the general conditions of the contract for the due performance of the contract.

8. We agree to abide by this tender for the period of Bid Validity from the Last date of Submission of tender, which may be extended further by mutual agreement. It shall remain binding upon us. If the tender is withdrawn by us, our earnest money will be forfeited.
9. Unless and until a formal agreement is prepared and executed this tender together with your written acceptance thereof shall constitute a binding contract between us.
10. We agree that at your sole discretion and without assigning any reason whatsoever, you reserve the right to accept and/or reject any or all tenders. The Chief Officer Khambhat Nagarpalika, does not bind itself to accept the lowest tender.

**Date:**  
**of the firm) Witness:**

**Yours faithfully,**  
**(Signature of the Tenderer with the seal**

1. **Signature :**  
**Name:**  
**Address:**

2. **Signature :**  
**Name:**  
**Address:**

# SBD SECTION-9

## DRAWING

## **SECTION - 10**

### **DOCUMENTS TO BE FURNISHED BY BIDDER**

**NOTE: ALL SUPPORTING DOCUMENTS MUST BE FURNISHED BY BIDDER AS PER BID EVALUATION CRITERIA FOR THE PURPOSE OF REALIZATION OF DRAFT TENDER PAPER.**

## GENERAL INSTRUCTIONS TO BIDDERS

### A. GENERAL

#### 1. BID INVITATION:

The Khambhat Nagarpalika (hereinafter referred to as “the Employer”) invites competitive bids from all interested and eligible bidders for

##### **Project Description:**

CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA... As per Appendix to bid details.

#### 1.2 Scope of Bid:

The scope of work/services to be done / provided by the contractor under this bid will be as under:

##### 1.2.3 Construction Scope:

As per Appendix to Bid details.

#### 1.3 Time of Performance:

The successful bidder will be expected to complete the works within (time in months) as per time limit given in Appendix to Bid details from the date of issue of letter of acceptance.

#### 1.4 Project Implementing Agency:

The “KHAMBHAT NAGARPALIKA” shall be the project-implementing agency. This contract shall be administered and managed by the KHAMBHAT NAGARPALIKA as per given in Appendix to Bid details.

#### 1.5 Allocation of Risk & Responsibilities:

##### 1.5.1 Contractor:

The preliminary designs and details contained in the bid documents are based on limited and indicative field data as available with the Employer at the time of preparation of the bidding documents. Bidder shall be responsible to verify / examine / check and make his own assessment of the site, site data, soil data and the schematic details shown in the bid documents based on his own investigations and/or additional surveys, if required, at bidder's own cost.

- The contractor will be responsible to procure and supply equipment and materials like cement, steel, for construction of Above Mentioned Work etc. to be supplied by the bidder at his own cost and risk. These materials and equipment shall conform to the specification contained in this document and will be procured from the approved vendors listed in this document as a part of this tender document. Vendor list cannot be changed at post tender or post contract stage.
- The procurements shall be made from the vendors approved by the NAGARPALIKA and contained in the vendor list provided in this document. Such vendors shall have BIS mark and ISO 9002 certification wherever applicable contained in **Appendix 2** of this document.

- **If case of procurement of materials outside India, no exemption Certificate shall be granted for import duty or any other duties applicable thereto. Further, the quality standard of the materials shall be of ISO /country of origin standard and shall have to be equivalent or higher than relevant BIS standard.**
- The contractor will supply the goods, materials and equipments duly tested and certified by the manufacturer as per “Quality Assurance Plan” (QAP) provided by the bidder and approved by the employer and/or it's appointed third party inspection agency.
- The Contractor will undertake all soil & site investigations and other explorations at his cost as may be necessary for design of all civil structures etc, which is covered under the scope of this contract.
- The Contractor will have to design the civil works Mentioned Above etc. as per the relevant national and/or international standards & as per latest specification and c Khambhat of practice published by the Bureau of Indian standards and shall be subjected to Nagarpalika or its appointed agencies approval at his cost so as to make them multi hazard proof (i.e. Cyclone, Earthquake). **IS 1893-2002 Criteria for Earthquake Resistance Design of Structures Part - I & Draft IS 1893-2002 Part II (Liquid Retaining Tanks) should be observed strictly.**
- The Contractor shall organize on the job and off the job-training program for the staff of the Nagarpalika or their nominated personnel within a period of four months form the date of completion.
- The Contractor shall be responsible to make good and bring to original position road and land surfaces etc. damaged during construction of structures at his cost.
- The Contractor shall be responsible for all the damages to the underground cables, power lines, telephone lines, other water/sewer lines and other infrastructure facilities etc. while executing the works under this contract and shall bear all costs relating to repairs / replacements.
- The contractor shall be responsible for failure of Structure during the full period of contract and the **defect liability period of Three year from the date of completion.**
- The Contractor will prepare and present interim/running and final bills.
- The Contractor shall be responsible for the safety and performance of all civil and other structures up to the end of period of defect liability of Three year from the date of completion. The damages/defects identified by the “Engineer in-charge” shall be made good, as per Standards, by the contractor at his cost and risk. In case of collapse of structures in part or full replacement/reconstruction shall be done by the contractor at his cost and risk.
- On successful completion of works and Operation & Maintenance as per the contract thereafter contractor shall handover the works to Nagarpalika.
- **The document can be down loaded from the site of department**
- The **NAGARPALIKA** assures all participants for the contract that adequate financial resources are available to cover the financial requirements and funds are available to meet the disbursement needs of the construction contracts in accordance with the provisions of tender documents.
- All the material shall be inspected by Nagarpalika internal system and/or through Third Party Agency appointed by the employer.
- **Special Condition:** - If Contractor fails provide materials in time and Nagarpalika have rights to provide those materials through its internal system of purchasing or utilization of those materials on their project the rate chargeable shall be the actual cost of material at site including all the taxes and 5% cost for storage.

#### 1.6 **The Employer:**



- Nagarpalika only under special circumstances and solely at its own absolute discretion consider the request of contractor to provide material to the contractor which he is unable to provide because of acceptable and recorded reasons, on payment of a price equivalent to the unit rate contained in the Price Bid or the Nagarpalika issue rate whichever is higher. Contractor will have to arrange his own transportation from the Nagarpalika store to his site of work at his own cost.
  - Nagarpalika will handover the clear possession of the site of works to the contractor immediately after the issuance of work order to commence the works.
  - Nagarpalika will provide indicative drawings and design parameters for all works to be designed by the contractor.
  - Nagarpalika will approve the detailed designs and drawings presented by the contractor either through its own internal system or through its authorized and appointed Third Party Agency.
  - Nagarpalika will approve and pay all interim/running/final bills presented by the Contractor.
  - Nagarpalika will be responsible to get all statutory permissions and clearances from the concerned central / state or local statutory authorities. However, the contractor shall have to manage the day-to-day activities based on these clearances on site. Nagarpalika shall provide required help and assistance for such day-to-day activities.
  - The Nagarpalika will make available Right of Use for construction of shelter home, its day-to-day management on site shall be the responsibility of the contractor for which Nagarpalika shall provide necessary help and assistance.
- 1.7 The works under this Contract shall be executed on the basis of Turnkey concept of Design Building, Constructing, testing and Commissioning all Civil Mechanical, electrical works and also cover Three year of defect liability period.
- 1.8 The Bidder is required to note that details of the proposed project given in the bid are subject to review and refinement during the course of detailed engineering to be undertaken by the successful bidder before commencement of the works.
- 1.9 All bids are to be completed and returned to the Employer in accordance with these Instructions to Bidders.
- 1.10 Throughout these bid documents the term "Bid" and "Tender" and their derivatives (Bidder/Tendered/Contractor/Applicant, bid/tendered, bidding/tendering, etc.) are synonymous. Also, throughout the bid documents, the word "day" means a calendar day, the word "month" means a calendar month and the word "year" means a calendar year.**
- 1.11 Information material borrowed by the Bidders, if any, shall remain the property of the Nagarpalika and shall be provided by the Nagarpalika for information, solely for the purpose of the bids execution under this Contract. All such borrowed material shall be returned to Nagarpalika after submission of the bids.

## **2 SOURCE OF FUNDS:**

**CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA...** As is to be financed through the funds available with the Nagarpalika or resources to be raised by Nagarpalika from financial institutions.

### **3 ELIGIBLE BIDDERS:**

- 3.1 The bidders who, after a look to the qualification criteria feel that they will be qualified can participate in this **Single Stage - Two Envelope** bidding procedure. The participating bidders shall be subjected to assessment of their technical and financial competence to carry out the work under this tender as per the **Qualification Criteria** contained in **Appendix - 1**. Only bidders qualified under this process will become eligible for opening of the price bid.
- 3.2 Bidders shall provide evidence of their continued eligibility satisfactory to the Employer, as the Employer shall reasonably request.
- 3.3 Bidders shall not be listed under a declaration of ineligibility for corrupt or fraudulent practices issued by the Central Govt. State in accordance with sub-clause 45.1 (c) or the list of black listed contractors announced by Nagarpalika / Govt. of Gujarat or its Public Sector undertakings.

### **4 ELIGIBLE MATERIALS, EQUIPMENTS & SERVICES:**

- 4.1 For purposes of Clause 4 above, "services" means the works and all project-related services including design services.
- 4.2 For purposes of Clause 4 above, "origin" means the place where the materials and equipment are mined, grown, produced or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing or substantial or major assembling of components, a commercial recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.
- 4.3 The materials, equipment and services to be supplied under the contract shall comply with the following provisions:
  - (a) All materials, equipment and services (including without limitation all computer hardware, software and systems, whether separately procured or incorporated within other equipment and services) shall be designed to be used prior to, during, and after the calendar year (**latest year**);
  - (b) Neither the performance nor functionality of such materials, equipment and services shall be affected by dates prior to, during, and after the **latest year**(c)  
Such materials, equipment and services, and the logic included therein, shall operate during each such time period without error relating to date data, specifically including any error relating to, or the production of, date, data which represents or references different centuries or more than one century and the correct treatment of the Year as a leap year, and
  - (d) The provision and use of such materials, equipment and services shall not infringe or violate any industrial property of intellectual property rights or claim of any third party.

### **5. QUALIFICATION OF THE BIDDER:**

- 5.1 To be qualified for award of Contract, bidders shall:
  - (a) Submit a written power of attorney authorizing the signatory of the bid to commit the bidder; and
  - (b) Submit Qualification requirements specifying financial capacity, technical capacity, minimum acceptable levels with regards to Bidder's experience in relevant projects and other relevant factors such as work in hand, future commitments, and litigation history as given and described in the **Appendix 1** to Instruction to Bidders.
  - (c) Submit proposals regarding work methods, scheduling and re sourcing which shall be, provided in sufficient detail to confirm the bidders' capability to

complete the works in accordance with the specifications and the time for completion.

- (d) Submit Memorandum of Understanding (MoU) with material supplier clearly stating the terms & conditions of the MoU. Such MoU shall not be amended or modified without prior consent from Nagarpalika during the period of performance of contract, Nagarpalika shall not allow such change except for special reasons.

~~5.2 Joint venture consortium of two or more firms / members / companies, as partners shall comply with the following requirements:~~

- ~~(a) In case of bidder participating as a Joint Venture, on his selection for award of contract, all members of the Joint Venture will have to sign the contract with the Employer and will be jointly and severally liable for performance of the contract/ Award of contract will be in the name of Joint Venture consortium which will be considered as “Legal Entity” as far as this bid/contract concern.~~
- ~~(b) The bid, and in case of a successful bid, the Form of Contract Agreement, shall be signed with the name of Joint Venture which will be legally binding on all partners;~~
- ~~(c) One of the partners shall be declared as Prime Bidder authorized to be in charge; and this authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners;~~
- ~~(d) 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;~~
- ~~(e) 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 a relevant statement to this effect shall be included in the Authorization mentioned under (b) above as well as in the Bid Form and the Form of Contract Agreement (in case of a successful bid); and~~
- ~~(f) A copy of the Stamped and notarized agreement entered into by the joint venture partners shall be submitted with the bid. Roles, responsibilities and financial stakes of all members of the Joint Venture consortium shall be clearly and unambiguously prescribed in the Joint Venture agreement. In case of non-prescription, the JV agreement will be declared as invalid and the bid will be treated as a single bidder, in the name of bidder, who has purchased the bid documents.~~
- ~~(g) In case of Joint Venture technical strengths of all the members shall be grouped together for evaluation. Financial strengths of all the JV members will be considered proportionate to their financial stakes.~~
- ~~(h) In case of “MoU”, with a supplier experience and strengths of supplier will be considered for evaluation of Supply and manufacture experience criteria.~~

~~5.3 Bidders shall also submit proposals of work methods and schedule, in sufficient detail to demonstrate the adequacy of the bidders' proposals to meet the Employer's Requirements and the completion time referred to in Sub-Clause 1.2 above.~~

~~5.4 All guarantees shall be in the name of the joint venture if the bid is submitted in the form of a joint venture consortium.~~

## **6. ONE BID PER BIDDER:**

Each bidder shall submit only one bid either by itself, or as a partner. A bidder who submits or participates in more than one bid under this proceed will cause all those bids to be rejected.

**7. COST OF BIDDING:**

The bidder shall bear all costs associated with the preparation and submission of its bid and the Employer will in no case be responsible or liable for those costs.

**8. SITE VISIT:**

- 8.1 The bidder is advised to depute a suitable team to visit and examine the Site of Works and its surroundings for fully understanding of the job and ascertain the difficulties that may be encountered during execution of the works and for obtaining for himself, on his own responsibility, all information that may be necessary for preparing the bid and entering into the Contract. The cost of visiting the Site shall be entirely at bidder's own expense.
- 8.2 The bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such inspection, but only upon the express condition that the bidder, its personnel and agents, will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expenses Incurred as a result of the inspection.

**B. BIDDING DOCUMENTS**

**9. CONTENT OF BIDDING DOCUMENTS**

- 9.1 The bidding documents are those stated below, and should be read in conjunction with any Addenda issued in accordance with Clause 11:

**VOLUME - I: TECHNICAL BID**

AS PER SBD

**VOLUME - II: PRICE BID**

AS PER SBD

- 9.2 The bidder is expected to examine carefully the contents of the Bidding documents. Failure to comply with the requirements of bid submission will be at the bidder's own risk. Pursuant to Clause 28, bids which are not substantially responsive to the requirements of the bidding documents will be rejected.

**10. CLARIFICATION OF BIDDING DOCUMENT:**

A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing or by fax (hereinafter the term "fax" is deemed to include electronic transmission such as facsimile, cable and telex) at the Employer's address indicated in the Invitation for Bids. The Employer will respond to any request for clarification, which it receives earlier than 7 days prior to deadline for submission of bids. Copies of the Employer's response, including a description of the enquiry, will be forwarded to all purchasers of the bidding documents.

**11. AMENDMENTS OF BIDDING DOCUMENTS:**

- 11.1 At any time prior to the deadline for submission of bids, the Employer may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder modify the bidding documents by issuing addenda.

- 11.2 Any addendum thus issued shall be part of the bidding documents pursuant to Sub-Clause 9.1, and shall be communicated in writing or by fax to all purchasers of the bidding documents. Prospective bidders shall acknowledge receipt of each addendum by fax to the Employer.
- 11.3 To afford prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may extend the deadline for submission of bids, in accordance with Clause 23.
- 11.4 All amendments and modifications issued by the Employer shall be deemed to be integral part of the contract to be signed with the successful bidder.

## **C. PREPARATION OF BIDS**

### **12. LANGUAGE OF BID:**

The bid, and all correspondence and documents, related to the bid, exchanged between the bidder and the Employer shall be written in the English language. Supporting documents and printed literature furnished by the bidder may be in another language provided they are accompanied by an accurate translation of the relevant passages in the English language, in which case, for purposes of interpretation of the bid the English translation shall prevail.

### **13. DOCUMENTS COMPRISING THE BID:**

- 13.1 The bid Shall be submitted Online Through N-Procure, Where Criteria relating to Technical Bid and Price bid shall be filled and submitted On-Line.

- 13.2 The technical proposal shall contain the following:

- (i) Bid Form for Technical Proposal and Appendix to Technical Proposal;
- (ii) Power of Attorney
- (iii) Information on Qualification (Completion Certificate given by component Authority as per Bid Evolution Criteria)
- (iv) Confirmation of Eligibility
- (v) Schedule of Major items of equipment's
- (vi) Schedule of major items of Constructional plant
- (vii) Schedule of key personnel
- (viii) Schedule of key Sub-contractors
- (ix) Schedule of recommended spare parts
- (x) Schedule of compliance with the bidding documents
- (xi) Schedule of construction facilities
- (xii) Schedule of construction method
- (xiii) Any other material required to be completed and submitted by bidders in accordance with these instructions to bidders.
- (xiv) Form of Bid Security
- (xv) Original Document of Tender Fee and Earnest Money Deposit

- 13.3 The price proposal shall be submitted On-Line

### **14. BID FORM & PRICE SCHEDULE:**

The Bidder shall complete the Bid Forms and schedules furnished in the bidding documents in the manner and detail indicated therein, following the requirements of Clauses 15 and 16.

**15. BID PRICES:**

- 15.1 Unless specified otherwise in Employer's Requirements, Bidders shall quote for the entire facilities on a "single responsibility" basis such that the total bid price covers all the Contractor's obligations mentioned in or to be reasonably inferred from the bidding documents in respect of the design, manufacture, including procurement and subcontracting (if any), delivery, construction, installation and completion of the facilities. This includes all requirements under the Contractor's responsibilities for testing, pre-commissioning and commissioning of the facilities and, where so required by the bidding documents, the acquisition of all permits, approvals and licenses, etc. services as may be specified in the bidding documents, all in accordance with the requirements of the Conditions of Contract.
- 15.2 The bidders shall have to give detailed rate analysis in justification of the prices as may be required by the employer as a part of the evaluation process, if so desired by the employer.

**16. BID CURRENCIES:**

The prices shall be quoted on fixed and firm price basis in Indian currency (i.e. INR) only without any price escalation and / or statutory variation.

**17. BID VALIDITY:**

- 17.1 Bids shall remain valid for a period of 120 days after the date of opening of technical proposals specified in Sub-Clause 26.1
- 17.2 In exceptional circumstances, prior to expiry of the original bid validity period, the Employer may request that the bidders extend the period of validity for a specified additional period. The request and the responses thereto shall be made in writing or by cable. A bidder may refuse the request without forfeiting its bid security. A bidder agreeing to the request will not be required or permitted to modify its bid, but will be required to extend the validity of its bid security for the period of the extension, and in compliance with Clause 18 in all respects.

**18 BID SECURITY:**

- 18.1 The bidder shall furnish, as part of its bid with the technical proposal, a bid security in the amount of **(Almost 1% of the Amount put to tender)**.
- 18.2 The bid security shall, at the bidder's option, be in one of the following form:
- (a) A Demand Draft payable to **(Name of Executing Authority given in Appendix to Bid details)** issued by a reputed Scheduled Bank except co-operative bank or a foreign bank.
  - (b) A fixed deposit receipt pledged in the name of **(Name of Executing Authority given in Appendix to Bid details)** from reputed Scheduled Bank except co-operative bank or a foreign bank and valid up to 30 days from the date of closure of the bid validity period of 120 days.
  - ~~(c) An unequivocal and unconditional Bank Guarantee in the prescribed format given in this document issue by reputed Scheduled Bank except co-operative bank or a foreign bank and valid up to 28 days from the date of closure of the bid validity period of 120 days.~~
- ~~The format of the bank guarantee shall be in accordance with the sample form of bid security included in Section 6; other formats may be permitted, subject to the prior approval of the Employer. The bid security shall remain valid for 28 days beyond the original validity period for the bid, and beyond any period of extension subsequently requested under Sub-Clause 17.2.~~
- 18.3 Any bid not accompanied by an acceptable bid security shall be rejected by the Employer as non-responsive.



- 18.4 The bid securities of unsuccessful bidders will be returned as promptly as possible, after the expiration of the period of bid validity.
- 18.5 The bid security of the successful bidder will be returned when the bidder has signed the Contract Agreement and furnished the required performance security.
- 18.6 The bid security may be forfeited;
- (a) If the bidder withdraws its bid, except as provided in Sub-Clauses 25.1 and 30.2.
  - (b) If the bidder does not accept the correction of its bid price, pursuant to Sub-Clause 36.2; or
  - (c) In the case of a successful bidder, if it fails within the specified time limit to:
    - (i) Sign the Contract Agreement,
    - (ii) Furnish the required performance security,

**19. ALTERNATIVE PROPOSALS BY BIDDERS:**

Bidders are not permitted to give any alternative offer containing technical or other alternatives. Their bid proposals shall be in total conformity of the employer's requirement as described in the bidding documents.

**21. FORMAT AND SIGNING OF BID:**

**21.1 The bidder shall prepare one original hard copy of the technical proposal**

- 21.2 The original copy of the bid shall be typed or written in indelible ink (in the case of copies, Photostats) are also, acceptable and shall be signed by a person or persons duly authorized to sign on behalf of the bidder, pursuant to Sub-Clauses 5.1 (a) or 5.2 (b), as the case may be. All pages of the bid where entries or amendments have been made shall be initialed by the person or persons signing the bid.
- 21.3 The bid shall contain no alterations, omissions or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the person or persons signing the bid.

**D. SUBMISSION OF BIDS**

**22 SEALING AND MARKING OF BIDS:**

- 22.1 The bid shall be submitted online through E-tendering.

**Online: The Price bid shall be filled online in the prescribed format provided on the Website and Submitted before 29/07/2026 up to 18.00 hrs.**

**22.2 SUPPORTING DOCUMENTS :**

While the bid shall be submitted online all the supporting documents including EMD and tender fee shall be submitted in sealed envelope along with other enclosure. Information to be provided in hard copy as a part of supporting documents shall be sent to the Chief Officer, Khambhat. Nagarpalika, Khambhat. Duly signed by the authorized signatory. The Supporting documents shall be submitted on or before due date and time in a sealed envelope clearly super-scribed with Tender Description, Address of Bid office and Due date.

The Bidder has to send all supporting documents by registered post only. So as to reach at the Bid Submission Office on or before the last date & time fixed for receipt of BID. Khambhat. Nagarpalika is not responsible for any loss or delay of Tender in transit.

The bid shall be in two envelopes as follows:

Envelop A - Bid security

Envelop B - Technical Bid & Supporting Documents.

22.2 The bidder shall seal the original bids in an inner and outer envelope; duly marking the envelopes as "ORIGINAL".

22.3 The inner and outer envelopes shall

(a) Be addressed to the: Employer at the following address:

**Chief Officer,  
KHAMBHAT. NAGARPALIKA,  
KHAMBHAT.  
Phone No: (O) 02698 (221300)**

(b) Bear the following identification:

**CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER:  
SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA.**

22.4 In addition to the identification required in Sub-Clause 22.3, the inner envelope shall indicate the name and address of the bidder to enable the bid to be returned, unopened in case it is declared "late" pursuant to Clause 24.

22.5 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the bid.

### **3. DEADLINE FOR SUBMISSION OF BIDS:**

23.1 **Bids must be received by the Employer at the address specified above not later than 06/08/2026 up to 18.00 Hrs. through registered post/ speed post only.**

23.2 The Employer may, at its discretion, extend the deadline for submission of bids by issuing an addendum in accordance with Clause 11, in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.

### **24 LATE BIDS:**

24.1 Any bid received by the Employer after the deadline for submission of bids prescribed in Clause 23 will be rejected and returned unopened to the bidder.

### **25 MODIFICATION & WITHDRAWAL OF BIDS:**

25.1 The bidder may modify or withdraw its bid after bid submission, provided that written notice of the modification or withdrawal is received by the Employer prior to the deadline for submission of bids.

25.2 The bidder's modification or withdrawal notice shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause 22, with the outer and inner envelopes additionally marked "MODIFICATION" or "WITHDRAWAL", as appropriate. A withdrawal notice may also be sent by fax but must be followed by a signed confirmation copy.

25.3 No bid may be modified by the bidder after the deadline for submission of bids, except in accordance with Sub-Clauses 25.2 and 36.2.



- 25.4 Except as provided in Sub-Clause 30.2, withdrawal of a bid during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified in Sub-Clause 17.1 may result in the forfeiture of the bid security pursuant to Sub-Clause 18.6.

## **E. OPENING & EVALUATION OF TECHNICAL PROPOSAL**

### **26 OPENING OF TECHNICAL PROPOSAL:**

- 26.1 The Employer will open the technical proposals, in the presence of bidders' representatives who choose to attend at:

**Chief Officer  
KHAMBHAT NAGARPALIKA  
In Office of the Nagarpalika  
Khambhat**

**Date & Time 07/08/2026 at 12.00 Hrs. (If Possible)**

The bidder's representatives who are present shall sign a register evidencing their attendance.

- 26.2 The price proposals will remain unopened and will be held in the custody of the Employer unit the time of bid opening of the price proposals. The time and date and location of the bid opening of the price proposals will be advised in writing or by fax by the Employer and will follow the receipt of approval by the Nagarpalika of the evaluation of the technical proposals.
- 26.3 Envelop marked "WITHDRAWAL" shall be opened and read out first bids for which an acceptable notice of withdrawal has been submitted pursuant to clause 25 shall not be opened.
- 26.4 The bidder's names, bid modification & withdrawals, such other details as the employer may consider appropriate, will be announced & recorded by the employer at the opening. The bidder's representatives will be required to sign this record.
- 26.5 The Employer shall prepare minutes of the bid opening, including the information disclosed to those present in accordance with sub clause 26.4.

### **27 PROCESS TO BE CONFIDENTIAL:**

Information relating to the examination, clarification, evaluation and comparison of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process. Any effort by a bidder to influence the Employer's processing of bids or award decisions by any way may result in the rejection of the bidder's bid.

### **28 PRELIMINARY EXAMINATION OF TECHNICAL PROPOSAL:**

The Employer will examine the bids to determine whether they are complete, whether the documents have been properly signed, whether the required security is included, and whether the bids are generally in order. Any bids found to be non-responsive for any reasons or not meeting the minimum levels of the performance or other criteria specified in the bidding documents will be rejected by the Employer and not included for further consideration.

## **29 EVALUATION & COMPARSION OF TECHNICAL PROPOSAL:**

The employer will carry out a detailed evaluation of the bids in order to determine whether the bidders are qualified and whether the technical aspects are substantially responsive to the requirements set for the in the bidding documents. In order to reach such a determination, the Employer will examine the information supplied by the Bidders and other requirements in the bidding documents, taking into account the following factors:

### **a. Qualification**

- i. the determination will take into account the Bidder's financial, technical all production capabilities and past performance; it will be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, pursuant to Sub-Clause 5.1(b), as well as such other information as the Employer deems necessary and appropriate; and
- ii. An affirmative determination will be a prerequisite for the employer to continue with the evaluation of the technical proposal; a negative determination will result in rejection of the Bidder's bid.

### **b. Technical:**

- i. Overall completeness and compliance with the Employer's Requirements; the technical merits of plant and equipment offered and deviations from the Employer's Requirements; suitability of the facilities offered in relation to the environment and climatic conditions prevailing at the site; quality, function and operation of any process control concept included in the bid;
- ii. Achievement of specified performance criteria by the facilities;
- iii. Compliance with the time schedule called for in Technical proposal and any alternative time schedules offered by Bidders, as evidenced by a milestone schedule provided in the bid;
- iv. Any deviations to the commercial and contractual provisions stipulated in the bidding documents.

## **30 CLARIFICATION OF TECHNICAL PROPOSALS:**

- 30.1 The Employer may conduct clarification meetings with any Bidder to discuss any matters, technical or otherwise, 'where the Employer requires amendments or changes to be made to the Technical Proposal.
- 30.2 Any effort by the bidder to influence the employer in the Employer's evaluation of technical proposals, bid comparison or the Employer's decisions on acceptance or rejection of bids may result in the rejection of the bidder's bid.

## **31 INVITATION TO ATTEND OPENING OF PRICE PROPOSALS:**

- 31.1 At the end of the evaluation of the technical proposals the Employer will invite bidders who have submitted substantially responsive technical proposals and who have been determined as being qualified for award to attend the bid opening of the price proposals. Bidders shall be given reasonable notice of the price proposal bid opening.
- 31.2 The Employer will notify Bidders that have been rejected on the grounds of being substantially non-responsive to the requirements of the bidding documents in writing and return the unopened price proposal.

## **F. OPENING & EVALUATION OF PRICE PROPOSALS**

### **32 OPENING OF PRICE PROPOSALS:**

- 32.1 The employer will open the price proposals of all bidders who submitted substantially responsive technical proposals at the time and date at the location advised to the bidders. The bidder's representatives who are present shall sign a register evidencing their attendance.
- 32.2 The bidder's name, the Bid Prices, the total amount of each bid, any discounts, and such other details as the employer may consider appropriate, will be announced and recorded by the employer at the opening. The bidder's representatives will be required to sign this record.
- 32.3 The employer shall prepare minutes of the bid opening, including the information disclosed to those present in accordance with Sub-clause.

### **33 PROCESS TO BE CONFIDENTIAL:**

Information related to the examination, clarification, evaluation and comparison of bids and recommendation of the award of a contract shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful bidder has been announced. Any effort by a bidder to influence the employer's, processing of bids or award decisions may result in rejection of the bidder's bid.

### **34 CLARIFICATION OF PRICE PROPOSALS AND CONTACTING THE EMPLOYER:**

- 34.1 To assist in the examination, evaluation and comparison of price proposals, the employer may, at its discretion, ask any bidder for clarification of its bid. The request for clarification and the response shall be in writing or by cable, but no change in price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by the employer in the evaluation of the bid in accordance with clause 36.
- 34.2 Subject to Sub-clause 34.1, no bidder shall contact the employer on any matter relating to its bid from the time of opening of price proposals to the time the contract is awarded. If the bidder wishes to bring additional information to the notice of the employer, it should do so in writing.
- 34.3 Any effort by the bidder to influence the employer in the employer's evaluation of price proposal, bid comparison or contract award decision may result in the rejection of the bidder's bid.

### **35 PRELIMINARY EXAMINATION OF PRICE PROPOSALS AND DETERMINATION OF RESPONSIVENESS:**

- 35.1 The Employer will examine the bids to determine whether they are complete, whether the documents have been properly signed, whether the required security is included, whether the bids are substantially responsive to the requirements of the bidding documents; and whether the bids provide any clarification and / or substantiation that the Employer may require pursuant to Clause 3.4.
- 35.2 A substantially responsive bid is one which conforms to all the terms, conditions and requirements of the bidding documents, without material deviation or reservation and includes the amendments and changes, if any, requested by the Employer during the evaluation of the bidder's technical proposal.

- 35.3 If a price proposal is not substantially responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.

**36 CORRECTION OF ERRORS:**

- 36.1 Price Proposals determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Arithmetic errors will be rectified on the following basis. If there is a discrepancy between the unit rate and the total cost that is obtained by multiplying the unit rate and quantity, the unit rate shall prevail and the total cost will be corrected unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit rate, in which case the total cost as quoted will govern and the unit rate corrected. If there is a discrepancy between the total bid amount and the sum of total costs, the sum of the total costs shall prevail and the total bid amount will be corrected.
- 36.2 The amount stated in the Form of Bid for Price Proposal will be adjusted by the Employer in accordance with the above procedure for the correction of errors and, shall be considered as binding upon the bidder. If the bidder does not accept the corrected amount of bid, its bid will be rejected, and the bid security may be forfeited in accordance with Sub-Clause 18.6(b).

**37 EVALUATIONS AND COMPARISON OF PRICE PROPOSAL:**

- 37.1 The Employer will evaluate and compare only the bids determined to be substantially responsive in accordance with Clause 35.
- 37.2 The Employer's evaluation of a bid will take into account, in addition to the bid prices indicated in the Schedule of Prices, the following costs and factors that will be added to each Bidder's bid price in the evaluation using pricing information available to the Employer, in the manner and to the extent indicated in Sub-Clause 38.4 and in the Employer's Requirements.
- (a) The additional price, if any, reflected in the price proposal. If the price stated is not realistic the bid is liable to be rejected,
  - (b) Compliance with the time schedule called for in the Appendix to Price Proposal and evidenced as needed in a milestone schedule provided in the bid;
  - (c) The projected operating costs during the initial period of operation of the facilities,
  - (d) The functional guarantees of the facilities offered against the specified performance criteria of the plant and equipment; and
  - (e) The extra cost of work, services, facilities etc., required to be provided by the Employer or third parties.
- 37.3 (a) The Employer reserve the right to accept or reject any variation or deviation. Variations, deviations, and other factors which are in excess of the requirements of the bidding documents or otherwise result in the accrual of unsolicited benefits to the Employer shall not be taken into account in bid evaluation.
- (b) The estimated effect of the price adjustment provisions of the Conditions of Particular Application, applied over the period of execution of the Contract, shall not be taken into account in bid evaluation.
  - (c) If the bid of the successful bidder is substantially below the Employer's estimate for the contract, the Employer may require the

bidder to produce detailed price analyses to demonstrate the internal consistency of those prices. After evaluation of the price analysis, the Employer may require that the amount of the performance security set forth in Clause 42 be increased at the expense of the successful bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful bidder under the Contract.

## G.        AWARD OF CONTRACT

### **38      AWARD:**

Subject to Clause 41, the Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and who has offered the Lowest Evaluated Bid Price, provided that such bidder has been determined to be (i) eligible in accordance with the provisions of Clause 3; and (ii) qualified in accordance with the provisions of Clause 5.

### **39      EMPLOYER'S RIGHT TO ACCEPT ANY BID OR TO REJECT ANY OR ALL BIDS:**

Notwithstanding Clause 40, the Employer reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids, at any time prior to award of Contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders of the grounds for the Employer's action.

### **40      NOTIFICATION OF AWARD:**

- 40.1 Prior to expiration of the period of bid validity prescribed by the Employer, the Employer will notify the successful bidder by fax, confirmed by registered letter, that its bid has been accepted. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") shall name the sum which the Employer will pay the Contractor in consideration of the execution, completion and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called "the Contract Price").
- 40.2 The notification of award will constitute the formation of the Contract.
- 40.3 Upon the furnishing by the successful bidder of a performance security (and domestic preference security where required), the Employer will promptly notify the other bidders that their bids have been unsuccessful.

### **41      SIGNING OF CONTRACT AGREEMENT:**

- 41.1 At the same time that he notifies the successful bidder that its bid has been accepted, the Employer will send the bidder the Form of Contract Agreement provided in the bidding documents, incorporating all agreements between the parties.
- 41.2 Within 15 days of receipt of the Form of Agreement, the successful bidder shall sign the Form and return it to the Employer.

### **42      PERFORMANCE SECURITY:**

- 42.1 Within 15 days of receipt of the notification of award from the Employer, the successful bidder shall furnish to the Employer a performance security in an amount of 10 percent of the Contract Price in accordance with the Conditions of

Contract. The form of performance security provided in Section 6 of the Bidding documents may be used or some other form acceptable to the Employer.

- 42.2 Failure of the successful bidder to comply with the requirements of Clauses 42 or 43 shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security.

### **43 CORRUPT OR FRAUDULENT PRACTICES:**

- 43.1 The Nagarpalika requires that bidders/suppliers/contractors has follow the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy:

- (a) Defines for the purposes of this provision, the terms set forth below as follows:
  - (i) “Corrupt practices” means behavior on the part of officials in the public or private sectors by which they improperly and unlawfully enrich themselves and/or those close to them, or induce others to do so, by misusing the position in which they are placed, and it includes the offering, giving, receiving, or soliciting of anything of value to influence the action of any such official in the procurement process or in contract execution; and
  - (ii) “Fraudulent practice” means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the determination of the Borrower, and includes collusive practice among bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the borrower of the benefits of free and open competition;
- (b) Will reject a proposal for award if it determines that the bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;
- (c) Will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded an contract if it at any time determines that the firm has engaged in corrupt and fraudulent practices in competing for, or in executing, an contract.

Furthermore, bidders shall be aware of the provision stated in sub-clause 1.16 and Sub-clause 15.5 of the Conditions of Contract, part II – conditions of particular application.

## **KHAMBHAT NAGARPALIKA KHAMBHAT**

### **Terms and Conditions:**

- Bidder must have follow all Rules and Resolutions Issued by Government of Gujarat Roads and Building Department/Finance Department /Central Government.
- For Roads Works Bidder must have to Follow Resolution No.PRC-10-2015-55-C Dated 04.11.2015 issued by GOG, R&B Department.
- Price Escalation / Star Rate Price Adjustment Will not be paid by KHAMBHAT NAGARPALIKA KHAMBHAT.
- All other Acts / Rules / Regulation, by laws order, notification etc. present or future Applicable to the CONTRACTOR / OWNER from time to time for performing the aforesaid WORKS.



**SITE VISIT CERTIFICATE.**  
**(ON COMPANY'S LETTER HEAD)**

**To  
The Chief Officer  
Khambhat  
Nagarpalika  
Khambhat.**

**Dear Sir,**

**SUB: BID DOCUMENT FOR CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT  
KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS  
YOJANA (YEAR: 2025-26) GRANT ( SECOND ATTEMPT).**

1. With reference to the tender invited by you for the above mentioned work/s, I/We do hereby confirm that I/We have carried out site visit and understood the project requirements in detail.
2. I / We have satisfied ourselves as to the current site conditions as on date \_\_\_\_\_, and agree to execute the project in accordance with the tender requirements.
3. We agree that at your sole discretion and without assigning any reason whatsoever, you reserve the right to accept and/or reject any or all tenders. The Chief Officer **Khambhat Nagarpalika, Khambhat** does not bind itself to accept the lowest tender.

Signature of Engineer  
**KHAMBHAT NAGARPALIKA**

Yours faithfully,

Date:  
the firm)

(Signature of the tenderer with the seal of

Witness:

**ANTI-BLACKLISTING INFORMATION**  
**(On Stamp Paper Rs. 300) Notarized.**

M/s \_\_\_\_\_ hereby certify and confirm that I or any of our Partner/ Promoter/s/director/s are not barred by Government of Gujarat (GOG)/any other entity of GOG or blacklisted by any State Government or Central Government/Department/Agency in India or from abroad from participating in Work/s, as individually/Partnership Firm as on Dt.\_\_\_\_\_. We further confirm that we are aware that our bid for the captioned tender would be liable for rejection in case any material misrepresentation is made or discovered about the requirements of this tender at any stage of the bidding process or thereafter during the agreement period. Dated this \_\_\_\_\_ day of, 2026.

Name of the Bidder:

Signature of the Authorized person:

Name of the Authorized Person:

**(ON COMPANY'S LETTER HEAD)**

**LETTER OF SUBMISSION OF BID, ASSURANCE LETTER.**

**To,  
CHIEF OFFICER  
KHAMBHAT NAGARPALIKA  
KHAMBHAT.**

**Respected Sir,**

**SUB: BID DOCUMENT FOR CONSTRUCTION WORK OF MUNICIPALITY BUILDING AT KHAMBHAT NAGARPALIKA UNDER: SWARNIM JYANTI MUKHYA MANTRI SAHERI VIKAS YOJANA(YEAR: 2025-26) GRANT ( SECOND ATTEMPT).**

1. With reference to the tender invited by you for the above mentioned work/s, I/We do hereby offer to perform, provide execute complete and maintain the work/s in conformity with the drawings, conditions of tender articles of agreement and conditions of contract, specifications, and bill of quantities for the sum of Total Quoted Amount at the rate quoted in the bill of quantities.
2. I / We have satisfied ourselves as to the location of site, examined the drawings and read of Articles of Agreement, conditions of tender, conditions of contract and specifications etc. and I/We understand that the works are to be completed within\_\_\_\_\_calendar months. I/We agree to finish the whole of the works within\_\_\_\_\_calendar months from the date of commencement of the work fully understanding that the time is the essence of the contract.
3. I/We will carry out various types of Pre and Post total station survey work in Connection with stipulated quantities in Schedule-B for smooth running of project and site layout management.
4. I/We will obtain at various locations for Deciding the Depth of Foundation and other criteria.
5. The Bidder/Contractor will have to Prepare Detailed Structure Design and Drawing on the Basis of Own Design for Component at his own Expanse According to Stages of Payment Given in Schedule-B, The Chief Officer Khambhat Nagarpalika, Khambhat, will not bare any Additional Expanse regarding the same.
6. We have independently considered the amount of liquidity damages as stated in the appendix and the general conditions of the contract and agree that it represents fair estimate of the loss likely to be suffered by THE CHIEF OFFICER KHAMBHAT NAGARPALIKA KHAMBHAT in the event of the works not being completed by us in time.
7. If our tender is accepted, we will, when required, furnish the security deposit for the sum named in the appendix to the general conditions of the contract for the due performance of the contract.

8. We agree to abide by this tender for the period of Bid validity from the Last date of Submission of tender, which may be extended further by mutual agreement. It shall remain binding upon us. If the tender is withdrawn by us, our earnest money will be forfeited.
9. Unless and until a formal agreement is prepared and executed this tender together with your written acceptance thereof shall constitute a binding contract between us.
10. We agree that at your sole discretion and without assigning any reason whatsoever, you reserve the right to accept and/or reject any or all tenders. The Chief Officer Khambhat Nagarpalika, does not bind itself to accept the lowest tender.

**Yours faithfully,**

**Date:**  
**firm)**  
**Witness:**

**(Signature of the Tenderer with the seal of the**

**1. Signature :**  
**Name:**  
**Address:**

**2. Signature :**  
**Name:**  
**Address:**