



# SURAT MUNICIPAL CORPORATION

(SMART CITY MISSION)



## Tender

For

**CONSTRUCTION OF 550 EWS-I RESIDENTIAL FLATS INCLUDING ALL INTERNAL INFRASTRUCTURE SERVICES & SITE DEVELOPMENT WORK AT T.P. SCHEME NO. 19 (PARVAT-MAGOB), F.P. NO. 100 & T.P. SCHEME NO. 41 (DINDOLI), F.P. NO. 29, UNDER "SMART CITY MISSION" ON ENGINEERING-DESIGNING, PROCUREMENT AND CONSTRUCTION BASIS (EPC MODE)**

TENDER NOTICE (ON LINE) NO : **(On line) DC/SUC/07/2016-17/Work No.-01**

### VOLUME - I TECHNICAL BID

Downloading of tender Documents	From 07-11-2016 to 07-12-2016 upto 17:00 Hrs.
Pre-Bid Queries & Meeting Pre-Bid Meeting (Online & Offline)	Bidder shall have to post their queries on E-mail address <a href="mailto:slumupgradation@gmail.com">slumupgradation@gmail.com</a> on or before 17-11-2016 up to 17.00 hrs.
Online Submission (Last Date)	On or before date 07-12-2016 upto 17:00 hrs.
Submission of Tender fee& EMD  (Physical Submission only)	To the Chief Accountant, Surat Municipal Corporation, Muglisara. Surat – 395003 by R.P.A.D. / Speed post only. From 08-12-2016 to 14-12-2016 upto 17:00 hrs.

### CLIENT

THE MUNICIPAL COMMISSIONER,  
SURAT MUNICIPAL CORPORATION, MUGLISARA, SURAT – 395 003.  
Phone : 91-261-2423751-56 , Fax : 91-261-2451935  
Email : [slumupgradation@gmail.com](mailto:slumupgradation@gmail.com)  
Web : [www.suratmunicipal.gov.in](http://www.suratmunicipal.gov.in)



**NAME OF WORK :** CONSTRUCTION OF 550 EWS-I RESIDENTIAL FLATS INCLUDING ALL INTERNAL INFRASTRUCTURE SERVICES & SITE DEVELOPMENT WORK AT T.P. SCHEME NO. 19 (PARVAT-MAGOB),F.P. NO. 100 & T.P. SCHEME NO. 41 (DINDOLI),F.P. NO. 29,UNDER "SMART CITY MISSION" ON ENGINEERING-DESIGNING, PROCUREMENT AND CONSTRUCTION BASIS (EPC MODE)

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# VOLUME - I

## Part -1



## Surat Municipal Corporation

### Section I - Notice Inviting Tender

Tender Notice No.	(Online) DC/SUC/07/2016-17/Work No.-01	
Organization Name	SURAT MUNICIPAL CORPORATION	
Department Name	SLUM UPGRADATION CELL	
Name of Work	CONSTRUCTION OF 550 EWS-I RESIDENTIAL FLATS INCLUDING ALL INTERNAL INFRASTRUCTURE SERVICES & SITE DEVELOPMENT WORK AT T.P. SCHEME NO. 19 (PARVAT-MAGOB),F.P. NO. 100 & T.P. SCHEME NO. 41 (DINDOLI),F.P. NO. 29,UNDER "SMART CITY MISSION" ON ENGINEERING-DESIGNING, PROCUREMENT AND CONSTRUCTION BASIS (EPC MODE)	
Tender Notice	(Online) DC/SUC/07/2016-17/Work No.-01	
Tender Type	On EPC MODE (Design, Engineering, Procurement and Construction Basis)	
Bidder Nationality	NCB	
Product	CONSTRUCTION OF 550 EWS-I RESIDENTIAL FLATS INCLUDING ALL INTERNAL INFRASTRUCTURE SERVICES & SITE DEVELOPMENT WORK AT T.P. SCHEME NO. 19 (PARVAT-MAGOB),F.P. NO. 100 & T.P. SCHEME NO. 41 (DINDOLI),F.P. NO. 29,UNDER "SMART CITY MISSION" ON ENGINEERING-DESIGNING, PROCUREMENT AND CONSTRUCTION BASIS (EPC MODE)	
Type of Contract	Single Work	
Bidding Currency	Single- Indian National Rupees	
Joint Venture	Not Allowed	
Schedule of E-Tender	Downloading of Tender Documents	07/11/2016 to 07/12/2016 upto 17:00 Hrs.
	Pre-Bid Meeting Date & Time	Bidder shall have to post their queries on E-mail address slumupgradation@gmail.com on or before 17-11-2016 up to 17.00 hrs.
	Last date of online submission of Tender documents (Technical Bid with duly filled & duly signed forms and Price Bid)	On or before date 07-12-2016 upto 17:00 hrs.
	Submission of Tender fee,EMD & Addenda-Corrigendum if any in Hard copy. (Physical Submission only)	Between 08/12/2016 to 14/12/2016 up to 17:00 Hrs. at the office of "Chief Accountant, Surat Municipal Corporation, Muglisara, by SpeedPost/RPAD only." In sealed cover duly super scribed with name of work and tender notice no.
	Opening of Bid (Online) & PQ documents submitted electronically	If possible on 08-12-2016 at 16:00 hrs.
	Opening of Price Bid (Online)	Will be intimated later on.
	Bid validity period	180 days from the opening of the price bid
	Project Duration	21 months including monsoon
Payment Details	Document Fee	Rs.18,000/- In form of Account Payee Demand Draft payable in favor of The Commissioner, Surat Municipal Corporation payable at Surat with bid submission.



	EMD (BID SECURITY)	Rs.35.36 lacs (Rs. Thirty Five Lacs and Thirty Six Thousand Only) Of this amount, the tenderer shall pay EMD of Rs. 17.68 lacs in the form of Bank Guarantee from the Nationalized Bank only. The balance of the EMD (Rs. 17.68 lacs) is to be deposited by way of pay order / Demand Draft issued in favour of Commissioner, Surat Municipal corporation, Surat through Nationalized Bank only payable at Surat.EMD in no other form shall be accepted.
	Estimated Value	Rs. 3535.10 lacs
General Terms & Conditions	<p>Bidders who wish to participate in this E-Tender will have to procure valid digital certificate as per information Technology Act 2000. Bidders can procure this certificate from any of the Government approved certifying agency i.e. (n) Code Solution. Bidders shall upload the tender documents after submitting the DD details for tender fees and EMD details online. The Demand Draft toward Tender Document fees can be submitted along with Earnest Money Deposit in electronic format only through online (by scanning) while uploading the bid. This submission shall mean that EMD and tender fee are received for purpose of opening the bid. Accordingly, offer of those shall be opened whose EMD and tender fee is received electronically. However, for the purpose of realisation of DD the Bidder shall send the DD as original through RPAD/ Speed Post so as to reach Account Department Main Office within 7 days from the last date of uploading. Penaltative action for not submitting DD in original to Account Department (Main Office) by Bidder shall be initiated and action shall be taken for a abeyance of registration and cancelation of E-tendering code for one year. Any document in support shall be in electronic format only through online( by scanning) and hard copy will not be accepted separately.</p> <p>This should be as per details given online and it should be drawn before last date of the uploading of the tender. The intending bidders shall have to submit the following documents along with the EMD (BID SECURITY) and tender fees. The Bidder should submit all the forms electronically only.</p> <ol style="list-style-type: none"> <li>1. The technical &amp; financial details required for evaluation dully digitally signed (As per section II &amp; III of volume-1, part-1 of the tender).</li> <li>2. Power of attorney.</li> <li>3. Company's profile and certificate of registration of company under the law.</li> </ol> <p><b>DOWNLOAD OF TENDER DOCUMENT :</b> The tender document for these work are available only in Electronic format which can be downloaded free of cost by the bidder.</p> <p><b>SUBMISSION OF TENDER :</b> Bidder shall submit their offer in electronic format on below mentioned website on or before the scheduled date and time as mentioned, after Digitally Signing the same. No Price bid in physical form will be accepted and any such offer if received by SURAT MUNICIPAL CORPORATION will be outrightly rejected. Bidders need not to submit Technical Bid in Hard Copy in physical form at this stage .Bidder shall have to submit separate account payee DD for Tender Fee &amp; EMD drawn in favor of <b>"The Commissioner, Surat Municipal Corporation, Surat"</b> Both the envelopes shall be placed in another envelope with due mention of Tender notice No., Name of work,date and time of opening of tenders and to be submitted in the office of the <b>To ,The Chief Accountant, Surat Municipal</b></p>	



	<p><b>Corporation, Muglisara. Surat – 395003</b> ,during the period mentioned above.Tender documents submitted by intending bidders shall be considered for evaluation only of those bidders,whose Earnest money deposit, tender fee and other documents(Addenda, Corrigendum if any) placed in the envelope are found in order.</p>
	<p>OPENING OF TENDER:- The Tender Bids will be opened on the specified date &amp; venue. Bidders who wish to remain present at Surat Municipal Corporation, at the time of tender opening can do so. Only one representative of each firmwill be allowed to remain present.</p>
Information for online participation	<ol style="list-style-type: none"><li>1. Internet site address for e-Tendering activities will be <a href="https://smc.nprocure.com">https://smc.nprocure.com</a></li><li>2. Interested bidders can view detailed tender notice and download tender document from the above mentioned website.</li><li>3. Bidders who wish to participate in online tender have to register with the website through the "New User Registration" link provided on the home page. Bidder will create login id &amp; password on the own in registration process.</li><li>4. Bidders who wish to participate in this tender need to procure Digital Certificate as per Information Technology Act-2000 usingthat they can digitally sign their electronic bids. Bidders can procure the same from any of the CCA approved certifying agencies, or they may contact (n) code Solution at below mentioned address and they will assist them in procuring the same.Bidders who already have a valid Digital Certificate need not to procure the same. In case bidders need any clarification regarding online participation, they can contact : M/s (n)code solution 301, G.N.F.C. Info Tower, Near Grant Bhagwati Hotel, Ahmedabad 380 015 INDIA Tel: +91 79 26857316 Tel: +91 79 26857317 Tel: +91 79 26857318 e-Mail:URL: <a href="https://smc.nprocure.com">https://smc.nprocure.com</a></li><li>5. Bidders who wish to participate in e-Tender need to fill data in pre defined forms of tender fee, EMD, Volume-1 of tender i.e. PQ(Technical) Or experience details and Price bid.(In electronic form only).</li><li>6. Bidder should upload scan copies of reference documents in support of their eligibility of the bid.</li><li>7. After filling data in pre defined forms bidders need to click on final submission link to submit their encrypted bid. Bidder can also submit Document Fees, EMD, Volume-1,2,3 of tender document&amp; Reference Documents in hard copy <u>only</u> if such instructions is given by tendering authority <u>in writing</u>.</li></ol>

EXECUTIVE ENGINEER  
SLUM UPGRADATION CELL  
SURAT MUNICIPAL CORPORATION



## SECTION II - BIDDING DATA

The following specific data for the Works to be procured shall complement, amend, or supplement the provisions in the Instructions to Bidders and Conditions of Contract. Whenever there is a conflict, the provisions herein shall prevail over those in the Instructions to Bidders.

Tender Notice No.	<b>(On line) DC/SUC/07/2016-17/Work No.-01</b>	
Work No.	<b>01</b>	
Bids to be submitted to	"Chief Accountant, Surat Municipal Corporation, Muglisara, by Speed Post/RPAD only."	
Name of Employer and Address	The Municipal Commissioner, Surat Municipal Corporation, Muglisara, Surat-395 003 Phone : 91-261-2423751 – 56, Fax : 91-261-2451935 Email: slumupgradation@gmail.com Web : www.suratmunicipal.gov.in..	
Name of Work	CONSTRUCTION OF <b>550 EWS-I RESIDENTIAL FLATS INCLUDING ALL INTERNAL INFRASTRUCTURE SERVICES &amp; SITE DEVELOPMENT WORK AT T.P. SCHEME NO. 19 (PARVAT-MAGOB), F.P. NO. 100 &amp; T.P. SCHEME NO. 41 (DINDOLI), F.P. NO. 29, UNDER "SMART CITY MISSION" ON ENGINEERING-DESIGNING, PROCUREMENT AND CONSTRUCTION BASIS(EPC MODE)</b>	
General Description of the work	Location & Plot Details	<b>T.P. S. NO. 19 (PARVAT-MAGOB), F.P. NO. 100 &amp; T.P.S NO. 41 (DINDOLI), F.P. NO. 29.</b>
	Plot Area in Sqmt.	<b>6565.00 &amp; 2072.00 respectively (As on record)</b>
	Plots for development	As above
	Carpet Area to be provided for each D.U.s.	<b>Between 26.00 Sq.mts to 27.00 Sq.mts for EWS-I</b>
	Minimum accommodation	(i) Living Room (ii) Bed Room (iii) Kitchen (iv) Bath (v) Toilet (vi) Wash Area
	Minimum Floor Height at G.F.(Parking Floor)	3.00 mt.
	Minimum Floor Height at each floor	2.85 mt.
	<b>Wachman Accomodation/office at G.F for each building</b>	<b>3.00 mt X 3.00 mt with additional sufficient size toilet bath facilities.</b>
	Minimum No. of Units	<b>550 Nos.</b>
Period of Completion	<b>21 months including Monsoon.</b>	
Estimated Cost of Project	<b>Rs. 3535.10 lacs</b> (with cost of cement and steel) (Prepared as per Schedule of Rates for, Surat Division -2015-16 & Market Rate for Non SOR Items)	
Earnest Money(Bid Security)	<b>Rs.35.36 lacs (Rs. Thirty Five Lacs and Thirty Six Thousand Only)</b>	
Tender Fees	<b>Rs.18,000/-</b> In form of Account Payee Demand Draft payable in favor of The Commissioner, Surat Municipal Corporation payable at Surat with bid submission.	





Performance Security	<p>10% of Contract Value. Out of total Performance Security (10% of contract value), initial Performance Security at 5% of the contract value shall be deposited by the bidder in the form of FDR/BG of listed nationalized Bank within 15 days on acceptance of tender and remaining Performance Security shall be deducted from the each R.A. Bill at rate of 5%)</p> <p>The successful tenderer shall have to enter into an agreement on a non-judicial stamp paper of Rs. 100/- if S.D. is paid in the form of Bank guarantee/D.D/Pay order or on stamp paper of Rs. 4.25% of S.D. Amount if it is paid in the form of F.D. as per the format of SMC.</p> <p>The Surety &amp; Undertaking shall be executed on stamp paper worth Rs. 100/- each.</p> <p>(i) Initial performance security deposit i.e. Bank guarantee will be released as below</p> <ul style="list-style-type: none"> <li>➤ After completion of project <b>(within 60 days from the date of the final bill payment - 5 %</b></li> </ul> <p>(ii) Remaining performance security deposit will be released as below during defect liability period</p> <ul style="list-style-type: none"> <li>➤ After 3 years of completion - 2.5 %</li> <li>➤ After 5 years of completion - 2.0 %</li> <li>➤ After 10 years of completion - 0.5 %</li> </ul> <p>provided that any defect if found shall have to be rectified /complied as per the direction given by E.I.C ,within the said periods.</p>
Retention Money	7% from each Running bill.
Defect Liability Period	10 (ten) years after issue of completion certificate
Brief Scope of work	<p>The work to be carried out under this contract shall consist of various items as generally described in Tender Documents. The development/construction of EWS-I houses including Conceptualisation, planning ,structural designing, structural proof checking and all other internal &amp; external amenities like Plumbing &amp; sanitation, Drainage, Electrification ,strom water drainage, Horticulture ,Fire safety ,Infrastructural facilities like RCC roads, compound wall,entry gate ,COP Development ,Street lighting, providing, installing &amp; commissioning of tertiary sewage treatment plant(TSTP), etc.The planning &amp; design of the building will have to be carried out by contractor as per the Guide lines of UD &amp; UHD and prevailing GDCR-SMC norms and shall have to be got approved from authority.</p> <p>The rates and prices in the Bid (except in so far as otherwise provided under the contract) include all constructional plant, labour, supervision, materials, all temporary works and false works, erection, maintenance, establishment and overhead charges, profit, taxation and levies and other charges with all general risks, liabilities and obligations set out or implied in the Contract and including remedy of any defects during the Defects Liability Period and shall include (but not limited to the following).</p> <p>(a). Carrying out Planning ,Designing and construction of all components of the Building structure with foundation, RCC superstructure, all finishing works and all Internal and External services with the infrastructural developments according to required specifications under this contract as per schedule of payment terms.</p>



	<p>(b). General works such as cleaning site before commencement , setting out axis and locations of foundations etc. and clearing the site after completion and before handing over the structure after defect liability period.</p> <p>(c). Collection and providing samples including transportation and carrying out tests on various constructional materials proposed to be used in the work. All tests as required as per provision of Indian standard codes/standard specifications and as suggested by Engineer in Charge and furnish test report/certificates from acceptable/Govt. approved testing laboratories.</p> <p>(d). Providing full furnished site office for the client and PMC. Setting up site laboratory for routine tests as per approved in QAP.</p> <p>(e). Giving programme of work to monitor progress of work and to sort out bottlenecks for lapses etc.</p> <p>(f). Complying with any other data, which may be required as per the specifications, conditions, etc., forming part of the contract.</p> <p>(g). Any other item of work not specifically provided in the contract but which is necessary being contingent in complying with the provisions of the contract.</p> <p>(h). All the concrete work shall have to be carried out by fully automatic batching plant with minimum output of 30 cu.mt per hour with each batch report printing facility or Digital weigh Batcher machine.</p> <p>(i). As built post execution drawing and approved designs shall have to be submitted in five copies including soft copy by the contractor.</p> <p>(j). List of brand/make for various product/material to be used for this work is enclosed in Vol –I. However the descresion of Engineer in charge, a change in brand could be permitted if circumstances so warrant in opinion of Engineer in charge.</p> <p>(k). Design of each and every component of the Building will be carried by the contractor through a Design consultant to be appointed as per contract.</p> <p>(l). The design shall be based on latest applicable IS codes.</p> <p>(m). In case of any disagreement regarding the applicability of codes/codal provisions, the decision of Engineer in charge, shall be final and binding to all.</p> <p>(n). It will be the responsibility of the contractor to submit the Design Calculations and Drawings in the format required by the Proof checking authority. In case of the designs being done through software, the contractor will have to provide a licensed version of the same to the Proof checking authority. The design calculations shall cover all steps and all cases as required by the codes.</p> <p>(o). All safety measures, accident claims, damages, land for plant - machinery and site office, necessary technical staff required, Police protection etc. shall be included.</p> <p>(p). All major components for design required to commence work shall be got approved within <b>1 months</b> from the date of approval of plans from authority.</p> <p>(q). The above all details are for guidance purpose and may change during execution as per site condition and requirements. The contractor may do their own survey and investigation to ascertain the soil strata.</p> <p><b>Note:</b> The Bidder is expected and deemed to have satisfied himself with all aspects of the Project and Site conditions to have been able to submit the Bid which when accepted , will get transformed into enforceable contract.</p>
<b>Qualifying Criteria</b>	The Applicant shall provide evidence that their firm has been actively



	<p>engaged in the civil works especially in construction of buildings and having experience of construction of atleast 1 building with <b>G.F + 8 stories or 25 mt. height or more</b> during the last 7 years in the role of Prime Contractor (work executed as a sub-contractors and the work executed through any other contractor will not be considered). The applicant shall provide evidence that, he has successfully completed or substantially completed <b>G.F + 8 stories or 25 mt. height or more building works</b> within the last seven years completing till Tender uploading date in Statement (A-1). The works completed / substantially completed during the current financial year will also be considered for counting the particular construction experience The works may have been executed by the applicant as a Prime contractor. Substantially completed works means those works that are at least 90% completed as on tender uploading date and continuing satisfactorily on the date of application. For this, the Certificate from the employer shall be submitted alongwith the application incorporating clearly the Contract value-billing amount, date of commencement of works, satisfactory performance of the contractor and any other relevant information .</p> <p>Post qualification will be based on Applicants satisfying all the following minimum criteria regarding their particular experience, financial position, personnel and equipment capabilities and other relevant information as demonstrated by applicants responses in the forms attached. The applicant to note specifically that all information given including those in the form of various formats must be supported by certificates from respective issuing authorities.</p>
Signature of Contractor	<p>(A) The average annual financial turnover during the last 3 years ending 2015-16 should not be less than 30% of the estimated amount put to tender</p> <p>(B) Experience of having successfully completed G.F.+3 stories or more as a prime contractor and shall have executed similar nature of works as a prime contractor during the last seven years ending 01-04-2010 to 31-03-2016 should be either of the following.</p> <p>(i) Three similar completed works, each costing not less than the amount equal to 40% of estimated cost put to tenders,</p> <p>or</p> <p>(ii) Two similar completed works, each costing not less than the amount equal to 50% of estimated cost put to tender,</p> <p>or</p> <p>(iii) One similar completed work of aggregate cost not less than the amount equal to 80% of estimated cost put to tender.</p> <p>(NOTE: Similar works means should have successfully constructed any Government/ semi Government R.C.C. Structure buildings Having <b>G.F.+ 3 stories</b> or more during the last 7 years ending 01-04-2010 to 31-07-2016 in the role of Prime Contractor (statement-A)</p> <p>AND</p> <p>An attested copy of <b>Registration with any of the department of State Government, Surat Municipal Corporation, Central Government etc. Of "AA" Class and Spl. Category-1(Bldg.) of Gujarat State or equivalent to Sp. Category-1(Bldg.)</b> in other State &amp; who have a certificate of registration with Employees Provident Fund Organization and having experience of construction of Multi Storied Residential Building with good quality and workmanship.</p>



	C) In view of the latest circular of IT Department IT clearance certificate is not required. However the contractor shall submit copy of the PAN card.																								
	<p>It is further to clarify that if any of work(s) is/are on hand with the applicant, but if the amount of the work done at the site is more than 90% of the total Project / Tender cost as on date i.e. <b>31/10/2016 or the date of downloading the tender document</b> then those work(s) will also be taken into consideration while evaluation.</p> <p>Following enhancement factors will be used for the cost of works executed and the financial figures to a common base for the value of the works completed in India.</p> <table border="1"><thead><tr><th>Sr.No</th><th>Year</th><th>Enhancing factor</th></tr></thead><tbody><tr><td>1</td><td>2016-17</td><td>1.00</td></tr><tr><td>2</td><td>2015-16</td><td>1.10</td></tr><tr><td>3</td><td>2014-15</td><td>1.21</td></tr><tr><td>4</td><td>2013-14</td><td>1.32</td></tr><tr><td>5</td><td>2012-13</td><td>1.46</td></tr><tr><td>6</td><td>2011-12</td><td>1.61</td></tr><tr><td>7</td><td>2010-11</td><td>1.77</td></tr></tbody></table> <p>Applicant should indicate actual figures of costs and amount for the works executed by them in the schedule without accounting for the above-mentioned factors.</p>	Sr.No	Year	Enhancing factor	1	2016-17	1.00	2	2015-16	1.10	3	2014-15	1.21	4	2013-14	1.32	5	2012-13	1.46	6	2011-12	1.61	7	2010-11	1.77
Sr.No	Year	Enhancing factor																							
1	2016-17	1.00																							
2	2015-16	1.10																							
3	2014-15	1.21																							
4	2013-14	1.32																							
5	2012-13	1.46																							
6	2011-12	1.61																							
7	2010-11	1.77																							
	<p><b>Average Annual financial turnover during the last 3 years:</b></p> <ol style="list-style-type: none"><li>1. The average annual financial turnover during the last 3 years ending 2015-16 should not be less than 30% of the estimated amount put to tender.</li><li>2. Attested copies of balance sheet with adequate document/proof shall be attached</li><li>3. The details shall be furnished in prescribed Statement - D:</li></ol> <p><b>No. of Building works completed. as follows:</b></p> <ol style="list-style-type: none"><li>1. Note:- Nos. of building works with its amount completed during last 7 years ending 01/04/2010 to 31/10/2016</li></ol> <p><b>Statement- A (for eligibility)</b></p> <p>(i) Three similar completed works, each costing not less than the amount equal to 40% of estimated cost put to tenders,</p> <p>or</p> <p>(ii) Two similar completed works, each costing not less than the amount equal to 50% of estimated cost put to tender,</p> <p>or</p> <p>(iii) One similar completed work of aggregate cost not less than the amount equal to 80% of estimated cost put to tender.</p> <ol style="list-style-type: none"><li>2. Attested copies of completion certificates for each completed work from the client mentioned above shall have to be attached.</li></ol>																								



	<ol style="list-style-type: none"><li>1. <b>Valid Registration with any of the department of State Government, Surat Municipal Corporation, Central Government etc. Of "AA" Class and Spl. Category-1(Bldg.) of Gujarat State or equivalent to Sp. Category-1(Bldg.) in other State.</b></li><li>2. Attested copies of same certificates for shall have to be attached.</li></ol> <p><b>Solvency Certificate of Nationalized Bank.</b></p> <ol style="list-style-type: none"><li>1. Solvency Certificate of Nationalized Bank for <b>Rs. 7.07 Crores.</b> (Not older than six months)</li><li>2. Attested copies of same certificates shall have to be attached.</li></ol>
Bid Evaluation criteria	<ol style="list-style-type: none"><li>(1) Financial Bid shall be opened only of that bidders , who satisfies the prescribed eligibility criteria mentioned here in tender document.</li><li>(2) Tender shall be allotted to the bidder who has quoted lowest tender amount (Provided the bidder has to strictly fulfill requirement of SMC for providing the minimum nos. of D.U's mentioned in the tender document).</li><li>(3) All the rights reserves for rejecting any or all the bids with the owner/SMC without assigning any reason thereof.</li></ol>



Water Charges	SMC shall not provide any water for the construction or any other purpose for the said works. The contractor shall have to make his own arrangements for supply of water, preferably by own bore well. However in any case, the quality of water shall meet with the standard requirements.																	
Project Milestones	<table border="1"> <thead> <tr> <th>Mile Stone No.</th> <th>Duration from the date of issue of Notice to Proceed with the work as a percentage of time limit (21 months)</th> <th>Financial Target (% of contract value)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>25%</td> <td>10%</td> </tr> <tr> <td>2</td> <td>40%</td> <td>50%</td> </tr> <tr> <td>3</td> <td>70%</td> <td>75%</td> </tr> <tr> <td>4</td> <td>100%</td> <td>100%</td> </tr> </tbody> </table>			Mile Stone No.	Duration from the date of issue of Notice to Proceed with the work as a percentage of time limit (21 months)	Financial Target (% of contract value)	1	25%	10%	2	40%	50%	3	70%	75%	4	100%	100%
Mile Stone No.	Duration from the date of issue of Notice to Proceed with the work as a percentage of time limit (21 months)	Financial Target (% of contract value)																
1	25%	10%																
2	40%	50%																
3	70%	75%																
4	100%	100%																
Liquidated Damages	<p>In event of these Milestones not having being achieved, an amount computed at 0.2% of Remaining Amount of Work per day subject to a Maximum of 10% of Total Contract Value shall be retained.</p> <p>Liquidated Damages shall start being retained as per contract on value of Remaining work on not achieving intermediate Milestones 1,2,3.</p> <p>The Liquidated damages shall be released without interest or charges if contractor achieves Milestone 4 before completion of approved time limit including extension of time limit, if approved.</p>																	
Bid Language	English																	
Country	INDIA																	
Currency	India Rupees (INR)																	
Design Criteria	<p>The Drawing(Cluster plan) attached with tender are for reference only. The design shall be carried out as per latest I.S. Codes and norms by the contractor from approved standard consultant.</p> <p>Planning alternative with detail presentation will provided by contractor and approved by Surat Municipal Corporation will consider final.</p>																	
Design Codes Applicable	Latest IS codes published by Bureau of Indian Standards (BIS) and all other relevant codes shall be applicable																	
Criteria for selection of Design Consulants	Design of each and every component of the Building will be carried by the contractor through a reputed Design consultant/ Firm approved by SMC (only consultants empanelled/approved by UD & UHD /AHM , Govt of Gujarat OR by license Structural Consultant of Surat Municipal Corporation).																	
Insurance	<p>The contractor shall take " contractors all risk insurance policy" for the estimated cost of the building viz. "Rs. 35.35 crores" Workmen compensation policy" for all workers and labours of contractor and client working at site and "Third Party Insurance Policy" to fully cover all third party type risk.</p> <p>All the insurance policies shall remain in force ,upto the completion of two (2) years from the date of possession/from the date of the inaugural function.</p> <p>For the rest of the defect liability period (10 years) the Insurance shall be covered for the individuals ,who are employed for the rectification of works (if any).</p> <p>The insurance policy so taken by the contractor for such purposes shall be in the joint name of the contractor and the client and the policy shall be deposited with the client.</p> <p>The Contractor All Risk (CAR) policy with third party insurance shall be submitted for (1) Construction period and (2) Defect liability period - upto 2 years from the issue of final bill of contractor.</p>																	
Bid validity period	180 days from the opening of the price bid																	



### SECTION III - QUALIFICATION INFORMATION

1. Copies of original documents defining the **constitution or legal status, place of registration and principal place of business; written power of attorney of the signatory of the Bid to commit the bidder**
2. Technical qualifications and experience of the proprietor or partners and leading technical employees in the firm (Statement-C)
  - (a) Name:
  - (b) Qualification:
  - (c) Status:
  - (d) Experience in years:
  - (e) From which date appointed in this firm, in case of employee:
  - (f) Date of joining the firm:
3. Whether the applicant maintains an office capable of preparing bills (Give Address):
4. Details of workshop, machines tools and plant held by the Applicant, as prescribed in Statement "J" precise number/quantum of equipment has to be mentioned.
- 4A. No of Building works completed in last 7 years .  
Statement – "A"& "A-1"
- 4B. No. of Building works on hand which include original construction work of Building.  
Details shall be furnished in prescribed Statement –"B"  
N.B. Attested copies of work order from the client shall be attached for each of the work mentioned
5. Whether enlisted in any other dept./ organization if so, which class showing amount qualified to tender:
6. Total Turnover of the firm per year with adequate documents for last 3 years  
(The details shall be furnished in prescribed Statement –D)
  - (i) Rs. \_\_\_\_\_
  - (ii) Rs. \_\_\_\_\_
  - (iii) Rs. \_\_\_\_\_
7. Balance sheets with profit and loss statement for the last five financial years duly certified by Chartered Accountant along with auditor's report.  
(Attested copies shall be attached)
8. Has the applicant or his partners or share holders been black listed in the past by any Government



department of any other body:

9. Details of work if any abandoned by the Contractor
10. Name of the Bank of which solvency certificate attached for a sum of **Rs. 7.07 Crores**
11. Date of submission of application:
12. Details about Tender Fee of Rs. 18,000/- as application fee (Non-refundable) :
13. Amount in arrears if to be paid to Government as per the demand from any Government Department or Corporation:
14. Information regarding any litigation or arbitration resulting from contracts executed by the bidder in the last five years or currently under execution. The information shall include the names of the parties concerned, the disputed amount, cause of litigation, and matter in dispute
15. **DECLARATION**
  1. I / We hereby certify that I / We am/are not partner(s) in the firm(s) blacklisted or connected with firm blacklisted in any State, C.P.W.D., M.E.S., or Railways or any Corporation:
  2. At present I/We am/are partner(s) in the following firms which is/are registered as approved contractor(s), firm(s) in any State, C.P.W.D., M.E.S., or Railways:
  3. We, the partners of this firm, hereby give an undertaking that we are jointly and severally responsible to meet all the liabilities over and above the business of this firm and make good the above financial loss sustained by the Surat Municipal Corporation as a result of our abandoning the works entrusted to us i.e. this firm:

(Partnership firm, all partners are required to sign)

Signatory's Name

Place :

Date:

Executive Engineer  
Slum Upgradation Cell  
Surat Municipal Corporation





## **BID CAPACITY**

1. The bidding capacity of the contractor should be equal to or more than the estimated cost of the work put to tender. The bidding capacity shall be worked out by the following formula:

**Bidding Capacity =  $[2AN-B]$**  Where,

**A** = Maximum value of construction works executed in any one year during the last five Year staking into account the completed as well as works in progress.

**N** = Number of years prescribed for completion of work for which bids has been invited.

**B** = Value of existing commitments and ongoing works and LOI issued to be completed During the period of completion of work for which bids have been invited.

2. The initial criteria prescribed above in respect of experience of similar class of work completed, bidding capacity and financial turnover etc. will first be scrutinized and the bidder's eligibility for the work to be determined.
3. In case any agency is L1 (First Lowest) in more than two works, SMC reserves the rights to allot the work to second lowest at the price of first lowest without any prejudice.
4. Municipal commissioner reserves the right to issue / not issue work of more than two packages to any single bidder even if bidder is lowest and with adequate bidding capacity.
5. Municipal commissioner also reserves the right to reject any application / tender . Without assigning any reason whatsoever thereof.

Place :

Date:

Executive Engineer  
Slum Upgradation Cell  
Surat Municipal Corporation



## STATEMENTS

The bidders qualifying the initial criteria will be evaluated for the following criteria and the said details to be submitted on prescribed forms appended with tender documents whose brief details are as under:

i)	Statement showing the similar works completed (minimum G+3 storied or more) in the last seven years. i.e. for a period starting from 01/04/2010 and ending on 31/10/2016	Statement A
ii)	Statement showing the details of work of construction of building with <b>more than G.F + 8 stories or 25 mt. height or more.</b> i.e. for a period starting from 01/04/2010 and ending on 31/10/2016	Statement A-1
iii)	Statement showing the similar works on hand / in progress. i.e. for a period starting from 01/04/2010 and ending on 31/10/2016	Statement B
iv)	List of Main Technical Staff Employed by the firm on Date	Statement C
v)	Details of Financial Information	Statement D
vi)	Statement of Bankers Certificate from a Nationalized Bank	Statement E
vii)	Projects Under Execution Or Awarded/Loi Issued.	Statement F
viii)	Performance report of works referred in form C & D should be duly authenticated/certified by an officer not below the rank of EE or equivalent should be furnished separately for each work completed or in progress	Statement G
ix)	Details of structure and organization	Statement H
x)	Details of technical & administrative personal to be employed for the work	Statement I
xi)	Details of construction Plants, equipment etc. likely to be used in carrying out this work.	Statement J
xii)	Litigation Details	Statement K
xiii)	Site visit certificate	Statement L
xiv)	Passengers lift	Statement M
xv)	Intended brand by Contractor	Statement N



## SURAT MUNICIPAL CORPORATION

### STATEMENT - A

Statement showing the similar works completed (**minimum G+3 storied or more**) in the last seven years.  
i.e. for a period starting from 01/04/2010 and ending on 31/10/2016

Sr.No.	Name of Department / Client with Address	Name of work	Estimated cost of work put to tender	Tendered Amount	Date of award of contract	Target date of completion of work as per contract and date of completion of work if completed		Actual Amount of work completed	Time limit in year and months		Percentage rate and amount of Penalty	Reasons for delay in completion of work	Remarks
						Target Date	Completion Date		Original Y M	Extended Y M			
1	2	3	4	5	6	7a	7b	8	9a	9b	10	11	12

**Note : - (1) Attested Copies of Work Order and Completion Certificates from issuing authority have to be attached.**

**(2) It is mandatory to furnish details in this format only.**

Signature of contractor

Signature of Contractor



# SURAT MUNICIPAL CORPORATION

## STATEMENT – A-1

Statement showing the details of work of construction of building with more than **G.F + 8 stories or 25 mt. height or more.**  
i.e. for a period starting from 01/04/2010 and ending on 31/10/2016

Sr.No.	Name of Department / Client with Address	Name of work	Estimated cost of work put to tender	Tendered Amount	Date of award of contract	Target date of completion of work as per contract and date of completion of work if completed		Actual Amount of work completed	Time limit in year and months		Percentage rate and amount of Penalty	Reasons for delay in completion of work	Remarks
						Target Date	Completion Date		Original Y M	Extended Y M			
1	2	3	4	5	6	7a	7b	8	9a	9b	10	11	12

**Note : -(1) Attested Copies of Work Order and Completion Certificates from issuing authority have to be attached.**  
**(2) It is mandatory to furnish details in this format only.**

Signature of contractor

Signature of Contractor



## SURAT MUNICIPAL CORPORATION

### STATEMENT - B

Statement showing the similar works on hand / in progress.

i.e. for a period starting from 01/04/2010 and ending on 31/10/2016

Sr.No.	Name of Department / Client with Address	Name of work	Estimated cost of work put to tender	Tendered Amount	Date of award of contract	Target date of completion of work as per contract and date of completion of work if completed		Actual Amount of work done	Time limit in year and months		Reasons for delay in completion of work	Remarks
						Target Date	% Progress till Date		Original Y M	Extended (if any) Y M		
1	2	3	4	5	6	7a	7b	8	9a	9b	10	11

**Note : -(1) Attested Copies of Work Order and detail progress Certificates from issuing authority have to be attached.**

**(2) It is mandatory to furnish details in this format only.**

Signature of the Contractor:-

Signature of Contractor

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SLUM UPGRADATION CELL,SMC,SURAT



## SURAT MUNICIPAL CORPORATION

### STATEMENT - C

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

Sr.No.	Name	Designation	Educational Qualification	Experience in the field	Duration of Service in the firm
1		Project Manager			
2		Senior Site Engineer			
3		Junior Site Engineer			
4		Plant Engineer			
5		Junior Electrical Engineer ( As & when required )			
6		Quality Control Engineer			
7		Non technical supervisor			

Place :

Signature of the Contractor

Date :

with full address

**Note : -(1) Attested Copies of Educational & experienced Certificates attached.  
(2) It is mandatory to furnish details in this format only.**

Enclosure : -1) Photograph  
2) Educational Certificates  
3) Experience Certificates

Signature of Contractor



## STATEMENT - D

### FINANCIAL INFORMATION

Financial analysis, Details to be furnished duly supported by figures in balance sheet / profit and loss account for the last five years duly certified by the Chartered accountant, as submitted by the applicant to the income Tax Department copies to be attached.

### General Construction Experience Record

All individual firms are requested to complete the information in this form with regard to the management of Works contracts generally. The information supplied shall be the annual turnover of the Applicant, in terms of the amounts billed to clients for each year for work in progress or completed. A brief note on each contract should be appended, describing the nature of the work, duration and amount of contract, managerial arrangements, employer and other relevant details.

Sr.No	Description of Item	2011-12	2012-13	2013-14	2014-15	2015-16
i.	Gross annual turnover on Construction work.					
ii.	Annual Net worth					
iii.	Profit/loss					
iv	Financial arrangements for carrying out the proposed work.					
v	Solvency certificate from bankers of applicant. Form 'B'					
vi.	Tax clearance certificate under the relevant act					

- Note :
1. Figures to be taken from audited balance sheets.
  2. Copies of the balance sheet to be attached
  3. The bidder shall have to provide that for a period of at least 4 months the bidder has ability to sustain negative cash balance and how he proposes to meet with the same.
  4. Cash Plan / Cash flow Statement.

### Signature of the Bidder

**Name & Designation of the bidder**

**Name of company**

**Rubber stamp of company**

**Date**

Sign.of Chartered Accountantwith seal.



## STATEMENT - E

### **FORM OF BANKERS CERTIFICATE FROM A NATIONALIZED BANK**

(solvency certificate from a schedule bank)

This is to certify **to** the best of our knowledge and information that M/S /Sh. \_\_\_\_\_ having marginally noted address, a customer of our bank are/is respectable and can be treated financially capable of any engagements up to a limit of

INR \_\_\_\_\_ (INR \_\_\_\_\_)

Though this certificate is issued without any guarantee or responsibility on the bank or any of its officers, it is based on careful opinion formed taking care of financial conduct of their transactions through the bank.

(Signature) For the Bank

#### **NOTE:**

1. Bankers certificates should be on letter head of the Bank, sealed in cover addressed to tendering authority.
2. In case of partnership firm, certificate should include names of all partners as recorded with the Bank.





## STATEMENT - F

### PROJECTS UNDER EXECUTION OR AWARDED/LOI ISSUED.

TILL LAST DATE OF SUBMISSION OF TENDER

Sr. No	Name of work/ Project . And location	Owner or sponsoring organization	Cost of work in Crores	Date of commencement As per contract	Stipulated date of completion.	Up to date amount of the work executed (INR)	Slow progresses if any & reason thereof	Name & address/ telephone of officer to whom reference may be made.	Remarks
1	2	3	4	5	6	7	8	9	10

Certified that above list of works are under execution or awarded/LOI issued and the information given is correct to my/our knowledge and belief

Signature of Applicant(s)



## STATEMENT - G

### PERFORMANCE REPORT OF WORKS REFERRED TO IN FOR "A, A1&B"

1. Sr No.
2. Name of work/Project and Location
3. For Building works:
  - i) Nature of building
    - (a) Load bearing
    - (b) RCC Framed Structure
  - ii) Height of building & numbers of floor.
4. Agreement No.
5. Client name:
6. Amount of Work:
7. Date of Starting of project:
8. Stipulated date of completion:
9. Actual date of completion:
10. Completion cost:
11. Justification for Delay, if any:
12. Amount of compensation
  - a. Levied for delayed completion if any
  - b. Amount of reduced rate items, if any

13. Litigation tendency:

14. Feedback from client:

(i) Quality of work	<input type="checkbox"/> Very good	G <input type="checkbox"/> d	<input type="checkbox"/> ir	P <input type="checkbox"/>
(ii) Finance Soundness	<input type="checkbox"/> Very good	G <input type="checkbox"/> d	<input type="checkbox"/> ir	P <input type="checkbox"/>
(iii) Technical Proficiency	<input type="checkbox"/> Very good	G <input type="checkbox"/> d	<input type="checkbox"/> ir	P <input type="checkbox"/>
(iv) Resourcefulness	<input type="checkbox"/> Very good	G <input type="checkbox"/> d	<input type="checkbox"/> ir	P <input type="checkbox"/>
(v) General behavior	<input type="checkbox"/> Very good	G <input type="checkbox"/> d	<input type="checkbox"/> ir	P <input type="checkbox"/>

Third party feedback, if any:-

**Signature of applicant**

**Signature & stamp of client**

**Note:** This Form shall be submitted notarized and scan copy of each work entered shall be uploaded.



## STATEMENT – H

### DETAILS OF STRUCTURE & ORGANISATION

1.	Name & address of the applicant	
2	Telephone No./Telex No./Fax no.	
3	Legal status of the applicant(attach copies of original document defining the legal status(s). (a) an individual. (b) A proprietary firm (c) A firm in partnership (d) A limited company or corporation.	
4	Particulars of Registration with various Government bodies (attach attested photocopy). (a) Registration number. (b) Organization/Place of Registration 1. 2. 3.	
5	Name and titles of Directors & officers with designation to be concerned with this work.	
6	Designation of individuals authorized to act for the organization.	
7	Was the applicant ever required to suspend construction for a period of more than six months continuously after you commenced the construction? If so give the name of the project and reason of suspension of work.	
8	Has the applicant or any constituent partner in case of partnership firm ever abandoned the awarded work before its completion? If so, give name of the project and reason for abandonment.	
9	Has the applicant or any partnership firm, ever been debarred/black listed for tendering in any organization at any time? If so give details.	
10	Has the applicant or any constituent partner in case of partnership firm ever been convicted by court of law? If so, give details	
11	In which field of Civil engineering construction you claim specialization and interest.	
12	Any other information considered necessary but not included above.	

#### **Sign of the applicant**



## STATEMENT – I

### DETAILS OF TECHNICAL AND ADMINISTRATIVE PERSONNEL TO BE EMPLOYED FOR THE WORK

Sr. No	Designation	Total number	Number available for this work	Name	Qualification.	Professional experience of details of work carried out.	How these would be involved in this work.	Remarks
1	2	3	4	5	6	7	8	9

**Sign of the applicant**



## STATEMENT – J

### Detail of Construction, Plant & Equipment Likely to be used in Carrying out the Work

Sr. No	Name of equipment		
1	2	3	
1	J.C.B. or excavator		
2	Concrete batching plant fully automatic of min 30 M3/hr capacity Age: Not more than 5 years).		
3	Digital weight Batcher Machine		
4	Concrete pump		
5	a)Concrete transit mixer b)Other equipment for transportation of concrete mix.		
6	Goods cum Lift for minimum capacity of 300 Kg.		
7	Shuttering (Steel formwork)		
8	Steel props (with accessories)		
9	Extended span or beams with accessories		
10	Vibrator (Needle) + Surface vibrator (Operating with electricity) +Diesel vibrator		
11	Water Tanker		
12	Trucks / Dumpers/		
13	Standard Testing Laboratory (As prescribed)		
14	Crane		
15	Pump & Motor		
16	Generator		

**Note :** - Ownership proof shall have to attach

Place :

Signature of the Contractor with full address

Date :

Signature of Contractor



## STATEMENT – K

### LITIGATION DETAILS

**Name of applicant / or parties ::**

Applicant should provide information on any History of litigation or arbitration resulting from contracts executed in last five years or currently under execution:

Sr. No.	Year	Award for/against applicant	Name of client, cause of litigation & matter of dispute	Disputed Amount in INR	

**NOTE:-**

1. The above information shall be supported with necessary documents otherwise the same shall be treated as null & void.
2. If the information to be furnished in this schedule will not be given & come to the notice subsequently will result in disqualification of bidder.

**Sign of the applicant**



## STATEMENT – L

### Site Visit Certificate

I/we \_\_\_\_\_, authorized representative of M/s \_\_\_\_\_ have visited the site of the proposed;

**CONSTRUCTION OF 550 EWS-I RESIDENTIAL FLATS INCLUDING ALL INTERNAL INFRASTRUCTURE SERVICES & SITE DEVELOPMENT WORK AT T.P. SCHEME NO. 19 (PARVAT-MAGOB), F.P. NO. 100 & T.P. SCHEME NO. 41 (DINDOLI), F.P. NO. 29, UNDER "SMART CITY MISSION" ON ENGINEERING-DESIGNING, PROCUREMENT AND CONSTRUCTION BASIS (EPC MODE)**

We have inspected and evaluated the existing site with reference to its location, topography, soil conditions, sub soil water table, cutting-filling/leveling, removing debris and demolition of existing structure, shifting of services if any etc. We have submitted this offer after satisfying ourselves about the local conditions, local costs, etc.

**Sign of the applicant**



## STATEMENT – M

### SPECIFICATIONS FOR PROPOSED ELEVATOR PASSENGERS LIFT

Sr. No.	Description	As per Tender Specification (Minimum Criteria)	Offered By the Supplier
1	Passengers/Load	6 / 420 Kg for Passenger lift & 8/544 Kg. for Fire lift	
2	Speed	1.0 mps up to 7 floors. 1.5 mtr above 7 floors.	
3	Serving	As described in schedule	
4	Levelling Accuracy	+/- 10 mm to 15 mm	
5	Power Supply	AC 400/440V, 3P/1P, 50 Hertz	
6	Entrance Position	All on one side	
7	Operation/Control	Simplex full collective with advanced microprocessor technology	
8	Type	Passenger lift	
9	Car Size	Suitable	
10	Car Entrance	Min. 900mm x 2000mm	
11	Car operating panel	Full Height S.S with Square/Round buttons with all control buttons or touch sensitive panel	
12	Landing operating panel	Full Height S.S with Square/Round buttons with all control buttons or touch sensitive panel	
13	Car door operation	Fully Automatic with Centre opening	
14	Car Wall/lift landing door/lift car door	S.S 304 Hair line finish	
15	Flooring	Anti-skid Flooring / Granite Flooring	
16	Car door protection	Multi-Beam Full Height Infra-Red	
17	Position indicators	Available at all floors	
18	Direction indicator on floor	Available at all floors	
19	Lighting	LED Lighting	
20	Ventilation	To be suggested by supplier	
21	Other features	Alarm, Emergency light, Overload Indicator, Telephone , ARD, S.S Hand Rails	

Note: Total numbers of elevator and person per lift shall be according to GDCR norm but minimum capacity of elevator (lift) shall be of 6 (Six) person.





## STATEMENT – N

### Intended brand by Contractor

Sr.No.	Item	Intended brand by Contractor
1.	Cement – 53 Grade OPC	
2	White Cement	
3.	Steel – Fe-500	
4	Structural Steel	
5.	(A) Vitrified tiles (Single or Double charged)	
6	(B) Ceramic tiles	
7	(C) Chequered precast concrete tiles	
8	Glazed tiles	
9	Wash basin	
10.	(A)PVC water supply pipes (SCH-80)	
	(B) PVC pipe(SCH-40 as rain water spout)	
11	M.S. Tubes	
12.	(A)PVC Drainage lines pipes	
	(B)PVC Rain water pipes	
	(C) PVC pipes(6 Kg./cm <sup>2</sup> )	
13.	Lift / elevators	
14.	Aluminium sections	
15	All Aluminium Hardware,Fittings	
16	Glass	
17.	Kitchen sinks	
18.	Bib tap / pillar cock / stop cock	
19.	Electric Items	
	(i) Wires (ii) Switches and Accessories (iii) Cable (iv) ARMOURED CABLES (v) MCB/ELCB/RCCB/ Distribution Switch (vi) Pump Set (vii) Motor Starter & panel	



	(viii) Luminaries	
20	Fire fighting equipments	
	(i) GI Pipes/Fittings (ii) Cast iron butterfly valves (iii) Gun metal valves (iv) Hydrant valves & accessories (v) Hose Reel (vi) Pressure Guage (vii) Fire Pumps (viii) Fire Extinguishers	
21.	Door shutters	
22	Flush Doors	
23	Door Frames	
	Sal Wood	
24.	Door Fittings / Hinges	
25	Plywood Products Commercial Block Board Commercial Ply Teak Ply	
26	Laminates / Decorative laminates	
27	Pre laminated board	
28	Impregnated Fibre Board	
29.	Exterior colour (weather shield max )	
30	Synthetic Enamel Paints / Oil bound distemper	
31	Putty	
32.	Paver Blocks	
33.	D.G. Sets	
34.	AAC Block	
35	Chemical mortar/AAC block jointer	
36.	Water ProofingCompound	
37.	Polycarbonate Sheets	
38.	Construction Chemicals	
39.	Drainageline network	



40	Water supply network	
41	Anti-Termite Treatment	
42	Polycarbonate Sheets	
43	Polyester Fibre	
44	Welding Rod	
45	Cast Iron Pipes and Fittings(LA Class)	
46	R.C.C. Pipes NP- 3 Class	
47	G.I. Pipes	
48	G.I. Fittings	
49	Gun Metal Valves	
50	Brass fittings	
51	C.P. Fittings	
52	W.C. Pan / Washbasin / Urinals /Anglow Indian tubs	
53	Stainless Steel Sinks	
54	Mirrors	
55	Plumbing /Sanitary Fixtures /Accessories	
56	C.I. Sluice valve,Check valves	
57	UPVC Borewell Column pipe	
58	Fibre reinforced R.C.C. Manhole Cover (Heavy Duty)	
59	C.I. Manhole cover with frame	
60	P.V.C. Pipes & Fittings	
61	P.V.C. / H.D.P.E Water Tanks	
62	Ball Cock	
63	UPVC Pipes(Solvent Welded Joints)	
64	C.P.V.C. Pipes & Fittings	
65	Water meter	



66	SWR pipe	
67	Fire Hydrant Valve & Air Valve, Scour Valve	

**Seal & Sign of the applicant**



## UNDERTAKING

Photographs			
Name			
Designation			
Specimen Signature			

### **Names, Photographs and Specimen Signature of Partners, Managing Director**

1. I/We agree that the decision of the Surat Municipal Corporation in prequalification/ selection of applicants/contractor, Phasing of work and in any other project related matter, will be final and binding to me/us.
2. All the information and data furnished here with are correct to my/our best of knowledge.
3. I/We agree that we have no objection if inquiries are made about our works, its related areas and any other inquiry regarding all details, projects and works listed by us in the pre-qualification document at any state.
4. I/We agree to submit signed and sealed original tender documents or qualification formats and other documents intimation from SMC.

Signature with seal of the company



**NAME OF WORK : CONSTRUCTION OF 550 EWS-I RESIDENTIAL FLATS INCLUDING ALL INTERNAL INFRASTRUCTURE SERVICES & SITE DEVELOPMENT WORK AT T.P. SCHEME NO. 19 (PARVAT-MAGOB),F.P. NO. 100 & T.P. SCHEME NO. 41 (DINDOLI),F.P. NO. 29, UNDER "SMART CITY MISSION" ON ENGINEERING-DESIGNING, PROCUREMENT AND CONSTRUCTION BASIS(EPC MODE)**

**'DECLARATION OF THE CONTRACTOR'**

- I / We hereby declare that I / We have made myself / ourselves thoroughly conversant with the local conditions including all materials and labour on which I / We have based my / our rates for this tender.
- The specifications and leads on this work have been carefully studied and understood before submitting this tender.
- I / We undertake to use only the best materials approved by the Engineer or his duly authorized representative during execution of the work and to abide by the decision.
- I/We undertake to best workmanship/line-level/plumb etc. during execution of the work and to abide by the decision.
- I/We have understood the schedule of payments and other terms of payments which is accepted by we/us .
- We further testify all informations provided in the Tender including the statements made from Statement A to Statement N are factually correct and any mis representation or concealment if discovered, we understand the same shall result in disqualification as Bidder and the decision of the Municipal Commissioner, Surat Municipal Corporation shall be final and binding.

Signature of Applicant



## 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. \_\_\_\_\_ nor any of its constituent partners are blacklisted by any of the Govt./Semi Govt. institutiois and not have abandoned any work of multistoried buildings in India nor any contract awarded to us for such works have been rescinded,during last five years prior to the date of this application.
3. The undersigned here by 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 my (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 SMC

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

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

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

\_\_\_\_\_  
Date

\_\_\_\_\_  
To be given on Non-judicial stamp paper of **Rs 100 duly** signed by authorized notary. \*



## SECTION IV – TENDER DRAWINGS

### FOR REFERENCE ONLY

Sr.No.	Title of Drawing	Drawing No.
1.	Layout Plan	
2	Key Plan	
3	Google Image Plan	
4	Cluster Plan(Showing Total No. of DUs & Flats & No. of Floor)	
5	Ground Floor Plan(Parking)	
6	Typical Floor Plan	
7	Terrace Floor Plan	
8	Elevation & Section	
9	Infrastructure Drawings	
	(A) Drainage (Typical Manhole Section)	
	(B) Typical Road Section	
	(C) Typical V.D.S. & Paver block Section	
	(D) Typical C.C.Pavement Road Section	
	(E) Reference drawing for Tertiary sewage treatment plant	
10	Typical Drawing for Compound wall & Entry Gate	

- Note :
- (1). The above drawings are for reference only. The Contractor can design the project-buildings-flats as per own design.
  - (2). The Infrastructure drawings shall be followed as per above sections.(Sr.No.9A,9B,9C)
  - (3). If Compound wall exists on site & as per opinion of Structural Engineer it is sound, the contractor can use the same. Necessary modification as per project design shall be carried out by the contractor including colour work as per instruction of SMC.





**VOLUME - I**  
**Part -2**



## Section V Instructions to Bidders

### 1. Scope of Bid

- 1.1 The Employer, as defined in the Bidding Data, herein after **“the Employer,”** wishes to receive bids for the Planning ,Designing & Construction of Works as described in the contract herein after referred to as “the Works.”
- 1.2 The successful bidder will be expected to complete the Planning ,Designing & Construction of the Buildings and its Infrastructure works within the period stated in the Bidding Data and contract from the date of commencement of theWorks.
- 1.3 Throughout these bidding documents, the terms “bid” and “tender” and their derivatives (“bidder/tenderer”, “bid/tender”, “bidding/tendering”, etc.) are synonymous, and day means calendar day. Singular also means plural.

### 2. Eligible Bidders

This invitation to bid is open to any bidder meeting the requirements specified in the Bidding data.

- A).** Bidders shall provide such evidence of their continued eligibility satisfactory to the Employer as the Employer shall reasonably request.
- B).** To be qualified for award of the Contract, bidders shall as part of their bid, furnish the information to the Employer of their capability and adequacy of resources to carry out the contract effectively. Bids shall include the documentation and information on the relevant Information Forms attached under qualification information.
- C).** The proposed methodology and program of Design & Construction, Environmental Management Plan (EMP), backed with equipment planning and deployment, duly supported with broad calculations and quality control procedures proposed to be adopted, justifying their capability of execution and completion of work as per technical specifications within stipulated period of completion.

### 3. Qualification of the Bidders shall, as part of their bid:

- (a) submit a written power of attorney authorizing the signatory of the bid to commit the bidder; and



(b) To be qualified for award of the Contract, bidders shall as part of their bid, furnish the information to the Employer of their capability and adequacy of resources to carry out the contract effectively

#### 4. One Bid per Bidder

A firm shall submit only one bid in the same bidding process. A bidder who submits or participates in more than one bid will cause all the proposals in which the bidder has participated to be disqualified.

#### 5. Cost of Bidding

The bidder shall bear all costs associated with the preparation and submission of its bid, including all cost necessary for site inspection and whatever investigations that may be necessary and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

#### 6. Site Visit

The bidder will be deemed to have visited and examined the Site of Works and its surroundings and obtained for itself at its own risk and responsibility and liability, all information that may be necessary for preparing the bid and entering into a contract for Design & Construction of the Works

#### 7. Content of Bidding

The Bid Document-Volume-I comprise the following sections and should be read in conjunction with Volume II and Volume III of this bid document. Documents :

Section No.	Particulars
<b>Volume -I - Part 1</b>	
1	Notice Inviting Tender
2	Bidding Data
3	Qualification Information
4	Drawings
<b>Volume -I - Part 2</b>	
5	Instruction to Bidders
6	General Instructions
7	Conditions of Contract (Draft Agreement)
	Article -1 Definitions and Interpretation
	Article-2 Scope of Project
	Article-3 Obligations of the contractor
	Article-4 Representations and warranties
	Article-5 Performance security and retention money
	Article-6 Right of way
	Article-7 Utilities and trees
	Article-8 Design and construction of the work
	Article-9 Quality assurance, monitoring and supervision



	Article-10 Completion certificate
	Article-11 Change of scope
	Article-12 Defects liability
	Article-13 Smc's Engineer
	Article-14 Payments
	Article-15 Insurance
	Article-16 Force majeure
	Article-17 Suspension of contractor's rights
	Article-18 Termination
	Article-19 Liability and indemnity
	Article-20 Labour laws
	Article-21 Safety code
	Article-22 Miscellaneous
	Article-23 Dispute resolution mechanism
8	Forms of Security and Contract Forms
9	Approved List of Banks
10	Abbreviation
11	Memorandum
12	Schedule of Payment (Stage wise)
13	IS Codes
14	Specification for Electrical Installation work
15	Specification for Fire safety work
16	Specification For Tertiary Sewage treatment Plant for Reuse In toilet Flushing and gardening
	<b>Vol – II Price Bid</b>
	<b>Vol – III General Technical Specifications For Building Works</b>
	<b>Vol – IV Drawings</b>

**Note:**

- a) In addition to all the information as contained in the above documents requires supplementary information or clarification; it shall be duty of the Bidder to obtain this from the Employer before submission of the bid.
- b) It shall be duty of the bidder to invite attention of the Employer to any omission, mistake or ambiguity that may be noticed before submission of the bid.
- c) Any omission, mistake, ambiguity or anomaly shall if subsequently noticed, be resolved consistent with Trade practice.
- d) Addenda, corrigendum is as a part of tender and it shall be submitted by the contractor.

**8. Amendment of Documents**

8.1 At any time prior to the deadline for submission of bids, the Employer may amend the bidding documents by issuing Addenda and giving adequate notice for complying with the same by the Bidder and for the same may extend the deadline for submission of the Bidder.



8.2 Any Addendum thus issued shall be part of the bidding documents and shall be uploaded to the website.

## 9. Language of Bid

The bid, and all correspondence and documents related to the bid exchanged by the bidder and the Employer shall be written in the bid language stipulated in the Bidding Data and Particular Conditions of Contract. 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 above stated language, in which case, for purposes of interpretation of the bid, the translation shall prevail.

## 10. Documents Comprising the Bid

The bid submitted by the bidder shall comprise the following: Tender Fees, Bid Security, Qualification information, and any information or other materials required to be completed and submitted by bidders in accordance with these instructions to Bidders.

## 11. Bid Prices

11.1 The price bid for the multi storied building and Infrastructure works shall be per D.U cost (per no). Payment shall be made as mentioned in the respective table in tender document.

11.2 All duties, taxes, Royalty, cess and other levies payable to the govt. as in vogue (till the date of submission of the bid) by the contractor under the Contract, or for any other cause, shall be included in the per DU cost submitted by the bidder. Any change there in shall reasonably and equitably be compensated / reimbursed on basis of strict evidence being provided by the Contractor to the satisfaction of the Commissioner, SMC.

## 12. Bid Validity

Bids shall remain valid for the period stipulated in the Bidding Data.

## 13. Bid Security

13.1 The bidder shall furnish, as part of its bid, a bid security in the amount stipulated in the Bidding Data in the currency of the Employer's country.

13.2 Any bid not accompanied by an acceptable bid security shall be treated by the Employer as non responsive.

13.3 The bid securities of unsuccessful bidders will be returned as promptly as possible, but not later than 30 days after the expiration of the original period, or any subsequently extended period of bid validity or after successful bidder enters into agreement.



13.4 The bid security of the successful bidder will be returned when the bidder has signed the Agreement and furnished the required performance security.

13.5 The bid security may be forfeited

- a) If the bidder withdraws its bid before the period of its validity expires and the tenderer may be disqualified from tendering for further works under the SURAT MUNICIPAL CORPORATION.
- b) In the case of a successful bidder, if he fails within the specified time limit to sign the Agreement completing all necessary formalities for the purpose including furnishing/ payment of performance security

#### 14. Pre-Bid Meeting

14.1 The bidder is requested, to submit any questions in writing or by e-mail, to reach the Employer not later than date specified in Notice Inviting Tender. It may not be practicable to answer questions received late, but responses to questions, including the text of the questions raised and the responses given, will be uploaded on the website. Any modification of the bidding documents that may become necessary as a result of the pre-bid queries shall be made by the Employer exclusively through the issue of an Addendum.

#### 15. Format and Signing of Bid

15.1 The successful bidder shall submit one copy of the signed bid (All Volumes) within 15 days from the issuance of work order.

15.2 The bid shall contain no alterations, omissions, or additions, unless such corrections are initialed by the person or persons signing the bid.

#### 16. Sealing and Marking of Bids

16.1 The tenderer shall pay Earnest money Deposit to the extent of 50% in the form of Bank Guarantee from the enlisted / approved Bank as per Section- IX . The balance 50 % of the Earnest Money Deposit is to be deposited by pay order/Demand Draft issued in favour of "The Commissioner ,Surat Municipal Corporation, Surat" through the enlisted / approved Bank as per Section-IX only payable at Surat.

16.2 Bank Guarantee and Demand Draft /Pay order for E.M.D & Demand Draft for Tender fee shall be submitted in electronic format only through online (by scanning) while uploading the bid. This submission shall mean that E.M.D & tender fee are received for purpose of opening of bid. Accordingly offer of those shall be opened whose E.M.D & Tender fee is



received electronically. However for the purpose of realization of Bank Guarantee and Demand Draft/Pay order for E.M.D and demand draft for tender fee bidder shall send them in original through RPAD/Speed Post so as to reach to Chief Accountant, Surat Municipal Corporation, Muglisara, Surat. Within 7 days from the last date of online submission of the bid as per tender notice. Penaltative action for not submitting Bank Guarantee and Demand Draft/Pay order for E.M.D. and Demand Draft for Tender fee in original to Chief Accountant, SMC(Main Office) by bidder shall be initiated and action shall be taken for abeyance of registration and cancellation of E-tendering code for one year. Any documents in supporting of bid shall be in electronic format only through online ( by scanning ) & hard copy will not be accepted separately.

## 17. Deadline for Submission of Bids

- 17.1 Bids (EMD & Tender Fees as mentioned in above-16) must be received by the Employer at the address specified in Notice Inviting Tender not later than the time and date stipulated in Notice Inviting Tender.
- 17.2 The Employer may, in exceptional circumstances and at its discretion, extend the deadline for submission of bids by issuing an Addendum, 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.

## 18. Late Bids

Any bid received by the Employer after the deadline for submission of bids will be returned unopened to the bidder.

## 19. Modification and Withdrawal of Bids

- 19.1 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.
- 19.2 The bidder's modification or withdrawal notice shall be prepared, sealed, marked, and delivered with envelope additionally marked "modification" or "withdrawal," as appropriate.
- 19.3 No bid may be modified by the bidder after the deadline for submission of bids.



## 20. Bid Opening

- 20.1 The bids as received on line shall be opened in presence of authorized representative of the bidders who chose to remain present on date of opening.
- 20.2 The Employer will carry out the process of scrutiny to determine the responsiveness of documents / data submitted electronically and qualify the bidders for further action.
- 20.3 A suitable date and time for opening of the Price bid will be intimated to those, who is found qualified.
- 20.4 On the specified date the Price bid of the successful qualified bidder shall be opened online.
- 20.5 The Employer shall prepare minutes of the bid opening, including the information disclosed to those present.
- 20.6 Bids not opened and read out at bid opening shall not be considered for further evaluation.
- 20.7 Where there is a discrepancy between the amounts in figures and in words, the amount in words will govern.

## 21. 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 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 the rejection of the bidder's bid.

22. Award The Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents and sanctioned by the Competent Authority.

## 23. Employer's Right to Accept Any Bid and to Reject Any or All Bids

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 assigning any reason there of and without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders on the grounds for the Employer's action.





## 24. Notification of Award

24.1 Prior to expiration of the period of bid validity prescribed by the Employer, the Employer will notify the successful bidder by letter that its bid has been accepted.

24.2 The notification of award will constitute the formation of the Contract.

## 25. Signing of Agreement

25.1 At the same time that the Employer notifies the successful bidder that its bid has been accepted, the Employer will send the bidder the Agreement in the form provided in the bidding documents, incorporating all agreements between the parties.

## 26. Performance Security

26.1 Within 15 days of receipt of the Letter of Acceptance from the Employer, the successful bidder shall furnish to the Employer a performance security and additional Performance Security for unbalanced offer quoted by the contractor in the form stipulated in the Bidding Data and the Conditions of Contract.

## 27. Unbalanced offer

27.1 In event of bid price being considered unbalanced in case of rates being higher or lower than 15 % of the reasonable rates as may be considered by SMC than SMC may direct the bidder to deposit separately performance security deposit of 15% of the amount of unbalanced contract in addition to regular performance/ security deposit. This deposit shall be released only on completion of the work along with the balance of performance deposit being released.



## SECTION VI – GENERAL INSTRUCTIONS

The following general instructions are not exclusive and the same are issued for general guidance of the bidder and shall in no way constitute any promise or Covenant on part of Surat Municipal Corporation but shall be binding obligations for all intents and purposes, the same are included in the Bid.

### **1.0 PLANNING ,DESIGNING AND EXECUTION OF THE WORKS**

The Contractor should visit and study the site conditions. The successful bidder shall prepare conceptual planning as per tender guideline , should get sanction from the EIC/SMC the architectural planning ,Preparation of 3-D ,Walkthrough , get approval from concerned authorities , Structural designing, proof Checking and execution of construction work including internal and external amenities and infrastructural works including compound wall, entry gate etc, to satisfaction of SMC. The conditions mentioned above or any other such relevant condition not spelt out here shall not cause the reason for extension of contract period. Before or during execution of the work , management of all the resourses including man power, materials and necessary drawings & designs management & maintained by contractor .Contractor is fully responsible for taking of particular permission from concern departments of Govt & local authorities. The proof checking shall **be got done to the satisfaction** SMC/Owner and all charges/fees for the same shall be paid by SMC/Owner.

### **2.0 ELECTRIC POWER SUPPLY**

The Contractor shall make all the necessary arrangement for procurement of electric power required for the work. The Contractor shall submit his requirement of Electric Power Supply for carrying out permanent works, operating plants and equipments, labourers camp and field offices etc., as a part of his work plan. If necessary the employer will issue the necessary certificates,letters of recommendation etc., to the Contractor for obtaining the power supply. However,the employer shall accept no responsibility for any delays in obtaining the power connections.In addition, the Contractor shall maintain standby diesel generators of adequate capacity.Non-availability of electric power will not be considered as a reason for delay in progress.

### **3.0 WATER SUPPLY FOR CONSTRUCTION, LABOUR CAMPS, OFFICES ETC.**

The Contractor shall make all necessary arrangements for the procurement of water required for construction and labour. The employer shall issue on request from contractor, thenecessary certificates, letters of recommendation etc., for obtaining the necessary permissions. The employer shall assume no responsibility for delay in progress due to delayin obtaining the permissions. The Contractor may drill bore wells as a source of construction water. The water shall be got tested by the Contractor at approved



laboratory at his own expense and certificates regarding the suitability for construction shall be submitted to the Engineer's Representative regularly as per his requirements.

#### **4.0 TELEPHONES / WIRELESS COMMUNICATION FACILITIES**

These will be arranged by Contractor at his own cost. The employer shall give the necessary certificates and letters of recommendation if necessary etc., to the Contractor.

#### **5.0 LAND FOR TEMPORARY USE**

Land for labour camps, storage yards temporary site sheds, batching plant, casting yard shall be arranged by the contractor at the site or nearby plot with the consent of EIC/SMC at his own cost.

#### **6.0 CONTRACTOR'S MATERIALS, LABOUR ETC.**

The Contractor shall provide everything necessary for the proper execution of the works according to the intent and meaning of the Drawings, Notes, and Specifications taken together, whether the same is or is not particularly shown or described therein; provided the same can be reasonably enforced therefrom. If the Contractor finds any discrepancy therein he shall immediately and in writing refer the same to the Engineer's Representative. The decision of the Engineer's Representative shall be final and binding on the Contractor. Figured dimensions shall be followed and the drawings shall not be scaled from.

#### **7.0 MATERIALS:**

1. Steel, cement and other materials necessary for execution of this work shall not be supplied by Surat Municipal Corporation and same shall be procured by the contractor at his own cost. Procurement of and testing certificates for cement and reinforcement steel round bars or high yield strength steel deformed bars as required shall be arranged by the contractor at his own cost from standard, reputed manufacturers only as per approved list. The contractor shall submit statement of sources for procurement of materials. The suitability of the same for the required quality, quantity, transport facilities etc. may be ascertained by the tenderer themselves before tendering and rates be quoted accordingly. The source of fine and coarse aggregates given in Table-1 is for general guidance only.
2. Procurement of all constructional materials as required shall be arranged by the contractor at his own cost from standard, reputed manufacturers / suppliers as may be approved by the client. The royalty receipts, Challans etc., shall have to be submitted by the contractor from time to time to the SMC.
3. The contractor will have to make his own arrangement for plants, equipments, machineries to be used in the execution of this work well in time after award of the contract.
4. The approved makes for various materials to be used in the project shall be as per the table given in tender.



5. The D.I./C.I. pipes and fittings require for laying of water supply network may be given to the contractor on his specific request in advance. The contractor shall have to pay the cost as per bill of the concerned department.

### TABLE –I

#### Statement of sources of procurement of coarse and fine aggregates

Sr. No.	Name of the materials	Name of the place where sources of supply is available.	Approximate lead from site of work	Remarks if any
1	Rubble	Areth	65 Km.	-
2	Crushed coarse aggregate	Areth	65 Km.	-
3	Crushed coarse aggregate	Songadh/Chikhli	85 Km.	-
4	Sand	Tapi River/Narmada River	From standard approved stretches to have materials as per specifications	Source to be beyond tidal influence.

**Note: The above distances and locations are for general guidance only. The contractor shall have to verify himself the sources, its distances etc. before tendering**

#### **8.0 NIGHT WORK & WORK ON SUNDAY & HOLIDAYS & BETWEEN SUNSET & SUNRISE :**

No work shall be carried out on Sundays and Corporation Holidays and no work shall be carried out before and after office hours except with special permission of Engineer-in-charge in writing previously obtained. Withholding such permission shall be no ground of complaint on the part of contractor for cause for compensation of them. Working period shall be maximum eight (8) hours per day. Permission to work



beyond 8 hours and to work on Sundays and holidays will be entirely at the discretion of the Engineer-in-charge and cannot be claimed by the contractor as a matter of right and the refusal to grant such permission will be not be set up as a ground for not completing the work within the contract period. Further to above condition, when Engineer in charge feels necessary to give permission to contractor to carry out the work on Sundays, Corporation holidays and before 8 hours, extra supervision charges arising due to overtime working of corporation supervisory staff shall be borne by the contractor at prevailing rates from time to time. Such extra supervision charges shall be deducted by corporation from running bills of contract at SMC discretion

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

#### **NIGHT WORK:**

Subject to any provisions to the contrary contained in the contract, no work shall be carried out after office hours without the prior permission of the Engineer-in-charge except when the work is unavoidable or absolutely necessary, for saving life or property or for the safety of the work, in which case, the contractor shall immediately inform the Engineer-in-charge or his representative, provided always that the provision of this clause shall not be applicable in the case of any work which it is customary to carry out by double or rotary shifts in which case sufficient advance notice shall be given of the intention to work at night to the Engineer-incharge after making all requisite arrangements and management of areas, materials and equipments, required under any emergency etc. The contractor can carry on work after office hours if so required, subject to provide undertaking in writing, for expediting the progress on the works or for any other reasons of technical safety. Whenever any work is required to be carried out at night in the interest of structural safety or any other reason with authorized to supervise, adequate lighting and other arrangement shall be made in advance by the contractor for proper execution and supervision of such work. The contractor shall not be however entitled to any extra payments for night work. The responsibilities of all kind shall be of contractor.

#### **PRECAUTIONS TO AVOID ANY NUISANCE TO THE NEIGHBORHOOD/SURROUNDING**

All the necessary precautions to be taken during the development of the project (either during day or night) ,to avoid any nuisance or any harm causing to the neighborhood/surrounding areas of proposed construction site.



No complaint should be arise by the neighbourhood/society dwellers ,during the development work by contractor or any of the persons directly or indirectly related to the site work.

In case of any such conditions the contractor shall be fully responsible for the settlement.

## **9.0 ENABLING WORKS**

The Contractor shall supply, fix and maintain at his own cost during the execution of works,all the necessary centering, and scaffolding, staging, planking, timbering, strutting, shoring,pumping, fencing, hoarding, watching and lighting by night as well as the necessary equipment for protection of public and safety of any adjacent roads and railway lines. The Contractor shall remove any or all such centering scaffolding, staging planking andequipment when ordered to do so by the Engineer's Representative and make good allmatters and things disturbed during the execution of works to the satisfaction of the Engineer's Representative.

## **10.0 TEMPORARY DIVERSIONS, MAINTANENCE OF SAME AND TRAFFIC MANAGEMENT**

This will be responsibility of the contractor.

## **11.0 OPPORTUNITIES AND FACILITIES FOR OTHER CONTRACTORS AGENCIES ETC.**

The Contractor shall, in accordance with the requirements of the Engineer's Representative afford all reasonable opportunities for carrying out their work to any other Contractors employed by the Employer and their workmen and to the workmen of the Employer and of any other duly constituted authorities who may be employed in the execution on or near the site of any work not included in the Contract or of any contract which the Employer may enter into in connection with or ancillary to the works. If, however, the Contractor shall on the written request of the Engineer or Engineer's representative make available to any such other Contractor or to the Employer or any such authority any roads or ways for the maintenance of which the Contractor is responsible or permit the use of by any such of the Contractor's scaffolding or any other plant on the site or provide any other service of whatsoever nature,for any such the Employer shall pay to the Contractor in respect of such use of service suchsum or sums as shall in the opinion of the Engineer be reasonable.

## **12.0 ENVIRONMENTAL SAFEGUARDS**

The Contractor shall take action of following points and note the stipulations as under asregards environmental safeguards as stipulated by the Ministry of Environment and Forests.



- 12.1 Appropriate measures shall be undertaken while undertaking digging activities to avoid degradation of water quality.
- 12.2 Borrow pits and other scars created during the road construction shall be properly leveled and treated.
- 12.3 Adequate provision for infrastructures facilities, i.e. water supply, fuel, sanitation, etc. shall be ensured for labourers during construction period in order to avoid damage to the environment.
- 12.4 No excavation from or dumping of waste materials into any water body / wetlands shall be done.
- 12.5 Borrow sites for earth, quarry sites for road construction and dump site shall be identified keeping in view:
  - a) No excavation or dumping on private property is carried out without written consent of the owner.
  - b) No excavation or dumping shall be allowed or wetlands, forests areas or other ecologically valuable or sensitive locations.
  - c) The excavation work shall be done in consultation with soil conservation and watershed development agencies working in the area:
  - d) Construction spoil/soil including bituminous material and other hazardous material must not be allowed to contaminate water course and the dump sites for such materials must be identified well in advances before construction and lined properly so that they do not leach into the ground water.
  - e) Any approvals required for the same shall be arranged by the contractor.

### **13.0 SITE OFFICE**

Contractor shall provide and maintain a furnished site office for the supervisory staff of the PMC/TPI/Consultants. It shall have at least 25.00 to 50.00 Sqm floor area Air – conditioned site office, with approved flooring and shall include electrical lights, fans, computer point including proper wiring, water supply, drainage, toilets, tables, chairs, cupboards, and shall be constructed at location directed by the Engineer and shall be maintained for a period upto 6 months /as directed by E.I.C ,beyond date of completion as certified by PMC/TPI/Consultants.

The site office with all services, furniture, fixtures shall be property of the contractor. Land for site office, field laboratory etc. is not available with SMC and could not be provided by employer. All Electric & Telephone /Mobile bills will be paid by the contractor for entire period of contract and up to 6 month



beyond completion of works and both the Electric & Telephone connections will be obtained by him.

#### **14.0 SHIFTING OF UTILITIES**

- (a) Contractor is required to liaison with concerned department for identifying exact location of the utility services. Any damages by the contractor while carrying outwork to the utilities shall be repaired at his own cost.
- (b) Deposits / Supervision charges levied by Govt. dept. & paid by the contractor for the purpose of shifting of utilities (under Provisional Sums) shall be reimbursable after due assessment, verification and scrutiny except for street light poles, set of signal poles, road signs/sign boards & consumer connection for water connections(Domestic/commercial).

#### **15.0 REMOVAL / DIVERSION OF UTILITY SERVICE**

If the over ground / under ground utility services like electric poles, telephone poles, water supply pipe lines, sewer lines, oil pipe lines, cables, gasducts etc. owned by various authorities including Public Undertakings and local authorities encountered during construction shall be diverted by the Contractor is included in the cost quoted (per DU cost in tender) by the contractor and will not be paid extra. In case in the opinion of the Engineer it is not possible to divert the utilities, the Contractor shall make necessary modifications in the structure at no extra cost to the client.

#### **16.0 UTILITY SERVICES**

There may be any type of problems within the premises of the existing plot where the work of multistoried building is going to be carried out. The utility services might be falling in the proposed plot are required to be shifted/relocated/protected by the bidder. Bidder shall contact these utility providers for the shifting/relocating/protecting of these utilities which comes within the construction work & as per the approval of the utility provider & paying the charges towards the shifting/relocating/protection to the utility service provider as per the norms prescribed by them (utility provider) the works shall have to be carried out by the contractor, at no extra cost and the same shall be including in the quoted rate by the bidder.

#### **17.0 TAXES**

In no case, octroi exemption shall be granted for any of the materials, equipment brought by contractor for execution of the work.

Surat Municipal Corporation shall not provide "C" Form for the tax purposes.





The rates to be quoted by the tenderer shall be inclusive of all taxes like VAT, sales tax, labor, construction cess, income tax, duties, etc., including such other taxes, duties, tolls, octroi, freshly levied taxes under any rules and no claim whatsoever in this context shall be entertained.

Goods/ equipments/ materials will be permitted for unloading after the submission of octroi receipts (if any)

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

If any Work Contract Tax or Labor welfare Tax or any other tax is levied by the Government during the course of execution of this contract, the same shall not be borne by contractor and the same shall be reimbursed on proof of payment to be appropriate authority being produced.

#### 17.1 IMPACT OF GST LAW

If any change in existing tax liability is created, the same shall be reimbursed/recovered to/from the contractor, on proof of payments.

### 18.0 LABOUR EMPLOYMENT

The Contractor shall furnish to the Engineer-in-charge every week during the progress of the works classified weekly returns of the number of the people employed on the work during the week. The report of skilled and unskilled labors shall be given in the prescribed form. The contractor shall have to obtain labor license from concerned Government department and shall have to submit to Employer.

The contractor shall strictly observe all the requirements laid down in the contract labour (Regulation and Abolition) Act, 1979 and the contract labor (Regulation and Abolition) (Gujarat) Rules, 1972 and other acts as amended from time to time so far as applicable.

### 19.0 TREASURE TROVE

In the event of the discovery by the Contractor or his employees during the progress of the works of any treasure, coins, antiquities, fossils, minerals or other articles or things of value or interest, whether geological, archeological or any other such treasure or other things shall be deemed to be the absolute property of client.

The contractor shall take all reasonable precautions to prevent his workmen or any other persons from removing such things as above and shall immediately upon discovery thereof and before removal, acquaint the Engineer-in-charge/SMC of such discovery and carry out his orders as to the disposal of the same which will be at the contractor's expense.



## **20.0 ADDITIONAL CONDITIONS**

- (a) Any damage caused to either private or public property, services, structures etc. shall be made good by Contractor without any extra cost to the employer
- (b) Contractor need to ensure proper and adequate traffic safety signboards, barricades, lighting at night shall be displayed during day and night to ensure that no accidents take place.
- (c) Contractor shall submit Quality Assurance plan based on ISO 9000 series document to form the basis evolving the quality system, applicable for all quality related activities.
- (d) No excavated material shall allowed to be stacked on roadside/ footpaths/public premises without written permission from competent authority.
- (e) Whenever new drains are constructed, the flow in the old drain will have to be suitably diverted to maintain the continuity of flow.

## **21.0 GENERAL INFORMATION**

Canvassing in connection with the tender is strictly prohibited, and such canvassed tenders submitted by the contractor will be liable to the rejected and his earnest money shall be absolutely forfeited.

On acceptance of the tender, the name of the accredited representative of the contractor who will be responsible for taking instructions from the Executive Engineer shall be communicated to the Executive Engineer in writing.

SMC reserves the right to engage suitable Project Management Consultant &/or third Party Inspection agency to Engineering Review, monitor & supervise the said work. PMC-TPI will performs its duties caring out jobs as per scope of works /TOR of RFP proposed by SMC. The selected contractor has to submit DBR (design basis report), drawings etc. to SMC-PMC and to take approval well in advance before start of the work. The selected contractor has to submit all the details ,drawings and materials ,which is essential to carry out the assignment/project for the better performance to the SMC ,along with the set of copies to PMC –TPI also.

Tenders which do not fulfill all or any of conditions or are submitted incomplete in any respect will be rejected. Surat Municipal Corporation Reserves the rights to increase / decrease the scope of work and contract without assigning any reason thereof. No claim to that effect shall been entertained.

Selected contractor has to carry out **planning, designing DU's with carpet area (26.00 Sq.mts to 27.00 Sq.mts for EWS-I & 35.50 Sq.mts to**



36.50 Sq.mts for EWS-II ) limited to indicated in this Bid. Please note that; lesser carpet area & Nos. of DUs than the indicated in this Bid will not be permitted in any case.

Conditional tenders will not be accepted and will be rejected outright.

In case of any dispute or clarification in specification of any tender items the decision of Surat Municipal Corporation shall be final.

No advance such as machinery advance, mobilization advance or materials advance will be given.(Except specified in the tender).

The technical bid shall be opened first on due date and time as mentioned above. The time and date of opening of financial bid of contractors qualifying the technical bid shall be communicated to them later on.



## **SECTION VII – CONDITIONS OF CONTRACT**



## ARTICLE 1

### DEFINITIONS AND INTERPRETATION

**The following definitions and interpretations shall be inclusive of the scope of denitions as per trade practice and rules of interpretation as acknowlged by law.**

#### 1.1 Interpretation

1.1.1 In this Agreement, unless the context otherwise requires,

- (a) references to any legislation or any provision thereof shall include amendment orre-enactment or consolidation of such legislation or any provision thereof so far as such amendment or re-enactment or consolidation applies or is capable of applying to any transaction entered into here under;
- (b) references to laws of India or Indian law or regulation having the force of law shall include the laws, acts, ordinances, rules, regulations, bye laws or notifications which have the force of law in the territory of India and as from timeto time may be amended, modified, supplemented, extended or re-enacted;
- (c) references to a "person" and words denoting a natural person shall be construed as a reference to any individual, firm, company, corporation, society, trust,government, state or agency of a state or any association or partnership (whetheror not having separate legal personality) of two or more of the above and shall include successors and assigns;
- (d) the table of contents, headings or sub-headings in this Agreement are for convenience of reference only and shall not be used in, and shall not affect, the construction or interpretation of this Agreement;
- (e) the words "include" and "including" are to be construed without limitation and shall be deemed to be followed by "without limitation" or "but not limited to"whether or not they are followed by such phrases;
- (f) references to "Scope of Work" include, unless the context otherwise requires,survey and investigation, design, developing, engineering, procurement, supply of plant, materials, equipment, labour, delivery, transportation, installation,processing, fabrication, safety measures, testing, and commissioning of theProject, including maintenance during the Construction Period, removing ofdefects, if any, and other activities incidental to the construction and "construct"or "build" shall be construed accordingly;
- (g) references to "development" include, unless the context otherwise requires,construction, renovation, refurbishing, augmentation, up-gradation and otheractivities incidental there to during the Construction Period, and "develop" shall be construed accordingly;
- (h) any reference to any period of time shall mean a reference to that according to Indian standard time;



- (i) any reference to day shall mean a reference to a calendar day;
  - (j) any reference to month shall mean a reference to a calendar month as per the Gregorian calendar;
  - (k) references to any date, period or Project Milestone shall mean and include such date, period or Project Milestone as may be extended pursuant to this Agreement;
  - (l) any reference to any period commencing "from" a specified day or date and "till" or "until" a specified day or date shall include both such days or dates; provided that if the last day of any period computed under this Agreement is not a businessday, then the period shall run until the end of the next business day;
  - (m) the words importing singular shall include plural and vice versa;
  - (n) references to any gender shall include the other and the neutral gender;
  - (o) "lakh" means a hundred thousand (100,000) and "crore" means ten million(10,000,000);
  - (p) "indebtedness" shall be construed so as to include any obligation (whether incurred as principal or surety) for the payment or repayment of money, whether present or future, actual or contingent;
  - (q) references to the "winding-up", "dissolution", "insolvency", or "reorganisation" of a company or corporation shall be construed so as to include any equivalent or analogous proceedings under the law of the jurisdiction in which such company or corporation is incorporated or any jurisdiction in which such company or corporation carries on business including the seeking of liquidation, winding-up, reorganisation, dissolution, arrangement, protection or relief of debtors;
  - (r) save and except as otherwise provided in this Agreement, any reference, at anytime, to any agreement, deed, instrument, licence or document of any description shall be construed as reference to that agreement, deed, instrument, licence or other document as amended, varied, supplemented, modified or suspended at the time of such reference; provided that this Clause shall not operate so as to increase liabilities or obligations of the SMC here under or pursuant here to in any manner whatsoever;
  - (s) any agreement, consent, approval, authorisation, notice, communication, information or report required under or pursuant to this Agreement from or by any Party or the SMC's Engineer shall be valid and effective only if it is in writing under the hand of a duly authorised representative of such Party or the SMC's Engineer, as the case may be, in this behalf and not otherwise;
  - (t) all the documents forming part of the contract shall be treated as integral whole and each one shall be in addition to being supplementary shall also be treated as complimentary to all other parts to the extent that the overall meaning and interpretation thereof shall be in conformity with the intention and purpose of this agreement.
  - (u) time shall be of the essence in the performance of the Parties' respective obligations. If any time period specified herein is extended for the reasons specified in the Agreement, such extended time shall also be of the essence, inviting all the liabilities attached to the requirement to the performance in terms of Liquidated Damages.
- 1.1.2 Unless expressly provided otherwise in this Agreement, any Documentation required to be provided or furnished by the Contractor to the SMC shall be provided free of cost in Five copies.

## 1.2 Definitions

The words and expressions beginning with capital letters and defined in this Agreement shall, unless the context otherwise requires, have the meaning ascribed there to herein, and the words and expressions defined in the Schedules and used therein shall have the meaning ascribed thereto in the



Schedules. For the purposes of the Contract Documents, the following words and terms shall have the meanings specified below (other words and abbreviations that have well-known technical or trade meanings are used in the Contract Documents in accordance with such recognized meanings), provided, however, that the terms defined in attached Documents, including but not limited to the Agreement, shall have the meanings specified in such document.

### 1.2.1 Definitions (for incorporated words)

In this Agreement, the following words and expressions shall, unless repugnant to the context or meaning thereof, have the meaning herein after respectively assigned to them:

“Accounting Year” means the financial year commencing from the first day of April of any calendar year and ending on the thirty-first day of March of the next calendar year;

“Affiliate” means, in relation to either Party {and/or Members}, a person who controls, is controlled by, or is under the common control with such Party {or Member} (as used in this definition, the expression “control” means, with respect to a person which is a company or corporation, the ownership, directly or indirectly, of more than 50% (fifty per cent) of the voting shares of such person, and with respect to a person which is not a company or corporation, the power to direct the management and policies of such person, whether by operation of law or by contract or otherwise);

“Agreement” means this Agreement, its Recitals, the Schedules here to and any amendments there to made in accordance with the provisions contained in this Agreement;

“Applicable Laws” means all laws, brought into force and effect by GOI or the State Government including rules, regulations and notifications made there under, and judgements, decrees, injunctions, writs and orders of any court of record, applicable to this Agreement and the exercise, performance and discharge of the respective rights and obligations of the Parties hereunder, as may be in force and effect during the subsistence of this Agreement;

“Applicable Permits” means all clearances, licences, permits, authorisations, no objection certificates, consents, approvals and exemptions required to be obtained or maintained under Applicable Laws in connection with the construction, operation and maintenance of the Work during the subsistence of this Agreement;

“Bank” means a bank incorporated in India and having a minimum net worth of Rs.1,000 crore (Rupees one thousand crore) or any other bank acceptable to the SMC;

“Base Date” means the last date of that calendar month, which date precedes the Bid Due Date by at least 28 (twenty eight) days;



"Bid" means the documents in their entirety comprised in the bid submitted by the [selected bidder/Consortium] in response to the Request for Proposals in accordance with the provisions thereof;

"Bid Security" means the bid security provided by the Contractor to the SMC in accordance with the Request for Proposal, and which is to remain in force until substituted by the Performance Security;

"Change in Law" means the occurrence of any of the following after the Base Date:

- (a) the enactment of any new Indian law;
- (b) the repeal, modification or re-enactment of any existing Indian law;
- (c) the commencement of any Indian law which has not entered into effect until the Base Date;
- (d) a change in the interpretation or application of any Indian law by a judgement of a court of record which has become final, conclusive and binding, as compared to such interpretation or application by a court of record prior to the Base Date; or

"Commencement Date" means the first date on which the contractor starts mobilizing his resources Men and/or Machineries and/or Material at site.

"Consortium" means the consortium of entities which have formed a joint venture for implementation of this Project;

"Contractor" shall have the meaning attributed there to in the array of Parties here in above as set forth in the Recitals;

"Defect" means any defect or deficiency in Construction of work or any part thereof, which does not conform with the Specifications and Standards.

"Document" or "Documentation" means documentation in printed or written form, or in tapes, discs, drawings, computer programmes, writings, reports, photographs, films, cassettes, or expressed in any other written, electronic, audio or visual form;

"Emergency" means a condition or situation that is likely to endanger the safety or security of the individuals on or about the The Work, including Users thereof, or which poses an immediate threat of material damage to any of the Project Assets;

"Encumbrances" means, in relation to the The Work, any encumbrances such as mortgage, charge, pledge, lien, hypothecation, security interest, assignment, privilege or priority of any kind having the effect of security or other such obligations, and shall include any designation of loss payees or beneficiaries or any similar arrangement under any insurance policy pertaining to the works.

The "EIC" shall mean the Engineer in charge i.e. officer of SMC who is designated as such for the time being in whose jurisdiction the work lies.





“Good Industry Practice” means the practices, methods, techniques, designs, standards, skills, diligence, efficiency, reliability and prudence which are generally and reasonably expected from a reasonably skilled and experienced contractor engaged in the same type of undertaking as envisaged under this Agreement and which would be expected to result in the performance of its obligations by the Contractor in accordance with this Agreement, Applicable Laws and Applicable Permits in reliable, safe, economical and efficient manner;

“Government Instrumentality” means any department, division or sub-division of the Government or the State Government and includes any commission, board, SMC, agency or municipal and other local SMC or statutory body including panchayat under the control of the Government or the State Government, as the case may be, and having jurisdiction over all or any part of the Work or the performance of all or any of the services or obligations of the Contractor under or pursuant to this Agreement;

“Insurance Cover” means the aggregate of the maximum sums insured under the insurances taken out by the Contractor and includes all insurances required to be taken out by the Contractor but not actually taken, and when used in the context of any act or event, it shall mean the aggregate of the maximum sums insured and payable or deemed to be insured and payable in relation to such act or event;

“Intellectual Property” means all patents, trademarks, service marks, logos, get-up, trade names, internet domain names, rights in designs, blue prints, programmes and manuals, drawings, copyright (including rights in computer software), database rights, semi-conductor, topography rights, utility models, rights in know-how and other intellectual property rights, in each case whether registered or unregistered and including applications for registration, and all rights or forms of protection having equivalent or similar effect anywhere in the world;

“Interim Payment Certificate” or “IPC” means the interim payment certificate issued by the SMC’s Engineer for payment to the Contractor in respect of Contractor’s claims for payment raised in accordance with the provisions of this Agreement;

“Lead Member” shall, in the case of a consortium, mean the member of such consortium who shall have the SMC to bind the contractor and each member of the Consortium; and shall be deemed to be the Contractor for the purposes of this Agreement;

“LOA” or “Letter of Acceptance” means the letter of acceptance of offer.

“Material Adverse Effect” means a material adverse effect of any act or event on the ability of either Party to perform any of its obligations under and in accordance with the provisions of this Agreement and which act or event causes a material financial burden or loss to either Party;

“MEPF” shall mean Mechanical, Electrical, Plumbing and Fire fighting system consultant who is designated as such for the time being in whose jurisdiction the work lies.



"Materials" are all the supplies used by the Contractor for incorporation in work or for the maintenance of the Work;

"Parties" means the parties to this Agreement collectively and "Party" shall mean any of the parties to this Agreement individually;

"Performance Security" shall have the meaning as given in the contract

"Plant" means the apparatus and machinery intended to form or forming part of work;

"Project" means the construction and maintenance of the Work in accordance with the provisions of this Agreement, and includes all works, services and equipment relating to or in respect of the Scope of the Project;

"Project Completion Date" means the date on which the Provisional Certificate is issued and in the event no Provisional Certificate is issued, the date on which the Completion Certificate is issued;

"Project Completion Schedule" means the progressive Project Milestones for completion of the Work on or before the Scheduled Completion Date;

"PMC" shall mean Project management consultant who is designated supervision agency during execution of this project.

"SMC" shall mean Surat Municipal Corporation in whose jurisdiction the work lies.

"SUC" shall mean Slum upgradation Cell of Surat Municipal Corporation.

"Re.", "Rs." or "Rupees" or "Indian Rupees" means the lawful currency of the Republic of India;

"Right of Way" means the constructive possession of the Site free from encroachments and encumbrances, together with all way leaves, easements, unrestricted access and other rights of way, how so ever described, necessary for construction and maintenance of the Work in accordance with this Agreement;

"Specifications and Standards" means the specifications and standards relating to the quality, quantity, capacity and other requirements for the Work, and any modifications thereof, or additions thereto, as included in the design and engineering for the Work submitted by the Contractor to, and expressly approved by, the SMC;

"Sub-contractor" means any person or persons to whom a part of work or the Maintenance has been subcontracted by the Contractor and the permitted legal successors in title to such person, but not an assignee to such person;

"Termination" means the expiry or termination of this Agreement;



"Termination Notice" means the communication issued in accordance with this Agreement by one Party to the other Party terminating this Agreement;

"TPI" shall mean Third party inspection consultant who is designated for quality monitoring of material & workmanship during execution of this project.

"TSTP" shall mean Tertiary Sewage Treatment Plant.

"WPI" means the wholesale price index for various commodities as published by the Ministry of Commerce and Industry, GOI and shall include any index which substitutes the WPI, and any reference to WPI shall, unless the context otherwise requires, be construed as a reference to the WPI published for the period ending with the preceding month.

### **1.3 Measurements and arithmetic conventions**

1.3.1 All measurements and calculations shall be in the metric system and calculations done to 2 (two) decimal places, with the third digit of 5 (five) or above being rounded up and below 5 (five) being rounded down.

### **1.4 Priority of agreements and errors/discrepancies**

1.4.1 This Agreement, and all other agreements and documents forming part of or referred to in this Agreement are to be taken as mutually explanatory and, unless otherwise expressly provided else where in this Agreement, the priority of this Agreement and other documents and agreements forming part hereof or referred to herein shall, in the event of any conflict between them, be in the following order:

- (a) this Agreement; and
- (b) all other agreements and documents forming part hereof or referred to herein; i.e. this Agreement at (a) above shall prevail over the agreements and documents at (b).

1.4.2 In case of ambiguities or discrepancies within this Agreement, the following shall apply:

- (a) between two or more Clauses of this Agreement, the provisions of a specific Clause relevant to the issue under consideration shall prevail over those in other Clauses;
- (b) between the Clauses of this Agreement and the Schedules, the Clauses shall prevail and between Schedules and Annexes, the Schedules shall prevail;
- (c) between any two Schedules, the Schedule relevant to the issue shall prevail;
- (d) between the written description on the Drawings and the Specifications and Standards, the latter shall prevail;
- (e) between the dimension scaled from the Drawing and its specific written dimension, the latter shall prevail; and
- (f) between any value written in numerals and that in words, the latter shall prevail.



## **ARTICLE 2**

### **SCOPE OF THE PROJECT**

#### 2.1 Scope of the Project

Under **this** Agreement, the scope of the Project (the "Scope of the Project") shall mean and include:

- (a) The development/construction of EWS-I including Conceptualisation, planning ,structural designing, structural proof checking and all other internal & external amenities like Plumbing & sanitation, Drainage, Electrification ,storm water drainage, Horticulture ,Fire safety ,Infrastructural facilities like RCC roads, Development of marginal space by VDS Concrete/Paver Block pavement, compound wall,entry gate ,COP Development ,Street lighting etc.work in accordance with the provisions of this Agreement and in conformity with the requirements.
- (b) maintenance of the Project in accordance with the provisions of this Agreement and in conformity with the requirements.
- (c) performance and fulfilment of all other obligations of the Contractor in accordance with the provisions of this Agreement and matters incidental there to or necessary for the performance of any or all of the obligations of the Contractor under this Agreement.
- (d) If due to any unavoidable circumstances, it needs to shift the location of project partly or fully, the contractor shall carry out the work partly or fully at another alternative locations without any extra claim. The expenditure towards preliminary activities if carried out by the contractor shall be reimbursed by SMC.(Actual expenditure or payment shown in Schedule of Payment-pre construction activities-as per stage of work carried out by the contractor which ever is less).
- (e) Scope of work contained in the paragraphs mentioned below is only indicative and not exhaustive. In addition the contractor shall be responsible for executing all items required for completing the houses in all respect to make the dwelling units habitable and ready for occupation including all services, environment-fit for habitation with electrical, landscaping works, water supply, sewerage, Providing, Installing and commissioning of Tertiary Sewage treatment plant, storm water, rain water harvesting system, roads, pathways etc. complete as per direction of Engineer-in-charge. The price quoted includes all above items and covers all details as may be required to meet the purpose and intents of the contract.

#### 2.2 SCOPE OF WORK : (As described in Bidding Data)

##### **A. Scope of Work :-**

- 1 Surat Municipal Corporation will provide the plot(s) for construction/development.



- 2 Contractors are requested to visit the site prior to fill/submit the tender and check all the necessary attributes/matters related for completion of this project.
- 3 All the activities required to be carried out for successful and timely completion of this project shall be carried out by the successful contractor.

**1. Detail Scope of work : The detail scope of work is as under :**

1. Survey of the boundry of the plot(s) as per the Final Plot map given by SMC. Carrying out with Total station, or any other survey(s) required during the execution of the project.
2. Appointment of the licensed architect / structural designer/MEPF Consultants/any other experts required for this project.
3. Preparation of Conceptual drawings – plan-elevation - section – 3-D views etc and submit preliminary project report to the department for preliminary approval. Contractor shall make presentation to SMC official ,if instructed by SMC. Contractor shall make necessary modifications as per instructions of SMC.
4. The Contractor will submit the model for layout of the project specifying details provided in layout along with in the tender documents in one month from stipulated date of start. He will also submit a model of modules of houses specifying all floors and its adjoining area. The scale of module shall be 1:500 for layout plan and 1:100 for dwelling unit. The bidder has to provide a model of layout and building unit along with a walk through presentation in one month from stipulated date of start.
5. For Architectural, Structural and MEP services contractor has to submit DBR (Design Basis Report) with conceptual drawing, data sheet and calculation before submitting Architectural, structural and MEP detail drawing for review.
6. The **maximum permissible FSI is 3.00** and the plot area for each Package is mentioned in this tender document. Bidder has to plan as per details given in minimum specific planning requirement (Article-2.2, clause-B) and accommodate maximum Nos. of DU's for each category. Bidder has to plan Maximum permissible number of Dwelling Units per floor/Building block nos. should be as mentioned herein below with maximum light and ventilation. Row house type planning will not be permitted.  
Nos of DUs/Floor and Maximum block shall be attached.  
For EWS -I & EWS-II category :-  
Maximum 12 Nos - Dwelling Units / Floor &  
Maximum 2 Building Blocks shall be Attached.
7. The scope of work for the agency shall include from conceptualization to the possession to the beneficiaries i.e. shall include preparation of layout (as per the rules and guideline of DCR and guideline published by Pradhan Mantri Awas Yojna, Guj. Govt.) and unit plans with cluster in the form of presentation for the approval of the competent authority with min. **2 to 3 alternatives** (but not limited to nos. of alternatives until the satisfactory approval from Client/Owner).



8. The legal sanction from respective departments shall be the responsibility of bidder/contractor (i.e. approval of project plans/drawings, necessary Airport NOC, Environmental NOC, Fire NOC, Lift NOC, BU Certificate etc.) All Charges for the approval shall be borne by Bidder/contractor.
9. Prepare complete structural design, drawing for foundation, super structure and for other related structures in the Housing pocket i.e. UGRs, pump(submersible), DG set, Pump houses, Tertiary treatment plant etc. to be provided in this Housing scheme as per provision contained in IS code/relevant codes, but not lower than the minimum specification mentioned in the tender and minimum requirement of the project.
10. The contractor shall be responsible for executing all the items required for completing the houses in all respect to make the dwelling units habitable and ready to use/occupy and also all services, make the environment fit for habitation with electrical, horticultural, rain water harvesting works complete as per direction of Engineer-in-Charge/PMC/SMC/Consultant.
11. Contractor has to submit compliance report of remarks (observation) given by SMC/PMC/consultant during scrutiny and review of architectural, structural and MEP drawings with revision of the drawings invariably.
12. Provision of protection against seismic forces as per relevant IS codes for structure in Gujarat shall be made.
13. On approval of the preliminary planning and project report, the contractor shall submit the plan / necessary drawings for sanction of local authorities as per UD,UHD and prevailing MMGY GDCR and local authority norms.
14. Soil investigations of site by reg. NABL laboratory.
15. Preparation of structural design and drawings as per latest guideline / codes / regulations.
16. Proof checking of the design and drawing prepared by structural consultant and checked by the proof check consultant appointed/approved by Surat Municipal Corporation. All expenditure of proof checking shall be borne by the corporation. All necessary data/calculation shall be submitted to proof check consultant as per instruction of consultant.
17. Site preparation, laying out and other related activities to be carried out for commencement of the work.
18. Shifting of any underground / overhead services of any agency /utility provider, require to shift for execution of work. All related liasioning and shifting expenditure shall be borne by the contractor.
19. Minimum plinth height shall be 450mm from adjoining heighest T.P. / SMC road (major). Minimum FRL of the internal road of the project site shall be 300mm above the adjoining main road.
20. The Brands of the various materials to be used in this project shall be from the list of approved / suggested brand in the tender. The contractor shall mention the brands he intends to use in this work at the time of submission of the tender (Statement "N"). No change in the brand of any



material will be permitted except under the special circumstances and approval from engineer - in charge/SMC .

21. The work shall be carried out as per latest I.S. codes and accepted norms of the construction. The workmanship and quality of the work shall be best & as per the good construction practice.
22. The contractor shall complete the work in scheduled time limit. The progress shall be maintained as per memorandum of the work, failing which the penalty as per tender shall be deducted from the R.A bill. The time limits includes time taken for approval of plans and proof checking of structural drawings and design. Time limit includes monsoon.
23. At the completion of the work the contractor shall submit the certificates duly signed by the contractor (All the partners of the firm), Architect and structural consultant as per Model form No.3 (Article 10.6).
24. VDS/Paverblock pavements shall be constructed in marginal space as per design and recent practice adopted in SMC. All major roads of the campus (more than 4.5mt.) shall be constructed as per design of RCC Road.
25. Water supply line shall be laid as per design approved by SMC with individual connections and Water meter fitting in each water tanks as per norms of SMC. water supply shall be connected to SMC water supply grid for each building/ U.G water tanks. External water supply infrastructure arrangement within the premises shall have to be provided by the contractor. All internal plumbing and sanitation line shall be concealed line. Separate internal flushing line network shall be installed for use of treated sewage water .
26. Sewerage lines will be laid as per scheme prepared, submitted by the contractor and approved as specified by SMC/PMC/Consultant.
27. Internal storm water drains (If necessary in the opinion of SMC) to be designed and constructed with Rain water harvesting system as per approved SMC/GDCR norms.
28. Planning designing and execution of the roof top rain water harvesting system for recharge the sub soil water including laying of pipelines and construction of substructure/ super structures is also to be done by the contractor.
29. The fire tank shall be of the necessary capacity as approved by fire authority. The fire line network shall be approved by fire authority of SMC. For which NOC should be obtained by contractor. The pump house/room shall be constructed as per instruction of SMC fire department requirement.
30. The overhead and underground water tank shall be of the capacity to retain water at the rate of 150 LPCD + free board. (The O.H [40% of total requirement] & U.G water tanks [60% of total requirement] OR shall be as per the capacity finalized/approved by SMC/PMC/Consultant). The



U.G. and O.H. tank required for use of treated sewage water shall be constructed by the contractor as per design and instruction of EIC.

31. The Marginal space in Campus shall be developed with VDS concrete pavement / paver block as approved by SMC/PMC/Consultant.
32. The contractor shall plant & grow the trees as per norms of SMC/GDCR.
33. The C.O.P. shall be developed with required height of wall. Yellow soil filling and grass - tree plantation as per instructions of Engg-in-charge. Benches & Gazebo Shall be provided as approved by SMC/Consultant.
34. The plot shall be surrounded by well designed compound wall ,Watchman cabins and entrance gate/(s).
35. The Campus name Board of required size ,as approved by SMC shall be fixed in letters of S.S 304 (powder coated)as approved by SMC/PMC/Consultant. All the building nos. shall be fixed at entrance of the building. All flat nos / floor nos and lift nos. with notations shall be fixed by the contractors.The list of flat holders made in approved materials should be provided in the Parking area / entrance area of each building or as advised by SMC.The parking bay/space markingwith yellow patta (Rubber paint)as directed in DCR.
36. For electric meter connection charges for all flats & common meter paid by the contractor in the name of SMC. Original receipt shall be submitted to SMC and it shall be reimbursed by SMC to contractor.  
The minimum charges for each electric meter of individual D.U & common amenities levied by electric supply company (after installation of meters) shall be borne by contractor.  
The minimum charges shall be paid maximum upto 6 months from the date of inaugural function or upto handing over of the Flat/amenities to beneficiaries /co-op society(s),whichever is earlier by the contractor.
37. All licences for Lifts / D.G. sets, Highrise electrification permission and other activities (if any) shall be taken by the contractor at his own expenses. The liaisoning shall be done by contractor.
38. All the flats shall be handed over in neat & clean condition The Contractor shall give key of all the flats with flat nos on each keychain.
39. Electric meter should be installed/fitted with as per instruction of owner and supply company and should be covered in alluminium or wooden cabinate (with glass). The Meter area shall be protected by M.S.Grill with door as per instruction of EIC.
40. All electric meter shall be marked with flat number.





41. The Contractor shall apply for PNG (Piped Natural Gas) connections. The deposit and initial charges (if any) shall be paid by contractor in name of Surat Municipal corporation .The original receipt submitted to SMC and it shall be reimbursed by SMC to contractor.
42. All water proofing of toilets and terraces shall be ensured on stamp paper for 10 (Ten) years guarantee against any leakages as per annexure.
43. The contractor has to construct Servant Room /watchman room/security persons rooms in each building with toilet facilities, in the parking floor or any other place directed by EIC/SMC without any extra payment .
44. After Successful completion of project contractor has to submit "AS-BUILT" Drawings (Signed by structural engineer & contractor) in 3 Sets as well as Soft copies of all drawings.
45. Contractor shall handover the tube wells / borewell constructed for construction purpose to SMC along with all pipes/pumps
46. Planning, designing and execution of all services like water supply, rain water harvesting system, Gas line network,sewerage ,Tertiary sewage treatment Plant, drainage system, roads, paths,electrifications and all connected sub structures and superstructures within the premises, as per bye laws and norms of the SMC or Concern Authority including making connections with the peripheral services after getting the services design approval from the SMC/PMC/Consultant.
47. Refuse area will be constructed in the plot as instructed by SMC/PMC/Consultant.
48. Infrastructure outside the plot shall be provided by SMC.
49. The cost of deficiency charges and rectifications of any defect at the end of the job is also to be borne by the contractor.
50. Contractor Shall erect batch mix plant (of minimum 12 to 15 cum/hr) fully automatic, computerized or Digital weigh batcher machine on the same site [to complete the project in time , if it is necessary to erect more plant (s) ,the contractor shall arrange for additional plant(s)] contractor shall not allowed to receive from any other RMC plant & also not allowed to supply from this site plant to any other agency without permission of SMC , for preparation of Design mix concrete. The Design mix concrete shall be prepared as per IS code standards , at his own cost and will prepare all concrete accordingly.
51. Cost of all materials, manpower, equipments, T&P ,fixtures, accessories, royalties, taxes, watch & ward, and all other essential elements for completion and maintenance of works shall be in the scope of contractor.Fees /charges for all experts/agencies shall be borne by contractor (i.e MEP services,consultancy services etc)
52. Any change, modification,revision etc. directed by SMC, proof consultants etc. in accordance with applicable standards and tender document will have to be done at contractor's cost and nothing extra shall be payable. Any change, modification,revision etc. shall be got first approval by SMC before execution.



53. Contractor has to provide structural stability certificate for 10 years & life span building structure certificate for 50 years.
54. Setting of testing lab. at site, fully equipped with equipments/apparatus needed for testing as specified by the R & B /SMC norms ,during construction the necessary laboratory equipments shall be provided by the contractor . 70% of the material shall be tested on site and 30% shall be tested in govt. approved lab.
55. Defect liability period would be uniformly **ten (10) years** from the date of completion of the project (from the date of inaugural function) in all respect & fit for occupation. However, maintenance of other building activities, such as cleaning, sweeping of pocket & desilting of sewer lines, S.W. Drain shall be done only once prior to handing over the respective pocket. All RCC structural components, under ground and over head water tanks & all kind of waterproofing shall be covered in defect liability. The decision of SMC in respect of magnitude of defects and scope of liability including rectification thereof shall be final and binding.
56. The bidder shall provide at its own cost
- (1) Operation & Maintenance (with parts) of lifts upto 2 (two) years, from the date of inaugural function, including cost of providing lift operator [round the clock for each of the shifts of 8 hours].
  - (2) Maintenance of all the pumps-equipments ,electric -fire panels (if any),Tertiary treatment plant & D.G. Sets. for 2 (two) years from the date of inaugural function (with parts).
  - (3) Contractor shall arrange for minimum one security person round the clock for each of the shifts of 8 hours.
57. All type of co-ordination and liasioning with all agencies related to the entire project shall be carry out by the Bidder/contractor.
58. The scope of work includes the Five sets of proof checked/approved drawings to be submitted to Client.The necessary drawing required for sanction of fire dept.,Electrical dept.,Water supply dept.,Drainage dept.,for Tertiary sewage treatment plant and any other related dept shall be provided by contractor.
59. The scope of work includes the issuance of all the necessary drawings, details and documents with the respective Unit Plan required for agreement to all individual beneficiaries for the title and record purpose with necessary required nos. of sets to the Client/Owner. Charges for the same shall be borne by Bidder/contractor.
60. The scope of work includes all safety provisions required to be maintained at site. Any mishap or accident occurred at site shall be the responsibility of the contractor. All legal problems arise out of such accident shall be the responsibility of the contractor.
61. All the related/allied/miscellaneous activities shall be carry out by the contractor ,for which no extra payment shall be payable to contractor.
62. Tertiary sewage treatment Plant :



Engineering-design ,Procurement and construction of Tertiary sewage treatment Plant for re-use of treated sewage for Toilet Flusing water & gardening water requirement  
The broad scope of work for Tertiary Sewage Treatment Plant for reuse of treated sewage for Toilet Flushing Water and Gardening shall consists of;

- a). Detailed engineering design of all plan areas, section, mechanical, electrical and piping systems according to the current and applicable BIS codes as applicable. The proposed plans of the TSTP shall be subject to the design of the Consultant and approval of SMC - Concerned department of SMC/Govt Department and final approved by E.I.C .
- b). The execution of the Civil & Structural Works shall be done by contractor as per approved plan, section & details submitted by contractor.
- c). Design, manufacture, assembly, installation, testing and commissioning of the main treatment units like tanks, mechanical equipment for the Tertiary Sewage Treatment Plant (TSTP) of capacity and design parameters given in this tender elsewhere.
- d). The tenderer may propose Packaged Containerized TSTP in the tender with proven technology, subject to approval by SMC.
- e). The Minimum & maximum plot area provided for TSTP shall be as per the prior approval by E.I.C.
- f). The F.G.L. shall be as per the approval by E.I.C.
- g). Drain channel, sump with a drainage submersible pump with pipe work, valves and discharge pipe up to nearest collection tank in plant area should be as per design by consultant & approved by E.I.C.
- h). Provide water meter on outgoing treated effluent for measuring the outflow.
- i). The work also includes:
  - a) Mechanical & Electrical works
  - b) Piping as specified.
  - c) Testing, commissioning and operation of plant with water and under load conditions.
  - d) O & M for period of 24 (Twenty Four) months.
- j). NOC (No Objection Certificate) from State Pollution Control Board and any other statutory authority whose approval is essential. The all the correspondence shall have to be carried out by contractor at its own. Only necessary legal fees shall be borne by SMC.
- k). All equipment and the entire installation shall be guaranteed against defective materials and workmanship for a period of 24 (Twenty Four) months reckoned after successful commissioning of system along with the documentation. During the defects liability period, the contractor shall replace defective parts and components free of cost. Rectification or repair may be permitted in case the defect is of minor nature.

**63. Landscaping:**

Preparation of landscaping plan including parks, plantation and execution of the same with following:

**64. The development of park: -**

Water hydrants, grassing creeper, planting trees etc.complete as per SMC (garden department) norms as per specification and drawing approved by the competent authority of SMC.

65. Complete leveling / dressing including filling of earth, its supply, disposal of surplus earth, (if any) to the approved disposal point or at the place within the radius of 5.00 kms (including necessary loading, unloading & carting required thereof) as directed by SMC.
66. Disposal of Storm water by surface runoff/storm water drainage shall be done.
67. The disposal of construction and demolition waste shall be responsibility of contractor, but if required by SMC disposal of same Construction & Demolition waste to the approved disposal point



or at the place within the radius of 5.00 kms (including necessary loading ,unloading & carting required thereof) as directed by engineer in charge should be done.

68. No extra payment for disposal shall be paid.
69. The RCC coping at window sill level and at lintel level shall have to be executed during execution work at all periphery.
70. Chicken mesh at junction of RCC & Block masonry work before the internal as well as external plaster work shall have to be executed.
71. One sample Dwelling Unit has to be made ready, within three months from date of starting of work. Location of the sample D.U is to be decided at planning stage and as directed by Engineer in charge. Further, brochures of the Project indicating drawings, pictorial views, specification and common amenities are to be prepared by the Bidders as per the instruction of Engineer in charge in sufficient quantity for the circulation to the beneficiaries.
72. All O.T.S. & O.T.S Passages-Ducts should be covered by the structural steel frame work with polycarbonate sheet to prevent the entry of rainwater in that area. All D.G. Set should be covered by structural steel frame work and roofing as approved by EIC.
73. Following minimum Plumbing Points are to considered for the each individual unit.
  - (1) Bath ,W.C, Wash ,Kitchen -One point each
  - (2) Wash basin - One Pillar cock, Stop cock & waste trap
  - (3) W.C -Flush cock
74. The street light network shall be laid with LED lights & octagonal poles, in such a way that all roads marginal space is fully illuminated as approved by SMC /GDCR.
75. The Scope of work also includes " TRANSFER OF NAME " for various SERVICES/CERTIFICATE / LICENCE /NOC/ PERMISSION related to Electrical ,Fire System & Tertiary Sewage treatment plant works.

Following SERVICES/CERTIFICATE /LICENCE /NOC /PERMISSION shall be covered for " TRANSFER OF NAME " activity.

- (i) For high rise Electrical works (High Rise Permission)
- (ii) For standby power supply (DG Set Permission)
- (iii) For Fire safety equipments (Fire NOC)
- (iv) Licence to operate Passenger LIFT (LIFT Licence)
- (v) Electric Supply company's BILL (Flat & Common Amenities)
- (vi) For approval/ Certificate/permission/Licence/NOC for functioning-operation of Tertiary sewage treatment plant

Initially contractor shall get all above SERVICES/CERTIFICATE /LICENCE /NOC /PERMISSION in the name of "Commissioner, Surat Municipal Corporation".

After handing over of Flats / Buildings, above SERVICES/CERTIFICATE /LICENCE /NOC /PERMISSION shall be Transferred / Changed in the name of concern Flat Holder or Flat Holder's Association.

Necessary administration support shall be provided by SMC. Necessary fees shall be initially paid by contractor which shall be reimbursed on submission of original payment receipt.

76. Box type M S Grill shall be provided by the contractor on each window ,which should be projected minimum 23 cm out side from the face of building & the M.S. Grill shall be provided at wash balcony with openable arrangement as directed by the E.I.C.The Unit weight shall be minimum 25.00 kg/smt.



77. The scope of work includes publication of board stating details of project as per instruction of EIC towards main road.

**B. Minimum Specific Planning Requirement of the Project :-**

1. Minimum Carpet Area to be provided : **26.00 (+1.00sq.mt.)**  
for each D.U.s. shall be
2. Minimum accommodation ..... : (i) Living Room  
: (ii) Bed Room  
: (iii) Kitchen  
: (iv) Bath  
: (v) Toilet  
: (vi) Wash Area
3. Minimum Floor Height : 2.85 mt.
4. Ground Floor - Parking height : 3.00 mt.
5. Servent Room/Wachman Room : **3.00 mt.X 3.00 mt.with additional sufficient size toilet-bath facilities at Ground Floor for each building.**
6. Minimum No. of Units : **550 Nos.**

**C. Minimum Specifications :-**

The following statements are to be read inclusive of relevant and latest IS and National Buildings codes for compliance without diluting the intention of the contract that no part or provision of the works should violate any / all specifications as laid down by relevant code and where there are multiple standards and codes applicable, the most stringent thereof shall be deemed to be applicable.

Sr.No	Description	EWS-I	EWS-II	Remarks
1	RCC WORK	RCC Work - M25 Design mix concrete OR upper grade as per design requirement	RCC Work - M25 Design mix concrete OR upper grade as per design requirement	
	RCC in Footings, columns, beams, slabs ,Pardi,RCC Tank, Staircase etc.	The detailed dimensions & mix of RCC to be adopted shall be as per approved structural design and as per latest I.S. Codes	The detailed dimensions & mix of RCC to be adopted shall be as per approved structural design and as per latest I.S. Codes	
	Parapet wall at	Parapet on the terrace	Parapet on the terrace shall	



	terrace(RCC Pardi -M20 concrete)	shall be 1.15 m above the finished terrace level.Parapet shall be provided of minimum 100 mm thick RCC wall.	be 1.15 m above the finished terrace level.Parapet shall be provided of minimum 100 mm thick RCC wall.	
	R.C.C. pardi in wash area & Balcony(RCC Pardi-M20 concrete)	1.15mt. Ht. & 75mm. Thk.RCC wall	1.15mt. Ht. & 75mm. Thk.RCC wall	
	R.C.C. pardi in staircase(RCC Pardi-M20 concrete)	1.15mt. Ht. & 75mm. Thk.RCC wall	1.15mt. Ht. & 75mm. Thk.RCC wall	
	R.C.C. Lintels, Chhajja etc.	(RCC -M20 concrete)	(RCC -M20 concrete)	
2	Brick Masonry work	Brick work in foundation and plinth using fly ash bricksin C:M 1:6 proportion and partition wall shall be in C:M 1:4 proportion	Brick work in foundation and plinth using fly ash bricksin C:M 1:6 proportion and partition wall shall be in C:M 1:4 proportion	
3	Block Masonry work	AboveP.L. Block masonry using 600/625 X 200/240 X 225mm/100mm thick AAC (Cellular) block [autoclaved aerated block] (confirming to IS : 2185 Part III) , using readymade premix tensile adhesive mixture,with RCC coping at interval directed & approved by E.I.C.	AboveP.L. Block masonry using 600/625 X 200/240 X 225mm/100mm thick AAC (Cellular) block [autoclaved aerated block] (confirming to IS : 2185 Part III) , using readymade premix tensile adhesive mixture,with RCC coping at interval directed & approved by E.I.C..	
4	(A) Flooring & Skirting	For all rooms Commercial quality Single charge vitrified tiles ( 24" x 24")	For all rooms Premium quality Double charge vitrified tiles ( 24" x 24")	
		No Skirting	For all rooms - Skirting of Vitrified tiles(100 mm high skirting in allrooms and Passage)	
		<b>Wash floor area-</b> 300x300 premium quality vitrified mat body tiles flooring	Wash floor area - 300x300 premium quality vitrified mat body tiles flooring	
		<b>Bath &amp; W.C.floor-</b> 300x300 premium quality vitrified mat body tiles flooring	<b>Bath &amp; W.C.floor</b> - 300x300 premium quality vitrified mat body tiles flooring	
		<b>For Bath dedo-</b> 300x200 glazed tiles dedo up to 1.20 mt. height <b>For W.C.dedo-</b> 300x200 glazed tiles dedo up to 1.00 mt. height <b>For Wash. dedo-</b> 300x200 glazed tiles in all side upto 1.15 mt ht.	For Bath <b>dedo-</b> 300x200 glazed tiles dedo up to 1.20 mt. height <b>For W.C. dedo-</b> 300x200 glazed tiles dedo up to 1.00 mt. height <b>For Wash. dedo</b> - 300x200 glazed tiles in all side upto 1.15 mt ht.	



		Entry steps & Lift dedo – Black Granite	Entry steps & Lift dedo – Black Granite	
	(B) Kitchen	No kitchen platform	Black Granite with 2'-0" glazed tiles Dado.(0.60mt. Ht.) + .S.S. Sink(with T bracket)	
	(C) Stair	Tread - kota stone	Tread - kota stone	
		Riser - Plaster work	Riser - Vitrified Tiles	
		Landing - kota stone	Landing - kota stone & Vitrified	
	(D) Passage	premium quality Single charge vitrified tiles ( 24" x 24")	Premium quality Double charge vitrified tiles ( 24" x 24")	
	(E) Parking	100% vitrified matt finish parking tiles (heavy duty )10 to 12 mm thick over 100 mm thick RCC(1:2:4) with nominal steel	100% vitrified matt finish parking tiles (heavy duty )10 to 12 mm thick over 100 mm thick RCC(1:2:4) with nominal steel	
5.	Doors			
	Main door	35mm thick flush doors water proof shutters for door including <b>RCC frames</b> of finished size 12cm.X7cm. including medium quality C.P.brass fixtures and fastening including 1.5mm. laminated sheet on both side with all periphery wooden moulding patti at masonry & frame joints etc.	35mm thick flush doors water proof shutters for door including Salwood frame finished size 12cm.X7cm. including medium quality C.P.brass fixtures and fastening including 1.5mm. laminated sheet on both side with all periphery wooden moulding patti at masonry & frame joints etc.	
	Internal door	35mm thick flush doors water proof shutters for door including RCC frames of finished size 12cm.X7cm. including medium quality C.P.brass fixtures and fastening including 1.5mm. laminated sheet on both side with all periphery wooden moulding patti at masonry & frame joints etc.	35mm thick flush doors water proof shutters for door including Granite frame finished size 12cm.X7cm. including medium quality C.P.brass fixtures and fastening including 1.5mm. laminated sheet on both side with all periphery wooden moulding patti at masonry & frame joints etc.	
	Bath /W.C. door	PVC Door like Sintex or equivalent make including RCC frames of finished size 12cm.X7cm. Door shutter made out of PVC extruded sections in the configuration of "A". The overall dimension of the	PVC Door like Sintex or equivalent make including Granite frames Door shutter made out of PVC extruded sections in the configuration of "A". The overall dimension of the same is 59mm x 24mm with usual process	



		same is 59mm x 24mm with usual process variation and having a wall thickness of 1.5mm± 0.3mm corresponding to Sintex code DWUF-302, PVC material confirming to IS 10151-1982, including alluminum fixtures and fastners etc comp.(200 mm panel wooden effect)with ventilation	variation and having a wall thickness of 1.5mm± 0.3mm corresponding to Sintex code DWUF-302, PVC material confirming to IS 10151-1982, including alluminum fixtures and fastners etc comp.(200 mm panel wooden effect)with ventilation	
	Door Fittings	C.P.brass fittings e.g. Tower bolts, handles, door stoppers,aldrops etc. shall be provided.	C.P.brass fittings e.g. Tower bolts, handles, door stoppers,aldrops etc. shall be provided.	
6.	Windows	2 tracks or 3 track sliding aluminum colour powder coated window with 5mm thick transparent bronze colour tinted float glass with all fixtures and fastening With all side Granite frame. Safety M.S. grill should be provided.	2 tracks or 3 track sliding aluminum colour powder coated window with 5mm thick transparent bronze colour tinted float glass with all fixtures and fastening With all side Granite frame. Safety M.S. grill should be provided.	
7.	Ventilation	Aluminum colour powder coated glass louvers With all side Granite frame	Aluminum colour powder coated glass louvers With all side Granite frame	
8.	Sinks	No Sink	steel sink of 0.46mt x 0.46 mt or 0.48mt x 0.40 mt size of Nirali or Diamond make with required all fittings & Fixtures	
9	Electrification	Concealed copper wiring. One fan point, two light point ,and one plug point in each room. Also necessary point for Fridge, TV,Washing M/c, Computer OR as directed by EIC.	Concealed copper wiring. One fan point, two light point ,and one plug point in each room and kitchen. Also necessary point for Fridge, TV,Washing M/c, Computer OR as directed by EIC.	
	Conduits for electrical and Telecommunication cables	To be laid as per National Building Code/ BIS standards and to be concealed.	To be laid as per National Building Code/ BIS standards and to be concealed.	
10.	(A) Inner Finising	inside smooth tari/mala finish	inside smooth tari/mala finish	
	(B) Outer Finising	Outside Double coat sand face plaster	Outside Double coat sand face plaster	
11.	Terrace Water proofing	Brickbats waterproofing treatment	Brickbats waterproofing treatment	10 years guarantee





	Bath/W.C./Wash room sunk portion Waterproofing .& cinder filling	All sunk slabs of bath/WC shall be with water proofing treatment.& filled with cinder and 75 mm th PCC (1:3:6)	All sunk slabs of bath/WC shall be with water proofing treatment.& filled with cinder and 75 mm th PCC (1:3:6)	10 years guarantee
12	(A) Inside colour work	Birla or Asian acrylic lappy (putty) and two coats of primer	Birla or Asian acrylic lappy (putty) and two coats of primer	
	(B)Out side colour work	Superior quality weather shield max paint	Superior quality weather shield max paint	
	(C)Painting on wood and steel work	Superior quality synthetic enamel paint, ISI mark	Superior quality synthetic enamel paint, ISI mark	
13	Internal Sanitary /Water Supply System			
	(A) Plumbing	Concealed	Concealed	
	(B)Rain water pipes	PVC rain water pipeconfirming to IS no. 13592 (Type "A")	PVC rain water pipe confirming to IS no. 13592 (Type "A")	
	(C )W.C. Pan	water closet sqatting pan (orissa type W.C. pan), 580 mm with flush & Bib cock	water closet sqatting pan (orissa type W.C. pan), 580 mm with flush & Bib cock	If on specific request of beneficiary, SMC instruct to provide anglow-Indian pan. It shall be provided without extra cost.
	(D)Wash Basin	wash basin with single hole for pillar tap at all floor levels, with M.S./G.I Brackets painted white incl. cutting holes & making good the same incl. fittings such as pillar tap, capstan head screw down high pressure with screws, shanks & back nuts, C.P . Brass waste trap, screw down stop tap 15 mm. dia. etc. complete.	wash basin with single hole for pillar tap at all floor levels, with M.S./G.I Brackets painted white incl. cutting holes & making good the same incl. fittings such as pillar tap, capstan head screw down high pressure with screws, shanks & back nuts, C.P . Brass waste trap, screw down stop tap 15 mm. dia. etc. complete.	
	(E)PVC pipes	150/110/75mm U-PVC / PVC pipe (SW) confirming to IS no. 13592 (Type "B") PVC pipes of 6kg/cm2 including all PVC fittings as per approved plumbing design.	150/110/75mm U- PVC/ PVCpipe (SW) confirming to IS no. 13592 (Type "B") PVC pipes of 6kg/cm2 including all PVC fittings as per approved plumbing design.	
	(F)Gully Trap	S.W. Gully trap with C.I.grating brick masonry	S.W. Gully trap with C.I.grating brick masonry	



		(C.M 1:5)chamber & water tight Pre cast R.C.C. cover of 300mmx300mm size (inside)	(C.M 1:5)chamber &water tight Pre cast R.C.C. cover of 300mmx300mm size (inside)	
	(H)Sewer Trap Chamber	10cm. x 15 cm.(4" x 6") S.W. trap with 0.45 x 0.6 mts. clear opening sewer trap chamber with 23cm. th. brick masonry walls with Precast RCC heavy duty Cover& necessary excavation ,refilling ,PCC etc. comp.	10cm. x 15 cm.(4" x 6") S.W. trap with 0.45 x 0.6 mts. clear opening sewer trap chamber with 23cm. th. brick masonry walls with Precast RCC heavy duty Cover & necessary excavation ,refilling ,PCC etc comp.	
	(I)Simple Chamber	simple chamber of 23 cm. th' B.B. Masonary in C.M 1:5, 455 x 610 mm &450 mm deep with Precast RCC heavy duty Cover& necessary excavation ,refilling ,PCC etc comp.	simple chamber of 23 cm. th' B.B. Masonary in C.M 1:5, 455 x 610 mm &450 mm deep with Precast RCC heavy duty Cover& necessary excavation ,refilling ,PCC etc comp.	
	(J)Pipe connecting house manhole and service manhole and onwards	PVC pipe of 150/230/300 mm dia. and RCC NP3 class pipes of required Diameter	PVC pipe of 150/230/300 mm dia. and RCC NP3 class pipes of required Diameter	
	(K)Internal Watersupply	P.V.C. pipes (SCH-80) for water supply line at all floor levels incl. fixtures like bends, tees, shoe etc joined with resin of approved brand & manufacture. from OHT & terrace, Terrace downward to all floors. Same standard shall be followed for flushing line.	P.V.C. pipes (SCH-80) for water supply line at all floor levels incl. fixtures like bends, tees, shoe etc joined with resin of approved brand & manufacture .from OHT & terrace, Terrace downward to all floors. Same standard shall be followed for flushing line.	
	(L)External WaterSupply	Main network 150 mm and above dia ,shall be of D.I. materials and branch lines shall be of 50/80 mm. G.I./uPVC.Pipes, as per approved design.	Main network 150 mm and above dia ,shall be of D.I. materials and branch lines shall be of 50/80 mm. G.I./uPVC.Pipes, as per approved design.	
	(M)Fittings	ISI marked.	ISI marked.	
14	Overhead tank (For clean water and for treated sewage water)	RCC Tank with waterproofing and Commercial Quality white glazed tiles in flooring & on wall of R.C.C. Tank, To be designed as per requirement.with Man hole cover of C.I /RCC .with necessary inlets & out lets	RCC Tank with waterproofing and Commercial Quality white glazed tiles in flooring & on wall of R.C.C. Tank, To be designed as per requirement.with Man hole cover of C.I /RCC .with necessary inlets & out lets for water supply cleaning &	



		for water supply, cleaning & fire lines	fire lines	
15	Hook for fan.	Fan hook shall be provided as per requirement.	Fan hook shall be provided as per requirement.	
16	Internal Roads parking and paths			
	(A) Sub grade	Sub grade to be prepared by excavating earth to an average depth of 22.5cm, leveling and dressing to complete and consolidating with road roller 8-10 tone as per specification.	Sub grade to be prepared by excavating earth to an average depth of 22.5cm, leveling and dressing to complete and consolidating with road roller 8-10 tone as per specification.	
	(B) R.C.C. Road	(Concrete road as per IRC Standard) CC road 180 mm thick with FIX FORM PAVER/Manual concrete finish of grade M 35 With dowel bar & Tie bar over Dry lean Concrete, 75 mm thick and expansion joint filled with sealant .with nominal steel. The respective drawing attached herein as ANNEXTURE-1	(Concrete road as per IRC Standard) CC road 180 mm thick with FIX FORM PAVER/Manual concrete finish of grade M 35 With dowel bar & Tie bar over Dry lean Concrete, 75 mm thick and expansion joint filled with sealant .with nominal steel. The respective drawing attached herein as ANNEXTURE-1	
	(C) V.D.S.	RCC road 100 mm thick with tremix concrete finish of grade M20 and expansion joint filled with sealant with nominal steel.	RCC road 100 mm thick with tremix concrete finish of grade M20 and expansion joint filled with sealant with nominal steel.	
	(D) Surfacing	Concrete surface, For external service like water supply or cabling. Concrete paver block may be provided	Concrete surface, For external service like water supply or cabling. Concrete paver block may be provided	
	(E) Kerb Stone	100mm thick readymade C.C.Kerb of strength M-20 (size 300mm X 380mm) as per CPWD specifications and as directed by engineer in charge	100mm thick readymade C.C.Kerb of strength M-20 (size 300mm X 380mm) as per CPWD specifications and as directed by engineer in charge	
	(F) Paths	60 mm thick Rubber moulded paver blocks (M35) with 50 , sand bedding over 50 mm thick PCC (1:5:10)	60 mm thick Rubber moulded paver blocks (M35) with 50 , sand bedding over 50 mm thick PCC (1:5:10)	80 MM Rubber moulded paver block (M35) shall be provided on main road edges and crossing.



17	Boundary wall with gates	1.80 m high from internal finished road.level. boundary wall constructed with BB Masonry or CC block with required no of MS gates of approved design with finish D/C plaster	1.80 m high from internal finished G. L. boundary wall constructed with BB Masonry or CC block with required no of MS gates of approved design with finish D/C plaster	
18	Numbering	Fully body Vitrified tiles with carving of digits in size of 200mm. X 100mm. incl. cost of cutting,carving,filled with colour/epoxy on the walls	Fully body Vitrified tiles with carving of digits in size of 200mm. X 100mm. incl. cost of cutting,carving,filled with colour/epoxy on the walls	
19	Lift.	Six/Eight passangers with emergency rescue device and announcing system with rated speed of 1.0/1.5 m/sec with micro processor/PLC control and ACVRF drive & shall be provided confirming to relevant BIS Code and façade shall be cladded with granite slab at All Floor.	Six/ Eight passangers with emergency rescue device and announcing system with rated speed of 1.0/1.5 m/sec with micro processor /PLC control and ACVRF drive & shall be provided confirming to relevant BIS Code and façade shall be cladded with granite slab at All Floor.	
20	Cement – 53 Grade OPC	Only OPC cement shall be used	Only OPC cement shall be used	
21	General	Efficient Rain Water harvesting network/ system to be laid / installed. Environment friendly material (green) to be used as far as possible. Good landscaped are to be provided.Necessary signage boards of required size as instructed. And society main board over all entry gate	Efficient Rain Water harvesting network/ system to be laid / installed. Environment friendly material (green) to be used as far as possible. Good landscaped are to be provided.Necessary signage boards of required size as instructed. And society main board over all entry gate	
22	Fire Safety	As per NBC/SMC norms	As per NBC/SMC norms	
23	Tertiary Sewage treatment plant	As per guideline/norms of NBC/SMC and specifications of GWS & SB. NOC from State Pollution Control Board and any other statutory authority ,whose approval is necessary.	As per guideline/norms of NBC/SMC and specifications of GWS & SB. NOC from State Pollution Control Board and any other statutory authority, whose approval is necessary.	



Note:-

1. OH/UG water tanks capacity shall be arrived considering water requirement 750 liters per HH.
2. Separate UG tank for fire safety and for treated sewage water(U.G. & O.H.) is to be provided as per norms.
3. ACTION WHEN NO SPECIFICATION IS ISSUED :

In case of any class of work for which no specification is supplied by the S.M.C. in the tender documents, such work shall be carried out in accordance with I.S.S. and if I.S.S. do not cover the same, the work should be carried out as per standard Engineering practice subject to the approval of Engineer-in-charge.

**D. Approved / Expected Brands :-**

Sr.No.	Item	Recommended/Suggested Brands
1.	Cement	Ambuja, Ultratech, Sanghi, Hathi, Siddhi, J.K. Laxmi - O.P.C. 53 grade
2.	White Cement	J.K. White, Birla White, Nihon White
3.	Steel	TMT Bars Fe-500 conforming to IS-1786:1985(reaffirmed 2004) TATA, SAIL, RINL, Electrotherm,, National, JSW. [Only TMT Steel shall be used]
4.	Structural Steel	SAIL, TISCO, ISCO, Vizag, Asian, confirming to relevant IS code
5.	(A) Vitrified tiles for EWS-1 Soluble Salt Type (B) Vitrified tiles for EWS-2 Double charged Type	Bell Ceramics, Somani, Kajaria, Nitco, Cera, Johnson, Asian, Euro, Restiles, Granamite, Swastik
6.	Ceramic tiles	Bell Ceramics, Somani, Kajaria, Nitco, Cera, Johnson, Asian, Euro, Restiles
7.	100 % Vitrified Parking tiles	Nitco, NTC, Kajaria, Vyara, Jhonson
8.	Glazed tiles	H & R Johnson', 'Somani, Nitco, Cera, Bell, Kajaria, Asian,
9.	Wash basin	Parryware, Hindware, Neycer, Jhonson, CERA, and Bell
10.	(A) PVC water supply pipes (SCH-80)	Astral, Supreme, Prince, Finolex
	(B) PVC pipe (SCH-40) as rain water spout	Astral, Supreme, Prince, Finolex



11	M.S. Tubes	TATA, Zenith, Asian, Jindal
12.	(A) PVC Drainage lines pipes (U-p.v.c. pipe (SWR) confirming to IS no. 13592 (Type "B"))	Astral, Supreme, Prince, Finolex
	(B) PVC Rain water pipes(U-p.v.c. pipe (SWR) confirming to IS no. 13592 (Type "A"))	Astral, Supreme, Prince, Finolex
	P.V.C. pipes (6 Kg f/cm 2)	Prince/Supreme/Astral
13.	Lift / elevators	Kone, Schindler, OTIS, Mitshubishi, Thyruksun Krupp,Trio
14.	Aluminium sections	Hindal, Jindal, Banco, Hindalco,
15	All Aluminium Hardware,Fittings	Everite, Garnish, Arches, Kausal, Nulite Alif, Shalimar(Bombay) Singla, Opel, Bolt, Arhish
16	Glass/Float	Saint Gobain, Modi, Hindustan Pilkington, Hindustan ,Tata , Asahi, Triveni, Shree Vallabh
17.	Kitchen sinks	Nirali, Diamond,Cobra, Jayna
18.	C.P brass screw down Bib tap / pillar cock / stop cock conform to I.S. 781-1977- (Wt. 400 gm.)	Crown,Prince,Jaguar-ESSCO,Plumber,Cera,Hindware or equivalent as approved by EIC
19.	Electric Items	
	(i) Wires	R.R. Kable, Finolex, Polycab, Havells
	(ii) Switches and Aecessories	Anchor,Allwyn, Pointer ,Vinay,Alex,Promot
	(iii) Cable	Finolex,Torrent,Havells,KEI,RR Kable,
	(iv) ARMOURED CABLES	CCI,UNIVERSAL,INCAB,GLOSTER,TROPODURE Finolex,Torrent,Havells,KEI,RR Kable, CCI,UNIVERSAL,INCAB,GLOSTER,TROPODURE
	(v) MCB/ELCB/RCCB/ Distribution	Siemens/ L&T /Hager/Havells/ABB/Legrand/C&S/Schneider



	Board/Change over switch/SFU/SDF/ Motor Starter (vi) Pump Set  (vii) Luminaries (viii) RIGID pipes & Accessories-for concealed wiring (ix) Liquid Level Controller (x) Earthing /Lightning Arrestor (xi) LED Aviation Light (xii) Street light pole (octagonal) (xiii) DWC pipe	Kirlosker, Crompton,Lubi ,CRI  Philips, GE ,Schredder Finolex,Precision,Nihir,Polycab  GELCO, OCLEG C&S,BCH,Siemens E-Link, Ashlok, Rip, Etp  Alpha-Lite, Avids Technovators Pvt Ltd.  Bajaj,Transrail,Valmont  Rex,Gemini,Duraline
20.	Fire fighting equipments	
	(i)GI Pipes/Fittings (ii) Cast iron butterfly valves (iii) Gun metal valves  (iv) Hydrant valves & accessories  (v) Hose Reel (vi) Pressure Guage (vii) Fire Pumps  (viii) Fire Extinguishers  (ix) Forged Fittings	Jindal / Tata/Asian Audco/IVC/Kirloskar/Fouress Audco/IVC/Kirloskar/Fouress  Newage/Aaag/Essel/Swati  Newage / Minimax /Essel Fiebig / Pricol / Bells Control Kirloskar / Crompton / KSB/Lubi  Safex / Minimax/Kenex  VS/JK/True forge/DRP



	(x)Wrapping & Coating tape (xi) Epoxy Paint (xii) Hose pipes (xiii) Flow Switch (a) Anticorrosive Material	IWL/Coatek/Rustech  Asian/ICI/Jenson & Nicholson  Newage /CRC/Essel  System Sensor,Potter,Honeywell,Rapid control  I W L / Rustech/Euroclamp, Gripple,Chilly
21.	Door shutters	As per approval of Engg-in-charge and shall be fitted after testing and approval.
22	(A)Flush Doors(confirming to I.S.1003 Part-I 1991)	'Sitapur plywood', 'Mysoboard', Sudarshan W & PIndustries, Bajwa, Baroda, Goyal, industrial corp,Wood craft, Jain wood industries, Alpro, Genda-Northen Doors, Greenply, Kitply, Bhutan or equivalent as approved by EIC
	(B)PVC Doors(PVC material confirming to IS 10151-1982)	Sintex,Rajeshri,KAKA or as approved by EIC
23.	Door Frames	
	Teak Wood	Bulsar/ C.P Teak (Second Class specified)
	Sal Wood	Sal wood [ Indian or Imported ] First class
24.	Door Fittings / Hinges	As per approval of Engg-in-charge and shall be fitted after testing and approval.
25	Plywood Products Commercial Block Board Commercial Ply Teak Ply	Greenply,Kitply/Century, Anchor, Duro, Green Ply, Western India plywood(WIP), Mysore marine
26	Laminates / Decorative laminates	Decolam, Greenlam Merinolam Formica, National laminate, Decolite, Delta
27	Pre laminated board	Bhutan, Eco board, Bakelite Hylem Nepalboard, Green board
28	Impregnated Fibre Board	Shalitex by Shalimar Tar Product
29.	Exterior colour (weather shield max)	ICI/Dulux, Asian Paint Ultima
30	Synthetic Enamel Paints /Oil bound distemper satin finish	ICI/Dulux, Johnson &Nicholson, Asian Paint, Dulux





31	Putty	J.K. white, Birla white
32.	Paver Blocks	Regency, Gurjari, Vyara, PEEDEE, Jagruti – Surator as approved by EIC/consultant
33.	D.G. Sets	Engine: Cummins, Greaves, Kirloskar, Caterpillar Alternator: Crompton, KEC, Stamphord
34.	AAC Block(confirming to IS : 2185, Part III)	Aerocon, Magicrete, Biltech, Litecone, Ecolite, Xtralite, <b>Anjani,Globcon</b> make [autoclaved aerated block] or as approved by EIC/consultant.
35	Chemical mortar/AAC block jointer	Iolite cube bond, Fairmate, Lion joint mortar,MAP block set and Unifix or as approved by EIC
36.	Water ProofingCompound	'CICO' , Fosroc, GE sillicon Pidilite, MC-Bauchmie, Sika,Roff,Perma
37.	Polycarbonate Sheets	Lexan, GE or approve by Engineer – in -Charge
38.	Construction Chemicals	Fosroc, MC-Bauchmie, Sika, Pidilite, Roff,Perma
39.	Drainageline network	NP 3 class RCC Pipes or as approved by EIC
40.	Water supply network	D.I.Pipes
41	Anti-Termite Treatment	Thyodin by Hoechest, Lyntric by Bayer India, Durmetby Cynamid India, Nocil Pyramid,Item sycour
42	Polycarbonate Sheets	Lexan, GE or approve by Engineer – in -Charge
43	Polyester Fibre	Recron 3S or approve by Engineer – in -Charge.
44	Welding Rod	Advani, Philips, Sunarc, Eshab
45	Cast Iron Pipes and Fittings(LA Class)	TISCO / ISCO/ KESHO SPUN Co. - Calcutta E.L.C. Standard approved manufacturers of any other brand of fittings having ISI marking.)
46	R.C.C. Pipes conform to I.S. 458-1971	Indian Hume Pipe Co., Alcock Cement Products, Patel Spun(Surat)
47	G.I. Pipes conform to I.S. 1239-1968	Jindal, Tata, Bharat SteelTube, Bombay, Zenith, G.S.T.Unik.("C" Class)
48	G.I. Fittings	"R " Mark, Unik.
49	Gun Metal Valves (Heavy)	Leader Engineering Works, Jalandhar, Crown / prince – Surat Bombay Metal Co Annapurna Metal Work, Calcutta'Sant'brand, Jalandhar, L&K, Bombay metal & Alloy man. co.Bomaby, Premier,Aatco,Atlas,BR,BS,NN.
50	Brass fittings (Heavy)	Leader Engineering Works, Calcutta L & K Mathura, Crown / Prince -Surat Annapurna Metal Works, Calcutta, Perko,Kingstone Ark, Enclss Willians, Chilly, AquvaPlus,Nova,Kingstone,Driple, Ranutrol Hansa.
51	C.P. Fittings	Ego Metal Works, Ballabhgarh,; GEM, New Delhi; SomaCalcutta;



	(Heavy)	Bilmet, Bombay 'ESSCO', Delhi. Rajka Metal Works, Delhi Eng. Co. Metal Works, Calcutta Everite, NU-Lite NavbhartShalimar Crown, Prince
52	W.C. Pan / Washbasin / Urinals /Anglow Indian W.C. Pan	Parryware, Hindware, Neycer, Jhonson,CERA, and Bell
53	Stainless Steel Sinks	Nirali, Diamond, Cobra,Jayna
54	Mirrors	Atul Glass Works , Haryana Sheet Glass Vallabh Glass Works, Modi Float glass, Asahi, Saint Gobin
55	Plumbing /Sanitary Fixtures /Accessories	Jaquar continental , CERA, Hindustan Sanitaryware / Parryco India.Hindware, Lauvet, Kohlar, Rak, Jaquar
56	C.I. Sluice valve,Check valves	Kirloskar, IVC,Burn,William Jacks, Indian Valve(IVC)
57	UPVC Borewell Column pipe	Astral, Supreme, Prince, Ashirvad Pipes, Duke, kisan, Precision.
58	Fibre reinforced R.C.C. Manhole Cover	Pratibha, CIDCO, approved brand
59	C.I. Manholecover with frame	ISI approved make
60	P.V.C. Pipes & Fittings	Astral, Supreme, Prince, Finolex
61	P.V.C. / H.D.P.EWater Tanks	Sintex or equivalent as approved by EIC
62	Ball Cock	GPA Brand by Govardhan Das Jullunder, L & K Brand by L. K.Industries Mathura, Sant Brand by Sant Press Metal WorksJullundhar
63	UPVC Pipes(Solvent WeldedJoints)	Astral, Supreme, Prince, Jain
64	C.P.V.C. Pipes & Fittings	Astral, Supreme, Prince
65	Water meter	Kapstan Bombay, Voltas Kent, Calcutta or equivalent as approved by SMC
66	SWR pipe	Astral, Supreme, Prince, Finolex
67	P.V.C. non-return full way wheel valve	Prince/Supreme/Jain/Astral
68	C.P.brass half turn flush cock	crown, prince,Jaguar,Plumber,Hindware or equivalent

**Notes:**

The following guidelines are to be noted with regard to use of materials in the work:

- a) The contractor shall produce samples of the materials for approval of the EIC. The materials of the makes, out of the above as approved by the EIC shall be used on the work.
- b) In respect of materials for which approved makes are not specified above, the make/brand will be decided by the EIC.



- c) Before bulk purchase of quantities of materials, it is the responsibility of the Contractor to get the samples of materials approved from consultant and EIC.
- d) All cost towards the testing shall be borne by the contractor.
- e) For all the material of approved brands necessary testing as per IS standards shall be done by the agency and no extra payment shall be paid for that.



### E. MINIMUM REQUIREMENT OF TECHNICAL REPRESENTATIVE(S)

SR No.	Designation	Qualification & Requirement				
1	Architect	B. Arch /B.E.Civil having, licence from the authority (Licenced Architect with minimum 5 years experience.)				
2	Structural Engineer	B.E.Civil / M.E.Civil having structural designer licence from the authority or as per Requirement of structural safety norms of GDCR/IS Code ( structural engineer with minimum 5 years experience.)				
<p>1.)The above professionals can be hired by the Bidder/contractor as consultants/can be on payroll. The Bidder/contractor must furnish all the documents including qualifications, experiences, memberships, pay slip (if on payroll), consulting agreement for the above mentioned professionals.</p> <p>2.)If hired, the above professional shall actively participate throughout the project.</p>						
SR No.	Designation	Min Qualification	Discipline	Min. Experience	No s	Remarks
1	Project Manager	B.E(Civil)	Civil Engg (Bldg Construction)	10 Year Exp.	1	Should have 10 years experience of Building construction
2	Senior Site Engineer	B.E(Civil)	Civil Engineering (Bldg Construction)	5 Years	1	Should have worked as site engineer atleast 2 similar type of projects
3	Junior Site Engineer	Diploma (Civil)	Civil Engineering (Bldg Construction)	0 to 2 Years	2	Should have experience of Building construction
4	Plant Engineer	B.E. Mech. / DME		2 to 3 Years	1	Should have experience of RMC Plant
5	Junior Electrical Engineer ( As & when required )	B.E / DCE (Electrical)	Electrical Engineering	2 to 3 Years	1	Should have experience for similar type of residential work
6	Material & Quality Control Engineer	D.C.E	-	1 to 2 Years	1	Should have worked as Material & Quality Control engineer
7	Non technical supervisor	Min 12 th Pass	Experienced person (Bldg Construction)	2 to 5 Years	2	Nos of persons may vary as per the requirement on site

\* no. of persons will depend on the size of the project and as per instruction of Executive Engineer.

**Note:** Assistant Engineer(s) retired from Govt. services that are holding diploma will be treated at par with Graduate Engineer.



**78. F. General :-**

- (1) All electrification work shall be executed through SMC/R & B license electrical contractor.
- (2) All plumbing and sanitation work shall be executed by SMC/R & B license plumber.
- (3) All water proofing work shall be executed by experienced agency.
- (4) PMC / TPI may be appointed for monitoring of quality of the work by SMC.
- (5) Google Image of site location / Key Plan to be provided to the bidder with tender documents.



## **ARTICLE 3 OBLIGATIONS OF THE CONTRACTOR**

### **3.1 Obligations of the Contractor**

- 3.1.1 Subject to and on the Terms, Conditions, Provisions and Representation of this Agreement, the Contractor shall undertake the survey, investigation, design, engineering, procurement, construction, and maintenance of the Work and observe, fulfil, comply with and perform all its obligations set out in this Agreement or arising hereunder.
- 3.1.2 The Contractor shall comply with all Applicable Laws and Applicable Permits (including renewals as required) in the performance of its obligations under this Agreement.
- 3.1.3 The Contractor shall discharge its obligations in accordance with Good Industry Practice and as a reasonable and prudent person.
- 3.1.4 The Contractor shall remedy any and all loss or damage to work from the commencement until the end of the Construction Period at the Contractor's cost, save and except to the extent that any such loss or damage shall have arisen from any default or neglect of the SMC.
- 3.1.5 The Contractor shall remedy any and all loss or damage to work during the Defects Liability Period at the Contractor's cost to the extent that such loss or damage shall have arisen out of the reasons specified in contract.
- 3.1.6 The Contractor shall remedy any and all loss or damage to work during the Maintenance Period at the Contractor's cost, save and except to the extent that any such loss or damage shall have arisen on account of any default or neglect of the SMC or on account of a Force Majeure Event.
- 3.1.7 The Contractor shall, at its own cost and expense, in addition to and not in derogation of its obligations elsewhere set out in this Agreement: -  
Ensure that the Contractor and its Sub-contractors comply with the safety and welfare measures for labour in accordance with the Applicable Laws and Good Industry Practice; Keep, on the Site, a copy of this Agreement, publications named in this Agreement, the Drawings, Documents relating to the Project, and Change of Scope Orders and other communications given under this Agreement. The SMC's Engineer and its authorised personnel shall have the right of access to all these documents at all reasonable times; Cooperate with other contractors employed by the SMC and personnel of any public SMC; and Not interfere unnecessarily or improperly with the convenience of the public, or the access to and use and occupation of all roads and footpaths, irrespective of whether they are public or in the possession of the SMC or of others.
- 3.1.8 The Contractor shall undertake all necessary superintendence to plan, arrange, direct, manage, inspect and test work.
- 3.1.9 The Contractor shall maintain all records as per Instructions of Engineer in Charge.

### **3.2 Obligations relating to sub-contracts and any other agreements**

- 3.2.1 The Contractor shall not sub contract any part or portion of the actual construction to any sub contractor without prior permission of the SMC which shall ordinarily not withhold any reasonable request thereof if the same is found in opinion of SMC to be in interest of the work.
- 3.2.2. In event any sub contract is approved by SMC the entire responsibility and liability as



contained in the original contract shall continue to remain unaltered and diluted and the contractor shall be completely and fully responsible to SMC as is SMC is having no privity of contract with the sub contractor.

- 3.2.3 It is expressly agreed that the Contractor shall, at all times, be responsible and liable for all its obligations under this Agreement notwithstanding anything contained in the agreements with its Sub-contractors or any other agreement that may be entered into by the Contractor, and no default under any such agreement shall excuse the Contractor from its obligations or liability hereunder.

### **3.3 Contractor's personnel**

- 3.3.1 The Contractor shall ensure that the personnel engaged by it or by its Sub-contractors in the performance of its obligations under this Agreement are at all times appropriately qualified, skilled and experienced in their respective functions in conformity with Good Industry Practice.
- 3.3.2 The SMC's Engineer may, for reasons to be specified in writing, direct the Contractor to remove any member of the Contractor's or Sub-contractor's personnel. Any direction issued by the SMC's Engineer shall specify the reasons for the removal of such person.
- 3.3.3 The Contractor shall on receiving such a direction from the SMC's Engineer order for the removal of such person or persons with immediate effect. The Contractor shall further ensure that such persons have no further connection with work or Maintenance under this Agreement. The Contractor shall then appoint (or cause to be appointed) are placement.

### **3.4 Contractor's care of work**

The Contractor shall bear full risk in and take full responsibility for the care of work, and of the Materials, goods and equipment for incorporation therein, from the Date of entry upon the site until the date of completion, defect liability, maintenance period as specified or date of final take over certificate whichever is the last date.

### **3.5 Electricity, water and other services**

The Contractor shall be responsible for procuring of all power, water and other services that it may require.



## ARTICLE 4 REPRESENTATIONS AND WARRANTIES

### 4.1 Representations and warranties of the Contractor

The Contractor represents and warrants to the SMC that:

- (a) it is duly organised and validly existing under the laws of India, and has full power and SMC to execute and perform its obligations under this Agreement and to carry out the transactions contemplated hereby ;
- (b) it has taken all necessary corporate and/or other actions under Applicable Laws to authorise the execution and delivery of this Agreement and to validly exercise its rights and perform its obligations under this Agreement;
- (c) this Agreement constitutes its legal, valid and binding obligation, enforceable against it in accordance with the terms hereof, and its obligations under this Agreement will be legally valid, binding and enforceable obligations against it in accordance with the terms hereof;
- (d) it is subject to the laws of India, and hereby expressly and irrevocably waives any immunity in any jurisdiction in respect of this Agreement or matters arising there under including any obligation, liability or responsibility hereunder;
- (e) the information furnished in the Bid and as updated on or before the date of this Agreement is true and accurate in all respects as on the date of this Agreement;
- (f) the execution, delivery and performance of this Agreement will not conflict with, result in the breach of, constitute a default under, or accelerate performance required by any of the terms of its memorandum and articles of association or any Applicable Laws or any covenant, contract, agreement, arrangement, understanding, decree or order to which it is a party or by which it or any of its properties or assets is bound or affected;
- (g) there are no actions, suits, proceedings, or investigations pending or, to its knowledge, threatened against it at law or in equity before any court or before any other judicial, quasi-judicial or other ULB's, the outcome of which may result in the breach of this Agreement or which individually or in the aggregate may result in any material impairment of its ability to perform any of its obligations under this Agreement;
- (h) it has no knowledge of any violation or default with respect to any order, writ, injunction or decree of any court or any legally binding order of any Government Instrumentality which may result in any material adverse effect on its ability to perform its obligations under this Agreement and no fact or circumstance exists which may give rise to such proceedings that would adversely affect the performance of its obligations under this Agreement;
- (i) it has complied with Applicable Laws in all material respects and has not been subject to any fines, penalties, injunctive relief or any other civil or criminal liabilities which in the aggregate have or may have a material adverse effect on its ability to perform its obligations under this Agreement;
- (j) no representation or warranty by it contained herein or in any other document furnished by it to the SMC or to any Government Instrumentality in relation to Applicable Permits contains or will contain any untrue or misleading statement of material fact or omits or





will omit to state a material fact necessary to make such representation or warranty not misleading;

- (k) no sums, in cash or kind, have been paid or will be paid, by it or on its behalf, to any person by way of fees, commission or otherwise for securing the contract or entering into this Agreement or for influencing or attempting to influence any officer or employee of the SMC in connection therewith;
- (l) all information provided by the {selected bidder/ members of the Consortium} in response to the Request for Qualification and Request for Proposals or otherwise, is to the best of its knowledge and belief, true and accurate in all material respects; and
- (m) nothing contained in this Agreement shall create any contractual relationship or obligation between the SMC and any Sub-contractors, designers, consultants or agents of the Contractor.



## ARTICLE 5 PERFORMANCE SECURITY AND RETENTION MONEY

### 5.1 Performance Security

5.1.1 The Contractor shall for the performance of obligations here under during the Construction Period shall provide to SMC, within 15 (Fifteen) days from issuance of work order, an irrevocable and unconditional guarantee for an amount equal to 5% (five percent) of the Contract Price from a listed bank in the form set forth in Schedule attached (the "Performance Security"). The such Performance Security deposit shall be valid until 60 (sixty) days after the payment of final bill. Till such Performance Security is obtained from SMC, the EMD will not be released and the said amount of EMD may be forfeited if performance security is not deposited within **15 days** from the date of work order. In addition, SMC shall deduct an amount of 5 % of the amount due from each R.A. Bill as submitted by the Contractor.

On completion of work to the satisfaction of SMC, 5% of the performance security, out of the aforesaid 10% shall be released while, the balance 5% shall be retained by SMC toward performance of obligations pertaining to defect liability. For release of this balance 5% of performance security, a condition precedent and mandatory. The balance 5% of performance security shall be released as per the clause 5.3. It is further agreed that the contractor is obliged to have the Bank Guarantee /Guarantees revalidated at least 30 days prior to the date of the expiry discharged by the SMC. For such revalidation SMC shall have no obligation to remind the contractor to do so.

**5.1.2 In addition as and when directed additional performance security as indicated Section V clause 27.1 also will be required to be deposited in event of SMC demanding the same because it finds the offer unbalanced.**

5.1.3 Notwithstanding anything to the contrary contained in this Agreement, the Parties agree that in the event of failure of the Contractor to provide the Performance Security in accordance with the provisions and within the time specified therein or such extended period as may be provided by the SMC, in accordance with the provisions, the SMC may encash the Bid Security and appropriate the proceeds thereof as Damages, and there upon all rights, privileges, claims and entitlements of the Contractor under or arising out of this Agreement shall be deemed to have been waived by, and to have ceased with the concurrence of the Contractor, and this Agreement shall be deemed to have been terminated by mutual agreement of the Parties.

5.1.4 Delay Penalty - 0.065 % per day.

### 5.2 Extension of Performance Security

The Contractor may initially provide the Performance Security for a period of 2 (two) years; provided that it shall procure the extension of the validity of the Performance Security, as necessary, at least 1 (one) month prior to the date of expiry thereof.

### 5.3 Release of Performance Security



Initial performance guarantee will be released as below

- After completion of project

**(within 60 days from the date of the final bill payment - 5 %**

Remaining performance guarantee will be released as below during defect liability period

- After 3 years of completion - 2.5 %
- After 5 years of completion - 2.0 %
- After 10 years of completion - 0.5 %

provided that there is no defect detected or rectified /complied as per the direction given by E.I.C ,within the said periods.

However, after the total completion of work & after payment of final bill, the contractor may convert the same to FDR of any Nationalized Bank at Surat in favour of Municipal Commissioner, Surat, for 3 years. Provided the contractor shall have to pay additional stamp duty of Rs. 4.25% of F.D.R.

The SMC shall return the 5% Performance Security as per above break up to the Contractor within 60 (sixty) days of the date of the expiry of the Maintenance Period or the Defects Liability Period under this Agreement. Notwithstanding the aforesaid, the Parties agree that the SMC shall not be obliged to release the Performance Security until all Defects identified during the Defects Liability Period have been rectified. SMC shall have no liability in event of any delay caused in release/ return of the performance security on any ground what so ever.

#### **5.4 Retention Money**

- 5.4.1 From every payment for Works due to the Contractor in accordance with the provisions, the SMC shall deduct 7% (seven per cent) there of as guarantee money for performance of the obligations of the Contractor during the Construction Period.
- 5.4.2 Upon occurrence of a Contractor's Default, the SMC shall, without prejudice to its other rights and remedies here under or in law, be entitled to appropriate the relevant amounts from the Retention Money as Damages for such Contractor's Default.
- 5.4.3 The Contractor may, upon furnishing an irrevocable and unconditional bank guarantee valid for 2 years and to be extended from time to time as per direction of SMC substantially in the form provided , require the SMC to refund the Retention Money deducted by the SMC under the provisions. The refund hereunder shall be made intranches of not less than 1% (one per cent) of the Contract Price.
- 5.4.4 The Retention money will released with payment of Final Bill.



## **ARTICLE 6 RIGHT OF WAY**

### **6.1 The Site**

The site of the Work (the "Site") shall comprise the site described in contract in respect of which the Right of Way shall be provided by the SMC to the Contractor. The SMC shall be responsible for: acquiring and providing Right of Way on the Site in accordance with the alignment finalised by the SMC, free from all encroachments and encumbrances, and free access thereto for the execution of this Agreement; and

### **6.2 Special/temporary Right of Way**

The Contractor shall bear all costs and charges for any special or temporary right of way required by it in connection with access to the Site. The Contractor shall obtain at its cost such facilities on or outside the Site as may be required by it for the purposes of the Work and the performance of its obligations under this Agreement.

### **6.3 Access to the SMC and the SMC's Engineer**

- 6.3.1 The Right of Way given to the Contractor hereunder shall always be subject to the right of access of the SMC and the SMC's Engineer and their employees and agents for inspection, viewing and exercise of their rights and performance of their obligations under this Agreement.
- 6.3.2 The Contractor shall ensure, subject to all relevant safety procedures, that the SMC has unrestricted access to the Site during any emergency situation, as decided by the SMC's Engineer.

### **6.4 Geological and archaeological finds**

It is expressly agreed that mining, geological or archaeological rights do not form part of this Agreement with the Contractor for work, and the Contractor hereby acknowledges that it shall not have any mining rights or interest in the underlying minerals, fossils, antiquities, structures or other remnants or things either of particular geological or archaeological interest and that such rights, interest and property on or under the Site shall vest in and belong to the SMC or the concerned Government Instrumentality. The Contractor shall take all reasonable precautions to prevent its workmen or any other person from removing or damaging such interest or property and shall inform the SMC forthwith of the discovery thereof and comply with such instructions as the concerned Government Instrumentality may reasonably give for the removal of such property. For the avoidance of doubt, it is agreed that any reasonable expenses incurred by the Contractor hereunder shall be reimbursed by the SMC. It is also agreed that the SMC shall procure that the instructions hereunder are issued by the concerned Government Instrumentality within a reasonable period.



## **ARTICLE 7 UTILITIES AND TREES**

### **7.1 Existing utilities and roads**

Notwithstanding anything to the contrary contained herein, the Contractor shall ensure that the respective entities owning the existing roads, right of way, level crossings, structures, or utilities on, under or above the Site are enabled by it to keep them in continuous satisfactory use, if necessary, by providing suitable temporary diversions with the SMC of the controlling body of that road, right of way or utility.

### **7.2 Shifting of obstructing utilities**

The Contractor shall, in accordance with Applicable Laws and with assistance of the SMC, cause shifting of any utility (including electric lines, water pipes and telephone cables) to an appropriate location or alignment, if such utility or obstruction adversely affects the execution of Works or Maintenance of work in accordance with this Agreement.

### **7.3 New utilities**

- 7.3.1 The Contractor shall allow, subject to such conditions as the SMC may specify, access to, and use of the Site for laying telephone lines, water pipes, electric cables or other public utilities.
- 7.3.2 The SMC may, by notice, require the Contractor to connect any adjoining road to the Work, and the connecting portion thereof falling within the Site shall be constructed by the Contractor at the SMC's cost which shall be pre negotiated between the parties.
- 7.3.3 The SMC may by notice require the Contractor to connect, through a paved road, any adjoining service station, hotel, motel or any other public facility or amenity to the Work, where upon the connecting portion thereof that falls within the Site shall be constructed by the Contractor on payment of the cost. The cost to be paid by the SMC to the Contractor shall be determined by the SMC's Engineer.
- 7.3.4 In the event the construction of any Works is affected by a new utility or works undertaken, the Contractor shall be entitled to a reasonable Time Extension as determined by the SMC's Engineer.

### **7.4 Felling of trees**

The SMC shall assist the Contractor in obtaining the Applicable Permits for felling of trees to be identified by the SMC for this purpose if and only if such trees cause a Material Adverse Effect on the construction or maintenance of the Work. The cost of such felling shall be borne by the contractor. The Parties here to agree that the felled trees shall be deemed to be owned by the SMC and shall be disposed in such manner and subject to such conditions as the SMC may in its sole discretion deem appropriate. For the avoidance of doubt, the Parties agree that if any felling of trees hereunder is in a forest area, the Applicable Permit thereof shall be procured by the SMC within the time specified in the Agreement.



## ARTICLE 8 DESIGN AND CONSTRUCTION OF THE WORK

### 8.1 General Design Obligations

8.1.1 The Contractor shall carry out, and be responsible for, the design of work. Design shall be prepared by qualified designers who are Engineer or other professionals who comply with the criteria (if any) stated in the Bidding Data. Unless otherwise stated in the Contract, the Contractor shall submit to the Engineer for consent the name and particulars of each proposed designer and design Consultant.

8.1.2 The Contractor warrants that he, his design consultant have the experience and capability necessary for the design. The Contractor undertakes that the designers shall be available to attend discussions with the Engineer's Representative at all reasonable times, until the expiry date of the relevant Defects Notification Period.

8.1.3 Design and drawings shall be developed in conformity with the specifications and standards set out in the contract. Such design shall have to meet the approval requirement of the designated authority of State Government and shall be responsible for obtaining final approval from the approving authority.

The Proof Consultant shall:

- evolve a systems approach with the Design Consultant so as to minimize the time required for final designs and construction drawings; and
- proof check the detailed calculations, drawings and designs, which have been prepared by the Design Consultant.

### 8.2 Design and Drawings

#### Submission of Design and Drawings:

(a) Submission of Architectural ,structural design and other services related drawings:

The drawing in order of priority and chronological order as mentioned below should be submitted for approval of the Engineer-in-charge.

Sr.No.	Description.	Duration.
1.	All architectural drawings approved by authority as per plot	Within 1 month from the date of Work order,(The contractor complete the procedure of approval of project report from the department and after approval of project report the contractor shall submit and got approval of plans from the authority within 1 month.
2.	Foundation drawings, G.B./P.B. drawings, & RCC U.G Water Tank drawings etc. (Structural & Arch.).	Within 15 Days from the date of approval of plans from authority.
3.	Parking floor slab drawings. (Structural & Arch.).	Within 1 month from the date of approval of plans from authority.
4.	Typical & Terrace floor slabs drawings , Staircabin & LMR slab drawings & Overhead RCC Water Tank	Within 1 month from the date of approval



	drawings etc. (Structural& Arch.).	of plans from authority.
5.	MEPF Services & infrastructural development drawings such as electrification, Road & paver block,water supply, sewer line, SW drains including UGR ,Tertiary sewage treatment plant, water Gallery PUMP Houses, Fire fighting work,Compound wall,Entry gate with Security cabin,Landscapping work,Fire fighting tank with pump room rain water harvesting.	Within 3 month from the date of starting the work on site.

- The above time duration is inclusive of total time duration..
- Structural drawings will be submitted by the agency as per schedule given above, which will be got proof checked from the Structural designer/institutions appointed by SMC. All service plans should be got approved from the concern-Government Authority/department/consultant. It is entirely the responsibility of the contractor to get the above designs approved and finalized within aforesaid period. Any delay on this account will attract penaltative actions as decided by E.I.C/SMC.
- Contractor has to submit all the drawings related to all services like Building,Electrification,Road & paver block, water supply line, drainage line ,Tertiary sewage treatment plant, SW drains including UGR, water Gallery PUMP Houses, Fire fighting work, Compound wall, Entry gate with Security cabin, Landscaping work, Fire fighting tank with pump room, rain water harvesting, Horticulture work,watchman room with toilet block facility, electrical services lift work etc. & get it approved from the EIC/PMC/Consultant before execution.
- The contractor(s) shall supply 2 copies of / laminated approved structural drawings/architectural drawings to the Engineer-in-charge for the use of the SMC after having approved from the competent authority within 7 days from the receipt of approval. And the contractor(s) shall supply required copies / laminated copies approved structural drawings/architectural drawings to the PMC/TPI/Consultants.
- In addition to above sets of drawings, contractor shall keep necessary sets of drawings required at site for its execution as directed by the Engineer-in-charge.
- It is entirely the responsibility of the contractor to get the design approval, within aforesaid period with liaisoning for the lift work, fire fighting work, water supply & drainage work, electrical work with meter fitting, Airport N.O.C.,Enviroment N.O.C.,Fire N.O.C., NOC for Tertiary sewage treatment plant with appropriate organization, not limited but includes all essential Certificates-approvals-licences-NOC related to complete the project. Any delay on this account will attract penalty . All the process & liaisoning related to obtain BUC shall be in the scope of contractor upto submission of BUC to the SMC/EIC.

8.2.1 Design and Drawings shall be developed in conformity with the Specifications and Standards. In the event, the Contractor requires any relaxation in design standards due to restricted Right of Way in any section, the alternative design criteria for such sections shall be provided for review of the SMC's Engineer.



8.2.2 In respect of the Contractor's obligations with respect to the design and Drawings of work, the following shall apply:

- (a) The contractor shall submit structural drawings prepared by his structural consultant
- (b) After submission of structural drawings. Within 15 (fifteen) days of the receipt of the Drawings, the SMC shall review the same by its proof check consultant and convey its observations if any to the Contractor with particular reference to their conformity or otherwise with the Scope of the Project and the Specifications and Standards. The Contractor shall not be obliged to await the observations of the SMC on the Drawings submitted pursuant here to beyond the period of 15 (fifteen) days and may begin or continue Works at its own discretion and risk; Provided, however that in case of a Major Building or Structure, the aforesaid period of 15 (fifteen) days may be extended upto 30 (thirty) days;
- (c) if the aforesaid observations of the SMC indicate that the Drawings are not in conformity with the Scope of the Project or the Specifications and Standards, such Drawings shall be revised by the Contractor in conformity with the provisions of this Agreement and resubmitted to the SMC for review. The SMC shall give its observations, if any, within 10 (ten) days of receipt of the revised Drawings.
- (d) no review and/or observation of the SMC's Engineer and/or its failure to review and/or convey its observations on any Drawings shall relieve the Contractor of its obligations and liabilities under this Agreement in any manner nor shall the SMC's Engineer or the SMC be liable for the same in any manner; and if errors, omissions, ambiguities, inconsistencies, inadequacies or other Defects are found in the Drawings, they and the construction works shall be corrected at the Contractor's cost, notwithstanding any review;
- (e) the Contractor shall be responsible for delays in submitting the Drawing as set forth caused by reason of delays in surveys and field investigations, and shall not be entitled to seek any relief in that regard from the SMC; and
- (f) the Contractor warrants that its designers, including any third parties engaged by it, shall have the required experience and capability in accordance with Good Industry Practice and it shall indemnify the SMC against any damage, expense, liability, loss or claim, which the SMC might incur, sustain or be subject to arising from any breach of the Contractor's design responsibility and/or warranty set out in this Clause.

8.2.3 Any cost or delay in construction arising from review by the SMC's Engineer shall be borne by the Contractor.

8.2.4 Within 90 (ninety) days of the Project Completion Date, the Contractor shall furnish to the SMC and the SMC's Engineer a complete set of as-built Drawings, in 3 (Three) hardcopies and in micro film form or in such other medium as may be acceptable to the SMC, reflecting work as actually designed, engineered and constructed.

8.2.5 Contractors clearly understand that notwithstanding all the statements above including its responsibility in respect of designs and drawings confirming to the requirements and relevant specifications, being checked and approved by proof checking agency as also having been scrutinized by SMC it is responsibility of the contractors that the final approval before commencement of execution shall have to be based on the drawings and design cleared and approved by the concerned authority of Government of Gujarat. All Designs and drawings shall be furnished to SMC in 5 copies.





### **8.3 Design Error**

8.3.1 If errors, omissions, ambiguities, inconsistencies, inadequacies or other defects are found in the Contractor's documents, they and work shall be corrected at the Contractor's cost, notwithstanding any consent or approval under this Clause.

### **8.4 Intellectual property rights**

8.4.1 The intellectual property rights in respect of drawings, designs and all that is relevant to the concept of rights shall be vested in SMC.

### **8.5 Construction of the Work**

8.5.1 The Contractor shall construct the works as specified, and in conformity with the Specifications and Standards set forth in the contract. The Contractor shall be responsible for the correct positioning of all parts of work, and shall rectify any error in the positions, levels, dimensions or alignment of work. and the Contractor agrees and undertakes that the construction shall be completed on or before the scheduled Completion Date, including any extension thereof.

8.5.2 The total price of the works shall be the price as indicated in the offer acceptance letter unless the same is modified or changed by SMC in view of any modification or change brought about after final approval of drawing, design and scheme of the work. It is clearly understood that the price quoted is the total per unit D.U price for the entire scope of the work as agreed.

### **8.6 Construction Programme**

The contractor shall submit a detailed programme within 15 days after receiving the letter of acceptance. Whenever necessary contractor shall also submit a revised programme indicating how he plans to catch up with the slippages. Each programme shall include the order in which he intends to carry out the work including the anticipated timing of each stage of design, procurement, deployment of resources and quantities involved. The programme will be projected as Bar Chart / CPM – Net work presentation. Contractor shall promptly give notice of probable future events or circumstance which may adversely affect the work. The programme should include deployment of financial resources commensurate with the work planned each month. If at any time actual progress is too slow to achieve target programme and/or progress has fallen behind the current programme then the engineer may instruct the contractor to submit revised programme with plan to mitigate time.

### **8.7 Extension of time for completion**

8.7.1 The work shall have to be completed within originally stipulated period as indicated in the contract. Time is essence of contract and failure to adhere to the time of completion shall attract liability for the contractor to pay Liquidated Damages as specified separately. However it has been agreed between the parties that in event of any variation or change taking place affecting the time of completion, time adjustment shall be made by SMC for which no additional cost will be payable. Such time extension shall ordinarily be for exceptionally adverse climatic conditions, enforceable shortage in availability of materials or any delay, impediment or prevention caused by or attributable to the SMC.



8.7.2 If contractor considered himself to be entitled to an extension of time for completion, the contractor shall give engineer a notice within 7 days from the cause justifying such extension indicating the period justified. The engineer of SMC shall evaluate the Time Impact and make an adjustment in time for completion. Such extension, it is reiterated shall not be associated with any compensation or claim for delay being pressed by the contractor.

### **8.8 Liquidated Damage/Delay Damages**

If contractors fails to comply with time for completion the contractor being given notice to make good the time fails to do so to the satisfaction of engineer he shall be liable to pay LD/Delay Damages for the default. The Delay Damages shall be the sum stated in Bidding data which shall be payable for delay for each day that is caused incompleteness. The total amount of such delay damages shall not exceed the amount named in the contract. It is agreed between the parties that the amount so named and the limit so fixed as compensation is the true and correct estimated damage caused to SMC resulting from extension of time and which otherwise is not subject to any arithmetic computation. These damages shall not release the contractor from its obligation to complete the job or from any duties or responsibilities which he may have under the contract.

## **ARTICLE 9**

### **QUALITY ASSURANCE, MONITORING AND SUPERVISION**

#### **9.1 Quality of Materials and workmanship**

The Contractor shall ensure that the Construction, Materials and workmanship are in accordance with the requirements specified in this Agreement, Specifications and Standards and Good Industry Practice.

#### **9.2 Quality control system**

9.2.1 The Contractor shall establish a quality control mechanism to ensure compliance with the provisions of this Agreement (the "Quality Assurance Plan" or "QAP").

9.2.2 The Contractor shall, within 30 (thirty) days of the commencement Date, submits to the SMC's Engineer its Quality Assurance Plan which shall include the following:

- (a) organisation, duties and responsibilities, procedures, inspections and documentation;
- (b) quality control mechanism including sampling and testing of Materials, test frequencies, standards, acceptance criteria, testing facilities, reporting, recording and interpretation of test results, approvals, check list for site activities, and proforma for testing and calibration in accordance with Good Industry Practice; and

**(c) Internal quality audit system.**

The SMC's Engineer shall convey its comments to the Contractor within a period of 21 (twenty-one) days stating the modifications, if any, required, and the Contractor shall incorporate those in the QAP to the extent required for conforming with the provisions in the contract.



9.2.3 The Contractor shall procure all documents, apparatus and instruments, fuel, consumables, water, electricity, labour, Materials, samples, and qualified personnel as are necessary for examining and testing the Project Assets and workmanship in accordance with the Quality Assurance Plan.

9.2.4 The cost of testing of Construction, Materials and workmanship shall be borne by the Contractor.

### **9.3. Methodology**

9.3.1 The Contractor shall, at least 15 (fifteen) days prior to the commencement of the construction, submit to the SMC's Engineer for review the methodology proposed to be adopted for executing work, giving details of equipment to be deployed, traffic management and measures for ensuring safety. The SMC's Engineer shall complete their view and convey its comments to the Contractor within a period of 10 (ten) days from the date of receipt of the proposed methodology from the Contractor.

### **9.4. Inspection and technical audit by the SMC**

9.4.1 The SMC or any representative authorised by the SMC in this behalf may inspect and review the progress and quality of the construction of Work and issue appropriate directions to the SMC's Engineer and the Contractor for taking remedial action in the event work are not in accordance with the provisions of this Agreement.

### **9.5 External technical audit**

9.5.1 At any time during construction, the SMC may appoint an external technical auditor to conduct an audit of the quality of work. The findings of the audit, to the extent accepted by the SMC, shall be notified to the Contractor and the SMC's Engineer for taking remedial action in accordance with this Agreement. The Contractor shall provide all assistance as may be required by the auditor in the conduct of its audit here under. Notwithstanding anything contained in the contract, the external technical audit shall not affect any obligations of the Contractor or the SMC's Engineer under this Agreement.

### **9.6 Inspection of construction records**

9.6.1 The SMC shall have the right to inspect the records of the Contractor relating to work.

### **9.7 Monthly progress reports**

9.7.1 During the Construction Period, the Contractor shall, no later than 10 (ten) days after the close of each month, furnish to the SMC and the SMC's Engineer a monthly report on progress of work in the format approved by SMC's engineer and shall promptly give such other relevant information as may be required by the SMC's Engineer.

### **9.8 Inspection**

9.8.1 The SMC's Engineer and its authorised representative shall at all reasonable times:

- (a) have full access to all parts of the Site and to all places from which natural Materials are being obtained for use in work; and
- (b) during production, manufacture and construction at the Site and at the place of production, be entitled to examine, inspect, measure and test the Materials and workmanship, and to check the progress of manufacture of Materials.



9.8.2 The Contractor shall give the SMC's Engineer and its authorised agents access, facilities and safety equipment for carrying out their obligations under this Agreement.

9.8.3 The Contractor shall submit a monthly inspection report (the "Inspection Report") to the SMC and the Contractor bringing out the results of inspections and the remedial action taken by the Contractor in respect of Defects or deficiencies. For the avoidance of doubt, such inspection or submission of Inspection Report by the Contractor shall not relieve or absolve the Contractor of its obligations and liabilities under this Agreement in any manner whatsoever.

### 9.9 Samples

9.9.1 The Contractor shall submit the following samples of Materials and relevant information to the SMC's Engineer for pre-construction review:

- (a) manufacturer's test reports and standard samples of manufactured Materials; and
- (b) samples of such other Materials as the SMC's Engineer may require.

### 9.10 Tests

9.10.1 For determining that work conform to the Specifications and Standards, the SMC's Engineer shall require the Contractor to carry out or cause to be carried out tests, at such time and frequency and in such manner as specified in this Agreement, and in accordance with Good Industry Practice for quality assurance.

9.10.2 In the event that results of any tests conducted establish any Defects or deficiencies in work, the Contractor shall carry out remedial measures and furnish a report to the SMC's Engineer in this behalf. The SMC's Engineer shall require the Contractor to carry out or cause to be carried out tests to determine that such remedial measures have brought work into compliance with the Specifications and Standards, and the procedure shall be repeated until such Works conform to the Specifications and Standards.

9.10.3 All expenditure including travel, lodging boarding of SMC Engineers and/or its representatives shall be borne by the contractor.

#### **Testing of materials:**

When required by the Engineer-in-charge the contractor(s) shall supply for the purpose of testing samples of all materials proposed to be used in the works. Samples submitted either to govern bulk supplies or required for testing before use shall be in suitable packages to contain them and shall be provided free of charge by the contractor. The cost of testing shall be borne by the contractor even if the result of the sample confirm or do not confirm to the relevant BIS code and specifications.

(i) The test certificates regarding its property including indication of its Thermo-Mechanically treated must accompany every lot and shall be submitted to Surat Municipal Corporation before utilizing the same. Unless and until such certificate is submitted, the steel procure at site will not be allowed to be used.

(ii) All expenditure required to be incurred for taking the samples conveyance, packing shall be borne by the contractor himself.

(iii) The failed material shall be removed from the site by the contractor at his own cost within a week time of written order of the Engineer-in-charge.



### 9.11 ACTION AND COMPENSATION IN CASE OF BAD WORKMANSHIP :

If it shall appear to the Engineer-in-charge that any work has been executed with materials of inferior description, or quality or are unsound or with unsound imperfect or unskilled workmanship or otherwise not in accordance with the contract shall, no demand in writing from Engineer-in-charge or his authorised representative specifying the work, materials or articles complained of, notwithstanding that the same may have been inadvertently passed, certified and paid for forthwith rectify or remove and reconstruct the work, specified and in the event of failure to do so within a period to be specified by Engineer- in-charge in his aforesaid demand, contractor shall be liable to pay compensation at the rate of one (1) percent of the tendered cost of work for every Ten (10) days limited to a maximum of Ten (10%) Percent of the value of work while his failure to do so continue and in the case of any such failure the Engineer-in- charge may on expiry of the notice period rectify and remove and re-execut the work or remove and replace with other at the risk and cost of the Contractor. The decision of the Engineer-in- charge as to any question arising under this clause shall be final and conclusive.

### STANDARD NORMS FOR QUALITY CONTROL

Sr No	Test	Frequency of tests as per I.S.	Acceptance Criteria
<b>1</b>	<b>Cement</b>		
a)	Setting time initial	50 -100 T- 2 sample	Not less than 30 minutes
	Final	100-200 T-3 sample	Not more than 600 minutes
		200-300 T-4 sample	
		300 - 500 T-5 sample	
		500- 800 T-6 sample	
		810- 1300 T-7sample	
b)	Fineness by Sieve	1 in 5 samples	90% passed from 90micron sieve
c)	Consistency	One sample(Each sample asabove)	Above 30 percent
d)	Compressive strength	One sample(Each sample asabove)	160 kg / cm <sup>2</sup> for OPC & PPC on thirdday
			220 kg / cm <sup>2</sup> for OPC & PPC on seventh day
			310 kg / cm <sup>2</sup> for OPC & PPC on twenty eight day
e)	Fineness test through Specific surface	1 in 5 samples	2250 kg/Cm <sup>2</sup> and above for OPC FOR PPC 3000 kg/Cm <sup>2</sup>
f)	Chemical AnalysisIS 4032-986	1 in 5 samples	Mgo less than 6 percentSO <sub>3</sub> less than 2.75 percentless on ignition upto 5 percent
<b>2</b>	<b>Sand</b>		
a)	Silt Content	1 sample of 10 kg/150 cu. mt.	Up to 3 percent
b)	Fineness modulus	- Do-	Specification as per specified standard. No sand of fourth zone shall be used.



<b>3</b>	<b>Kapachi - Grit for Bituminous work</b>				
a)	Gradation		1/200 m3		
b)	Flakiness index		1/200 m3	Max 30 %	
c)	Impact		1/100 m3	Max 30 %	
d)	Abrasion		1/100 m3	Max 35 %	
e)	Bit. Extraction		100 MT - 1	0.80 to 4 %	
f)	Bitumin (penetration test)		100 MT - 1		
g)	Stripping value		50 -100 m3 one test	Max. 25 %	
<b>3</b>	<b>Kapachi - Grit for Building work</b>			As per IS 183-1970 standards	
a)	Gradation		2 test / Season	As per relevant specifications provision	
b)	Impact		2 test / Season	wearing surface overlaid surface (IS18.5-1972)30 % 45 %	
c)	Abrasion		2 test / Season	30 % 5 %	
d)	Soundness		2 test / Season	Loss with Loss with	
<b>4</b>	<b>Bricks</b>				
a)	Efflorescence		20 bricks out of 2000	Moderate	
			32 bricks out of 3500		
			50 bricks out of 50000		
b)	Water absorption		-DO-	Less than 20 Percent	
c)	Compressive strength		-DO-	Minimum average 35 Kg/cm2 & individual result may fall below up to 20 percent	
<b>5</b>	<b>Cement Concrete flooring/Mosaic tiles</b>				
a)	Water absorption		6 tiles /2000 tiles	Maximum 10 percent	
b)	Transverse strength		12 tiles /2000 tiles	Wet Dry	
				80 Kg/cm2 120 Kg/cm2	
c)	Abrasion		6 tiles /2000 tiles	Average wear shall not exceed 3.5 mm	
<b>6</b>	<b>Water Chemical Analysis</b>		Once for approval source		
a)	PH		"	6 to 8	
b)	Chlorides		"	2000 mg/L (PCC) & 500 mg/L for RCC	
c)	Organic (matter)		"	200 mg/L Max.	
d)	Inorganic (matter)		"	3000 mg/L Max.	
e)	Sulphate (mg/L)		"	500 mg/L Max.	
f)	TDS		"	2000 mg/L Max.	
<b>7</b>	<b>Cement Concrete cubes ordinary and controlled concrete</b>	As per IS 456-2000		Gradedesignation	Specified characteristic cube compressive strength. At 28 days N/mm2
		work m3	No. ofsample	M10	10
		1-5 m3	1	M15	15
		6-15 m3	2	M20	20
		16-30	3	M25	25



		m3				
		31-50 m3	4		M30	30
		51 m3 & above	4+ one		M35	35
		add sample for each 50 m3 part there of			M40	40
	ordinary and controlled concrete for road bridge	suces /60m3 each for 7 and 28 days further that everyday for first six days and once in three days there after.	Average compressive strength of each day should not be less than specified strengths subject to that 20% cubes per day (i.e.) 1 per 5 may fall below specified strength up to its 85 percent			
<b>8</b>	<b>Steel</b>					
a)	Mild steel bar	1 test /40 MT	Nominal dia of bars in mm	Ultimate tensile Strength Kg/cm2	Yield stress	Elongation (in%)
			0-20	42	26	23
			20-40	42	26	23
			over 40	42	26	23
			All size	49.5	42.5	14.5
b)	TMT bars		Fe-500 Quenched and Tempered (TMT) bars of different diameters satisfying IS : 1786, with Yield stress > 500 N/mm2 , Tensile strength > 545 N/mm2 And elongation more than 12.00 %			
c)	steel for general structural purpose specification IS 2062-1992		Gr.A Fe410 WS 410 N/mm2(All size) Gr.B. Fe410 WB 410 N/mm2(All size) Gr.C. Fe410 WC 410 N/mm2(All size)			
d)	steel wires for prestressed concrete IS 1785 part-1 19 lab		8.0 140 Kg/mm2 7.0 150 Kg/mm2 5.0 160 Kg/mm2 4.0 175 Kg./mm2 3.0 190 Kg./mm2			
			85 % the minimum specific tensiled strength			
<b>9</b>	<b>Teakwood</b>	As per LOT				
a)	Colour					
b)	Hardness					
c)	Density					
d)	Weight					
e)	Moisture cement					
f)	Porosity					
g)	Rasin					
h)	I.D. Mark					
<b>10</b>	All Other Material	As suggested by Consultant/EIC/ TPI as per relevant IS code				

**NOTE :**



- (1) For Sand and Coarse aggregate two Nos. of full bag for one sample shall be supplied by agency.
- (2) For water test 5:00 liters of water shall be supplied by agency in plastic container for each sources.
- (3) Sample from the lot shall be selected by authorized representative along with representative of SMC or TPI or PMC.
- (4) Selected sample shall be handed over personally by representative of S.M.C. or TPI or PMC in sealed condition with letter containing sample No. and sampling date.
- (5) Test report should be received by the department containing reference of department's letter, sample No. sampling date and date of testing.
- (6) Tests as may be directed by Engineer in charge as shown above shall have to be Conducted
- (7) Above mentioned all the tests of the materials and others shall be carried out for in construction of each and every different lot in External Laboratory.

#### LIST OF APPROVED LABORATORY

Sr.no	Name	Address
1	Gujarat Engineering Research Institute (GERI)	Katargam ,Surat.
2	Unique Engineering Testing & Adviosry Service	216, road 6F, New Estate, Udhyog nagar, Udhna, Surat, Gujarat 394210
3	Bhoomi researchCentre	2/1362, "Bhumi House", Sagrampura, Opp. Sub-Jail, Ring Road,, Surat, 395005
4	SVNIT	Ichchhanath,Surat.
5	Vidyabharti Trust Intsttute of Technology and Research Center	Umrakh,Bardoli, Surat, Gujarat 394345

Note : During course of the execution if any other laboratory is approved by SMC, the contractor can send the material in that laboratory also. The frequency for testing of samples (in either of the laboratories) shall be decided by SMC/E.I.C.

#### 9.11 Examination of work before covering up

In respect of the work which the SMC's Engineer is entitled to examine, inspect,measure and/or test before it is covered up or put out of view or any part of the work isplaced thereon, the Contractor shall give notice to the SMC's Engineer whenever any such work is ready and before it is covered up. The SMC's Engineer shall then either carry out the examination, inspection or testing without unreasonable delay or promptly give notice to the Contractor that the SMC's Engineer does not require to do so. Provided, however, that if any work is of a continuous nature where it is not possible or prudent to keep it uncovered or incomplete, the Contractor shall notify the schedule of carrying out such work to give sufficient opportunity, not being less than 3(three) business days' notice, to the SMC's Engineer to conduct its inspection,measurement or test while the work is continuing. Provided further that in the event the Contractor receives no response from the SMC's Engineer within a period of 3 (three) business days from the date on which the Contractor's notice





hereunder is delivered to the SMC's Engineer, the Contractor shall be entitled to assume that the SMC's Engineer would not undertake the said inspection.

### **9.12 Rejection**

9.12.1 If, as a result of an examination, inspection, measurement or testing, any Plant, Materials, design or workmanship is found to be defective or otherwise not in accordance with the provisions of this Agreement, the SMC's Engineer shall reject the Plant, Materials, design or workmanship by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good the Defect and ensure that there placed item complies with the requirements of this Agreement.

9.12.2 If the SMC's Engineer requires the Plant, Materials, design or workmanship to be retested, the tests shall be repeated under the same terms and conditions, as applicable in each case. If the rejection and retesting cause the SMC to incur any additional costs, such cost shall be recoverable by the SMC from the Contractor; and may be deducted by the SMC from any monies due to be paid to the Contractor.

### **9.13 Remedial work**

9.13.1 Notwithstanding any previous test or certification, the SMC's Engineer may instruct the Contractor to:

- (a) remove from the Site and replace any Plant or Materials which are not in accordance with the provisions of this Agreement;
- (b) remove and re-execute any work which is not in accordance with the provisions of this Agreement and the Specification and Standards; and (c) execute any work which is urgently required for the safety of the Work, whether because of an accident, unforeseeable event or otherwise; provided that in case of any work required on account of a Force Majeure Event.,

9.13.2 If the Contractor fails to comply with the instructions issued by the SMC's Engineer, within the time specified in the SMC's Engineer's notice or as mutually agreed, the SMC's Engineer may advise the SMC to have the work executed by another agency. The cost so incurred by the SMC for undertaking such work shall, without prejudice to the rights of the SMC to recover Damages in accordance with the provisions of this Agreement, be recoverable from the Contractor and may be deducted by the SMC from any monies due to be paid to the Contractor.

### **9.14 Quality control records and Documents**

The Contractor shall hand over to the SMC's Engineer a copy of all its quality control records and documents before the Completion Certificate is issued.

### **9.15 Video recording and Photography**

During the Construction Period, the Contractor shall provide to the SMC for every calendar quarter, photographs and a video recording, which will be compiled into a 3(three)-hour compact disc or digital video disc, as the case may be, covering the status and progress of Works in that quarter. The video recording shall be provided to the SMC no later than 15 (fifteen) days after the close of each quarter after the commencement date.

### **9.16 Suspension of unsafe Construction Works**



- 9.16.1 In event its come to the notice of SMC any impending risk to the work or the personnel on and around the project site, the SMC may by notice require the Contractor to suspend forthwith the whole or any part of work if, in the reasonable opinion of the SMC's Engineer, such work threatens the safety of the Users and pedestrians.
- 9.16.2 The Contractor shall, pursuant to the notice under contract, suspend work or any part there of for such time and in such manner as may be specified by the SMC and thereupon carry out remedial measures to secure the safety of suspended works, the Users and pedestrians. The Contractor may by notice require the SMC's Engineer to inspect such remedial measures forthwith and make a report to the SMC recommending whether or not the suspension hereunder may be revoked. Upon receiving the recommendations of the SMC's Engineer, the SMC shall either revoke such suspension or instruct the Contractor to carry out such other and further remedial measures as may be necessary in the reasonable opinion of the SMC, shall be repeated until the suspension hereunder is revoked.
- 9.16.3 All costs incurred for maintaining and protecting work or part thereof during the period of suspension shall be borne by the Contractor; provided that if the suspension has occurred as a result of any breach of this Agreement by the SMC, the Costs shall be borne by the SMC. However cost for maintaining and protecting the work for first 30 days, in any event shall be borne by Contractor irrespective of SMC bringing about the suspension for its own convenience. The quantum of cost for maintenance and protection of the work when payable to the contractor shall be subject to approval of SMC engineer.
- 9.16.4 If suspension of Works is for reasons not attributable to the Contractor, the SMC's Engineer shall determine any Time Extension to which the Contractor is reasonably entitled.

#### **9.17 Setting of site Laboratories:**

The contractor shall install testing equipment at site. The contractor shall ensure and certify the calibration of the equipment so installed and shall maintain the same in working order throughout the period of construction. The contractor shall also provide necessary trained staff for carrying out such tests for using such equipment. The tests shall be carried out under the supervision of the Engineer-in-charge/PMC/TPI.

#### **9.18 Instructions for Composite Contract:**

It will be obligatory on the part of the tenderer to sign the tender documents for all the components. (The schedule of quantities, conditions and specials conditions etc.).

In case of breakage of any existing service lines, it shall be immediately attended by the contractor failing which SMC has full liberty to get work done at the cost and risk of the contractor over and above repairing charges, penalty as decided by the Engineer in charge shall be imposed and deducted from Bill of the contractor.

#### **9.19 Condition for Cement:**

- 9.19.1 Cement required for the work shall be procured by the contractor.  
The contractor shall procure, only Ordinary Portland Cement (conforming to IS:8112). This procurement shall be from reputed manufacturers of cement having a production capacity of one million tons per annum or more as approved by Ministry of Industry, Government of India and



holding license to use IS certification make for their product whose name shall be got approved from Engineer-in-charge. Supply of cement shall be taken in 50 Kg. bags bearing manufacturer's name or his registered trademark, if any and grade and type of cement as well as IS marking.

- 9.19.2 The account of daily receipt and issue of cement shall be maintained in a register in the prescribed Performa and signed daily by the contractor or his authorized agent in token of its correctness.
- 9.19.3 Samples of cement arranged by the contractor shall be taken by the Engineer-in-charge and got tested in accordance with provisions of relevant BIS Code. In case test results indicate that the cement arranged by the contractor does not conform to the relevant BIS codes the same shall stand rejected and shall be removed from the site by the contractor at his own cost within a week's time of written order from the Engineer-in-charge.
- 9.19.4 The contractor shall supply free of charge the cement required for testing. The cost of testing charges shall be borne by the contractor.
- 9.19.5 The actual issue and consumption of cement on work shall be regulated and proper accounts maintained.
- 9.19.6 For non-scheduled items, the decision of the Executive Engineer regarding theoretical quantity of cement which should have been actually used shall be final and binding on the contractor.
- 9.19.7 Cement brought to site and remaining unused after completion of work shall not be removed from site without written permission of the Engineer-in-charge.

#### **9.20 Condition for Steel:**

(a) The contractor shall procure steel reinforcement of Thermo Mechanically Treated TMT/CRS Bars Fe-500 conforming to IS-1786:1985(reaffirmed 2004). The contractor shall have to submit documentary proof to the satisfaction of the Engineer-in-charge of having procured the steel reinforcement. The contractor shall have to obtain and furnish test certificates to the Engineer-in-charge and get tested in accordance with provision of relevant specifications. In case, test results indicate that the steel arranged by the contractor does not confirm to the specifications, the same shall stand rejected and shall be removed from the site of work by the contractor at his own cost within 7 days of written order from the Engineer-in-charge to do so.

(b) The steel reinforcement bars shall be brought to the site in bulk supply of 10 tons or more or as directed by the Engineer-in-charge.

(c) The steel reinforcement shall be stored by the contractor at site of work in such a way as to prevent distortion and corrosion and nothing extra shall be paid on this account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.



(d) For checking nominal mass tensile strength, bend test, rebound test etc. specimen of sufficient length shall be cut from each size of the bar at random at frequency not less than that specified below:-

Size of Bar.	For consignment below 100 tons	For consignment above 100 Tons.
Under 10mm dia bars	One sample for each 25 tons or part thereof.	One sample for each 40 tons or part thereof.
10mm to 16mm dia. Bars	One sample for each 35 tons or part thereof.	One sample for each 45 tons or part thereof.
Over 16mm dia bars	One sample for each 45 tons or part thereof.	One sample for each 50 tons or part thereof.

The contractor shall supply free of charge the steel required for testing. The cost of tests shall be borne by the contractor.

e) Steel brought to site and steel remaining unused shall not be removed from site without the written permission of Engineer-in-charge.

f) Every care should be taken to avoid mixing different types of grades of bars in the same structural members as main reinforcement to satisfy relevant latest IS Codes. In case of buildings wherever the situation necessitates the changeover shall be made only from any one level onwards. In case of foundation, all foundation elements (footing and grade beams) shall have the same kind of steel. In case of columns all structural elements up to the level of change where the changeover is taking place should have the same kind of steel as those in columns,

g) The reinforcing steel brought to site of work, shall be stored on brick / timber platform of 30/40cm. height. Nothing extra shall be paid on this account.

f) During the execution of work contractor should maintained BAR BENDING SCHEDULE (BBS).

#### 9.21 Condition for water:

a) The contractor shall make his own arrangement for providing water for construction and drinking purpose. Contractor shall get the water tested from any approved laboratory of SMC as per direction of Engineer-in-Charge at regular interval All expenses towards collection of samples, packing, transportation and testing charges etc. shall be borne by the contractors.

b) The contractor shall arrange at his own cost and nothing extra shall be paid to the contractor on this account. The water shall be got tested at SMC laboratory.

c) In the event of any difference of opinion among site representatives in carrying out the item of work in accordance with the agreement the Engineer-in-charge shall decide the issue and his decision shall be final and binding on the contractor and the contractor shall be bound to carry out the instruction to complete work in time. At no point of time the contractor shall stop execution of the work on any ground what so ever.



## 9.22 WORK IMPLEMENTATION :

### SERVICES FOR MANAGEMENT OF PROJECT

The Services for management of project will include planning, scheduling monitoring progress reporting, quality assurance and quality control and overall Project Management functions. Contractor shall nominate Project Manager who will be responsible for the total scope of work under this contract and shall respond to SUC, **Surat Municipal Corporation** and EIC and/or their representative.

The Contractor is expected to execute the work services under this contract on TASK FORCE concept with a dedicated team of specialists –Experienced persons, who will be responsible and respond to the Project Manager. The Task Force shall be so organized as to give effective management and control of various services to the Project Manager.

#### 9.22.1. PROJECT PLANNING :

- a) CONTRACTOR shall provide additional resources whenever the scheduling shown on the **BAR CHART/ S Curve** indicates a possible delay in the completion date. Such additional effort may require an increase in equipment and/or personnel and / or work in excess of the normal working time. All extra costs incurred by the CONTRACTOR in order to prevent a possible delay in the completion date will be to CONTRACTOR's account.
- b) CONTRACTOR shall notify the E.I.C. within 24 hours after any occurrence which will adversely affect the completion date of the project. In addition, the Contractor shall include statement of proposed remedial action for expediting these items.
- c) While preparing network diagrams, monsoon period from June mid to September mid shall be kept in view. Internal roads, drains and other civil works should be planned such that rains do not have impact on the progress of the Work.
- d) BAR CHART should be supported by resource based network for proper planning, monitoring, and control of the project execution, keeping the overall schedule unchanged.
- e) A joint programme of execution of WORK will be prepared by the Engineer-in-Charge and CONTRACTOR which will take into account the Time Schedule of completion.
- f) Monthly / weekly construction programme will be drawn up by Engineer-in-Charge/CONSULTANT jointly with the CONTRACTOR based on availability of work fronts. The CONTRACTOR shall scrupulously adhere to these Targets / programme by deploying adequate personnel and construction tools and tackles and he shall also supply all materials included his scope of supply in time to achieve the targets set out in the weekly and monthly programmes. In all matters concerning the extent of targets



set out in the weekly and monthly programmes/targets and the degree of achievements, the decision of the Engineer-in-Charge / CONSULTANT shall be final and binding on the CONTRACTOR.

#### 9.22.2 PROGRESS REPORTS DURING CONSTRUCTION

- a) CONTRACTOR shall make every effort to keep the Dept. adequately informed as to the progress of the WORK throughout the Contract period.
- b) CONTRACTOR shall keep the Dept. informed well in advance of the construction schedule so as to permit the Dept. to arrange for requisite inspection to be carried out in such a manner as to minimize interference with the progress of WORK. It is imperative that close co-ordination be maintained with the E.I.C. / Dept. during all phases of Work.
- c) Contractor shall give every day report on category-wise labour & equipment deployed alongwith the progress of work done on previous day in the proforma prescribed by EIC.
- d) All important events shall be photographed by the contractor and to be submitted to Dept. for records.

#### 9.22.3 PROGRESS MEASUREMENT METHODOLOGY :

The contractor is required to submit within **Two Weeks** of award of work, the methodology of progress measurement of sub ordering, manufacturing / delivery, sub-contracting and the basis of computation of overall service / physical progress achieved. The Owner reserves the right to modify the same in part or in full.

#### 9.22.4 FUNCTIONAL SCHEDULES :

The contractor shall prepare detailed functional schedules in line with Bar-Diagram for function monitoring and control and submit scheduled progress curves for each function viz. Ordering, delivery and construction.

#### 9.22.5 PROGRESS REVIEW MEETING :

The contractor shall present the program and status at various review meeting as & when required.

<b>(A) Review Meetings</b>	
<b>Level of Participation</b>	Contractor, Engineer-in-Charge,PMC/TPI,Consultants
<b>Agenda</b>	<ol style="list-style-type: none"> <li>a) Weekly Program V/S actual achieved in the post week &amp; program for next week.</li> <li>b) Remedial action and hold up analysis.</li> <li>c) Client query / Approval / Site Officer.</li> </ol>
<b>(B) Monthly Review Meeting</b>	



<b>Level of Participation</b>	Senior Officers of Dept. / Consultant & Contractors, Engineer-in-Charge, PMC/TPI, Consultants
<b>Agenda</b>	<b>a)</b> Progress Status / Statistics.
	<b>b)</b> Completion Outlook.
	<b>c)</b> Major Hold Ups / Slippage's.
	<b>d)</b> Assistance Required.
	<b>e)</b> Critical Issues.
	Client Query / Approval.
<b>Venue</b>	S.U.C/ Site Office or as decided by EIC.

### PROGRESS REPORTING.

The contractor shall submit the following progress reports on a regular basis for SUC, **Surat Municipal Corporation's** information:

i) Monthly Progress Report.

This report shall be submitted on a monthly basis within 5(five) calendar days from cut-off date, as agreed upon covering overall scenario of the project. The report shall include, but not limited to the following:

- Executive Summary – Summary of major events / activities, completed during the period being reported.
- Schedule versus actual percentage progress and progress curves for Sub-ordering, Sub-Contracting, Constructing and Overall Project.
- Area of concern / problem / hold-ups, impacts and action plans.
- Activities executed, achievements during the month and targets for the following months.
- Analysis of critical activities and impact on overall completion.
- Chronological achievement of key events indicating scheduled and actual occurrence dates.
- Annexures giving status summary for drawings, MRs, equipment and materials delivery, Sub-contracting and construction. ( Typical formats are enclosed herewith for contractor's reference)
- Resources deployment status against planned.



- Change order status.
- Construction photographs.

ii) Weekly Reports.

This report will be prepared for Division Office and Construction site in summarized fashion and submitted on every Tuesday taking status as of Sunday by the contractor on weekly basis and will cover following items :

- Activities completed (Sub-contracting, Construction etc.)\
- Resource deployed – men and machines.
- Quantities and Productivity achieved in Key area of work.
- Programme of work for the next week.
- Record of Mandays lost, with the reasons.
- Constraints.
- The report / information may be transmitted preferably through Fax/mail.

iii) Daily Progress report.

- Important activities for the day at site.
- Receipt of major Equipment / Materials received at site.

**REQUIREMENT OF COPIES FOR SUBMISSION OF SCHEDULES & REPORTS.**

Sr.No.	Name of Document	No. of Copies.
1.	Overall Project Schedule	3
2.	Detailed Activity Network	3
3.	Functional Schedules	3
4.	Construction Network	3





5.	Monthly Progress Reports	3
6.	Weekly Progress Report	3
7.	Daily Bulletin	3

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Various typical formats for planning and reporting various activities of the Project are enclosed as Annexure. The format can be changed as per requirement of SMC.



JOB NO. : _____ PROJECT NAME : _____ LOI DATE : _____ START DATE : _____ CONT. COM. DATE : _____ ANT. COM. DATE : _____	<b>MONTHLY PROGRAMME</b>	PROGRAM FOR THE LAST MONTH : _____ ACHIEVED IN THE LAST MONTH : _____ CUMMULATIVE SCHEDULE : _____ CUMMULATIVE ACTUAL : _____ WORK FRONT AVAILABLE : _____ SCH. FOR THE MONTH : _____ PROGRAMME FOR THE MONTH : _____
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S.NO	ACTIVITY DESCRIPTION	UNIT	ESTIMATED QUANTITY	REVISED QUANTITY	WID. VALUE.	QTY PLANNED IN LAST MONTHS	QTY. ACHD. IN LAST MONTH	CUMM. QTY ACHD	WORK FRONT	QTY PLANNED IN THIS MONTH	WEEK WISE PROGRAMME				CONSTRAINTS
											11-18	19-16	27-03	04-10	

Signature of Contractor



JOB NO. : _____ LOI DATE : _____ START DATE : _____ CONT. COM. DATE : _____ ANT. COM. DATE : _____	<p><b><u>WEEKLY PROGRESS REPORT</u></b></p> DISCIPLINE : _____ WEEKLY PROGRESS : FROM _____ TO _____ WEEKLY PROGRESS : FROM _____ TO _____	PROGRAM FOR THE WEEK : _____ ACHIEVED DURING WEEK : _____ CUMM. SCH. PROGRESS : _____ CUMM. ACT. PROGRESS : _____ PROGRAM FOR NEXT WEEK : _____
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S.NO.	ACTIVITY DESCRIPTION	UNIT	ESTIMATED QUANTITY	REVISED QUANTITY	WTD. VALUE.	PROGRAM FOR THE WEEK	ACHIEVED DURING WEEK	CUMM. QUANTITY.	WTD.VALUE ACHIEVED	WORK FRONT	PROGRAM FOR NEXT WEEK	HOLD-UPS/REMARKS.

Signature of Contractor



### DAILY PROGRESS REPORT

1	<b>SKILLED LABOUR STRENGTH :</b>					
Today	1. MASON	2. CARPENTER	3. FITTER	4. ELECTRICIAN	5. PLUMBER	6. WELDER
	7.GETTYMAN	8.OPERATOR				
2	<b>UNSKILLED LABOUR STRENGTH:</b>					
	9. LABOUR (M/C)	10. LABOUR (F/C)	11. CARPENTER 'S HELPER	12. FITTER 'S HELPER	13. WIREMAN	14. OTHERS
Today						
3	<b>EQUIPMENT IN OPERATION</b>			<b>STATUS WORKING / NOT WORKING</b>		
	a) CONCRETE BATCHING PLANT					
	b) CONCRETE MIXER					
	c) VIBRATOR					
	d) HOIST					
	e) J.C.B.					
	f) TRACTORS					
	g) DIGITAL WEIGH BATCHER MACHINE					
	h) WELDING MACHINE					
	i) PUMP					
4	<b>MATERIAL STATUS</b>					
	a) Cement	b) Steel	c) Bricks	d) Fine Aggregate	e) Coarse Aggregate	f) Shuttering
Today						
This Month						
Upto Date						
5	<b>ACTIVITIES IN PROGRESS</b>					
SR. NO.	NAME OF WORK	LOCATION	APPROX.QTY. EXECUTED	WHETHER AS TARGETED MORE / LESS		
6	<b>REMARKS</b>					

**Project Manager  
(Contractor)**

**Const. Manager  
(Consultant)**

Signature of Contractor



### 9.23 QUALITY CONTROL, TESTS AND INSPECTION

- 9.23.1 The CONTRACTOR shall carry out the various tests as enumerated in the technical specifications of the Contract and the technical documents that will be furnished to him during the performance of the work and no separate payment shall be made unless otherwise specified in schedule of Prices.
- 9.23.2 All the tests either on the field or at outside laboratories concerning the execution of the work and supply of materials by the CONTRACTOR shall be carried out by CONTRACTOR at his own cost.
- 9.23.3 The work is subject to inspection at all times by the Engineer-in-Charge. The CONTRACTOR shall carry out all instructions given during inspection and shall ensure that the work is being carried out according to the technical specifications of the Contract, the technical documents and the relevant codes of practice furnished to him during the performance of the work( If necessary).
- 9.23.4 Any work not conforming to the execution drawings, specifications or codes shall be rejected forthwith and the CONTRACTOR shall carry out the rectifications / replacement at his own cost.
- 9.23.5 All results of inspection and tests will be recorded in the inspection reports, proforma of which will be approved by the Engineer-in-Charge. These reports shall form part of the completion documents.
- 9.23.6 Inspection and acceptance of the work shall not relieve the CONTRACTOR from any of his responsibilities under this Contract.
- 9.23.7 The contractor at his cost should make arrangement for the required testing facilities such as cube testing, sieve analysis apparatus, cement testing device, slump cone, cube moulds, weighing machines etc. at site in order to have regular check on works, materials used etc.
- 9.23.8 If any tests are required to be carried out in conjunction with the work or materials or workmanship not supplied by the contractor such tests shall be carried out by the contractor as per instruction of EIC & cost of such costs shall be reimbursed by the **Surat Municipal Corporation**.

### 9.24 FINAL INSPECTION

After completion of all tests as per specifications, the whole work will be subject to a final inspection to ensure that WORK has been completed as per requirement. If any defects noticed in the work are attributable to CONTRACTOR these shall be attended by the CONTRACTOR at his own cost, as and when they are brought to his notice by the **Surat Municipal Corporation**. The **Surat Municipal Corporation** shall have the right to have these



defects rectified at the risk and cost of the CONTRACTOR, if he fails to attend to these defects immediately.

#### **9.25 Recovery for lesser material issued/consumed.**

Quantity of cement & steel shall be calculated on the basis of quantity of cement and steel required for different items or work as per standard consumption, with up to date overall consumption will be checked at the time of final bill, if any material consumed is less than standard norms, same amount shall be recovered from final bill.

#### **Cement, Reinforcement steel and other materials:**

(1) Penalty for **Cement and Reinforcement steel** shall be levied as below against variation than the actual consumption:

- (a) No penalty if actual total consumption is equal to or more than standard theoretical total consumption. For over consumption of cement no extra payment shall be made.
- (b) **Twice the Basic Rate of Rs. 5,200/-** per MT for the variation in cement consumption less than standard theoretical consumption.
- (c) **Twice the Basic Rate of Rs. 31,000/- per MT for TMT steel & 33,000/- per MT for CRS steel** for variation in steel consumption less than standard theoretical consumption.

(2) No separate payment shall be made for any kind of wastage/excess consumption in the materials.

### **ARTICLE 10**

#### **COMPLETION CERTIFICATE**

##### **10.1 Provisional Certificate**

10.1.1 Upon completion of all Works forming part of the Work, save and except work for which Time Extension has been granted, the SMC's Engineer shall, at the request of the Contractor, issue a provisional certificate of completion if the Tests for and in respect of the completed Works are successful. The Provisional Certificate shall have appended there to a list of outstanding items of work (the "Punch List") that need to be completed in accordance with the provisions of this Agreement. The Contractor undertakes to complete the minor outstanding items of works in respect of those Sections of the Work for which the Provisional Certificate has been issued, within a period of 30 (thirty) days of the date of Provisional Certificate, and those parts of work in respect of which Time Extension has been granted, within the extended period thereof. For the avoidance of doubt, the Parties agree that the Punch List shall include all Works for which Time



Extension has been granted and shall also include any minor outstanding items of work forming part of the completed Sections if such works do not materially affect the use of the completed Sections for their intended purpose. The Parties further agree that Provisional Certificate shall not be issued if the completed Works cannot be safely and reliably placed in service of the Users thereof.

10.1.2 If the SMC's Engineer determines that the Work or any completed part thereof does not conform to the provisions of this Agreement and cannot be safely and reliably placed in operation, it shall forthwith make a report in this behalf and send copies hereof to the SMC and the Contractor and withhold issuance of the Provisional Certificate until the Defects or deficiencies are rectified by the Contractor and Tests are successful in accordance standard.

10.1.3 Notwithstanding anything to the contrary contained in contract, the SMC may, at anytime after receiving a report from the SMC's Engineer under that Clause, direct the SMC's Engineer to issue a Provisional Certificate and such direction shall be complied forthwith.

### **10.2 Completion of remaining Works**

All items in the Punch List shall be completed by the Contractor in accordance with the provisions of this Agreement. For any delay in their completion other than for the reasons solely attributable to the SMC or due to Force Majeure, the SMC shall be entitled to recover Damages from the Contractor in accordance with this Agreement.

### **10.3 Completion Certificate**

10.3.1 Upon completion of all Works and on submission of completion certificate by the contractor the SMC's Engineer shall forthwith issue to the Contractor a Completion certificate after verification of site..

10.3.2 Upon receiving the Completion Certificate, the Contractor shall remove its equipment, materials, debris and temporary works from the Site within a period of 30 (thirty) days thereof, failing which the SMC may remove or cause to be removed, such equipment, materials, debris and temporary works and recover from the Contractor an amount equal to 120% (one hundred and twenty per cent) of the actual cost of removal incurred by the SMC.

10.3.3 Without prejudice to the obligations of the Contractor specified, the property and ownership of all the completed Works forming part of the Work shall vest in the SMC.

### **10.4 Handing over of Project:**

Three months before the likely date of completion of flats in all respects, contractor shall intimate to the Engineer-in-charge the following.

(a) The contractor(s) shall submit the break-up of cost of construction of different parts of the project i.e. cost of individual D.U, excluding cost of courtyard, cost of development of site and other miscellaneous items as directed by Engineer-in-charge or In the manner the break up required to the E.I.C

(b) The contractors/agency shall lay the services as per approved plan by concern department. On completion of services the contractor /agency will submit the required number of completion plan to various authorities for handing over. The SMC also reserves the right to withhold the amount which is



likely to be payable to these agencies as deficiency charges. The decision of the Engineer-in-charge in this regard shall be final and binding on the contractor(s)/agency(s).

(c) The contractor shall have to give possession of DU's completed in all respect to the beneficiaries as and when directed by SMC after completion of the allotment procedure as per Govt. guidelines.

#### **10.5 AS BUILT DRAWINGS AND DOCUMENTATION :**

The as built drawings and documents shall be submitted by the contractor in 3 [**Three**] sets including the drawings supplied by the contractor and the vendor designs along with one reproducible media / tracing / soft copies & Failure of such submission within the stipulated time limit attracts the penalty decided by E.I.C.





## 10.6 MODEL FORM :

### **No.1 GUARANTEE BOND TO BE EXECUTED BY CONTRACTOR FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF WATER PROOFING WORKS.**

The Agreement made this .....day of.....Two thousand and.....between.....son of ..... The power of attorney holder of company (hereinafter called the Guarantor of the one part) and the Surat Municipal Corporation (here in after called the SMC of the other part) WHEREAS THIS Agreement is supplementary to a Contract (Hereinafter called the Contract) dated..... And made between the GUARANTOR OF THE ONE part and the SMC of the other part, whereby the Contractor, inter-alia, undertook to render the buildings and structures in the said Contract recited completely water and leak- proof. AND WHEREAS THE GUARANTOR agreed to give a Guarantee to the effect that the said structures will remain water and leak- proof for Ten years to be reckoned from the date after the Maintenance Period prescribed in the Contract.

NOW THE GUARANTOR hereby guarantees that water proofing treatment given by him will render the structures completely leak- proof and the minimum life of such water proofing treatment shall be Ten years to be reckoned from the date after the maintenance period prescribed in the Contract.

Provided that the Guarantor will not be responsible for leakage caused by earthquake or structural defects or misuse of roof or alteration and for such purpose:

1. Misuse of roof shall mean any operation which will damage water proofing treatment, like chopping of firewood and things of the same nature, which might cause damage to the roof;
2. Alteration shall mean construction of an additional storey or a part of the roof or construction adjoining to existing roof whereby water proofing treatment is removed in parts;
3. The decision of the Engineer-in-charge with regard to cause of leakage shall be final. During this period of guarantee, the Guarantor shall make good all defects and in case of any defects being found, render the building water proof to the satisfaction of the Engineer-in-Charge at his cost and shall commence the work for such rectification within seven days from the date of issue of the notice from Engineer-in-Charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other Contractor at the GUARANTOR'S risk and cost. The decision of the Engineer-in-Charge as to the cost, payable by the Guarantor shall be final and binding. That if, Guarantor fails to execute the water proofing or commits breach there under then the Guarantor will indemnify the Principal and his successors against all loss, damage, cost, expense or otherwise which may be incurred by his by reason of any default on the part of the GUARANTOR in performance and observance of this Supplementary Agreement. As to the amount of loss and/or damage and/or cost incurred by the SMC, the decision of the Engineer-in-Charge will be final and binding on the parties.

IN WITNESS WHEREOF these presents have been executed by the Obligator \_\_\_\_\_ and by \_\_\_\_\_ and for an on behalf of the Surat Municipal Corporation, on the day, month and year first above written. SIGNED, SEALED AND DELIVERED BY OBLIGATOR IN THE PRESENCE OF –

1) \_\_\_\_\_



2) \_\_\_\_\_

SIGNED FOR AN ON BEHALF OF THE SURAT MUNICIPAL CORPORATION BY

\_\_\_\_\_

in the presence of -

1. \_\_\_\_\_

2. \_\_\_\_\_



**No.2 GUARANTEE BOND TO BE EXECUTED BY CONTRACTOR FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF ANTI TERMITE WORKS.**

The Agreement made this .....day of.....Two thousand and.....between.....son of ..... The power of attorney holder of company (hereinafter called the Guarantor of the one part) and the Surat Municipal Corporation (here in after called the SMC of the other part) WHEREAS THIS Agreement is supplementary to a Contract (Hereinafter called the Contract) dated..... And made between the GUARANTOR OF THE ONE part and the SMC of the other part, whereby the Contractor, inter-alia, undertook to render the buildings and structures in the said Contract recited completely Anti termite work.

AND WHEREAS THE GUARANTOR agreed to give a Guarantee to the effect that the said structures will remain Anti termite proof for Ten years to be reckoned from the date after the Maintenance Period prescribed in the Contract.

NOW THE GUARANTOR hereby guarantees that Anti termite treatment given by him will render the structures completely Anti termite proof and the minimum life of such Anti termite treatment shall be Ten years to be reckoned from the date after the maintenance period prescribed in the Contract.

That if, Guarantor fails to execute the ANTI TERMITE or commits breach there under then the Guarantor will indemnify the Principal and his successors against all loss, damage, cost, expense or otherwise which may be incurred by his by reason of any default on the part of the GUARANTOR in performance and observance of this Supplementary Agreement. As to the amount of loss and/or damage and/or cost incurred by the SMC, the decision of the Engineer- in-Charge will be final and binding on the parties.

IN WITNESS WHEREOF these presents have been executed by the Obligator \_\_\_\_\_and by \_\_\_\_\_ and for an on behalf of the Surat Municipal Corporation, on the day, month and year first above written. SIGNED, SEALED AND DELIVERED BY OBLIGATOR IN THE PRESENCE OF –

1)\_\_\_\_\_Signatureofcontractor\_\_\_\_\_

2)\_\_\_\_\_

SIGNED FOR AN ON BEHALF OF THE SURAT MUNICIPAL CORPORATION BY

\_\_\_\_\_

in the presence of -

1. \_\_\_\_\_

2. \_\_\_\_\_



### **No.3 CERTIFICATE FOR COMPLETION**

I/We the undersigned Mr.....power of attorney holder/partner of  
.....was awarded the work of construction of .....vide  
work order No.....Dt.....

The work was undertaken by our agency. I/We have completed this work as per  
scope of work of tender with satisfactory quality and workmanship. The architectural  
and structural design was prepared by experienced experts of this field.

We assure for best services during defect liability period.

The work was completed and handed over to SMC on this .....day of  
.....month of year 20.....

Contractor's Name :

Signature :

Architect's Name :

Signature :

License No.:

Structural engineer's Name :

Signature :

License No.:



## **ARTICLE 11 CHANGE OF SCOPE**

### **11.1 Change of Scope**

- 11.1.1 The SMC may, notwithstanding anything to the contrary contained in this Agreement, require the Contractor to make modifications/alterations to work ("Change of Scope") during the progress of work and before the issue of the Completion Certificate either by giving an instruction or by requesting the Contractor to submit a proposal for Change of Scope involving additional cost or reduction in cost and adjustment of time.
- 11.1.2 Change of Scope shall mean: any change that is brought about at the instance of SMC after the complete drawing and design has been approved as provided in the contract. Such change shall be limited to -
- (a) change in specifications of any item of Works;
  - (b) omission of any work from the Scope of the Project.
  - (c) any additional work, Plant, Materials or services which are not originally included in the Scope of the Project.
- 11.1.3 If the Contractor determines at any time that a Change of Scope will, if adopted, (i) accelerate completion, (ii) reduce the cost to the SMC of executing, maintaining or operating the Work, (iii) improve the efficiency or value to the SMC of the completed the Work, or (iv) otherwise be of benefit to the SMC, it shall prepare a proposal with relevant details at its own cost. The Contractor shall submit such proposal, supported with the relevant details and the amount of addition or reduction in the Contract Price to the SMC to consider such Change of Scope. The SMC shall, within 15 (fifteen) days of receipt of such proposal, either accept such Change of Scope with modifications, if any, and initiate proceedings there for or reject the proposal and inform the Contractor of its decision. For the avoidance of doubt, the Parties agree that the Contractor shall not undertake any Change of Scope without the express consent of the SMC, save and except any Works necessary for meeting any Emergency.

### **11.2 Procedure for Change of Scope**

- 11.2.1 In the event of the SMC determining that a Change of Scope is necessary, it may direct the SMC's Engineer to issue to the Contractor a notice specifying in reasonable detail work and services contemplated thereunder (the "Change of Scope Notice").
- 11.2.2 Upon receipt of a Change of Scope Notice, the Contractor shall, with due diligence, provide to the SMC and the SMC's Engineer such information as is necessary, together with preliminary documentation in support of:
- (a) the impact, if any, which the Change of Scope is likely to have on the Project Completion Schedule if work or services are required to be carried out during the Construction Period; and
  - (b) the options for implementing the proposed Change of Scope and the effect, if any, each such option would have on the costs and time thereof, including the following details:
    - (i) break down of the quantities, unit rates and cost for different items of work;
    - (ii) proposed design for the Change of Scope; and
    - (iii) proposed modifications, if any, to the Project Completion Schedule of the Work.
- For the avoidance of doubt, the Parties expressly agree that, the Contract Price (per DU base) shall be increased or decreased, as the case may be, on account of Change of Scope.



11.2.3 Upon reaching an agreement, the SMC shall issue an order (the "Change of Scope Order") requiring the Contractor to proceed with the performance thereof. In the event that the Parties are unable to agree, the SMC may:

- (a) issue a Change of Scope Order requiring the Contractor to proceed with the performance thereof at the rates and conditions approved by the SMC till the matter is resolved.

11.2.4 The provisions of this Agreement, in so far as they relate to Works and Tests, shall apply mutatis mutandis to work undertaken by the Contractor.

### **11.3 Payment for Change of Scope**

Payment for Change of Scope shall be made in accordance with the payment schedule specified in the Change of Scope Order.

The payment for change of scope and extra item shall be made as per the Schedule of Rates (SOR) of the relevant year as per which the tender for SOR items are prepared plus or minus % above/below of estimated tender cost as quoted by the Contractor and for non SOR items the rates will be paid as per market rate or as per mutual consent.

### **11.4 Restrictions on Change of Scope**

11.4.1 No Change of Scope shall be executed unless the SMC has issued the Change of Scope Order save and except any Works necessary for meeting any Emergency.

11.4.2 Change made because of any default of the Contractor in the performance of its obligations under this Agreement shall not be deemed to be Change of Scope, and shall not result in any adjustment of the Contract Price or the Project Completion Schedule.

## **ARTICLE 12**

### **DEFECTS LIABILITY**

#### **12.1 Defects Liability Period**

12.1.1 As mentioned herein above in tender.

#### **12.2 Remedying Defects**

The Contractor shall repair or rectify all Defects and deficiencies observed by the SMC's Engineer during the Defects Liability Period within a period of 15 (fifteen) days from the date of notice issued by the SMC's Engineer in this behalf, or within such reasonable period as may be determined by the SMC's Engineer at the request of the Contractor, in accordance with Good Construction Practice.

#### **12.3 Cost of remedying Defects**

For the avoidance of doubt, any repair or rectification undertaken in accordance with the contract, including any additional testing, shall be carried out by the Contractor at its own risk and cost, to the extent that such rectification or repair is attributable to:



- (a) the design of the Project;
- (b) Plant, Materials or workmanship not being in accordance with this Agreement and the Specifications and Standards;
- (c) improper maintenance during construction of the Work by the Contractor; and/or
- (d) failure by the Contractor to comply with any other obligation under this Agreement.

#### **12.4 Contractor's failure to rectify Defects**

In the event that the Contractor fails to repair or rectify such Defect or deficiency within the period specified by the SMC's engineer, the SMC shall be entitled to get the same repaired, rectified or remedied at the Contractor's cost so as to make the Work conform to the Specifications and Standards and the provisions of this Agreement. All costs consequent thereon shall, after due consultation with the SMC and the Contractor, be determined by the SMC's Engineer. The cost so determined and an amount equal to One hundred twenty percent (120 %) of the cost as Damages shall be recoverable by the SMC from the Contractor and may be deducted by the SMC from any monies due to the Contractor.

#### **12.5 Contractor to search cause**

- 12.5.1 The SMC's Engineer may instruct the Contractor to examine the cause of any Defect in work or part thereof before the expiry of the Defects Liability Period.
- 12.5.2 In the event any Defect is attributable to the Contractor, the Contractor shall rectify such Defect within the period specified by the SMC's Engineer, and shall bear the cost of the examination and rectification of such Defect.
- 12.5.3 In the event such Defect is not attributable to the Contractor, the SMC's Engineer shall, after due consultation with the SMC and the Contractor, determine the costs incurred by the Contractor on such examination and notify the same to the Contractor, with a copy to the SMC, and the Contractor shall be entitled to payment of such costs by the SMC.
- 12.5.4 Any latent structural defects, if noticed within the defect liability period of ten years, the same shall be rectified at the cost of the contractor.

### **ARTICLE 13**

#### **SMC'S ENGINEER**

##### **13.1 Appointment of the SMC's Engineer**

- 13.1.1 The SMC shall nominate and appoint the engineer-in-charge who shall carry out the duties as are necessary in performance of protection of interest of SMC as also may enable parties to achieve the work as intended in terms of the contract. The engineer shall have no authority to amend or alter the contract either on time or cost basis.
- 13.1.2 The appointment of the SMC's Engineer shall be made no later than 15 (fifteen) days from the date of this Agreement. The SMC shall notify the appointment or replacement of the SMC's Engineer to the Contractor.
- 13.1.3 The staff of the SMC's Engineer shall include suitably qualified engineers and other professionals who are appointed to assist the SMC's Engineer to carry out its duties.



13.1.4 In addition to nominating SMC's engineer, SMC shall be free to engage any agency or individual in capacity of project management engineer/Third Party Inspection agency who shall assist SMC engineer in fulfilling the role and duty of an engineer as required under the contract.

### **13.2 Instructions of the SMC's Engineer**

13.2.1 The SMC's Engineer may issue to the Contractor instructions for remedying any Defect. The Contractor shall take such instructions from the SMC's Engineer, or from an assistant to whom appropriate authority has been delegated.

13.2.2 The instructions issued by the SMC's Engineer shall be in writing. However, if the SMC's Engineer issues any oral instructions to the Contractor, it shall confirm in writing the oral instructions within 2 (two) working days of issuing them.

13.2.3 In case the Contractor does not receive the confirmation of the oral instruction within the time specified, the Contractor shall seek the written confirmation of the oral instructions from the SMC's Engineer. The Contractor shall obtain acknowledgement from the SMC's Engineer of the communication seeking written confirmation. In case of failure of the SMC's Engineer or its delegated assistant to reply to the Contractor within 2 (two) days of the receipt of the communication from the Contractor, the Contractor may not carry out the instruction.

## **ARTICLE 14**

### **PAYMENTS**

#### **14.1 Contract Price**

14.1.1 The SMC shall make payments to the Contractor for work on the basis of the per DU cost quoted by the bidder in tender and sanctioned by the authority and as per tender clause of schedule of payment.

14.1.2 The Contract Price includes all duties, taxes, royalty and fees that may be levied in accordance with the laws and regulations in force as on the Base Date on the Contractor's equipment, Plant, Materials and supplies acquired for the purpose of this Agreement and on the services performed under this Agreement. Nothing in this Agreement shall relieve the Contractor from its responsibility to pay any tax, that may be levied in India (by any of the Government departments) on work execution OR profits made by it in respect of this Agreement.

14.1.3 No price escalation for change in rates of any materials will be paid /recovered by Surat Municipal Corporation.

14.1.4 Unless otherwise stated in this Agreement, the Contract Price covers all the Contractor's obligations for work under this Agreement and all things necessary for the Construction and the remedying of any Defects in the Work.

14.1.5 All payments under this Agreement shall be made in Indian Rupees.





### **14.3 Interim Payment Statement for Works**

As stated in the tender.

### **14.4 Time of payment**

15.4.1 The SMC shall pay to the Contractor any amount due under any payment certificate issued by the SMC's Engineer.

- (a) payment shall be made no later than 30 (thirty) days from the date of submission of the Interim Payment Statement by the Contractor to the SMC's Engineer for certification subject to, the submission being not required to be referred back to contractor for corrections.

### **14.5 Final Payment Statement**

14.5.1 Within 60 (sixty) days after receiving the Completion Certificate the Contractor shall submit to the SMC's Engineer for consideration six copies of a Final Payment Statement as per approved format by SMC engineer (the "Final Payment Statement") for Works, with supporting documents showing in detail, in the form prescribed by the SMC's Engineer:

- (a) the summary of Contractor's interim Payment claims for Works as submitted in accordance with contract;
- (b) the amounts received from the SMC against each claim; and
- (c) any further sums which the Contractor considers due to it from the SMC.

If the SMC's Engineer disagrees with or cannot verify any part of the Final Payment Statement, the Contractor shall submit such further information as the SMC's Engineer may reasonably require. The SMC's Engineer shall deliver to the SMC:

### **14.6 Discharge**

Upon submission of the Final Payment Statement for Works, the Contractor shall give to the SMC, with a copy to the SMC's Engineer, a written discharge confirming that the total of the Final Payment Statement represents full and final settlement of all monies due to the Contractor in respect of this Agreement for all work arising out of this Agreement, except for any monies due to either Party on account of any Defect. Provided that such discharge shall become effective only after the payment due has been made in accordance with the Final Payment Certificate issued.

### **14.9 Final Payment Certificate**

14.9.1 Within 30 (thirty) days after receipt of the Final Payment Statement for Works, and the written discharge, and there being no disputed items of claim, the SMC's Engineer shall deliver to the SMC, with a copy to the Contractor, a final payment certificate (the "Final Payment Certificate") stating the amount which, in the opinion of the SMC's Engineer, is finally due under this Agreement or otherwise. For the avoidance of doubt, before issuing the Final Payment Certificate, the SMC's Engineer shall ascertain from the SMC all amounts previously paid by the SMC and for all sums to which the SMC is entitled, the balance, if any, due from the SMC to the Contractor or from the Contractor to the SMC, as the case may be.

14.9.2 The SMC shall, pay to the Contractor the amount which is stated as being finally due in the Final Payment Certificate and in that event no further amount shall ever become due and payable to



the contractor in respect of this contract save and except as indicated in the final payment certificate.

#### **14.10 Correction of Interim Payment Certificates**

The SMC's Engineer may by an Interim Payment Certificate make any correction or modification in any previous Interim Payment Certificate issued by the SMC's Engineer.

#### **14.11 OVERPAYMENT AND UNDERPAYMENT :**

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

The Surat Municipal Corporation further reserves the right to enforce recovery of any over payment when detected.

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

### **ARTICLE 15**

#### **INSURANCE**

##### **15.1 Insurance for Works and Maintenance**

15.1.1 The Contractor shall effect and maintain at its own cost the insurances as per the requirements of SMC and Law.

15.1.2 The SMC and the Contractor shall, in accordance with its obligations as provided for in this Agreement, be liable to bear the cost of any loss or damage that does not fall within the scope of this contract or cannot be recovered from the insurers.

15.1.3 The Contractor shall, save and except as provided for in this Agreement, fully indemnify, hold harmless and defend the SMC from and against any and all losses, damages, costs, charges and/or claims with respect to:

- (a) the death of or injury to any person; or
- (b) the loss of or damage to any property (other than work);



that may arise out of or in consequence of any breach by the Contractor of this Agreement during the execution of work or the remedying of any Defects therein.

15.1.4 The SMC shall fully indemnify the Contractor from and against any and all losses, damages, costs, charges, proceedings and/or claims arising out of or with respect to

(a) the use or occupation of land or any part thereof by the SMC;

(b) the right of the SMC to execute work, or any part thereof, on, over, under, in or through any land;

(c) the damage to property which is the unavoidable result of the execution and completion of work, or the remedying of any Defects therein, in accordance with this Agreement; and

15.1.5 Without prejudice to the obligations of the Parties the Contractor shall maintain or effect such third party insurances as may be required under the Applicable Laws.

15.1.6 The Contractor shall provide to the SMC, within 30 days of the commencement Date, evidence of professional liability insurance maintained by its Design Director and/or consultants to cover the risk of professional negligence in the design of Works. The professional liability coverage shall be for a sum of not less than 3% (three per cent) of the Contract Price and shall be maintained until the end of the Defects Liability Period.

## **15.2 Notice to the SMC**

No later than 15 (fifteen) days after the date of this Agreement, the Contractor shall by notice furnish to the SMC, in reasonable detail, information in respect of the insurances that it proposes to effect and maintain in accordance with contract and trade practice. Within 15 (fifteen) days of receipt of such notice, the SMC may require the Contractor to effect and maintain such other insurances as may be necessary.

## **15.3 Evidence of Insurance Cover**

15.3.1 All insurances obtained by the Contractor in accordance with this contract shall be maintained with insurers on terms consistent with Good Industry Practice. Within 10 (Ten) days from the commencement date, the Contractor shall furnish to the SMC notarised true copies of the certificate(s) of insurance, copies of insurance policies and premium payment receipts in respect of such insurance, and no such insurance shall be cancelled, modified, or allowed to expire or lapse until the expiration of at least 45 (forty-five) days after notice of such proposed cancellation, modification or nonrenewal has been delivered by the Contractor to the SMC. The Contractor shall act in accordance with the directions of the SMC, provided that the Contractor shall produce to the SMC the insurance policies in force and the receipts for payment of the current premium.

15.3.2 The Contractor shall ensure the adequacy of the insurances at all times in accordance with the provisions of this Agreement. SMC shall be entitled to stop any payment at any time if on demand the contractor fails to satisfy SMC about all Insurance policies being held in valid and enforceable form.

## **15.4 Remedy for failure to insure**

If the Contractor shall fail to effect and keep in force all insurances for which it is responsible pursuant hereto, the SMC shall have the option to either keep in force any such insurances, and pay such premium and recover the costs thereof from the Contractor, or in the event of



computation of a Termination Payment, treat an amount equal to the Insurance Cover as deemed to have been received by the Contractor.

#### **15.5 Waiver of subrogation**

All insurance policies in respect of the insurance obtained by the Contractor shall include a waiver of any and all rights of subrogation or recovery of the insurers thereunder against, inter alia, the SMC, and its assigns, successors, undertakings and their subsidiaries, Affiliates, employees, insurers and underwriters, and of any right of the insurers to any set-off or counter claim or any other deduction, whether by attachment or otherwise, in respect of any liability of any such person insured under any such policy or in any way connected with any loss, liability or obligation covered by such policies of insurance.

#### **15.6 Contractor's waiver**

The Contractor hereby further releases, assigns and waives any and all rights of subrogation or recovery against, inter alia, the SMC and its assigns, undertakings and their subsidiaries, Affiliates, employees, successors, insurers and underwriters, which the Contractor may otherwise have or acquire in or from or in any way connected with any loss, liability or obligation covered by policies of insurance maintained or required to be maintained by the Contractor pursuant to this Agreement (other than third party liability insurance policies) or because of deductible clauses in or inadequacy of limits of any such policies of insurance.

#### **15.7 Accident or injury to workmen**

Notwithstanding anything stated in this Agreement, it is hereby expressly agreed between the Parties that the SMC shall not be liable for or in respect of any damages or compensation payable to any workman or other person in the employment of the Contractor or Sub-contractor, save and except as for death or injury resulting from any act, omission or default of the SMC, its agents or servants. The Contractor shall indemnify and keep indemnified the SMC from and against all such claims, proceedings, damages, costs, charges, and expenses whatsoever in respect of the above save and except for those acts, omissions or defaults for which the SMC shall be liable.

#### **15.8 Insurance against accident to workmen**

The Contractor shall effect and maintain during the Agreement such insurances as may be required to insure the Contractor's personnel and any other persons employed by it on the Work from and against any liability incurred. The Contractor's personnel/any person employed by the Contractor shall include the Sub-contractor and its personnel.

#### **15.9 Application of insurance proceeds**

The proceeds from all insurance claims, except for life and injury, shall be applied for any necessary repair, reconstruction, reinstatement, replacement, improvement, delivery or installation of the Work and the provisions of this Agreement in respect of construction of works shall apply mutatis mutandis to work undertaken out of the proceeds of insurance.



#### **15.10 Compliance with policy conditions**

Each Party hereby expressly agrees to fully indemnify the other Party from and against all losses and claims arising from its failure to comply with conditions imposed by the insurance policies effected in accordance with this Agreement.

### **ARTICLE 16**

#### **FORCE MAJEURE**

##### **16.1 Force Majeure**

As used in this Agreement, the expression "Force Majeure" or "Force Majeure Event" shall mean Acts of God beyond the control of human beings and those which cannot be foreseen resulting in circumstances affecting the performance of the contract. It may also include any Political, Social or Legal act whose consequence on the progress of the work would have an analogous effect as Acts of God rendering parties to this contract completely helpless to amend the situation and keep the contract performing. The only remedy against the circumstance of force majeure affecting the progress shall be grant of extension of time for performance as found reasonable in opinion of SMC and no other compensation whatsoever shall be payable or be liability of SMC.

### **ARTICLE 17**

#### **SUSPENSION OF CONTRACTOR'S RIGHTS**

##### **17.1 Suspension upon Contractor Default**

Upon occurrence of a Contractor Default, the SMC shall be entitled, without prejudice to its other rights and remedies under this Agreement including its rights of Termination hereunder, to (i) suspend carrying out of work or Maintenance or any part thereof, and (ii) carry out such Works or Maintenance itself or authorise any other person to exercise or perform the same on its behalf during such suspension (the "Suspension"). Suspension hereunder shall be effective forthwith upon issue of notice by the SMC to the Contractor and may extend up to a period not exceeding 90 (ninety) days from the date of issue of such notice.

##### **17.2 SMC to act on behalf of Contractor**

During the period of Suspension hereunder, all rights and liabilities vested in the Contractor in accordance with the provisions of this Agreement shall continue to vest therein and all things done or actions taken, including expenditure incurred by the SMC for discharging the obligations of the Contractor under and in accordance with this Agreement shall be deemed to have been done or taken for and on behalf of the Contractor and the Contractor undertakes to indemnify the SMC for all costs incurred during such period. The Contractor hereby licences and sub-licences respectively, the SMC or any other person authorised by to use during Suspension, all Intellectual Property belonging to or licensed to the Contractor with respect to the Work and its design, engineering, construction and maintenance, and which is used or created by the Contractor in performing its obligations under the Agreement.



### **17.3 Revocation of Suspension**

17.3.1 In the event that the SMC shall have rectified or removed the cause of Suspension within a period not exceeding 60 (sixty) days from the date of Suspension, it shall revoke the Suspension forthwith and restore all rights of the Contractor under this Agreement. For the avoidance of doubt, the Parties expressly agree that the SMC may, in its discretion, revoke the Suspension at any time, whether or not the cause of Suspension has been rectified or removed hereunder.

17.3.2 Upon the Contractor having cured the Contractor Default within a period not exceeding 60 (sixty) days from the date of Suspension, the SMC shall revoke the Suspension forthwith and restore all rights of the Contractor under this Agreement.

## **ARTICLE 18 TERMINATION**

### **18.1 Termination for Contractor Default**

18.1.1 Save as otherwise provided in this Agreement, in the event that any of the defaults specified below shall have occurred, and the Contractor fails to cure the default within the time limit specified by SMC the Contractor shall be deemed to be in default of this Agreement (the "Contractor Default"), unless the default has occurred solely as a result of any breach of this Agreement by the SMC or due to Force Majeure. The defaults referred to herein shall include:

- (a) the Contractor fails to provide, extend or replenish, as the case may be, the Performance Security in accordance with this Agreement;
- (b) subsequent to the replenishment or furnishing of fresh Performance Security, the Contractor fails to cure, within a Cure Period of 30 (thirty) days, the Contractor Default for which the whole or part of the Performance Security was appropriated;
- (c) the Contractor does not achieve the latest outstanding Project Milestone due in accordance with the provisions of contract, subject to any Time Extension, and continues to be in default for 45 (forty five) days;
- (d) the Contractor abandons or manifests intention to abandon the construction or Maintenance of the Work without the prior written consent of the SMC;
- (e) the Contractor fails to proceed with work in accordance with the provisions of contract or stops Works and/or the Maintenance for 30 (thirty) days without reflecting the same in the current programme and such stoppage has not been authorised by the SMC's Engineer;
- (f) failure to complete the remarks stated from EIC, items within the periods stipulated contract;
- (g) the Contractor fails to rectify any Defect, the non rectification of which shall have a Material Adverse Effect on the Project, within the time specified in this Agreement or as directed by the SMC's Engineer;
- (h) the Contractor subcontracts work or any part thereof in violation of this Agreement or assigns any part of work or the Maintenance without the prior approval of the SMC;
- (i) the Contractor creates any Encumbrance in breach of this Agreement;
- (j) an execution levied on any of the assets of the Contractor has caused a Material Adverse Effect ;
- (k) the Contractor is adjudged bankrupt or insolvent, or if a trustee or receiver is appointed for the Contractor or for the whole or material part of its assets that has a material bearing on the Project;



- (l) the Contractor has been, or is in the process of being liquidated, dissolved, wound-up, amalgamated or reconstituted in a manner that would cause, in the reasonable opinion of the SMC, a Material Adverse Effect;
  - (m) a resolution for winding up of the Contractor is passed, or any petition for winding up of the Contractor is admitted by a court of competent jurisdiction and a provisional liquidator or receiver is appointed and such order has not been set aside within 90 (ninety) days of the date thereof or the Contractor is ordered to be wound up by court except for the purpose of amalgamation or reconstruction; provided that, as part of such amalgamation or reconstruction, the entire property, assets and undertaking of the Contractor are transferred to the amalgamated or reconstructed entity and that the amalgamated or reconstructed entity has unconditionally assumed the obligations of the Contractor under this Agreement; and provided that:
    - (i) the amalgamated or reconstructed entity has the capability and experience necessary for the performance of its obligations under this Agreement; and
    - (ii) the amalgamated or reconstructed entity has the financial standing to perform its obligations under this Agreement and has a creditworthiness at least as good as that of the Contractor.
  - (n) any representation or warranty of the Contractor herein contained which is, as of the date hereof, found to be materially false or the Contractor is at any time hereafter found to be in breach thereof;
  - (o) the Contractor submits to the SMC any statement, notice or other document, in written or electronic form, which has a material effect on the SMC's rights, obligations or interests and which is false in material particulars;
  - (p) the Contractor has failed to fulfil any obligation, for which failure Termination has been specified in this Agreement; or
  - (q) the Contractor commits a default in complying with any other provision of this Agreement if such a default causes a Material Adverse Effect on the Project or on the SMC.
- 18.1.2 Without prejudice to any other rights or remedies which the SMC may have under this Agreement, upon occurrence of a Contractor Default, the SMC shall be entitled to terminate this Agreement by issuing a Termination Notice to the Contractor; provided that before issuing the Termination Notice, the SMC shall by a notice inform the Contractor of its intention to issue such Termination Notice and grant 15 (fifteen) days to the Contractor to make a representation, and may after the expiry of such 15 (fifteen) days, whether or not it is in receipt of such representation, issue the Termination Notice.
- 18.1.3 After termination of this Agreement for Contractor Default, the SMC may complete work and/or arrange for any other entities to do so. The SMC and these entities may then use any Materials, Plant and equipment, Contractor's documents and other design documents made by or on behalf of the Contractor and the contractor shall have no entitlement to remove and or take possession of any plant, machineries, materials, equipments without the consent of SMC who shall then have the entitlement to engage and use these for completing the balance work as may be in the best interest of the work. In that event the certificate of any payment, fee, charge that may be due to contractor for such use shall be final and binding.



## 18.2 Termination for SMC's convenience

Notwithstanding anything stated hereinabove, the SMC may terminate this Agreement for convenience. The termination shall take effect 30 (thirty) days from the date of notice hereunder. This shall amount to foreclosure of contract whereby the parties will treat the contract as nullified and settled the account in such a way that no party retains any unearned benefit at the point of foreclosure.

## 18.3 Requirements after Termination

Upon Termination of this Agreement, the Contractor shall comply with and conform to the following:

- (a) deliver to the SMC all Plant and Materials which shall have become the property of the SMC
- (b) deliver all relevant records, reports, Intellectual Property and other licences pertaining to work, Maintenance, other design documents and in case of Termination occurring after the Provisional Certificate has been issued, the "asbuilt" Drawings for work;
- (c) transfer and/or deliver all Applicable Permits to the extent permissible under Applicable Laws; and
- (d) vacate the Site within 15 (fifteen) days or any further period if permitted by SMC in writing.
- (e) In event contractor for whatever reason fails to vacate the site, where upon he has no permission to enter for performance of work, he shall be declared as unauthorised person and thereafter shall be liable to all actions as trespassers as and when he, his agents, vendors, sub contractor or any one without permission of SMC attempts to enter the site.

## 18.4 Valuation of Unpaid Works

18.4.1 Within a period of 45 (forty-five) days after Termination, as the case may be, has taken effect, the SMC's Engineer shall proceed to determine as follows the valuation of unpaid Works (the "Valuation of Unpaid Works"):

- (a) value of the completed stage of work, less payments already made;
- (b) reasonable value of the partially completed stages of works as on the date of Termination, only if such works conform with the Specifications and Standards; and
- (c) value of Maintenance, if any, for completed months, less payments already made, and shall adjust from the sum thereof
- (i) any other amounts payable or recoverable, as the case may be, in accordance with the provisions of this Agreement; and (ii) all taxes due to be deducted at source.
- (d) The rates to be operated for this clause shall be on SOR used for preparation of estimate adjusted for contract price quoted (% above/below estimated cost) including escalation if permissible.

18.4.2 The Valuation of Unpaid Works shall be communicated by SMC to the Contractor, within a period of 30 (thirty) days from the date of Termination.

## 18.5 Termination Payment

18.5.1 Upon Termination on account of Contractor's Default, the SMC shall:

- (a) encash and appropriate the Performance Security and Retention Money, or in the event the Contractor has failed to replenish or extend the Performance Security, claim the





amount, as agreed pre-determined compensation to the SMC for any losses, delays and cost of completing work and Maintenance, if any;

- (b) encash and appropriate the bank guarantee, if any, for and in respect of any dues as may be recoverable from the contractor.
- (c) pay to the Contractor, by way of Termination Payment, an amount equivalent to the Valuation of Unpaid Works after adjusting any other sums payable or recoverable, as the case may be, in accordance with the provisions of this Agreement.

#### **18.6 Other rights and obligations of the Parties**

Upon Termination for any reason whatsoever

- (a) property and ownership in all Materials, Plant and Works and the Workshall, as between the Contractor and the SMC, vest in the SMC in whole;
- (b) risk of loss or damage to any Materials, Plant or Works and the care and custody thereof shall pass from the Contractor to the SMC; and
- (c) the SMC shall be entitled to restrain the Contractor and any person claiming through or under the Agreement from entering upon the Site or any part of the Project except for taking possession of materials, stores, implements, construction plants and equipment of the Contractor, which have not been vested in the SMC in accordance with the provisions of this Agreement.

## **ARTICLE 19**

### **LIABILITY AND INDEMNITY**

#### **19.1 General indemnity**

The Contractor will indemnify, defend, save and hold harmless the SMC and its officers, servants, agents, Government Instrumentalities and Government owned and/or controlled entities/enterprises, (the "SMC Indemnified Persons") against any and all suits, proceedings, actions, demands and third party claims for any loss, damage, cost and expense of whatever kind and nature, whether arising out of any breach by the Contractor of any of its obligations under this Agreement or from any negligence under the Agreement, including any errors or deficiencies in the design documents, or tort or on any other ground whatsoever, except to the extent that any such suits, proceedings, actions, demands and claims have arisen due to any negligent act or omission, or breach or default of this Agreement on the part of the SMC Indemnified Persons.

#### **19.2 Indemnity by the Contractor**

19.2.1 The Contractor shall fully indemnify, hold harmless and defend the SMC and the SMC Indemnified Persons from and against any and all loss and/or damages arising out of or with respect to:

- (a) failure of the Contractor to comply with Applicable Laws and Applicable Permits;
- (b) payment of taxes required to be made by the Contractor in respect of the income or other taxes of the Sub-contractors, suppliers and representatives; or
- (c) non-payment of amounts due as a result of Materials or services furnished to the Contractor or any of its Sub-contractors which are payable by the Contractor or any of its Sub-contractors.



19.2.2 The Contractor shall fully indemnify, hold harmless and defend the SMC Indemnified Persons from and against any and all suits, proceedings, actions, claims, demands, liabilities and damages which the SMC Indemnified Persons may hereafter suffer or pay by reason of any demands, claims, suits or proceedings arising out of claims of infringement of any domestic or foreign patent rights, copyrights or other intellectual property, proprietary or confidentiality rights with respect to any materials, information, design or process used by the Contractor or by the Sub-contractors in performing the Contractor's obligations or in any way incorporated in or related to the Project. If in any such suit, action, claim or proceedings, a temporary restraint order or preliminary injunction is granted, the Contractor shall make every reasonable effort, by giving a satisfactory bond or otherwise, to secure the revocation or suspension of the injunction or restraint order. If, in any such suit, action, claim or proceedings, the Work, or any part thereof or comprised therein, is held to constitute an infringement and its use is permanently enjoined, the Contractor shall promptly make every reasonable effort to secure for the SMC a licence, at no cost to the SMC, authorizing continued use of the infringing work. If the Contractor is unable to secure such licence within a reasonable time, the Contractor shall, at its own expense, and without impairing the Specifications and Standards, either replace the affected work, or part, or process thereof with non-infringing work or part or process, or modify the same so that it becomes non-infringing.

## **ARTICLE 20**

### **LABOUR LAWS**

#### **20.1 Labour Laws to be complied by the Contractor.**

Notwithstanding any provision as may herebelow, Contractor without an exception and limitation shall be liable for complete adherence and responsibilities arising out of all the labour laws as may be in force or as may become effective from time to time. The contractor shall obtain a valid license under the Contractor Labour (R & B) Act 1970, and the Contract Labour (Regulation and Abolition) Central Rules 1971, before the commencement of the work, and continue to have a valid license until the completion of the work. The contractor shall also abide by the provisions of the Child Labour (Prohibition and Regulation) Act, 1986. The contractor shall also comply with the provisions of the building and other construction Workers (Regulation of Employment & Conditions of Service) Act, 1996 and the building and other Construction Workers Welfare Cess Act, 1996.

The contractor shall ensure the registration of all eligible workers (inclusive of those of subcontractors and petty contractors) with construction workers welfare board.

Any failure to fulfill these requirements shall attract the penal provisions of this contract arising out of the resultant non- execution of the work.

No labour below the age of fourteen years shall be employed on the work.



## 20.2 Payment of Wages:

i The contractor shall pay to labour employed by him either directly or through sub-contractors, wages not less than fair wages as defined in the Contractor's Labour Regulations or as per the provisions of the contract Labour ( Regulation and Abolition) Central Rules, 1971, wherever applicable.

ii The contractor shall, notwithstanding the provisions of any contract to the contrary, cause to be paid fair wage to labour indirectly engaged on the work, including any labour engaged by his sub-contractors in connection with the said work, as if the labour had been immediately employed by him.

iii In respect of all labour directly or indirectly employed in the works for performance of the contractor's part of this contract, the contractor shall comply with or cause to be complied with the Central Public Works Department contractor's Labour Regulations made by Government from time to time in regard to payment of wages, wages period, deductions from wages recovery of wages not paid and deductions un-authorized made, maintenance of wage books or wage slips, publication of scale of wages and other terms of employment, inspection and submission of periodical returns and all other matters of the like nature or as per the provisions of the Contract Labour (Regulation and Abolition) Act 1970, and the Contract Labour (Regulation and Abolition) Central Rules, 1971, wherever applicable.

lv (a) The Engineer-in-Charge concerned shall have the right to deduct from the money due to the contractor any sum required or estimated to be required for making good the loss suffered by a worker or workers by reasons of non-fulfillment of the conditions of the contract for the benefit of the workers, non-payment of wages or of deductions made from his or their wages which are not justified by their terms of the contract or non-observance of the Regulations.

(b) Under the provision of Minimum Wages (Central) Rules 1950, or statutory modification thereof ,the contractor is bound to allow to the labours directly or indirectly employed in the works one day rest for 6 days continuous work and pay wages at the same rate as for duty. In the event of default, the Engineer-in-Charge shall have the right to deduct the sum or sums not paid on account of wages for weekly holidays to any labours and pay the same to the persons entitled thereto from any money due to the contractor by the Engineer-in- Charge concerned.

In the case of Gujarat, however, as the all-inclusive minimum daily wages fixed under Notification of the Gujarat Administration ACT No.11 OF 1948 1\*, dated 15th MARCH,1948 as amended from time to time are inclusive of wages for the weekly day of rest, the question of extra payment for weekly holidays would not arise.

v. The contractor shall comply with the provisions of the Payment of Wages Act, 1936, Minimum Wages Act, 1948, Employees Liability Act, 1938, Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947, Maternity Benefits the modifications thereof or any other laws relating thereto and the rules made there under from time to time.



Vi The contractor shall indemnify and keep indemnified SMC against payment to be made under and for the observance of the laws aforesaid and the Contractor's Labour Regulation without prejudice to his right to claim indemnify from his sub-contractors.

Vii The laws aforesaid shall be deemed to be a part of this contract and any breach thereof shall be deemed to be a breach of this contract.

viii Whatever is the minimum wage for the time being, or if the wage payable is higher than such wage, such wage shall be paid by the contractor to the workmen directly without the intervention of Jamadar and that Jamadar shall not be entitled to deduct or recover any amount from the minimum wage payable to the workmen as and by way of commission or otherwise.

ix The contractor shall ensure that no amount by way of commission or otherwise is deducted or recovered by the Jamadar from the wage of workmen.

### **20.3 PANELTY FOR EACH DEFAULT TO PROVIDE FACILITIES:**

All provisions of concerned labour law shall be liability of the Contractor and consequences therefrom from any non compliance shall be liability of the Contractor.

It shall be expressed duty of Contractor to comply with all Welfare measures as may reasonable be expected to be discharged by the Contractor.

### **20.4 PROTECTION OF HEALTH AND SANITARY ARRANGEMENTS:**

In respect of all labour directly or indirectly employed in the works for the performance of the contractor's part of this contract, the contractor shall comply with or cause to be complied with all the rules framed by Govt. from time to time for the protection of health and sanitary arrangements for workers employed by the SMC and its contractors.

### **20.5 LEAVE AND PAY:**

Leave and pay during leave shall be regulated as follows:

#### **1. Leave:**

i) In the case of delivery-maternity leave not exceeding 8 weeks, 4 weeks up to and including the day of delivery and 4 weeks following that day,

ii) In the case of miscarriage –up to 3 weeks from the date of miscarriage.

#### **2. Pay:**

i) In the case of delivery- leave pay during maternity leave will be at the rate of the women's average daily earning, calculated on total wages earned on the days when full time work was done during a period of three months immediately preceding the date on which she



gives notice that she expects to be confined or at the rate of Rupees one only a day whichever is greater.

- ii) In the case of miscarriage – leave pay at the rate of average daily earning calculated on the total wages earned on the days when full time work was done during a period of three months immediately preceding the date of such miscarriage.

### **3. CONDITIONS FOR THE GRANT OF MATERNITY LEAVE:**

No maternity leave benefit shall be admissible to a woman unless she has been employed for a total period of not less than six months immediately preceding the date on which she proceeds on leave.

4. The contractor shall maintain a register of Maternity (Benefit) in the Prescribed Form and the same shall be kept at the place of work.

### **20.6 BREACH OF CONTRACTOR:**

In the event of the contractor(s) committing a default or breach of any of the provisions of the Contractor's Labour Regulations and Model Rules for the protection of health and sanitary arrangements for the workers as amended from time to time or furnishing any information or submitting or filling and statement under the provisions of the above Regulations and Rules which is materially incorrect, he/they shall, without prejudice to any other liability, pay to the SMC a sum not exceeding INR 200/- for every default, breach or furnishing, making, submitting, filing such materially incorrect statements and in the event of the contractor(s) defaulting continuously in this respect, the penalty may be enhanced to INR 200/- per day for each day of default subject to a maximum of 5 percent of the estimated cost of the work put to tender. The decision of the Engineer-in-Charge shall be final and binding on the parties.

Should it appear to the Engineer-in-Charge that the contractor(s) is/ are not properly observing and complying with the provisions of the Contract's Labour Regulations and Model Rules and the provisions of the Contract Labour (Regulation and Abolition) Act 1970, and the Contract Labour (R& A) Central Rules 1971, for the protection of health and sanitary arrangements for work people employed by the contractor(s) (hereinafter referred as "the said Rules") the Engineer-in-Charge shall have power to give notice in writing to the contractor(s) requiring that the said Rules be complied with and the amenities prescribed therein be provided to the work people within a reasonable time to be specified in the notice. If the contractor(s) shall fail within the period specified in the notice to comply with and/observe the said Rules and to provide the amenities to the work people as forfeited, the Engineer-in-Charge shall have the power to provide the amenities hereinbefore mentioned at the cost of the contractor(s). the contractor(s) shall erect, make and maintain at his/ their own expenses and to approved standards all necessary huts and sanitary arrangements required for his/their work people on the site in connection with the execution of the works, and if the same shall not have been created or constructed, according to approved standards, the Engineer-in-Charge shall have power to give notice in writing to the contractor(s) requiring that the said huts and sanitary arrangements be remodeled and/or reconstructed according to approved standards, and if the contractor(s) shall fail to remodel or reconstruct such huts and sanitary arrangements according to approved standards within the period specified in the notice, the Engineer-in-Charge shall have the power to remodel or reconstruct such huts and sanitary arrangements according to approved standards at the cost of the contractor(s).



**It is expected that the Contractor to comply with all Contractor's Labour Regulation Acts and Rules provided therefrom.**

#### **20.7 Employment of skilled/semi skill worker:**

The contractor shall, at all stages of work, deploy skilled/semiskilled tradesmen who are qualified and possess certificate in particular trade from CPWD Training Institute/Industrial Training Institute/National Institute of construction Management and Research (NICMAR)/ National Academy of Construction, CIDC or any similar reputed and recognized Institute mangled/certified by State/Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled/semiskilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to Engineer in charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Engineer-in-Charge. Failures on the part of contractor to obtain approval of Engineer-in-Charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of INR 100 per such tradesmen per day. Decision of Engineer in Charge as to whether particular tradesmen possess requisite skill and amount of compensation in case of default shall be final and binding.

Provided always, that the provisions of this clause shall not be applicable for works with estimated cost put to tender being less than INR 5 Crores.

#### **20.8 Minimum Wages Act to be complied with:**

The contractor shall comply with all the provisions of the Minimum Wages Act, 1948, and Contract Labour (Regulation and Abolition) Act, 1970, amended from time to time and rules framed there under and other labour laws affecting contract labour that may be brought into force time to time.

### **ARTICLE 21**

#### **SAFETY CODE, MODEL RULES FOR PROTECTION OF HEALTH & SANITARY ARRANGEMENTS FOR WORKERS EMPLOYED BY SMC OR ITS CONTRACTORS, LABOUR REGULATIONS.**

1. Suitable scaffolds should be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except such short period work as can be done safely from ladders. When a ladder is used, an extra mazdoor shall be engaged for holding the ladder and if the ladder is used for carrying materials as well suitable footholds and hand-hold shall be provided on the ladder and the ladder shall be given an inclination not steeper than 1/4 to 1 (1/4 horizontal and 1 vertical).



2. Scaffolding of staging more than 3.6m (12ft.) above the ground or floor, swung or suspended from an overhead support or erected with stationary support shall have a guard rail properly attached or bolted, braced and otherwise secured at least 90 cm. (3ft.) high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such opening as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.
3. Working platforms, gangways and stairways should be so constructed that they should not sag unduly or unequally, and if the height of the platform or the gangway or the stairway is more than 3.6m (12ft.) above ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened as described in (2) above.
4. Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of person or materials by providing suitable fencing or railing whose minimum height shall be 90 cm (3ft.).
5. Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9m. (30ft.) in length while the width between side rails in rung ladder shall in no case be less than 29 cm. (11½") for ladder up to and including 3m. (10ft.) in length. For longer ladder, this width should be increased at least ¼" for each additional 30cm. (1 foot) of length. Uniform step spacing of not more than 30 cm shall be kept. Adequate precautions shall be taken to prevent danger from electrical equipment. No materials on any of the sites or work shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The contractor shall provide all necessary fencing and lights to protect the public from accident and shall be bound to bear the expenses of defense of every suit, action or other proceedings 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 proceedings to any such person or which may, with the consent of the contractor, be paid to compensate any claim by any such person.
6. Excavation and Trenching: – All trenches 1.2m. (4ft.) or more in depth, shall at all times be supplied with at least one ladder for each 30m. (100ft.) in length or fraction thereof Ladder shall extend from bottom of the trench to at least 90 cm. (3ft.) above the surface of the ground. The side of the trenches which are 1.5m. (5ft.) 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 sides collapsing. The excavated materials shall not be placed within 1.5m. (5ft.) of the edges of the trench or half of the depth of the trench whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or undercutting shall be done.
7. Demolition: – Before any demolition work is commenced and also during the progress of the work.
  - i) All roads and open areas adjacent to the work site shall either be closed or suitably protected.
  - ii) No electric cable or apparatus which is liable to be a source of danger or a cable or apparatus used by the operator shall remain electrically charged.



- iii) All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.
8. All necessary personal safety equipment as considered adequate by the Engineer-in-Charge should be kept available for the use of the person employed on the site and maintained in a condition suitable for immediate use, and the contractor should take adequate steps to ensure proper use of equipment by those concerned: -
- 9 The Contractor shall not employ men and women below the age of 18 years on the work of painting with products containing lead in any form. Wherever men above the age of 18 are employed on the work of lead painting, the following precaution should be taken :
- 10 SMC may require, when necessary medical examination of workers.
- 11 All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.
- 12 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.
- 13 Where drinking water is obtained from an intermittent public water supply, each workplace shall be provided with storage where such drinking water shall be stored.
- 14 Every water supply or storage shall be at a distance of not less than 50 feet 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, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with a trap door which shall be dust waterproof.
- 15 A reliable pump shall be fitted to each covered well, the trap door shall be kept locked and opened only for cleaning or inspection which shall be done at least once a month.  
The contractor shall supply only potable water in the labour camp sample of water shall be drawn from the source of water supply in the labour camps every month and got tested from the Municipal Corporation's lab by the contractor. Wherever drinking water is supplied to the labour camps through tankers. Samples shall be drawn from the tankers and got tested. Water storage tanks chlorine tablets shall be added from time to time as per requirement so that portability of water remains intact No extra payment shall be made on this account.





## **ARTICLE 22 MISCELLANEOUS**

### **22.1 Governing law and jurisdiction**

This Agreement shall be construed and interpreted in accordance with and governed by the laws of India, and the courts at Surat shall have exclusive jurisdiction over matters arising out of or relating to this Agreement.

### **22.2 Waiver of immunity**

Each Party unconditionally and irrevocably:

- (a) agrees that the execution, delivery and performance by it of this Agreement constitute commercial acts done and performed for commercial purpose;
- (b) agrees that, should any proceedings be brought against it or its assets, property or revenues in any jurisdiction in relation to this Agreement or any transaction contemplated by this Agreement, no immunity (whether by reason of sovereignty or otherwise) from such proceedings shall be claimed by or on behalf of the Party with respect to its assets;
- (c) waives any right of immunity which it or its assets, property or revenues now has, may acquire in the future or which may be attributed to it in any jurisdiction; and
- (d) consents generally in respect of the enforcement of any judgement or award against it in any such proceedings to the giving of any relief or the issue of any process in any jurisdiction in connection with such proceedings (including the making, enforcement or execution against it or in respect of any assets, property or revenues whatsoever irrespective of their use or intended use of any order or judgement that may be made or given in connection therewith).

### **22.3 Delayed payments**

The interim payments shall generally be made as per the provision of the contract. However it is clearly understood that all such payments are to be treated as and by way of advance against the final consideration and therefore there shall be no entitlement of any compensation for any inconvenience on account of delay being caused in payment of interim certificate.

### **22.4 Waiver**

22.4.1 Waiver, including partial or conditional waiver, by either Party of any default by the other Party in the observance and performance of any provision of or obligations under this Agreement:-

- (a) shall not operate or be construed as a waiver of any other or subsequent default thereof or of other provisions of or obligations under this Agreement;
- (b) shall not be effective unless it is in writing and executed by a duly authorized representative of the Party; and
- (c) shall not affect the validity or enforceability of this Agreement in any manner.

22.4.2 Neither the failure by either Party to insist on any occasion upon the performance of the terms, conditions and provisions of this Agreement or any obligation there under nor time or other indulgence granted by a Party to the other Party shall be treated or deemed as waiver of such breach or acceptance of any variation or the relinquishment of any such right hereunder.



## 22.5 Liability for review of Documents and Drawings

Except to the extent expressly provided in this Agreement:

- (a) no review, comment or approval by the SMC or the SMC's Engineer of any Document or Drawing submitted by the Contractor nor any observation or inspection of the construction, or maintenance of the Work nor the failure to review, approve, comment, observe or inspect hereunder shall relieve or absolve the Contractor from its obligations, duties and liabilities under this Agreement, the Applicable Laws and Applicable Permits; and
- (b) the SMC shall not be liable to the Contractor by reason of any review, comment, approval, observation or inspection referred to in Sub-clause (a) above.

## 22.6 Exclusion of implied warranties etc.

This Agreement expressly excludes any warranty, condition or other undertaking implied at law or by custom or otherwise arising out of any other agreement between the Parties or any representation by either Party not contained in a binding legal agreement executed by both Parties.

## 22.7 Entire Agreement

This Agreement and the Schedules together constitute a complete and exclusive statement of the terms of the agreement between the Parties on the subject hereof, and no amendment or modification hereto shall be valid and effective unless such modification or amendment is agreed to in writing by the Parties and duly executed by persons especially empowered in this behalf by the respective Parties. All prior written or oral understandings, offers or other communications of every kind pertaining to this Agreement are abrogated and withdrawn. For the avoidance of doubt, the Parties hereto agree that any obligations of the Contractor arising from the Request for Qualification or Request for Proposals, as the case may be, shall be deemed to form part of this Agreement and treated as such.

## 22.8 Severability

If for any reason whatever, any provision of this Agreement is or becomes invalid, illegal or unenforceable or is declared by any court of competent jurisdiction or any other instrumentality to be invalid, illegal or unenforceable, the validity, legality or enforceability of the remaining provisions shall not be affected in any manner, and the Parties will negotiate in good faith with a view to agreeing to one or more provisions which may be substituted for such invalid, unenforceable or illegal provisions, as nearly as is practicable to such invalid, illegal or unenforceable provision. Failure to agree upon any such provisions shall not be subject to the Dispute Resolution Procedure set forth under this Agreement or otherwise.

## 22.9 Notices

Any notice or other communication to be given by any Party to the other Party under or in connection with the matters contemplated by this Agreement shall be in writing and shall be addressed to following offices.

- a) For Contractor

\_\_\_\_\_



b) For SMC

### **22.10 Counterparts**

This Agreement may be executed in two counterparts, each of which, when executed and delivered, shall constitute an original of this Agreement.

### **22.11 Limitation of Liability**

22.11.1 Neither Party shall be liable to the other Party for loss of use of any Works, loss of profit, loss of any contract or for any indirect or consequential loss or damage which may be suffered by the other Party in connection with this Agreement'

22.11.2 The total liability of one Party to the other Party under and in accordance with the provisions of this Agreement, shall not exceed the Contract Price. For the avoidance of doubt, this Clause shall not limit the liability in any case of fraud, deliberate default or reckless misconduct by the defaulting Party.

### **22.12 WORK IN MONSOON :**

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

### **22.13 ASSISTANCE TO ENGINEER-IN-CHARGE :**

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

### **22.14 NO COMPENSATION FOR ALTERATION IN OR RESTRICTION OF WORK :**

If at any time from the commencement of work, the owner shall for any reasons whatsoever not require the whole or part thereof a specified in the tender to be carried out, the Engineer-in-charge shall give notice in writing of the contractor, who shall have no claim to any payment or compensation whatsoever on account of any profit or advantage which he might have derived from execution of work in full, but which he did not derive in consequence of the full amount of the work not having been carried neither shall be have any claim for compensation by reason if any alternations having been made in original specifications, drawings, designs and instructions which shall involve any curtailment of the work as originally contemplated. When the contractor is a partnership firm, the prior approval in writing of the S.M.C. shall be obtained before any change is made in the constitution of the firm, where the contractor is an individual or a Hindu Undivided Family business concern, such approval as aforesaid shall, likewise be obtained before sub-contractor enters into any agreement with other parties whereunder the reconstituted firm would have the right to carry out the work hereby undertaken by the contractor. In either case if prior approval as aforesaid is not obtained, the contract shall be deemed to have been allotted in contravention of sub-letting clause hereof and the same action may be taken and the same consequence shall ensure as provided in the sub-letting clause.



#### **22.15 IN EVENT OF DEATH OF CONTRACTOR :**

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

#### **22.16 MEMBER OF THE OWNER NOT INDIVIDUALLY LIABLE :**

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

#### **22.17 BREACH OF CONTRACT BY CONTRACTOR :**

If the contractor fails to perform the work under the contract with due diligence or shall refuse or neglect to comply with instruction given to him, by the Engineer-in-charge in accordance with the contract, or shall contravene the provisions of the contract, the S.M.C. may give notice in writing to the contractor to make good such failure, neglect or contravention. Should the Contractor fail to comply with such written notice within twenty eight (28) days of receipt, if the Municipal Commissioner shall think fit, it shall be lawful for the Surat Municipal Corporation, without prejudice to any other rights, the contractor may have under the contract, to terminate the contract for all part of the works, and to make any other arrangements it shall deem necessary to complete the work outstanding under the contract at the time of termination. In this event Article 22.24 (Subletting of work) and 22.25 (Sub-Contracts for Temporary Works etc.) hereof shall be invoked and the performance security shall immediately become due and payable to the SMC the value of the work done on the date of termination and not paid for shall stand forfeited to the Surat Municipal Corporation and the Surat Municipal Corporation shall have entitlement to use of any works which the contractor may have at the site at the time of termination of the contract.

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

1. Contractors have to place a board showing details of work at site at his own cost as per details given by Department. i.e. Name of work, Name of Contractor, Project cost, work sanction detail, detail of work order and time limit, Address of Executive Engineer & Phone No. & Fax No.
2. If Contractor will not furnish a Photograph of the Board placed on site showing the details as above department will retain 0.25 % to 1 % of tender amount temporarily from the running bill.
3. A work of building is carried out at one plot but in the case of water supply line, drainage line etc. or any other service line, the work carried out in length, in this case one board should be placed on both ends and other boards should be placed as per the instruction of Engineer in charge.
4. The Engineer-in-Charge may require the contractor to dismiss or remove from the site of the work any person or persons in the contractors' employ on the work who may be incompetent



or misconduct himself and the contractor shall forthwith comply with such requirements. In respect of maintenance /repair of renovation works etc. where the labour have an easy access to the individual houses, the contractor shall issue identity cards to the labourers, whether temporary or permanent and he shall be responsible for any untoward action on the part of such labour. AE/JE will display a list of contractors working in the colony/ blocks on the notice board in the colony and also at the service center, to apprise the residents about the same.

- 5 It shall be the responsibility of the contractor to see that the building under construction is not occupied by any body un-authorized during construction, and is handed over to the Engineer-in- Charge with vacant possession of complete building. If such building though completed is occupied illegally, then the Engineer-in-Charge shall have the option to refuse to accept the said building/buildings in that position. Any delay in acceptance on this account will be treated as the delay in completion and for such delay a levy up to 5% of tendered value of work may be imposed by the Surat Municipal Corporation whose decision shall be final both with regard to the justification and quantum and be binding on the contractor. This decision of Surat Municipal Corporation will not be opened to any arbitration/litigation

However, the Executive Engineer, through a notice, may require the contractor to remove the illegal occupation any time on or before construction and delivery.

#### **22.19 SPECIAL NOTE :**

**Following details pertaining to work progress is mandatory.**

**(A) Bar chart:** Contractor shall submit bar chart showing schedule of execution of various activities within stipulated time limit

**(B) Material Management :** Contractor shall provide following details

- Source of materials i.e. yellow earth, Coarse aggregate, Grit, fine aggregates, bricks, cement, steel etc.
- Supply schedule : According to bar chart, the flow diagram of materials.

**(C) Man power management :**

The contractor shall submit details of manpower of various categories (skilled & unskilled labours) to be deployed for the work as under.

- Minimum no. of skilled and unskilled labors to be deployed on the work
- List of supervisors & engineers for supervision & quality control of the work.

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

**(E)** Further the contractors for services are required to produce the certified copies of paid challans in respect of employees/workers employed by said contractor in



respect of work allotted by Surat Municipal Corporation, along with copies of Pay Roll and Muster Roll. If the same are not produced, the bills will not be released.

**22.20 If Near relative working in SMC then the contractor not allowed to tender:**

The contractor shall not be permitted to tender for works in the SMC circle (Division in case of contractor of Horticulture/Nursery Categories) responsible for award and execution of contract in which his near relative is posted as Divisional Accountant or as an officer of any capacity between the grades of Surat Municipal Corporation -and Junior Engineer(both inclusive). He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and are near relatives to any Gazetted Officer in the SMC or in the Ministry of Urban Development. Any breach of this condition by the contractor would render him liable to be removed from the approved list of contractor of this Department. If however the contractor is registered in any other department, he shall be debarred from tendering in SMC for any breach of this condition.

Note: by the term "Near relatives" is meant wife, husband, parents and grandparents, children and grand-children, brothers and sisters, uncles, aunts and cousins and their corresponding inlaws.

**22.21 NO Gazetted Engineer to work as Contractor within one year of retirement:**

No engineer of gazetted rank or other gazette officer employed in engineering or administrative duties in an engineering department of the SMC shall work as contractor or employee of a contractor for a period of two years after his retirement from Government service without the previous permission of SMC in writing. This contract is liable to be cancelled if either the contractor or any of his employees is found at any time to be such a person who had not obtained the permission of SMC as aforesaid, before submission of the tender of engagement in the contractor's service, as the case may be.

**22.22 SUBLETTING OF WORKS:**

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

**22.23 SUB-CONTRACTORS FOR TEMPORARY WORKS ETC. :**

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



## **ARTICLE 23**

### **DISPUTE RESOLUTION MECHANISM**

#### **23.1 RESOLUTION OF DISPUTES :**

Except or otherwise specifically provided in the contract, all disputes concerning questions of fact arising under the contract shall be decided by the Engineer in charge, subject to a written appeal by the Contractor to the Engineer in charge and these decisions shall be final and binding on the parties hereto. Any disputes or difference including those considered as such by only one of the parties arising out of or in connection with this contract shall be to the extent possible settled amicably between the parties. If amicable settlement can not be reached then all disputed issues shall be settled as provided in (a)

##### **(a) DISPUTE OR DIFFERENCES TO BE REFERRED TO:**

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

The question or difference shall be settled by the Municipal Commissioner who shall state his decision in writing and give notice of same to the Engineer and to the contractor. Such decision shall be final & binding upon both parties to the contract and work on contract if not already breached or abandoned shall proceed normally unless and until the same shall be revised (or upheld) due to any Judicial proceeding. Should the Municipal Commissioner fail to give a decision within three (3) calendar months after issuance of notice of a question, dispute or difference or if the contractor is dissatisfied with any such decision of the Municipal Commissioner, then the matter may be referred to court of law subject to SURAT JURISDICTION .

#### **23.2 DELETION OF ARBITRATION CLAUSE**

ARBITRATION word or Clause should be considered deleted wherever written in the whole tender.

### **IN WITNESS WHEREOF THE PARTIES HAVE EXECUTED AND DELIVERED THIS AGREEMENT AS OF THE DAY, MONTH AND YEAR FIRST ABOVE WRITTEN.**

SIGNED, SEALED AND  
DELIVERED  
For and on behalf of SMC  
by:

(Signature)  
(Name)  
(Designation)

In the presence of: 1.  
2.

{COUNTERSIGNED and accepted by:  
Name and particulars of other members of the Consortium}

SIGNED, SEALED AND  
DELIVERED  
For and on behalf of  
THE CONTRACTOR by:

(Signature)  
(Name)  
(Designation)



## **Section VIII - Forms of Security and Contract Forms**

This Section contains forms which, once completed, will form part of the Contract. The forms for Performance Security and Advance Payment Security, when required, shall only be completed by the successful Bidder after contract award.

### **Table of Forms**





## **UNDERTAKING ON EARNEST MONEY SURRENDER:**

I/We hereby tender for carrying out **CONSTRUCTION OF 550 EWS-I RESIDENTIAL FLATS INCLUDING ALL INTERNAL INFRASTRUCTURE SERVICES & SITE DEVELOPMENT WORK AT T.P. SCHEME NO. 19 (PARVAT-MAGOB), F.P. NO. 100 & T.P. SCHEME NO. 41 (DINDOLI), F.P. NO. 29, UNDER "SMART CITY MISSION" ON ENGINEERING-DESIGNING, PROCUREMENT AND CONSTRUCTION BASIS (EPC MODE)** (herein before and herein after referred to a client of the work) as specified in the memorandum & under Price-Bid showing items of work to be carried out within time specified therein and in accordance with all specifications, designs, drawings and instructions in writing referred to in provisions under annexed conditions of contract under contract documents and agree that all materials of construction in the work are to be procured by us. Should this tender be accepted, I/We hereby agree to abide by and fulfil all the terms and provisions of the conditions of contract annexed thereto as fully applicable, and in default thereof, agree to forfeiture of and pay to the client, the sums of Earnest money mentioned in the said conditions.

Receipt No. \_\_\_\_\_ dated \_\_\_\_\_ from client, in respect of the sum or Rs. \_\_\_\_\_ /- deposited, be in the form of Bank Guarantee Rs. \_\_\_\_\_ /- and Pay Order/Demand Draft drawn for Rs. \_\_\_\_\_ /- bearing No. \_\_\_\_\_ dated \_\_\_\_\_ on the \_\_\_\_\_ drawn in favour of \_\_\_\_\_ is herewith forwarded representing the earnest money, the full value of which is to be absolutely forfeited to client, should I/We not deposit the full amount of security deposit specified in the memorandum, and in accordance with clause 1 of para 5.1 of the said conditions, otherwise the said sum of Rs. \_\_\_\_\_ /- shall be refunded.

Amount to be specified in figures and words.

Place :

Date :

Address :

Signature of the  
contracting agency submitting

the tender

Signed and given in presence of \_\_\_\_\_

Address :

Occupation : Signature of witness to

the contracting agency.



Rs. 100/- STAMP

**FORMAT FOR BANK GUARANTEE**

- [1] In consideration of the Terms and Conditions of an "Agreement made between Commissioner, Surat Municipal Corporation, Surat (herein after called" Surat Municipal Corporation") and..... (Contractor) (hereinafter called "Contractor" for the work of ..... (Name of work) for the ..... deposit for the due fulfillment by the contractor of the terms and conditions contained in the said agreement, We Bank of ..... (hereinafter referred to as the Bank) at the request of ..... (Name of Contractor) do hereby undertake to pay the Surat Municipal Corporation an Amount not exceeding Rs..... against any loss or damage caused to or suffered by Surat Municipal Corporation by reason of any breach of any term or condition contained in the said agreement by the said Contractor.
- [2] We Bank of..... do hereby undertake to pay the amount due and payable under this Guarantee without any demur merely on a demand from the Surat Municipal Corporation stating that the amount claimed in due by way of loss of damage caused to or would be caused to or suffered by the Surat Municipal Corporation by the reason of breach by the said contractor of any of the terms and conditions in the said agreement of by reason of the contractor failure to perform the said agreement. Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee shall be restricted to an amount not exceeding Rs.....
- [3] We undertake to pay the Surat Municipal Corporation any money so demanded notwithstanding dispute or disputes raised by the contractor. In any suit of proceeding pending before any Court or Tribunal relating thereto our liability under this present being absolute and unequivocal. The payment so made by under this bond shall be a valid discharge of our liability for payment there under and the contractor shall have no claim against us for making such payment.
- [4] We Bank of ....., ..... further agree that the guarantee herein contained shall remain in full force and effecting during the period that would be taken for the performance of the said agreement and that under or by virtue of said agreement have been fully paid and its clime satisfied or discharged or till Commissioner, Surat Municipal Corporation, Surat clarified that the terms and conditions of the said agreement have been fully and properly carried out by the said contractor and accordingly discharge this guarantee. Unless a demand or claim under this agreement is made on us in writing on or before (dt.) ..... we shall be discharged from all liability under this Guarantee thereafter.
- [5] We Bank of ..... further agree with the Surat Municipal Corporation that the Surat Municipal Corporation shall have the fullest liberty without our consent and without in any manner our obligations hereunder to vary and of the terms and conditions of the said agreement or to extend the time of performance by the said contractor from time to time or to postpone for any time or time to time any of the power



exercisable by the Surat Municipal Corporation against the said contractor and to Forbes or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any variation or extension being granted to the said contractor or for any béarnaise, act or omission of the part of the Surat Municipal Corporation or any indulgence by the Surat Municipal Corporation to the said contractor or by any such matter or thing whatsoever which under the law relating to sureties would but for his provision have of a relieving us.

[6] This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor.

[7] We Bank of ..... lastly under take not to revoke during its currency except with the previous consent of the Surat Municipal Corporation in writing.

**NOT WITH STANDING ANYTHING CONTAINED HERE IN :**

[1] Our liability under this bank guarantee is restricted to Rs.

[2] This bank guarantee is shall valid up to .....

[3] Our liability to make payment shall arise and we are liable to pay the guarantee amount or any part there of under this guarantee, only if serve upon us a written claim a demand in terms of the guarantee on or before dt. ....

THIS BANK GUARANTEE IS ENCASHABLE AT OUR BRANCH OFFICE  
AT SURAT

[4] In written of bank has executed this present the day and year first written.

Date the ..... , Month ..... , Year ..... for .....(Bank name).

**Seal, stamp and signature  
of Bank's authorized Signatory**



## SECTION IX - APPROVED LIST OF BANKS

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

- 1) Indian Bank
- 2) State Bank of India
- 3) Punjab National Bank
- 4) Bank of Baroda
- 5) Union Bank of India
- 6) Bank of India
- 7) Oriental Bank of Commerce
- 8) Canara Bank
- 9) Central Bank of India
- 10) Corporation Bank
- 11) Allahabad Bank
- 12) Indian Overseas Bank
- 13) Dena Bank
- 14) Syndicate Bank
- 15) Andhra Bank
- 16) Punjab & Sind Bank
- 17) Bank of Maharashtra
- 18) Vijaya Bank
- 19) United Bank of India
- 20) UCO Bank or Any other Nationalized Bank
- 21) IDBI
- 22) HDFC
- 23) AXIS Bank
- 24) ICICI Bank Limited
- 25) The Surat People's Co-operative Bank Ltd.
- 26) The Mehsana Urban Co-operative Bank Ltd.
- 27) Kotak Mahindra Bank
- 28) The Kalupur Commercial Co-operative Bank Ltd.
- 29) Rajkot Nagrik Sahkari Bank Ltd.
- 30) The Ahmedabad Mercantile Co-operative Bank Ltd.
- 31) Development Credit Bank Ltd.



## **SECTION X - ABBREVIATION USED IN THIS SPECIFICATION (CIVIL) WORKS.**

Sr. No.	Abbreviation	Details
1.	SMC	Surat Municipal Corporation
2.	G.W.S.S.B	Gujarat Water Supply & Sewerage Board
3.	Specification	Government of Gujarat R & B department General Technical Specifications for Building and Roads Works, and CPWD specification 2009 Vol.I & II with up to date correction slips,
4.	B.S.N.L.	Bharat Sanchar Nigam limited.
5.	C.D.O.	Central Design organization.
6.	I.I.T.	Indian institute of Technology.
7.	E.I.L.	Engineers India limited.
8.	N.B.C.C.	National Building construction Corporation Limited.
9.	EWS-I EWS-II	Economic Weaker Section
10.	W.C.	Water Closet
11.	G.I.	Galvanized iron.
12.	S.C.I.	Sand Cast iron.
13.	U.G.T/R	Underground Storage Tank/Reservoir
14.	C.C.1:1.5:3	Cement concrete 1:1.5:3 i.e. 1 cement:1.5 coarse sand:3 graded stone aggregate of approved nominal size.
15.	C.C.1:2:4	Cement concrete 1:2:4 i.e. 1 cement:2coarse sand:4 graded s tone aggregate of approved nominal size.
16.	C.C.1:3:6	Cement concrete 1:3:6 i.e. 1 cement:3 coarse sand:6 graded stoneaggregate of approved nominal size.
17.	C.C.1:4:8	Cement concrete 1:4:8 i.e. 1 cement:4 coarse sand:8 graded stoneaggregate of approved nominal size.
18.	C.C.1:5:10	Cement concrete 1:5:10 i.e. 1 cement:5 coarse sand:10 graded stoneaggregate of approved nominal size.
19.	B.W.1:3	Brick work in cement mortar 1:3 i.e. 1 Cement : 3coarse sand.
20.	B.W.1:4	Brick work in cement mortar 1:4 i.e. 1 Cement : 4 coarse sand.
21.	B.W.1:6	Brick work in cement mortar 1:6 i.e. 1 cement:6 coarse sand.
22.	R.C.C.	Reinforced cement concrete
23.	ISI	Indian Standard Institution.
24.	M.S.	Mild steel.
25.	M	Meter.
26.	Cm.	Centimeter.



27.	mm	Millimeter
28.	Kg.	Kilogram
29	Sq. m.	Square Meter
30.	A.C.	Asbestos Cement.
31.	C.P.	Chromium Plated.
32.	HDPE	High Density polyethylene
33.	S.F.R.C.	Steel Fiber Reinforced concrete.
34.	S.W.	Stone Ware.
35.	B.I.S.	Bureau of Indian standard.
36.	F.D.A.	Food Drug administration.
37.	C.B.R.I.	Central building Research institute.
38.	i/c	Including.
39.	S/S	Socketed & spigot
40.	NP-2	Non Pressure Class 2.
41.	NP-3	Non Pressure class-3
42.	C.M.1:2	Cement mortar (1 cement:2 coarse sand.)
43.	I.L.	Invert level.
44.	w.r.t.	With respect to
45.	P.O.L.	Petrol Oil and lubricants.
46.	GEB	Gujarat Electricity Board
47.	M-35	Design Mix Concrete of strength-M-35(As per IS:456)
48.	M-30	Design Mix Concrete of strength- M-30-do-
49.	M-25	Design Mix Concrete of strength-M-25 do--
50.	M-20	Ordinary cement Concrete of strength-M-20 do--
51.	M-15	Ordinary cement Concrete of strength-M-15 -do-
52.	Cum	Cubic meter
53.	CM 1:3	Cement mortar 1:3 (1Cement:3 coarse sand)
54.	CM 1:4	Cement mortar 1:4 (1Cement:4 coarse sand)
55.	CM 1:6	Cement mortar 1:6 (1Cement: 6 coarse sand)
56.	CGHS	Co-operative Group Housing Society
57.	DUs	Dwelling Units



58.	DP	Development Plan
59.	Hect.	Hectare
60.	BBL	Building Bye-Laws
61.	FAR/FSI	Floor Area Ratio, Floor space index
62.	ESS	Electric Sub-Station
63.	n.s.	Nominal Size
64.	CPWD	Central Public Works Department
65.	PWD	Public Works Department
66.	ECS	Equivalent Car Space
67.	CSC	Convenient Shopping Centre
68.	JV	Joint Venture
69.	EWS	Economical Weaker Section
70.	CGPCB	Central Govt. Pollution Control Board.
71.	St.PCB	State Pollution Control Board.
72.	PP-R	Poly propylene-Random-Co – Polymer
73.	CPVC	Chlorinated Polyvinyl-Chloride
74.	RTGS	Real Time Gross Settlement
75.	NEFT	National Electronic Fund Transfer
76.	UTR	Unique Transaction Reference
77.	SEAC	State Expert Appraisal Committee
78.	SEIAA	State Environment Impact Assessment Authority
79.	INTACH	Indian National Trust For Art and Cultural Heritage
80.	GFS	Gujarat Fire Service
81.	ISO	International Organization for Standardization
82.	IEC	International Electrotechnical Commission
83.	EIC	Engineer in charge
84.	PMC	Project management consultant
85.	TPI	Third party inspection consultant
86.	MEPF	Mechanical,Electrical,Plumbing,Fire consultant
87.	I.S.S.	Indian Standard Specification



## SECTION XI - MEMORANDUM

I/We \_\_\_\_\_ the undersigned do hereby Tender for carrying out the work described in the schedule subject to the condition annexed in schedule attached herewith in Tender documents.

(1)	General Description of work	:-	CONSTRUCTION OF 550 EWS-I RESIDENTIAL FLATS INCLUDING ALL INTERNAL INFRASTRUCTURE SERVICES & SITE DEVELOPMENT WORK AT T.P. SCHEME NO. 19 (PARVAT-MAGOB),F.P. NO. 100 & T.P. SCHEME NO. 41 (DINDOLI),F.P. NO. 29,UNDER "SMART CITY MISSION"ON ENGINEERING-DESIGNING, PROCUREMENT AND CONSTRUCTION BASIS(EPC MODE)
(2)	Estimate Cost	:-	Rs. 3535.10 lacs (with cost of cement and steel) (Prepared as per Schedule of Rates for, Surat Division -2015-16 & Market Rate for Non SOR Items)
(3)	Earnest Money Deposit	:-	Rs.35.36 lacs (Rs. Thirty Five Lacs and Thirty Six Thousand Only)
(4)	Performance Security	:-	<p>10% of Contract Value (Out of total Performance Security 10% of the contract value, initial Performance Security at 5% of the contract value shall be deposited by the bidder in the form of FDR/BG of listed nationalized Bank within 15 days on acceptance of tender, and remaining Performance Security shall be deducted from the each R.A. Bill at rate of 5%)</p> <p><b>In case of unbalanced offer being found by SMC contractor may be asked to deposit additional performance security as provided in the contract In case of unbalanced offer being found by SMC contractor may be asked to deposit additional performance security as provided in the contract</b></p>





	Total Performance Security		Rs. 10% of tender amount (Article-5) <b>In case of unbalanced offer being found by SMC contractor may be asked to deposit additional performance security as provided in the contract</b>
(5)	Retention Money	:-	7 % of total amount of work done (shall be released at the time of final bill)
(6)	Time allowed for the completion of work from date fixed in written order to commence	:-	21 (Twenty one) Months (Including monsoon)
(7)	Penalty for delayed work	:-	In event of these Milestones not having being achieved, an amount computed at 0.2% of Remaining Amount of Work per day subject to a Maximum of 10% of Total Contract Value shall be retained.  Liquidated Damages shall start being retained as per contract on value of Remaining work on not achieving intermediate <u>Milestones 1,2,3</u> .  The Liquidated damages shall be released without interest or charges if contractor achieves <u>Milestone 4</u> before completion of approved time limit including extension of time limit, if approved or else the same shall be adjusted as Liquidated Damages for delay in performance.
(8)	The progress of work should confirm to the following schedule		
	Financial Target (% of contract value) - 10%	:-	25 % of the time limit
	Financial Target (% of contract value) - 50%	:-	40 % of the time limit
	Financial Target (% of contract value) - 75%	:-	75 % of the time limit
	Financial Target (% of contract value) - 100%		100 % of the time limit
(9)	Defect liability period	:-	10 (ten) years after issue of completion certificate



(10)	Construction Cess	:-	1% of Total work done & to be deducted in every bill
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SIGNATURE OF THE CONTRACTOR.

NAME AND ADDRESS :-

EXECUTIVE ENGINEER  
SLUM UPGRADATION DEPARTMENT  
SURAT MUNICIPAL CORPORATION



## SECTION XII - SCHEDULE OF PAYMENT AT VARIOUS STAGES

**Name of work :- CONSTRUCTION OF 550 EWS-I RESIDENTIAL FLATS INCLUDING ALL INTERNAL INFRASTRUCTURE SERVICES & SITE DEVELOPMENT WORK AT T.P. SCHEME NO. 19 (PARVAT-MAGOB),F.P. NO. 100 & T.P. SCHEME NO. 41 (DINDOLI),F.P. NO. 29,UNDER "SMART CITY MISSION" ON ENGINEERING-DESIGNING, PROCUREMENT AND CONSTRUCTION BASIS(EPC MODE)**

- 1) Total fees quoted by successful contractors per DU : A
- 2) Total Project Cost(Ax No. of DUs): B
- 3) Payment Payable in Running Bills & Final Bill : C (100% of B)
- 4) Preconstruction Activity payment : D = 1% of C
- 5) Civil Works : E =87% of C
- 6) Infrastructure Services : F =9% of C
- 7) Post Construction Activities : G= 3% of C

**Note : Payment for all kind of below mentioned different activities shall be done on per DUs bases**

Sr. No	Description	Payment to be Released
<b>STAGE 1 : PRECONSTRUCTION ACTIVITIES</b>		
<b>D-1</b>	On Submission and approval of Preliminary project report & On approval of all Architectural Drawings, layout, building plans etc from approval authority	0.25% of A X No. of Dus for which work is executed
<b>D-2</b>	Submission of foundation designs and complete structural drawings for superstructure and onapproval from proof check consultant	0.25% of A X No. of Dus for which work is executed
<b>D-3</b>	Submission and approval of all services plans i.e, (Drainage ,Road network, W/s network, Gasline Network, Fire Safety works etc) from competent authority	0.25% of A X No. of Dus for which work is executed
<b>D-4</b>	Actual laying out at site, Contractor office, water supply and electricity arrangement, labour camp with toilets and baths etc. and on completion of all other required preconstruction activities as decided by SMC	0.25% of A X No. of Dus for which work is executed
<b>TOTAL PAYMENT PAYABLE UPTO STAGE 1 = 1% of Total Fees Quoted by Successful contractors</b>		
<b>STAGE 2 : CIVIL WORKS</b>		
<b>E-1</b>	Completion of work upto plinth	8% of A X Total No. of Dus of each building for which work is executed
<b>E-2</b>	Completion of RCC work for U.G WATER TANK as per required norms including all necessary water proofinginside & out side (also Top slab of tank) and tiles fitting and covering and as per instruction of engineer in charge	0.40% of A X No. of Dus for which work is executed
	Completion of RCC Frame work as per instruction of engineer in charge	29% of A X No. of Dus for which work is executed
	Completion of RCC work for Terrace parapet Pardi , Stair cabin , Lift machine room, O.H WATER TANK as per required norms including all necessary water proofing and tiles fitting and covering and as per instruction of engineer in charge	0.60% of A X No. of Dus for which work is executed
<b>E-3</b>	Completion of Masonary Work+RCC lintal & chhaja, door frame	10% of A X No. of Dus for



	fitting , which include ground floor servant room , foyer , electric panel walls& terrace level stair cabin , lift machine room ect. ( per floor wise payment will be considered, ground floor brick work will be paid with first floor brick work payment, lift machine room & stair cabin , OTS parapet brick work will be included in last floor brick work )	which work is executed
<b>E-4</b>	Completion of Internal Plaster on wall & ceiling Work which include ground floor servant room , foyer , electric panel wall & terrace level stair cabin , lift machine room ect. ( per floor wise payment will consider & for ground floor work 70% of per floor payment will be done, lift machine room & stair cabin , ots parapet plaster work will be included in last floor with work extra 30% will be paid for last floor payment)	6% of A X No. of Dus for which work is executed
<b>E-5</b>	Completion of External plaster. (Including all ghisi,patta,drips and patterns)	7 % of A X Total No. of Dus of each building for which work is executed
<b>E-6</b>	Completion of Internal Plumbing and Sanitation works(Including plumbing of treated sewage water for flushing in toilets).	1.5 % of A X No. of Dus for which work is executed
<b>E-7</b>	Completion of External Plumbing and sanitation ( Payment will release on full completion of external plumbing-Drainage work )	1.75% of A X Total No. of Dus of each building for which work is executed
<b>E-8</b>	Completion of Flooring at ground floor parking area including entrance foyer with lift wall cladding & stair riser/tread complete.	1.0 % of A X Total No. of Dus of each building for which work is executed
	Completion of all Flooring work including skirting,dedo & water proofing of toilets and wash area , lift wall cladding , stair riser/tread etc	5.0 % of A X No. of Dus for which work is executed
	Completion of Granite/Marble frame work for doors & window as Details	1.0 % of A X No. of Dus for which work is executed
<b>E-9</b>	Completion of fixing of all Door Shutters/PVC Shutters including all fittings & fastening etc. complete	2.25 % of A X No. of Dus for which work is executed
<b>E-10</b>	Completion of Alluminium Windows / ventilation fittings including all work.	2.25 % of A X No. of Dus for which work is executed
<b>E-11</b>	Completion of M.S. Grill and other fabrication works	0.75 % of A X No. of Dus for which work is executed
<b>E-12</b>	Completion of Internal electrification including all cable laying upto meter area including parking electrification for Parking Level.	0.5 % of A X Total No. of Dus of each building for which work is executed
	Completion of Internal electrification including all cable laying upto meter area (All floors). Terrace electrification will be included in 8th floor work.	3.5% of A X No. of Dus for which work is executed
<b>E-13</b>	Completion of Internal painting on wall & ceiling Work which include ground floor servant room , foyer , electric panel wall & terrace level stair cabin , lift machine room ect. ( per floor wise payment will be considered , ground floor work will be paid 70% of equal division, lift machine room & stair cabin , ots parapet painting workwill be included in 8th floor work payment with extra 30% of equal division)	1.5% of A X No. of Dus for which work is executed
<b>E-14</b>	Completion of External painting	0.5% of A X Total No. of Dus of each building for which work is executed



<b>E-15</b>	Completion of Terrace water proofing	0.5% of A X Total No. of Dus of each building for which work is executed
<b>E-16</b>	Supplying of lifts on site	2.0% of A X Total No. of Dus of each building for which work is executed
<b>E-17</b>	Erection of lifts on site with full working condition & Obtaining NOC	2.0% of A X Total No. of Dus of each building for which work is executed
<b>TOTAL PAYMENT PAYABLE UPTO STAGE 2 = 87% of Total Fees Quoted by Successful contractors</b>		
<b>STAGE 3 : INFRASTRUCTURE WORKS</b>		
<b>F-1</b>	Laying and completion of Drainage network with all necessary connections and on submission of final certificates of payment charges from competent authority	0.70% of A X Total No. of Dus of project
<b>F-2</b>	Supply, Installation, Testing and Commissioning of Tertiary Sewage Treatment Plant (TSTP) for Toilet Flushing Water and Gardening within campus.	1.00 % of A X Total No. of Dus of project
<b>F-3</b>	Laying and completion of water Supply network with all necessary connections and Water Meter Connections for Water supply with final certificates of payment of charges from competent authority	0.50% of A X Total No. of Dus of project
<b>F-4</b>	Completion of RCC work for FIRE WATER TANK as per required norms including all necessary water proofing and tiles fitting and covering and as per instruction of engineer in charge	0.30% of A X Total No. of Dus of project
<b>F-5</b>	Laying and completion of Fire Fighting network with all necessary connections and NOC from competent authority including fire pump & pump room	1.00% of A X Total No. of Dus of project
<b>F-6</b>	Laying and completion of GAS Supply network with all necessary connections and final certificates of charging of line from competent authority	0.50% of A X Total No. of Dus of project
	Construction & Completion of C.C. Road and Paver Blocks in campus	1.0% of A X Total No. of Dus of project
<b>F-7</b>	Construction & Completion of Vacuum Dewatering System concrete and Paver Blocks pavement in marginal areas	1.0% of A X Total No. of Dus of project
<b>F-8</b>	Construction & Completion of Compound wall and Entry gate(s) with all MS fabrication works including colour works etc. complete.	1.0% of A X Total No. of Dus of project
<b>F-9</b>	Growing of Trees as per norms in all Plot areas as per approved Drawing of your landscape architect and as per instruction of Engineer in Charge	0.10 % of A X Total No. of Dus of project
<b>F-10</b>	Erection of Street light poles as per norms in all Plot areas as per approved Drawing of your architect and as per instruction of Engineer in Charge	0.50 % of A X Total No. of Dus of project
<b>F-11</b>	Supplying, Erection, Commissioning and Testing for required Nos. of DG Sets on suitable foundation above plinth level with all necessary precaution and safety measures and as per norms for relevant power supply for commissioning of lifts and water pumps in case of failure of power supply as per instruction of Engineer in charge with all necessary Certificates . Payment per	0.70 % of A X Total No. of Dus of project



	D.G. set = Total Payment/Total nos of D.G. set in campus.	
<b>F-12</b>	Supplying, Erection, Commissioning and Testing for organic waste disposal system as per norms of authority	0.20 % of A X Total No. of Dus of project
<b>F-13</b>	Development of Common Open Area (Garden Recreation and Landscaping) as per approved landscape drawing submitted by architect as per instruction of Engineer in charge.	0.50 % of A X Total No. of Dus of project
<b>TOTAL PAYMENT PAYABLE UPTO STAGE 3 = 9% of Total Fees Quoted by Successful contractors</b>		
<b>STAGE 4 : POST CONSTRUCTION ACTIVITIES</b>		
<b>G-1</b>	Operation and Maintenance of TSTP for first 12 months after Commissioning	0.50 % of A X Total No. of Dus of project
<b>G-2</b>	Operation and Maintenance of TSTP for Second 12 months after commissioning	0.50 % of A X Total No. of Dus of project
<b>G-3</b>	Providing and Liaisoning with competent authority regarding installation of Transformer and Low/High Tension Underground Electric supply lines and availing meter connections for FLAT and 3-Phase Meter related to common amenities like LIFT, Fire pumps, street light, parking lights etc., as per required norms with all necessary precautionary and safety measures under instruction of Engineer in Charge and with all necessary certificates	0.60 % of A X Total No. of Dus of project
<b>G-4</b>	Liaisoning with competent authority and acquired Building Use Certificate (BUC) with all required norms	0.10 % of A X Total No. of Dus of project
<b>G-5</b>	Clear Indication of Society names and Building Names on 304 S.S Grade white powder quoted letters in required nos., and laying of Flat no-Floor Nos.-Lift nos.-Meter Nos. and other informationary boards as directed by Engineer in charge	0.10 % of A X Total No. of Dus of project
<b>G-6</b>	Cleaning and Clearing all the Construction waste from site and handling over neat and clean society campus along with cleaning of each and every flat, terracc, parking, all watertanks, and provide neat and hygienic habitat for living including locking of each flat alongwith key with marking of FLAT no on each keychain.	0.20 % of A X Total No. of Dus of project
<b>G-7</b>	Successful Completion of projects and Handing over the keys to beneficiaries with formation of RWA.	1.0 % of A X Total No. of Dus of project
<b>TOTAL PAYMENT PAYABLE UPTO STAGE 4 = 3% of Total Fees Quoted by Successful contractors</b>		
<b>TOTAL PAYMENT MADE FOR (Stage-(1)+ Stage-(2)+ Stage-(3)+ Stage-(4) = (100%)</b>		

**Special Note:-**

1. Power to release prorata payment for any activity will remain with SMC.
2. The payment breakup is considered for ease in release of stage wise payment.  
In any case the total payment shall not be increased than total sanctioned amount.
3. The payment will be released on completion of work of each stage & each floor .



4. The pro-rata payment will be done as per completion of each floor work.
5. The decision of engineer in-charge will be final for consideration of pro-rata payment and shall be binding to the contractor.
6. The contractor can submit R.A. bill on Stage wise completion of each floor-work .
7. The Retention money at 7 % shall be deducted from each R.A. bill.
8. The security deposit @ 5% shall be deducted from each R.A. bill.

<b>MODE OF PAYMENT</b>					
<b>EXAMPLE FOR MODE OF PAYMENT</b>					
1	A	Quoted Rate per Dus by Contractor	6,00,000.00		
2	B	Total nos of Dus	320		
3	C	Total nos of Building in layout plan	5		
4	D	Nos of floor in each building considering 8 Dus per floor	8		
5	E	Total Amount quoted by successful contractors		A X B	19,20,00,000.00
6	STAGE-1	Pre construction Activity payment		1% of (E)	19,20,000.00
7	STAGE-2	Civil Works		87% of (E)	16,70,40,000.00
8	STAGE-3	Infrastructure Services		9% of (E)	1,72,80,000.00
9	STAGE-4	Post Construction Activities		3% of (E)	57,60,000.00
10	TOTAL				19,20,00,000.00



	PAYMENT OF STAGE-1 TO STAGE-4				
NOTE :	Payment for all kind of below mentioned different activities shall be done on per DUs bases				
DESCRIPTION AND MODE OF PAYMENT FOR ALL ACTIVITIES					
Sr.No.	Description	Payment to be Released		Illustration	
STAGE 1 : PRECONSTRUCTION ACTIVITIES ( CONSIDERING TOTAL Dus OF PROJECT )					
B-1	On Submission and approval of Preliminary project report & On approval of all Architectural Drawings, layout, building plans etc from approval authority	0.25% of A X No. of Dus for which work is executed	0.25% of 600000 X 320	480000.00	
B-2	Submission of foundation designs and complete structural drawings for superstructure and onapproval from proof check consultant	0.25% of A X No. of Dus for which work is executed	0.25% of 600000 X 320	480000.00	
B-3	Submission and approval of all services plans i.e, (Drainage network, W/s network, Gasline Network, Fire Safety works etc) from competent authority	0.25% of A X No. of Dus for which work is executed	0.25% of 600000 X 320	480000.00	
B-4	Actual laying out at site, Contractor office, water supply and electricity arrangement, labour camp with toilets and baths etc. and on completion of all other required preconstruction activities as decided by SMC	0.25% of A X No. of Dus for which work is executed	0.25% of 600000 X 320	480000.00	
( B1 )TOTAL PAYMENT PAYABLE UPTO STAGE 1 = 1% of Total Amount Quoted by Successful contractors				1920000.00	
STAGE 2 : CIVIL WORKS (CALCULATION SHOWING FOR ONE BUILDING HAVING TOTAL 64 DUs ONLY)					
C-1	Completion of work upto plinth	8% of A X Total No. of Dus of each building for which work is executed	8% of 600000 X 64	3072000.00	
C-2	Completion of RCC work for U.G WATER TANK as per required norms including all necessary water proofing and tiles fitting and covering and as per instruction of engineer in charge	0.40% of A X No. of Dus for which work is executed	0.4% of 600000 X 64	153600.00	





	Completion of RCC Frame work as per instruction of engineer in charge ( For Parking + 8 story building , RCC Slab will be 9 nos) , per slab payment will be 11136000/nos of slab = Rs 1237333.33	29% of A X No. of Dus for which work is executed	29% of 600000 X 64	11136000.00
	Completion of RCC work for Terrace Pardi , Stair cabin , Lift machine room O.H WATER TANK as per required norms including all necessary water proofing and tiles fitting and covering and as per instruction of engineer in charge	0.60% of A X No. of Dus for which work is executed	0.6% of 600000 X 64	230400.00
C-3	Completion of Masonary Work+RCC lintal & chhaja, door frame fitting , which include ground floor servant room , foyer , electric panel wall & terrace level stair cabin , lift machine room ect. ( per floor wise payment will be considered, ground floor brick work will be paid with first floor brick work payment, lift machine room & stair cabin , ots parapet brick work will be included in 8th floor brick work ) i.e. per floor brick work payment will be Rs 3840000/8 = Rs 480000.00	10% of A X No. of Dus for which work is executed	10% of 600000 X 64	3840000.00
C-4	Completion of Internal Plaster on wall & ceiling Work which include ground floor servant room , foyer , electric panel wall & terrace level stair cabin , lift machine room ect. ( per floor wise payment will consider & for ground floor work 70% of per floor payment will be done, lift machine room & stair cabin , ots parapet plaster work will be included in 8th floor with work extra 30% will be paid for 8th floor payment) i.e. per typical floor plaster work payment will be Rs 2304000/9 = Rs 256000.00 . For GF 0.70 X 256000 = RS. 179200.00 , For 8th Floor 1.30 x 256000 = Rs 332800.00	6% of A X No. of Dus for which work is executed	6% of 600000 X 64	2304000.00
C-5	Completion of External plaster .	7% of A X Total No. of Dus of each building for which work is executed	7% of 600000 X 64	2688000.00
C-6	Completion of Internal Plumbing and Sanitaion works	1.5% of A X No. of Dus for which work is executed	1.5% of 600000 X 64	576000.00
C-7	Completion of External Plumbing and sanitation ( Payment will release on full completion of external plumbing work )	1.75% of A X Total No. of Dus of each building for	1.75% of 600000 X 64	672000.00



		which work is executed		
C-8	Completion of Flooring at ground floor parking area including entrance foyer with lift wall cladding & strair riser/tread complete	1.0 % of A X Total No. of Dus of each building for which work is executed	1% of 600000 X 64	384000.00
	Completion of all Flooring work including skirting,dedo & water proofing of toilets and wash area , lift wall cladding , stair riser/tread etc	5.0 % of A X No. of Dus for which work is executed	5% of 600000 X 64	1920000.00
	Completion of Granite/Marble frame work around doors & window as Details	1.0 % of A X No. of Dus for which work is executed	1% of 600000 X 64	384000.00
C-9	Completion of fixing of all Door Shutters including all fittings & fastening etc. complete	2.25% of A X No. of Dus for which work is executed	2.25% of 600000 X 64	864000.00
C-10	Completion of Alluminium Windows / ventilation fittings including all work.	2.25% of A X No. of Dus for which work is executed	2.25% of 600000 X 64	864000.00
C-11	Completion of M.S. Grill and other fabrication works	0.75% of A X No. of Dus for which work is executed	0.75% of 600000 X 64	288000.00
C-12	Completion of Internal electrification including all cable laying upto meter area including parking electrification for Parking Level.	0.5 % of A X Total No. of Dus of each building for which work is executed	0.5% of 600000 X 64	192000.00
C-13	Completion of Internal electrification including all cable laying upto meter area (All floors). Terrace electrification will be included in 8th floor work.	3.5% of A X No. of Dus for which work is executed	3.5% of 600000 X 64	1344000.00
C-14	Completion of Internal painting on wall & ceiling Work which include ground floor servant room , foyer , electric panel wall & terrace level stair cabin , lift macine room ect. ( per floor wise payment will be considered , ground floor work will be paid 70% of equal division, lift machine room & stair cabin , ots parapet painting workwill be included in 8th floor work payment with extra 30% of equal division) i.e. per typical floor painting work payment will be Rs 576000/9 = Rs 64000.00 . For GF 0.70 X 64000.00 = RS. 44800.00 , For 8th Floor 1.30 x 64000.00 = Rs 83200.00	1.5% of A X No. of Dus for which work is executed	1.5% of 600000 X 64	576000.00



C-15	Completion of External painting	0.5% of A X Total No. of Dus of each building for which work is executed	0.5% of 600000 X 64	192000.00
C-16	Completion of Terrace water proofing	0.5% of A X Total No. of Dus of each building for which work is executed	0.5% of 600000 X 64	192000.00
C-17	Supplying of lifts on site	2.0% of A X Total No. of Dus of each building for which work is executed	2% of 600000 X 64	768000.00
C-18	Erection of lifts on site with full working condition & Obtaining NOC	2.0% of A X Total No. of Dus of each building for which work is executed	2% of 600000 X 64	768000.00
TOTAL PAYMENT PAYABLE UPTO STAGE 2 = 87% of Total Fees Quoted by Successful contractors				33408000.00
(C1) FOR FIVE BUILDING IN LAYOUT			C1 * 5	167040000.00
STAGE 3 : INFRASTRUCTURE WORKS ( CONSIDERING TOTAL DUs OF PROJECT )				
D-1	Laying and completion of Drainage network with all necessary connections and on submission of final certificates of payment charges from competent authority	0.70% of A X Total No. of Dus of project	0.70% of 600000 X 320	1344000.00
D-2	Supply, Installation, Testing and Commissioning of Tertiary Sewage Treatment Plant (TSTP) for Toilet Flushing Water and Gardening within campus.	1.00 % of A X Total No. of Dus of project	1.00% of 600000 X 320	1920000.00
D-3	Laying and completion of water Supply network with all necessary connections and Water Meter Connections for Water supply with final certificates of payment of charges from competent authority	0.50% of A X Total No. of Dus of project	0.50% of 600000 X 320	960000.00
D-4	Completion of RCC work for FIRE WATER TANK as per required norms including all necessary water proofing and tiles fitting and covering and as per instruction of engineer in charge	0.30% of A X Total No. of Dus of project	0.30% of 600000 X 320	576000.00



D-5	Laying and completion of Fire Fighting network with all necessary connections and NOC from competent authority including fire pump & pump room	1.00% of A X Total No. of Dus of project	1.0% of 600000 X 320	1920000.00
D-6	Laying and completion of GAS Supply network with all necessary connections and final certificates of charging of line from competent authority	0.50% of A X Total No. of Dus of project	0.50% of 600000 X 320	960000.00
D-7	Construction & Completion of C.C. Road and Paver Blocks in campus	1.0% of A X Total No. of Dus of project	1.0% of 600000 X 320	1920000.00
D-8	Construction & Completion of Vaccum Dewatering System concrete and Paver Blocks pavement in marginal areas	1.0% of A X Total No. of Dus of project	1.0% of 600000 X 320	1920000.00
D-9	Construction & Completion of Compound wall and Entry gate(s) with all MS fabrication works including colour works etc. complete.	1.0% of A X Total No. of Dus of project	1.0% of 600000 X 320	1920000.00
D-10	Growing of Trees as per norms in all Plot areas as per Suggested Drawing of your landscape architect and as per instruction of Engineer in Charge	0.10 % of A X Total No. of Dus of project	0.10 % of 600000 X 320	192000.00
D-11	Erection of Street light poles as per norms in all Plot areas as per Suggested Drawing of your architect and as per instruction of Engineer in Charge	0.50 % of A X Total No. of Dus of project	0.50 % of 600000 X 320	960000.00
D-12	Supplying, Erection, Comissioning and Testing for required Nos. of DG Sets on suitable foundation above plinth level with all necessary precaution and safety measures and as per norms for relavent power supply for commisioning of lifts and water pumps in case of failure of power supply as per instruction of Engineer in charge with all necessary Certificates . Payment per D.G. set = Total Payment/Total nos of D.G. set in campus.	0.70 % of A X Total No. of Dus of project	0.70 % of 600000 X 320	1344000.00
D-13	Supplying, Erection, Comissioning and Testing for organic waste disposal system as per norms of authority	0.20 % of A X Total No. of Dus of project	0.20 % of 600000 X 320	384000.00
D-14	Development of Common Open Area (Garden Recreation and Landsapping) as per approved landscape drawing submitted by architect as per instruction of Engineer in charge.	0.50 % of A X Total No. of Dus of project	0.50 % of 600000 X 320	960000.00



( D1 ) TOTAL PAYMENT PAYABLE UPTO STAGE 3 = 9% of Total Fees Quoted by Successful contractors				17280000.00
STAGE 4 : POST CONSTRUCTION ACTIVITIES				
1	Operation and Maintenance of TSTP for first 12 months after Commissioning	0.50 % of A X Total No. of Dus of project	0.50 % of 600000 X 320	960000.00
2	Operation and Maintenance of TSTP for Second 12 months after commissioning	0.50 % of A X Total No. of Dus of project	0.50 % of 600000 X 320	960000.00
3	Providing and Liasoning with competent authority regarding installation of Tranformer and Low/High Tension Underground Electric supply lines and availing meter connections for FLAT and 3-Phase Meter related to common amenities like LIFT, Fire pumps, street light, parking lights etc., as per required norms with all necessary precautionary and safety measures under instruction of Engineer in Charge and with all necessary certificates	0.60 % of A X Total No. of Dus of project	0.60 % of 600000 X 320	1152000.00
4	Liasoning with competent authority and acquired Building Use Certificate (BUC) with all required norms	0.10 % of A X Total No. of Dus of project	0.10 % of 600000 X 320	192000.00
5	Clear Indication of Society names and Building Names on 304 S.S Grade white powder quoted letters in required nos., and laying of Flat no-Floor Nos.-Lift nos.-Meter Nos. and other informationary boards as directed by Engineer in charge	0.10 % of A X Total No. of Dus of project	0.10 % of 600000 X 320	192000.00
6	Cleaning and Clearing all the Construction waste from site and handling over neat and clean society campus along with cleaning of each and every flat,terracc,parking,all watertanks,and provide neat and hygienic habitat for living including locking of each flat alongwith key with marking of FLAT no on each keychain.	0.20 % of A X Total No. of Dus of project	0.20 % of 600000 X 320	384000.00
7	Successful Completion of projects and Handing over the keys to beneficiaries with formation of RWA.	1.0 % of A X Total No. of Dus of project	1.0 % of 600000 X 320	1920000.00
( E1 ) TOTAL PAYMENT PAYABLE UPTO STAGE 4 = 3% of Total Fees Quoted by Successful contractors				5760000.00
TOTAL PAYMENT MADE (B1+C1+D1+E1)				19,20,00,000.00



### SECTION XIII I.S. CODES

IS Code No.	Subject
<b>GENERAL</b>	
IS 4082	Stacking & storage of construction materials and components at site – Recommendations
IS 1200	Method of measurement of building and civil engineering work.(All Parts)
IS 1141	Seasoning of Timber – Code of practice
<b>EARTH WORK</b>	
IS 3674	Safety code for excavation work
IS 1498	Classification and identification of soils for general engineering purposes.
IS 1200 (Pt-1)	Method of measurement of earth work
IS 1200 (Pt-27)	Method of measurement of earth work (by Mechanical Appliances)
IS 4081	Safety code for Blasting and related drilling operation
IS 41000 (Part-IV)	Excavators
IS 6313 (Pt-II)	Anti Termite measures in buildings (pre-constructional)
IS 6313 (Pt-III)	Anti Termite measures in buildings for existing buildings
IS 6940	Methods of test for pesticides and their formulations
IS 8944	Chlorpyrifos emulsifiable concentrates
IS 8963	Chlorpyrifos – Technical specifications
IS 12138	Earth moving equipments
<b>MORTARS</b>	
IS 269	Specification for 33 grade ordinary Portland cement
IS 455	Specification for Portland slag cement
IS 650	Specification for standard sand for testing of cement
IS 1269	Specification for 53 grade ordinary Portland cement
IS 1542	Specification for sand for plaster
IS 2116	Specification for sand for masonry mortar
IS 2250	Code of practice for preparation and use of masonry Mortar
IS 3025	Method of sampling and test for water
IS 3406	Specification for masonry cement
IS 3812 (Part-I)	Specification for flyash for use as pozzolana in cement mortar and concrete



IS 3812 (Part-II)	Specification for flyash for use as admixture in cement mortar and concrete
IS 8041	Rapid hardening Portland cement
IS 8042	Specification for white cement
IS 8112	Specification for 43 grade ordinary Portland cement
IS 1298	Methods of test for determination of free lime in portland cement
IS 6452	High alumina cement for structural use
IS 1489	Portland Pozzolana Cement
<b>CONCRETE WORK</b>	
IS 383	Specification for coarse and fine aggregate from natural source for concrete
IS 303	Coarse and fine aggregates from natural sources for concrete
IS 1830	Methods for sampling of aggregates for concrete
IS 2386	Method of test for aggregates for concrete
(a) Part-I : Particle size and shape	
(b) Part-II : Estimation of deleterious materials and organic impurities	
(c) Part-III : Specific gravity, density, voids absorption and bulking	
(d) Part-IV : Mechanical properties	
(e) Part-V : Soundness	
IS 2505	General requirements for concrete vibrators –immersion type
IS 2506	General requirements for concrete vibrators – screedboard concrete vibrators
IS 2645	Specification for integral water proofing compounds for cement mortar and concrete
IS 761 (Part-I)	Code of practice for extreme weather concreting (Part-I) recommended practice for hot weather concrete
IS 7861 (Part-II)	Code of practice for extreme weather concreting (Part-II) recommended
IS 9103	Specification for concrete admixtures
IS 460	Test sieves
IS 1607	Methods for dry sieving



IS 1834	Hot applied sealing compounds for jointing concrete
<b>REINFORCED CEMENT CONCRETE WORK</b>	
IS 1904	Structural safety of buildings, shallow foundation
IS 1893	Criteria for earthquake resistant design of structures
IS 432 (Part-I)	Specification for mild steel and medium tensile steelbars and hard drawn steel wire for concrete reinforcement part-I mild steel and medium tensile steel bars
IS 432 (part-II)	Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement part-II hard drawn steel wire
IS 456	Code of practice for plain and reinforced concrete
IS 516	Method of test for strength of concrete
IS 1200 (Part-II)	Method of measurement of building and civil engineering work – concrete work
IS 1200 (Part-V)	Method of measurement of building and civil engineering work – concrete work (Part 5 – Form work)
IS 1566	Specification for hard drawn steel wire fabric for concrete requirement
IS 1599	Method of bend test
IS 1343	Code of practice for Prestressed Concrete
IS 1786	Specification for high strength deformed steel and wires for concrete reinforcement
IS 1791	Specification for batch type concrete mixes
IS 2502	Code of practice for bending and fixing of bars for concrete reinforcement
IS 2751	Recommended practice for welding of mild steel plain and deformed bars for reinforced construction
IS 4925	Batch plants specification for concrete batching and mixing plant
IS 4926	Ready – Mixed Concrete
IS 6523	Specification for precast reinforced concrete door, window frames
IS 10262	Recommended guidelines for concrete mix design
IS 13311 (Part-I)	Indian standard for non-destructive testing of concrete. Method of test for ultrasonic pulse velocity
IS 13311 (Part-II)	Indian standard for non-destructive testing of concrete. Method of testing by rebound hammer.
IS 3370	Concrete structures for storage of liquids





IS 1568	Wire gauge for general purposes
IS 1139	Hot rolled mild steel and medium tensile steeled formed bars for concrete reinforcements
IS 2502	Code of practice for bending and fixing of bars for concrete reinforcement
IS 2751	Code of practice for welding of mild steel bars used for reinforced concrete work
<b>STEEL WORK</b>	
IS 226	Structural steel
IS 2062	Steel for general structural purpose
IS 800	Code of practice for use of structural steel in general in steel construction
IS 806	Code of practice for use of steel Tubes in general building construction
IS 816	Code of practice for use of metal arc welding for general construction in mild steel
IS 818	Code of practice for safety and healthy requirements in electric and gas welding and cutting operations
IS 822	Code of procedure for inspection of welds
IS 1038	Steel doors, windows and ventilators
IS 1081	Code of practice for fixing and glazing of metal (Steel and aluminium) doors, windows and ventilators
IS 1161	Steel tubes for structural purposes
IS 1200 (Pt. VIII)	Method of measurements of steel work and iron works
IS 1367	Technical supply conditions for threaded steel fasteners
IS 1821	Dimensions for clearances holes for bolts and screws
IS 2074	Ready mixed paint, air drying redoxide zinc chrome priming
IS 4736	Hot – dip zinc coating on mild steel tubes
IS 4923	Hollow steel sections for structural use – specification
IS 6188	Metal rolling shutters and rolling grills
IS 7452	Specification for hot rolled steel sections for doors, windows and ventilators
<b>BRICK WORK</b>	
IS 712	Specification for building limes
IS 1077	Common burnt clay building bricks
IS 1200 (Part 3)	Method of measurements of brick works
IS 2212	Code of practice for brick work (1 <sup>st</sup> Revision)



IS 3495	Method of test for burnt clay building bricks
IS 5454	Methods of sampling of clay building bricks
IS 13757	Specification of burnt clay fly ash bricks
IS 2691	Burnt clay facing bricks
<b>MARBLE WORK</b>	
IS 1122	Method of test for determination of true specific gravity of natural building stones
IS 1118	Method of test for determination of water absorption, apparent specific gravity and porosity of natural building stones
IS 1130	Marble (blocks, slabs and tiles)
IS 4101 (Part-I)	Code of practice for external facing and veneers: Stonefacing
IS 14223 (Part-I)	Polished Building Stones ( Part-I) Granite
<b>WOOD WORK AND P.V.C. WORK</b>	
IS 204 (Part-I)	Specification for tower bolts (ferrous bolt)
IS 208	Specification for door handles
IS 287	Recommendations for maximum permissible moisture contents of timber used for different purpose
IS 303	Specification for plywood for general purposes
IS 401	Code of practice for preservation of timber
IS 453	Specification for double acting spring hinge
IS 710	Specifications for Marine Plywood
IS 1003 (Part-I)	Specification for timber paneled and glazed shutter Part-I (Door shutters)
IS 1003 (Part-II)	Specification for timber paneled and glazed shutter Part-II (Window and ventilator shutters)
IS 1200 Part-XIV	Method of measurement of building and civil engg. Work glazing
IS 1200 Part-XII	Wood work and joinery
IS 1328	Specification for veneered decorative plywood
IS 1341	Specification for steel butt hinges
IS 1659	Specification for block boards
IS 1823	Specification for floor door stopper
IS 1868	Specification for anodic coating on aluminium and its alloy
IS 2046	-do- Decorative thermo setting synthetic resin bonded laminated sheet
IS 2095	Specification for gypsum plaster board
IS 2202 (Pt I)	Specification for wooden flush door shutter, solid core type (plywood face)



	panels)
IS 2209	Specification for mortice lock (Vertical Type)
IS 2547	Specification for gypsum plaster
IS 3097	Specification for veneered particle board
IS 3564	Specification for door closer (hydraulically regulated)
IS 3847	Specification for mortice night latch
IS 5930	Specification for mortice latch
IS 7196	Specification for hold fast
IS 8756	Specification for mortice ball catch for use in woodenalmirah
IS 9308 (Part-II)	Specification for mechanically extracted coir fibres(Mattress coir fibres)
IS 12817	Specification for stainless steel butt hinges
IS 12823	Specification for wood products – Prelaminated particle Boards
IS 14900	Specifications for transparent float glass
IS 4021	Timber door, windows and ventilator frames.
IS 2191	Wooden flush door shutters (cellular and hollow core type)
<b>FLOORING</b>	
IS 1200 (Part-XI)	Method of measurement of Building and Civil Engineering work (Part 11) paving, floor finishes, dado and skirting
IS 1237-Edition 2.3	Specification for cement concrete flooring tiles
IS 1443	Code of practice for laying and finishing of cement concrete flooring tiles
IS 2114	Code of practice for laying in-situ terrazzo floor finish
IS 3622	Specification for sand stone (Slab & Tiles)
IS 4457	Acid and / or alkali Resistant tiles
IS 5318	Code of practice for laying of hard wood parquet and wood block floors
IS 5766	Code of practice for laying of burnt clay brick floor
IS 13630 (Part-1 to 15)	Methods of Testing for ceramic tiles
IS 13712	Specification for ceramic tiles, definition, classification characteristic and marking
IS 15622	Specification for pressed ceramic tile.
<b>ROOFING</b>	
IS 277	Galvanised steel sheets (Plain and corrugated)
IS 651	Glazed stoneware pipes and fittings
IS 1200 (Pt IX)	Method of measurements of building and civil engineering work : Part-9



	Roof covering (including cladding)
IS 1200 (Pt X)	Method of measurements of building and civil engineering work : Part-10 ceiling and lining
IS 2095 (Pt-1)	Gypsum plaster boards (Pt. 1) plain Gypsum plasterboards
IS 2935	Specification for flat transparent sheet glass
IS 459	Corrugated and semi corrugated asbestos cement sheet
<b>FINISHING WORKS</b>	
IS 1542	Sand for plaster
IS 1661	Code of practice for cement and cement-lime plaster finishes on walls and Ceilings
IS 1625	Code of practice for preparation and use of lime mortar in buildings
IS 2250	Code of practice for preparation and use of masonry mortars
IS 712	Building limes
IS 1635	Code of practice for field slacking of lime and preparation of putty.
IS 427	Distemper, dry colour as required
IS 428	Distemper, oil emulsion, colour as required
IS 6278	Code of practice for white washing and colour washing
IS 106	Ready mixed paint, brushing, priming for enamels for use on wood.
IS 102	Ready mixed paint, brushing, red lead, non- setting, priming
IS 123	Ready mixed paint, brushing, finishing, semi-gloss, for general purposes
IS 1477	Code of practice for painting of ferrous metals in buildings
IS 2074	Ready mixed paint, red oxide-zinc chrome priming
IS 2339	Aluminium paint for general purposes in dual container
IS 2932	Enamel, synthetic, exterior, type 1
	(a) under coating,
	(b) finishing, colour as required
IS 137	Specification for ready mixed paint, brushing, matt or eggshell flat finishing interior to Indian Standard colours as required
IS 1131	Specification for enamel, interior
	(a) under coating (b) finishing.
IS 129	Specification for ready mixed paint, brushing, grey filler for enamel for use over primers
IS 533	Specification for gum spirit of turpentine (oil of turpentine)
IS 101	Methods of tests for ready, mixed paint, & enamels



IS 118	Specification for ready mixed paint, brushing finishing semi glossy for (Part I) general purposes
IS 2933	Enamel, Exterior
(a) Under Coating	
(b) Finishing	
IS 5410	Cement Paint
IS 5411	Plastic emulsion, Paint Part- I for interior use
IS 419	Specifications for putty for use in window frames
<b>ROAD WORK</b>	
IS 164	Ready mixed paint for road marking
IS 278	Specification for galvanized steel barbed wire for fencing
IS 1838 (Pt.1)	Specification for performed filters for expansion joint in concrete pavements and structures (non extruding and resilient type / bitumen impregnated fibre)
IS 73	Paving bitumen with bitumen felts
IS 73-1992	Specification for paving bitumen
IS 1203	Method of testing tar and bituminous material Determination of penetration
<b>WATER SUPPLY, SANITARY INSTALLATIONS &amp; DRAINAGE</b>	
IS 771 (Pt.1)	Specification for glazed fire clay sanitary appliances : part 1:General requirements
IS 1703	Water fittings – copper alloy float valves (horizontal plungertype) – Specification
IS 1729	Cast iron / Ductile iron Drainage Pipes and pipe fittings for Overground non-pressure pipe line Socket and Spigot Series
IS 1795	Specification for pillar taps for water supply purposes
IS 2326	Specification for Automatic Flushing Cisterns for Urinals (Other than plastic cisterns)
IS 2548 (Part-1)	Plastic seats and covers for water closets Part 1 : Thermo set seats and covers – Specifications
IS 2548 (Part-2)	Plastic seats and covers for water closets Part 2 : Thermoplastic seats and covers specification
S 2556	Vitreous sanitary appliances (vitreous chine) – Specifications



IS 2556 (Part-1)	Part-1: General requirements
IS 2556 (Part-2)	Paart-2 : Specific requirements of wash-down water closets
IS 2556 (Part-4)	Part-4 : Specific requirements of wash basins
IS 2556 (Part-6)	Part-6 : Specific requirements of Urinals & Partitions plates
IS 2556 (Part-7)	Part-7 : Specific requirements of accessories for sanitary appliances
IS 2963	Specification for copper alloy waste fittings for wash basins and sinks
IS 3076	Specification for low density polyethylene pipes for potable water supplies
IS 4827	Specification for electroplated coating of nickel and chromium on copper and copper alloys
IS 4984	Specification for high density polyethylene pipes for potable water supplies
IS 4985	Unplasticised PVC pipes for potable water supply –Specifications
IS 7231	Plastic flushing cisterns for water closets and urinals –Specifications
IS 13983	Stainless steel sinks for domestic purposes – Specifications
IS 774	Specification for flushing cistern for water closets and urinals
IS 775	Specification for cast iron brackets and supports for wash basins and sink.
IS 778	Specification for cast copper alloy gate and check valves for water works.
IS 651	Specification for salt glazed stoneware pipes and fittings.
IS 3597	Method of test for concrete pipes
IS 1239	Mild steel tubes and tubulars
IS 1711	Self closing taps
IS 1726	Cast iron manhole covers and frames intended for use in drainage works
IS 1742	Code of practice for building drainage
IS 2065	Code of practice for water supply in buildings
IS 1870	Code of practice for design and construction of septic tank
IS 2693	Non-ferrous waste fittings for wash basins and sink
IS 4127	Code of practice for laying of glazed stoneware pipes
IS 4346	Washers for water taps for cold water services
IS 778	Gun metal gate, globe and check valves for water services
IS 7634	Laying and jointing for polythene pipes and PVC pipes (Part I to III)



IS 8008 Part I	Specification for injection Moulded HDPE fittings for potable toIV) water supplies
IS 3844	Code of practice for installation of internal fire hydrants in multistorey buildings
IS 780	Specification for sluice valves for water works purposes (50 to300 mm size)
IS 781	Specification for cast copper alloy screw down bib taps and stopvalves for water services
IS 782	Specification for caulking lead
IS 909	Underground fire hydrant, sluice valve type – Specification
IS 2692	Ferrules for water services – Specification
IS 15450	PE-AL-PE Pipes for hot and cold water supplies – Specifications
IS 15778	Chlorinated Polyvinyl Chloride (CPVC) pipes for potable hot and cold water distribution supplies – Specifications
IS 1230	Cast iron rain water pipes and fittings
IS 1626	Asbestos cement building pipes, gutters and fittings (Spigot and socket type)
IS 2527	Code of practice for fixing rainwater gutters and down pipes for roof drainage
IS 458	Pre-cast concrete pipes (with and without reinforcement)
IS 783	Code of practice for laying concrete pipes
IS 1728	Specification for Cast Iron Manhole Covers and Frames
IS 4127	Code of practice for Laying of Glazed Stone Ware Pipes
IS 12592	Pre-cast Concrete Manhole Covers and Frames-Specifications
IS 5382	Specification for rubber sealing rings for gas mains, water mains and sewers
IS 13592	Unplasticised polyvinyl chloride (UPVC) pipes for soil and Waste discharge system for inside and outside building
<b>ALUMINIUM WORK</b>	
IS 733	Wrought Aluminium Alloys, Bars, Rods and Sections (For GeneralEngineering Purposes) – Specification
IS 737	Wrought Aluminium and aluminium alloy sheet
IS 1285	Wrought Aluminium and Aluminum Alloy, Extruded Round Tubeand Hollow sections (for General Engineering Purposes) –Specification



IS 1868	Anodic coating on Aluminium and its alloy – Specification
IS 1948	Specification for Aluminium Doors, Windows and Ventilators
IS 5523	Method of testing anodic coating on aluminum and its alloys
IS 6012	Measurement of coating thickness by Eddy Current Method
IS 6315	Floor springs (Hydraulic regulated) for heavy doors –Specifications
IS 6477	Dimensions of extruded hollow section and tolerances
IS 14900	Transparent Float Glass – Specifications
<b>WATER PROOFING TREATMENT</b>	
IS 3370 (Part 1)	Code of practice for concrete structures for the storage of liquid: Part-1 General Requirements

**Note : The latest IS code provisions shall be adopted.**





## **SECTION XIV - SPECIFICATION FOR ELECTRICAL INSTALLATION WORK**

### **BILL OF MATERIAL**

Below list of item is likely to be used in the project . However, final capacity/size/rating etc shall be decided during detailed engineering and they should be got approved from EIC.

This list should be considered as technical specifications .For any query or discrepancy follow the detail tender specifications or IS Rules decision of EIC shall be final and binding.

The list below is indicative, not exhaustive. Necessary items required to be added for satisfactory completion of the project should be considered as part of the scope of work.

1. Point wiring for Light / Fan/ Bell with 2-1.5 sq.mm & earthwire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of pipe to be erected concealed in/ on surface on wall/ceiling complete with 6A Tissino ISI marked flush type switch / bell push & accessories erected on Metal/PVC Box covered with 3 mm thick PC ( Polycarbonate) acrylic sheet with necessary Lamp holder/ceiling rose / H.D.Connector as directed. (a) with medium class Rigid PVC pipe and accessories
2. Point wiring for Two Way Controlled Light Point with 2-1.5 sq.mm & earthwire of 1.5 sq.mm (green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of pipe to be erected concealed in / flushed on wall / ceiling complete with 6A Tissino Type ISI marked accessories with earth continuity erected on Metal/PVC box covered with 3 mm thick PC(Polycarbonet) / Acrylic sheet. with necessary Lamp holder/ceiling rose / H.D.Connector as directed. (a) with medium class Rigid PVC pipe and accessories
3. Point wiring for independent PLUG with following size mains earthwire of 1.5 sq.mm (green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of pipe to be erected concealed in /flushed on wall/ceiling , complete with ISI marked 3 / 5 Pin socket and tissino type switch erected with earth continuity connection erected on Metal / PVC box covered with 3 mm thick PC(Polycarbonet) / Acrylic sheet. (a) with medium class Rigid PVC pipe and accessories
  - a. For 6 / 16 A Plug with 2 - 1.5 sqmm Cu Mains
  - b.For 6 / 16 A Plug with 2 - 2.5 sqmm Cu Mains
4. Point wiring for looped PLUG with tissino type single pole ISI marked Switch and Socket erected with necessary connections erected on wooden /Metal/ PVC Box covered with 3 mm thick PC(Polycarbonet) /Acrylic sheet for open / concealed wiring for following size.
5. Point wiring for secondary light point with 2-1.5 sq.mm & earthwire of 1.5 sq.mm (green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of pipe to be erected concealed in / flushed on wall/ceiling, complete with earth continuity and necessary connection with primary light with accessories erected on Metal / PVC box covered with 3 mm thick PC(Polycarbonet) / Acrylic sheet for open / concealed wiring. with necessary Lamp holder / ceiling rose / H.D.Connector as directed. Note:- Maximum up to 6 mtrs length, excess will be considered as Mains for Secondary Point. (a) with medium class Rigid PVC pipe and accessories



6. Providing & erecting PVC Corrugated Flexible Conduit with required nos. of coupling, PVC bushes, Check-nuts etc. complete of following sizes. (1) 20 mm, (2) 10 mm
7. 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
  - a. 20 mm, b. 25 mm
8. Supplying and erecting Flexible PVC insulated multistrand multicore 1.1 kv grade ISI marked copper wires of following size to be erected as directed.
  - a. 1.50 Sq.mm 3 core round PVC sheathed
  - b. 2.50 Sq.mm 3 core round PVC sheathed
9. 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 sqmm.
  - b. 2 wire 2.5 sqmm.
10. Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected in / on wall / ceiling with 2.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size (a) with medium class Rigid PVC pipe and accessories
  - (a) 2 wire 4 sq. mm
  - (b) 2 wire 6 sq. mm
11. Providing & Erecting approved make following size of TV Co-axial flexible cable comprising inner conductor of solid bare copper insulated with Foam PE & Secondary conductor made of poly - Aluminium film bonded Al. Braids @ suitable coverage overall sheathed with black PVC insulation. b).RG-6
12. Supplying & erecting approved make LAN cable of following size in existing pipe as per direction  
[D] CAT - 6
13. Providing & Erecting following Shockproof tissino type accessories erected on 3 mm thick PC (Polycarbonate) sheet in PVC/ Metal Box. erected on wall/ ceiling.
  - a. Supply & Installation of Electronic Hum free EME Socket type steps fan regulator
14. Supply & Installation of Decorative call bell Ting-tong box type 250 volts complete erected



15. 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. As per the guidance of EIC.
16. Supplying and erecting bakelite sheet 12mm thick HYLAM make on existing angle iron frame.
17. (A) Supplying and laying UPVC PANEL TRUNKING (CABLE DUCT) system comprising unplasticised polyvinyl, chloride rigid material with ignition free & flame proof confirming BS .All necessary accessories and measuring of following sizes.
  - a. 60 mm x 45 mm trunking.
  - b.25 mm x 25 mm trunking.
18. Providing& fixing G.P. L-Slotted Angle (3" Gap, 16 Gauge ) and M.S L-Type Patti Bracket With PVC Coated (8mm) Nut-Bolts (with 2 wiser) and 3" Khila on wall at Levels of approved design including the cost of cutting, drilling holes & make good the wall etc coplete-For Meter Fitting Arrangement of Single/Three Phase Meterbox (with MCB) as per site requirment.
19. 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
  - b. 63 Amp. Cat III.
20. SETC of 240 V, 6 Amp – 32 Amp double pole MCB for motor & inductive load (C Curve) having 10 KA breaking capacity & confirms to IS : 8828 in existing box having following capacity with ISI mark. Cat III. (A) 6 to 32 Amp.
21. Miniature circuit breaker single pole 6A to 32A suitable to operate on 240 V A.C. system and having breaking capacity 10 KA to be erected in existing box. confirming to IS 8828/1996 with ISI Mark Cat III.
22. Approved make ELCBs / RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 6 KA and suitable for operation on single phase 240 V. having characteristic of quick action & tripping with all advance feature & do not incorporate any electronic component. for following Max. rating erected as directed
  - a.25 Amps double pole Cat III.
  - b.40 Amps double pole Cat III.
23. Approved make ELCBs / RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 6 KA and suitable for operation on 3 phase and neutral 415V. having characteristic of quick action & tripping with all advance feature & do not incorporate any electronic component for following Max. rating erected as directed.
  - a.63 Amps four pole Cat III.



24. Providing and erecting Sheet Steel powder coated MCB distribution board - flush / surface mounted fitted with busbar, neutral link, earth bar and DIN rail, confirming to IS 13032 and BS 5486-1986 without MCB to house appropriate nos. of MCBs. (The DBs should be used of same company of MCB to be used)
- Single Phase 4 Way SS double door
  - Single Phase 6 Way SS double door
  - Single Phase 8 Way SS double door
  - Single Phase 12 Way SS double door
  - Three phase 8 way SS Double door for horizontal single phase outgoing
25. Plastic enclosure fitted with DIN rail suitable for incorporating One / Two nos. MCB
26. Plastic enclosure fitted with DIN rail suitable for incorporating Three /Four nos. MCB
27. Providing and erecting busbar chamber confirming to IS-375 fabricated from 16 G.M.S. sheet, dust & vermin proof having hinged door with rubber gasket and necessary busbar supports with COPPER busbar having current density not more than 1.6 Amp. / sq.mm (Rated current / cross section area) duly wrapped with colour insulation tape for phase sequence, three phase & neutral each suitable for following current capacity with necessary painting mounted on wall or pedestal frame of required size with necessary connections.
- suitable for 63/100 Amp. Capacity
  - suitable for 200 Amp. Capacity
  - suitable for 300 Amp. Capacity
28. Approved make Four Pole LT Heavy Duty Switch Disconnecter Fuse Unit Cubical type with sheet steel Encloser complete with operating mechanism suitable to operate on 415V A.C. With HRC fuses of suitable load confirming to IS. 13947 (Part I & III). of following capacities
- 200 A Cat III
  - 300/320 A Cat III
29. Erection & connection Charges for 200A/ 250A/ 300 A /325 A HRC TPN as following (b)Erection on New angle iron frame duly painted with red oxide .
30. Approved make Iron Clad or metal clad four pole change over switch 415V. confirming to IS of following capacity
- 63 A Cat III
  - 125 A Cat III
31. Erection & connection charges for 63 A / 100A / 125 A change over switch as following
- Erection on New angle iron frame duly painted with red oxide



32. Approved make Four pole moulded case circuit breaker having breaking capacity ICU of 25 KA. at 415 V, having normal current rating up to 25 A to 100A. with Fixed thermal & magnetic release suitable to work on A.C. supply 50 c/s. with all internal connections & complete with 16 G.M.S. housing. Cat III
33. Approved make Four pole moulded case circuit breaker having breaking capacity ICU of 35 KA. at 415 V. having Normal current rating up to 200A. with variable Thermal & magnetic release suitable to work on A.C. supply 50 c/s. with all internal connections & complete with 16 G.M.S. housing. Cat III
34. Providing and erecting Two way Centre off Four pole MCB Change Over Switch (IS 13947-3 / IEC 60947-3) in existing box.
- a. for 40 Amp Cat III.
35. supply, laying, testing & erecting XLPE(IS:7098)(I)-88 ISI unarmoured copper cable 1.1 KV grade to be erected as directed of following size.
- a. 3 core 2.5 sq mm
- b. 4 core 4 sq mm
36. Providing and, fixing heavy duty flange type brass cable gland with rubber ring for PVC insulated armoured cable complete with out going tails, insulating tape etc for following size of cables.
- a. 2 to 4 core 2.5/4 sq. mm
- b. 2 to 4 core 6/10 sq. mm
- c. 2 to 4 core 16 sq. mm
37. Providing and, fixing heavy duty flange type brass cable gland with rubber ring for PVC insulated armoured cable complete with out going tails, insulating tape etc for following size of cables.
- a. 3 & 1/2 core 35/50 Sq. mm
- b. 3 & 1/2 core 70 Sq. mm
- c. 3 & 1/2 core 120 Sq. mm
- d. 3 & 1/2 core 240 Sq. mm
38. 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 4 sq. mm.
- b. 4 core 6 sq. mm.
39. 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
- a. 3 1/2 core 35 Sq. mm ( 16 Sq. mm 1/2 core)



b.3 1/2 core 50 Sq. mm ( 25 Sq.1/2 mm core)

c.3 1/2 core 70 Sq. mm ( 35 Sq. mm 1/2 core)

d.3 1/2 core 120 Sq. mm ( 70 Sq. mm 1/2 core)

e.3 1/2 core 240 Sq. mm( 120 Sq. mm 1/2 core)

40. 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

a.4 core 10 Sq. mmb.4 core 16 Sq. mm

c.4 core 35 Sq. mm

41. Mains with ISI marked, 1.5KV grade electrolyte multi stranded, annealed copper conductor with heat resistant PVC insulated conforms to IS 694, IEC - 227 erected in existing pipe of following size (Specifically for control panel, relays, power switchgears, motor starters & control wiring) with required size of copper lugs, nuts and bolts if required.

a.One wire 6.00 sq. mm

b.One wire 10.00 sq. mm

c.One wire 16.00 sq. mm

d.One wire 25.00 sq. mm

e.One wire 35.00 sq. mm

42. Providing and fixing approved make Perforated C type cable tray. Made from CR sheet steel. The cable tray should be single or double bended as per required and as per IS 2062/1079 and shall be coated with hot dip galvanizing as per IS 2629/4759. with coupler plate / Fish plate and GI hardware like nut - bolt and washers etc. erected on existing support as per Specification and as per instruction of engineer in charge..  
(5) 300 X 50 X 1.5 mm Thick

43. Manhole

Providing 900 mm(B) x 900 mm(W) X 1000 mm(D) manhole complete with 6" thick brick wall, plastering on both sides and providing C.I. hinged cover complete in all respect.

44. Making trench in soft soil of suitable width of 90 cms deep for laying cable or locating the fault all over the run and backfilling the same and making the surface as normal ground.

45. Providing & laying. R.C.C. Hume pipe for cable to be laid 90 cms. below ground across the road crossing or on floor with necessary material in an approved manner and making the ground as per original.

a.150 mm dia

b.250 mm dia



46. 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 for laying of cable. below ground / road surface for enclosing cable and back filling the same to make ground as per original.

a.50 mm dia b. 90 mm dia

c. 120 mm dia

47. Providing and erecting white stove enamelled channel type / Industrial type fluorescent fitting with open ended through reflector complete with Electronic Ballast complete with holder erected with lead wire and connections with one tube 40/36 watt.120 cms. and adapter if required. Equivalent to PHILIPS, Havell's, Crompton or Bajaj. Final Decision is taken by EIC.

48. Providing, installing and commissioning of Low Intensity LED type Aviation Warning Light, Type 'B' with intensity of >32 Cd, conforming to ICAO regulations, Red Color solid state lamp elements (LED'S), light will burn in stationary mode with inbuilt photocell card for automatic dusk to dawn operation, Operating Voltage – 230 V AC, 50 HZ. Weather Protection-IP 65.

49. 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 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. (b)For Electrical installation up to 11 KV in normal soil.

Length of Pipe : 2.00 mtrs

Back filling Compound :1 no. Bag of 25 Kg.

50. Providing and erecting HOT deep Galvanized iron strip (25X3 MM) or 8 SWG GI Wire. Final Decision is taken by EIC.

51. Providing and fixing of lightning conductor are Heavy Duty type made from Low Carbon Steel having 25 mm dia. 1300 mm long, with 250 micron copper coating is carrying out on the surface, having single prong at top, with 84 mm dia. 3 mm thick copper base plate including holes etc. complete as required.

52. Providing and erecting required size HOT deep Galvanised iron strip for earthing of H.T. OCB / ACB/ Transformer, LT panel board, Motors/ Lightning Arrestor etc. using proper clamp.(Note: Providing and fixing GI Strip of 25 mm x 3 mm thick on parapet or surface of wall / on top of roof with insulated spacers / clamps at every 750 mm interval for supporting lightning conductor as required for horizontal & Vertical run).

53. Pipe type earthing having 150 cms.long and 2.5 cms. dia. galvanised iron pipe with coupling and buch buried in specially prepared earth pit complete with necessary 8 SWG earth wire. (Only for Street Light Pole)

54. Providing & erecting open well horizontal mono block pump set with cast iron body, complete for three phase submersible motor having

a.For 5 HP 3 phase open well horizontal mono block pump set suitable for 1350 LPM to 310 LPM @ 10 to 42 Mtr head suitable for 50/65 mm dia delivery pipe Cat II.



b.For 7.5 HP 3 phase open well horizontal mono block pump set suitable for 1550 LPM to 370 LPM @ 13.5 Mtr to 42 Mtr head suitable for 65/75 mm dia delivery pipe Cat II.

c.For 10 HP 3 phase open well horizontal mono block pump set suitable for 940 LPM to 350 LPM @ 36 to 56 MTR head suitable for 65/50 mm dia delivery pipe Cat II.

d.For 15/20 HP 3 phase open well horizontal mono block pump set suitable for 1025 LPM to 580 LPM @ 48 to 72 MTR head suitable for 65 /50 mm dia delivery pipe Cat.II

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

a.DOL up to 5.0 H.P.

56. Supplying & erecting approved make 3 phase motor control cubical panel ( Star - Delta) made from 16 G. CRCA sheet duly painted with epoxy powder painted inside and outside with hinged doors and locking arrangement, consisting of suitable size of ON- OFF isolator (AC - 3/23 duty) main fuses, single phasing preventer cum water level. Guard (Complete unit), Toggle switch to by pass Single phase preventer cum WLG, indicating lamps for R- Y- B phases, over load relay, Automatic water level controller, Ammeter & Voltmeter each with two way selector switch incoming wires duly socket Crimped, Panel to be erected on angle iron frame grouted on wall as directed. Star Delta & main contactor, overload relay, thermal / Electronic Star delta cutoff timer, start - stop push buttons. The isolator overload relay & contactors of L& T, Siemens or Cuttler Hamer make only. Panel to be erected on angle iron frame ground on wall.

a.S/D up to 10 H.P.

b.S/D up to 15 H.P.

57. Supplying & erecting approved make Automatic liquid level controller 6A.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.

58. Providing and erecting ISI marked PVC insulated PVC Sheathed Flat flexible Submersible copper cable approved make of following Size.

a.3 Core x 2.5 Sq. mm.

b.3 Core x 4 Sq. mm.

c.3 Core x 6 Sq. mm.

59. Providing and fixing approved make Octagonal poles. Made from CR sheet steel. The pole should be made as per IS. and shall be coated with hot dip galvanizing as per IS 2629/4759. with required base plate suitable suspend local wind speed to be erected on existing foundation.





a.5 Mtr. Long 70 mm Top X 130 mm bottom dia, 3 mm thickness

b.6 Mtr. Long 70 mm Top X 135 mm bottom dia, 3 mm thickness

60. Providing street light pole bracket consisting of Light Class MS.pipe of 4.2 cms. outside dia. complete with suitable M.S. sleeve tubing of approximate 45 cms. and length suitable for 76.5 mm / 80mm. / require size pole top having sufficient fastners for fixing the brackets and having spread of 1 mtr. length with suitable rise as per site condition & suitable welded stiffener reducer and nipple with check nut complete painted with one coat of Red oxide / PU base primer and two coats of Aluminium / PU paint. paint with following nos of arms.

a.Single Arm bracket 1 Mtr

b.Double Arm Bracket 1 Mtr

61. New generation, aesthetically designed LED streetlight for Street lighting, having secondary optics with uniform distribution of light. Pressure die cast aluminium housing powder coated in grey and toughened glass. Suitable for System wattage AS BELOW, IP Protection IP 66, Class-I, Operating 120-270V AC, THD less than 10%, Power Factor greater than 0.9, Surge protection of 4 KV, Colour temperature 5000-6000 K.

a.SITC of LED st.Light Luminaries. 20 W MAX.

b.SITC of LED st.Light Luminaries. 45 W MAX.

62. SITC of LED Outdoor Flood Light having powder coated PDC aluminium body with toughened glass visor fitted in frame IP 66, Luminaries 45W MAX.

63. Supplying & erecting approved make SMC press moulded composite FRP. loop-in, loop-out approx. 2mm thick box complete with bakelite connector strip 4way & hinged doors having locking arrangements with mounting clamp with nuts, bolts & washers suitable for erection on pole with cable clamps & earth bolt of following size of box. (b) 250mm x 200mm x 100mm [deep]

64. Providing M-20 / 1:2:4 cement concrete foundation & 70 % PCC from bottom including excavation for the pole of size 45 x 45 x 100 cms. Deep in below ground level with plinth of 45 cms x 45 cms (or 45 cms dia x 45 cms) high upper ground level with necessary curing and finishing in approved manner.  
( for 4 & 6 mtr pole)

65. Providing printed instruction chart both in English and Gujarati and duly framed with front glasses, for treatment of person suffering from Electric shock

66. Feeder Pillar of suitable capacity,-6kw, 9kw, 12 kw or suitable capacity 1 phase or 3 phase as required.

67. Supplying and erecting approved make Astronomical type Time switch suitable for 230V+10%16A. floating contacts with manual override switching for on & off without influencing the program sequence as per specification.

68. Supplying & erecting power contactor for time switch complete erected as per direction Cat III

a.4 pole 440V 40 Amp.



69. Supplying, Erecting, Testing & Commissioning the Automatic passenger / stretcher lift having following main features:

a. Supply, Erecting, Testing and Commissioning of Automatic 6 passengers Lift ground plus 5 to 15 up floors with emergency rescue device and announcing system with rated speed of 1.5 / 1.75 m/sec with micro proce/PLC control and ACVRF drive

b. Supply, Erecting, Testing and Commissioning of 8 passengers Lift ground plus 5 to 15 up floors with emergency rescue device and announcing system with rated speed of 1.5 / 1.75 m/sec with micro proce/PLC control and ACVRF drive (For Fire Lift)

70. Supplying and erecting, commissioning and testing diesel generating set

a. DG Set of Continuous Rating of 30 KVA, BHP not less than 42 BHP at 50 °C

b. Continuous Rating of 40 KVA, BHP not less than 50.5 BHP at 50 °C

c. Continuous Rating of 50 KVA, BHP not less than 65.8 BHP at 50 °C

d. Continuous rating of 75 KVA, BHP not less than 91 BHP at 50 °C

71. Solderless crimping type Aluminium lugs conforming to IS suitable for cable of following size evenly crimped with high pressure tool & connected to switchgear terminals with brass/cadmium plated nut bolts in an approved manner.

a. 10 Sq.mm

b. 16 Sq.mm

c. 25 Sq.mm

d. 35/50 Sq.mm.

e. 70 Sq.mm.

f. 95 Sq.mm.

g. 120 Sq.mm.

h. 300 Sq.mm.

72. Solderless crimping type Copper lugs conforming to IS suitable for cable of following size evenly crimped with high pressure tool & connected to switchgear terminals with brass/cadmium plated nut bolts in an approved manner. 1.5/2.5 to 6 Sq.mm



## ELECTRICAL INSTALLATION WORK

### 1.0 INTERNAL WIRING

This section covers, definition of point wiring, system of wiring and supply, installation, connection, testing and commissioning of point wiring for light points, ceiling fan points, exhaust fan points, convenience socket outlet points, power socket outlet points etc. including fixing of light fixtures, ceiling fan, exhaust fan, wall fan etc.

### 1.1 STANDARDS

The following standards and rules shall be applicable:

STANDARD NO.	PARTICULAR
<b>IS : 732</b>	Code of practice for electrical wiring installation (System voltage not exceeding 650 V)
<b>IS : 1646</b>	Code of practice for fire safety of buildings (General) Electrical installation.
<b>IS : 2509</b>	Rigid non-metallic conduits for electrical wiring.
<b>IS : 6946</b>	Flexible (Pliable) non-metallic conduits for electrical installation.
<b>IS : 1293</b>	3 pin plugs and sockets.
<b>IS : 8130</b>	Specifications of conduits for electrical installation.
<b>IS : 3854</b>	Switches for domestic purpose.
<b>IS : 3415</b>	Fittings for rigid non-metallic conduits.
<b>IS : 4648</b>	Guide for electrical layout in residential building Indian electricity act and rules.

All standards and codes mean the latest.

### 1.2 POINT WIRING

A point shall consist of the branch wiring from the distribution board together with a switch as required, including the ceiling rose or pendant holder or swan holder, or ceiling fan box or socket or suitable termination. A point shall include, in addition, the earth continuity conductor / wire from the distribution board to the earth pin / stud of the outlet / switch box and to the outlet points.

The point wiring shall be carried out in the under mentioned manner :

- 1.2.1 Supply, installation, fixing of conduits with necessary accessories, junction / pull / inspection / switch boxes and outlet boxes.
- 1.2.2 Supplying and drawing of wires of required size including earth continuity wire.
- 1.2.3 Supply, installation and connection of flush type switches, sockets, cover plates, switch plates, etc.
- 1.2.4 The point shall be complete with the branch wiring from the Switch board to the outlet point, Pre laid conduit with accessories, junction, pull, inspection boxes, control switch, socket, outlet boxes, ceiling roses, button / swan holder, connector etc.



### 1.3 POINT

The point shall include supply, installation, connection, testing and commissioning of point as described under “point wiring”.

The point shall consist of wiring from the outlet point to the switch board as required with a connector/ plate/ ceiling rose fan box with hook socket with switch. The point shall include in addition to phase and neutral wire a PVC insulated earth continuity wire from switch to outlet. The point shall consist of the circuit wiring from LDB to outlet point through switch and/or socket, switch board as required and including the outlet points with connector, fan hook box or sockets. A point shall include in addition to phase and neutral wire a PVC insulated Earth continuity wire from LDB to the final termination at outlet points.

### 1.4 SYSTEM OF WIRING

The system of wiring shall consist of single core, PVC insulated, 650/1100 volt grade, copper conductor FRLS wires laid through concealed PVC conduits as directed.

### 1.5 GENERAL

The contractor shall submit for approval, the drawing of conduit layout indicating the route of the conduits, number and size of the conduits, location of junction / inspection / pull / outlet boxes, size and location of switch boxes, number and size of wires pulled through each conduit and all other necessary relevant details prior to laying of conduits. Only after the drawings are approved, the contractor shall proceed the work of conduit laying.

Prior to laying and fixing of conduits, the contractor shall carefully examine the working drawings prepared by him and approved by the Consultant indicating the layout, satisfy himself about the sufficiency of number and sizes of conduits, location of junction boxes, sizes and location of switch boxes and other relevant details. Any discrepancy found in the drawings shall be brought to the notice of the Owner's site representative. Any modifications suggested by the contractor shall be gotten approved before the actual laying of conduits is commenced.

In laying of conduits it is important that not more than two right angle bends are provided for each circuit and as far as possible. No junction box shall be provided in the entire length of conduit run for drawing of wires. Only switch outlets, lighting fixture outlets, equipment power outlets and socket outlets shall be considered for drawing of wires.

### 1.6 MATERIAL

#### 1.6.1 PVC CONDUITS :

All non-metallic PVC conduits shall conform to IS : 9537. The conduit shall be plan and type as specified in IS : 9537 and shall be used with the corresponding accessories (Refer IS : 3419 specification for fittings for rigid non PVC metallic conduits). PVC conduits shall be rigid unplasticised, medium gauge having 1.6 – 1.8 mm. wall thickness up to 20 mm. diameter conduit and 1.8 - 2 mm. wall thickness for all sizes above 20 mm. diameter.



#### 1.6.2 BOXES :

All the boxes for switches, sockets and other receptacles, junction boxes, pull boxes and outlet boxes shall be provided. Separate screwed earth terminal shall be provided in the box for earthing purpose. All boxes shall have adequate no. of knock out holes of required diameter for conduit entry. Switch boxes to receive switches, socket outlets, power outlets, telephone outlets, fan regulators, etc. shall be fabricated to the approved shape and size to accommodate all the devices without overcrowding. Outlet boxes to receive ceiling fan shall be fitted with adequately sized rod / hook to fix ceiling fan. The boxes shall be of minimum depth of 65 mm.

#### 1.6.3 COVER PLATE:

The cover of the boxes to receive outlet points shall be provided.

#### 1.6.4 CABLES:

- ✓ The cables shall conform to IS : 694. For all internal wiring FRLS wires of 650 / 1100 volts grade, single core shall be used.
- ✓ The conductors shall be plain annealed copper conductors complying with IS : 1554.
- ✓ The conductors shall be circular copper conductor.
- ✓ The insulation shall be PVC complying with the requirements of IS : 694. It shall be applied by an extrusion process and shall form a compact homogenous body.
- ✓ The thickness of PVC insulation shall be as set out in the relevant standards
- ✓ The cores of all cables shall be identified by colours in accordance with the following sequence.

Single phase	- Red
Three phase	- Red, Yellow, Blue
Neutral	-Black
Earth	-Green or Green/Yellow

Means of identifying the manufacturer shall be provided throughout the length of cable.

Unless otherwise specified in the drawings the size of the cables used for internal wiring shall be as follows:

In case of circuit wiring for lights, exhaust fans, convenience socket outlet points (P+N+E) :

**3 nos. of 1.5 mm.<sup>2</sup> - From switch board to outlet points**

#### 1.6.5 SWITCHES :

Switches shall conform to IS : 3854, IS : 1293 and IS : 4615. The switches shall be single pole, single or two way and shown on the drawings or as specified. They shall be of piano(tissino type) type rated for 250 volt, and of full 5 / 15 A capacity. They shall be provided with insulated dollies and covers.

The switches shall be rocker operated with a quite operating mechanism with bounce free snap action mechanism enclosed in an arc resistant chamber. The switches shall have pure silver and silver cadmium contacts. The switches shall be flush modular type The make of the switches shall be as indicated in the drawings or BOQ or make of material or as suggested and approved by the client.



The switches installed in outdoor area shall be industrial, metal clad type, and shall be provided in weather proof enclosures, complete with weather proof gasketed covers.

#### 1.6.6 SOCKETS :

The sockets shall conform to IS : 1293. Each socket shall be provided with control switch of appropriate rating. The sockets shall be piano(tissino type) type, rated for 250 volts, and either of full 5 A or 15 A capacity, as mentioned on the drawings.

Sockets shall be of three pin type, the third in being connected to earth continuity conductor. The socket shall be flush modular type. The sockets installed in machine room, plant room or wet / damp area shall be metal clad weather proof type. The finishing and make of all the sockets shall be same as light switch. The socket shall have fully sprung contacts and solid brass shrouded terminals to ensure positive electrical connections.

The sockets shall be provided with automatic shutters, which opens only when earth pit of the plug inserts in the socket.

The socket shall be provided with three pin plug top suitable to the socket and of the same make as socket.

### 1.7 DRAWING OF CONDUCTORS

The drawing and joining of copper conductor or wires shall be executed with due regard to the following precautions, while drawing insulated wires into the conduits, care shall be taken to avoid scratches and kinks which may cause breakage of conductors. There shall be no sharp bends.

Insulation shall be shaved off for a length of 15 mm at the end of wire like sharpening of a pencil and it shall not be removed by cutting it square or ringing.

PVC insulated copper conductor wire ends before connection shall be properly soldered (at least 15 mm length) with soldering flux / copper solder, for copper conductor. Strands of wires shall not be cut for connecting to the terminals. The connecting brass-screws shall have flat ends. All looped joints shall be soldered and connected through terminals block / connectors. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less. Conductors having nominal cross section are exceeding 4 sq. mm shall always be provided with crimping type cable sockets. At all bolted terminals, brass flat washer of large area and approved steel spring washers shall be used. Brass nuts and bolts shall be used for all connections.

Only certified wire man and cable jointers shall be employed to do joining work.

For all internal wiring PVC insulated wires of 650 / 1100 volts grade shall be used. The sub-circuit wiring for point shall be carried out in looping system and no joint shall be allowed in the length of the conductors. No wire shall be drawn in to any conduit, until all work of any nature that may cause



injury to wire is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of the wire. Before the wires are drawn into the conduits the conduits shall be thoroughly cleaned of moisture, dust, and dirt or any other obstruction by forcing compressed air through the conduits.

Maximum permissible number of 1100 volt grade PVC insulated wires that may be drawn into rigid non metallic or PVC Conduits are given below :

Size of wires Nominal Cross section Area (Sq. mm.)	Maximum number of wires within conduit size(mm)				
	20	25	32	40	50
1.5	5	10	14	--	--
2.5	5	8	12	--	--
4	3	7	10	--	--
6	2	5	8	--	--
10	--	3	5	6	--
16	--	2	3	--	6
25	--	--	2	4	6
35	--	--	--	3	5

## 1.8 JOINTS

The wiring shall be by looping back system, and hence all joints shall be made at main switches, distribution boards, socket outlets, lighting outlets and switch boxes only. **No joints shall be made inside conduits and junction boxes.** Joints where unavoidable , due to any specified reasons, prior permission in writing shall be obtained from the client before making such connections. Joints by twisting conductors are prohibited.

## 1.9 LOAD BALANCING

Balancing of circuit in three phase installation shall be planned before the commencement of wiring and shall be strictly adhered to.

## 1.10 EARTHING

All earthing systems shall be in accordance with IS : 3043 - 1985 code of practice for earthing.

## 1.11 TESTING OF INSTALLATION

Before a completed installation is put into service, the following tests shall be complied with.

### 1.11.1 INSULATION RESISTANCE

The insulation resistance shall be measured by applying 500 volt megger with all fuses in places, circuit breaker and all switches closed.



The insulation resistance in giga ohms of an installation, measured shall not be less than 50 mega ohms divided by the number of points on the circuit.

The insulation resistance shall be measured between  
EARTH TO PHASE  
EARTH TO NEUTRAL  
PHASE TO NEURAL  
PHASE TO PHASE

#### 1.11.2 EARTH CONTINUITY PATH :

The earth continuity conductors shall be tested for electrical 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 and shall not exceed one ohm.

#### 1.11.3 POLARITY OF SINGLE POLE SWITCHES :

A test shall be made to verify that every no-linked, single pole switch is connected to one of the phase of the supply system.

#### 1.11.4 COMPLETION CERTIFICATES :

All the above tests shall be carried out in presence of client and the results shall be recorded in a prescribed forms. Any default during the testing shall be immediately rectified and that section of the installation shall be re tested. The completed test result from shall be submitted to the client for approval.

On completion of an electric installation 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 a prescribed form as required by the local electric supply authority.

## 2.0 DISTRIBUTION BOARDS

### DISTRIBUTION BOARDS (DB's)

Distribution Boards (DB's) shall be suitable for operation on 3 Phase/single phase, 415/240 volts, 50 cycles, neutral grounded at transformer. The DB shall be minimum di-electric strength of 2.5 KV / Sec. All Distribution Boards shall manufactured by a manufacturer listed in Appendix-I.

DB's shall comply with the latest Relevant Indian Standards and Electricity Rules and Regulations and shall be as per IS-13947-1993.

### 2.1 CONSTRUCTION FEATURES

DB's shall be **IP 43** & made out of 1.6 mm thick high quality CRCA sheet steel and shall be pre-treated and powder coated sheet steel used in the construction of DB shall be folded and braced as





necessary to provide a rigid support for all component. DB shall be suitable for indoor / outdoor installation, wall mounting free standing type, in double door construction. The Distribution Boards shall be totally enclosed, completely dust and vermin proof and shall be with hinged doors, Neoprene gasket, padlocking arrangement. All removable/ hinged doors and covers shall be grounded by 4.0 sq mm tinned stranded copper connectors. Distribution Boards shall be suitable for the climatic conditions. Joints of any kind in sheet metal shall be seam welded, all welding, slag shall be rounded off and welding pits wiped smooth with plumber metal. The general construction shall confirm to IS-8623-1977 (Part-1) for factory built assembled switchgear & control gear for voltage up to and including 1100 V AC.

All panels and covers shall be properly fitted and square with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with wing nuts. Self threading screws shall not be used in the construction of DBs.

Three phase boards shall have phase barriers and a wire channel on three sides. Neutral bars shall be solid tinned copper insulated bars with tapped holes and chase headed screws. For 3 phase DB's, 3. Independent neutral insulated bars shall be provided. All DB's shall be internally pre-wired using copper insulated PVC wires brought to a terminal strip of appropriate rating for outgoing feeders.

Knockout holes of appropriate size and number shall be provided in the DB's in conformity with the location of cable/conduit connections. Detachable sheet steel gland plates shall be provided at the top / bottom to make holes for additional cable entry at site if required.

Distribution Boards shall comprises of the following:

- 1.1.1 A panel for mounting where appropriate incoming supply circuit breaker & other auxiliaries for Control & distribution as required.
- 1.1.2 Installation accessories shall be part of the DB for fixing conductor and rails for mounting MCB's and RCCB's etc.. neutral bus bars & earthing bus bars required in the circuit. All busbars in the FDB shall be insulated type.
- 1.1.3 Service cable /interconnection shall be part of the Distribution Boards.
- 1.1.4 The board shall be installed at a height such that the operating is within reach of the normal human height i.e. 1.2 to 1.8 meters from finish floor level.
- 1.1.5 Degree of protection shall be IP-52 for indoor application, IP-54 for kitchen & laundry and IP-55 for outdoor application.



- 1.1.6 All three phase distribution boards shall have 4 rows and single phase distribution boards shall have single rows for housing of MCB's and RCCB's unless noted otherwise.
- 1.1.7 Phase segregation to be maintained in all three phase distribution boards.
- 1.1.8 Earthing shall be provided in each FDB's.

## 2.2 MINIATURE CIRCUIT BREAKER (MCB) & MCCB

### MCB

Miniature Circuit Breaker shall comply with IS-8828-1996/IEC898-1995. Miniature circuit breakers shall be quick make and break type for 240/415 VAC 50 Hz application with magnetic thermal release for over current and short circuit protection. The breaking capacity shall not be less than 10 KA at 415 VAC. MCBs shall be DIN mounted. The MCB shall be Current Limiting type (Class-3). MCBs shall be classified (B,C,D ref IS standard) as per their Tripping Characteristic curves defined by the manufacturer. The MCB shall have the minimum power loss (Watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values. MCB shall ensure complete electrical isolation & downstream circuit or equipment when the MCB is switched OFF.

The housing shall be heat resistant and having a high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP, TPN and 4 Pole miniature circuit breakers shall have a common trip bar independent to the external operating handle.

MCB should be having an integrated label holder with dual side din rail locking facility. Incoming & Outgoing should have facility for termination of Busbar & Cable separately.

Cable termination facility should be up to 35 sq. mm.

### MCCB

The MCCB shall be **thermal magnetic** having features of indication and protection for overload, short circuit, earth fault. MCCB should be confirming to IS 13947 or IEC-947.

### **Important Parameters**

Sr No	Parameters	Data
1.	Rated Operating Voltage	500 V
2.	Rated Insulation Voltage	1000 V
3.	Rated Impulse Withstand voltage	8 Kv
4.	Rated ultimate short ckt breaking capacity @	35 kA



	415V	
5.	Rated Short time withstand current for 1sec	35kA
6.	Rated Short time withstand current for 3 Seconds	--
7.	Rated short circuit making capacity @ 440V ac	105kA
8.	Protection range for over load and short circuit	from 40% to 100%
9.	Utilization category	B
10.	Mechanical Life operations without Maintenance	4000
11.	Mechanical Life operations with Maintenance	4000
12.	Electrical Life operations @ 440V without maintenance	4000
13.	Number of poles	3 or 4 as applicable

The MCCB shall be with protections and having various setting range as below with 2NO+2NC auxiliary contacts.

Protection	Current Adjustment	Time Adjustment
Overload ( $I_r$ )	0.4 – 1 times $I_n$	Min. 5 Setting
Short circuit	1.5 – 10 times $I_r$	Min. 4 Setting
Instantaneous	1.5 – 11 times $I_n$	Fixed
Earth fault	0.2 – 1 times $I_n$	Min. 4 Setting

Following constructional features are required:

- ✚ Trip free mechanism
- ✚ Total segregation between power and front shield so as to guarantee maximum operational safety.
- ✚ Operating lever should indicate true position of contacts.
- ✚ Provision for ROH with door interlock facility and pad lock facility. Adjustable shaft for ROH.

## 2.3 RESIDUAL CURRENT CIRCUIT BREAKER CURRENT OPERATED TYPE (RCCB)

### I. System of Operation

Residual Current Circuit Breaker shall conform to IEC 61008. RCCB shall work on the principle of core balance transformer. The incoming shall pass through the toroidal core transformer. As long as the currents in the phase and neutral shall be the same, no electro motive force shall be



generated in the secondary winding of the transformer. In the event of a leakage to earth, an unbalance shall be created which shall cause a current to be generated in the secondary winding, this current shall be fed to a highly sensitive miniature relay, which shall trip the circuit if the earth leakage current exceeds a predetermined critical value. RCCB shall be current operated independent of the line voltage, current sensitivity shall be of 30 / 100 mA at 240/415 volts AC and shall have a minimum of 20,000 electrical operations.

It should provide full protection as envisaged by IE rules – 61-A, 71 – ee, 73 – ee, 1985 and also rule 50 of IE rule 1956.

## II. Mechanical Operation

The moving contacts of the phases shall be mounted on a common bridge, actuated by a rugged toggle mechanism. Hence, the closing /opening of all the three phases shall occur simultaneously. This also shall ensure simultaneous opening of all the contacts under tripping conditions.

## III. Neutral Advance Feature

The neutral moving contact shall be so mounted on the common bridge that, at the time of closing, the neutral shall make contact first before the phases; and at the time of opening, the neutral shall break last after allowing the phases to open first. This is an important safety feature which is also required by regulations.

MCB should be having an integrated label holder with dual side din rail locking facility. Incoming & Outgoing should have facility for termination of Busbar & Cable separately.

Cable termination facility should be up to 35 sq. mm.

## IV. Testing Provision

A test device shall be incorporated to check the integrity of the earth leakage detection system and the tripping mechanism. When the unit is connected to service, pressing the test knob shall trip the ELCB / RCCB and the operating handle shall move to the "OFF" position.

### 2.4 **EARTHING**

Earthing shall be provided as per IS:3043-1987.

### 2.5 **PAINTING**

All sheet steel work shall undergo a process of degreasing, pickling in acid, cold rinsing, phosphating, passivating (seven tank processing) and then painted with electrostatic paint (Powder coating). The shade of colour of panel inside/outside shall be of Siemens gray paint shade no. RAL-7032 of IS Code No.5.

### 2.6 **LABELS**



Engraved PVC labels shall be provided on all incoming and outgoing feeder. Circuit diagram showing the arrangements of the circuit inside the distribution panels shall be pasted on inside of the panel door and covered with transparent plastic sheet.

## 2.7 TESTING

Testing of panels shall be as per following codes:

IS: 8623 (Part -I) 1977 for factory built assemblies of switch gear for voltages upto and including 1000 VAC.

IS: 13947 : 1993 Degree of protection

## 2.8 WIRING

In wiring a distribution panel it shall be insured that total load of various distribution panel and/or consuming devices is divided evenly between the phases and number of ways as per Consultants drawing.

## 3.0 MEDIUM VOLTAGE CABLES

### 3.1 SCOPE

This section shall cover supply of medium voltage cables.

### 3.2 STANDARDS

The following standards and rules shall be applicable :

IS : 1554 PVC insulated electric cables (heavy duty).

IS : 1753 Aluminium conductors for insulated cables.

IS : 3961 Recommended current ratings for cables.

IS : 8130 Aluminium conductors for insulated cables

Indian Electricity Act and Rules.

### 3.3 MEASUREMENTS

The cables will be measured in meters. The unit rate shall include cutting the cable into required lengths, packing , loading , unloading, insurance, transportation, delivery to stores/site as per work order, stocking in stores, testing of cables at stores etc. of medium voltage cable.

### 3.4 GENERAL

The medium voltage cables shall be supplied, laid, connected, tested and commissioned in accordance with the drawings, specifications, relevant Indian Standards specifications, manufacturer's instructions. The cables shall be delivered at site in original drums with manufacturer's name, size, and type, clearly written on the drums.



### 3.5 MATERIAL

The MV cables shall be cross linked polyethylene (XLPE) insulated PVC sheathed of 1100 volts grade aluminium or copper conductor, armoured and unarmoured heavy duty, conforming to IS : 7098 Part I IS : 1988 Part I. as asked for in the schedule of quantities.

- 3.5.1 All XLPE Aluminium/Copper Power cables shall be 1100 Volts grade, multi core constructed as per IS : 7098 Part-I of 1988 as follows :
- a) Stranded Aluminium /Copper conductor of high conductivity upto 4 mm.<sup>2</sup> size, the conductor shall be solid and above 4 mm.<sup>2</sup>, conductors shall be concentrically stranded as per IEC : 228.
  - b) Cores laid up
  - c) The inner sheath should be bonded over with thermo-plastic material for protection against mechanical and electrical damage.
  - d) Armoring should be provided over the inner sheath to guard against mechanical damage. Armoring should be Galvanised steel wires or galvanised steel strips. (In single core cables used in A.C. system armoring should be non-magnetic hard aluminium Wires/Strips. Round steel wires should be used where diameter over the inner sheath does not exceed 13 mm; above 13 mm flat steel armour should be used. Round wire of different sizes should be provided against specific request.)
  - e) The outer sheath should be specially formulated heat resistant black PVC compound conforming to the requirement of type ST2 of IS : 5831-1984 extruded to form the outer sheath.
- 3.5.2 Conductor shall be of electrolytic Aluminium/Copper conforming to IS : 8130 and are compact circular or compact shaped.
- 3.5.3 Insulation shall be of XLPE type as per latest IS general purpose insulation for maximum rated conductor temperature 70 degree centigrade.
- 3.5.4 In Inner sheath laid up cores shall be bonded over with thermoplastic material for protection against mechanical and electrical damage.
- 3.5.5 Insulation, inner sheath and outer sheath shall be applied by extrusion and lapping up process only.
- 3.5.6 Armoring shall be of galvanised steel wire/flat.  
Galvanised steel flat strip / round wires applied helicaly in single layers complete with covering the assembly of cores.  
For cable size upto 25 Sq. mm. : Armour of 1.4 mm dia G.I. round wire  
For cable size above 25 Sq. mm. : Armour of 4 mm wide 0.8 mm thick G.I. strip
- 3.5.7 Repaired cables shall not be used.



3.5.8 Current ratings of the cables shall be as per IS : 3961.

3.5.9 The XLPE insulated cables shall conform to latest revision IS read along with this specifications. The Conductor shall be stranded Aluminium/Copper circular/ sector shaped and compacted. In multi core cables the core shall be identified by red, yellow, blue and black coloring of insulation as following.

CORE IDENTIFICATION :

Two core : Red and Black  
Three core : Red, Yellow and Blue  
Four core : Red, Yellow, Blue and Black  
Single core : Green, Yellow for earthing

Black shall always be used for neutral.

3.5.10 The XLPE insulated 1100 Volts grade power cables shall conform to latest IS and shall be suitable for a steady conductor temperature of 70 degree centigrade. The conductor shall be stranded Aluminium/Copper as called for in the Schedule of quantities. The outer sheath shall be as per the requirement of type ST-2 of IS:5831 of 1984.

3.5.11 The cables shall be suitable for laying in racks, ducts, trenches, conduits and underground buried installation with uncontrolled back fill and chances of flooding by water.

3.5.12 Progressive automatic in line sequential marking of the length of cables in meters at every one meter shall be provided on the outer sheath of all cables.

3.5.13 Cables shall be supplied in non returnable wooden drums as per IS : 10418. Both ends of the cables shall be properly sealed with PVC/Rubber caps so as to eliminate ingress of water during transportation, storage and erection.

3.5.14 The product should be coded as per IS :- 7098 Part-I as follows :-

Aluminium Conductor	A
XLPE Insulation	2X
Steel round wire armour	W
Steel strip armour	F
Steel Double round wire armour	WW
Steel Double strip armour	FF
Non-magnetic (Al.) round wire armour	Wa
Non-magnetic (Al.) strip armour	Fa
PVC outer sheath	Y



### 3.6 GENERAL

All cables shall be adequately protected against any risk of mechanical damage to which they may be liable in normal conditions of handling during transportation, loading, unloading etc.

The cable shall be supplied in single length i.e. without any intermediate joint or cut unless specifically approved by the client.

The cable ends shall be suitably sealed against entry of moisture, dust, water etc. with cable compound as per standard practice.

### 3.7 TESTING

#### 3.7.1 FINISHED CABLE TESTS AT MANUFACTURER'S WORKS :

The finished cables shall be tested at manufacturer's works. Following routine tests for each and every length of cable and copy of test results shall be furnished for each length of cable along with supply. If specified, the cables shall be tested in presence of clients representative.

(a) VOLTAGE TEST :

Each core of cable shall be tested at room temperature at 3 KV A.C. R.M.S. for a duration of 5 minutes.

(b) CONDUCTOR RESISTANCE TEST :

The D.C. Resistance of each conductor shall be measured at room temperature and the results shall be corrected to 20° c. to check the compliance with the values specified in IS 8130 - 1976.

**Prior to dispatching cables, and at the time of delivering the cables at stores, following tests shall be carried out :-**

Insulation Resistance test between phases and phase to Neutral and phase to earth.

Continuity test of all the phases, neutral and earth continuity conductor.

Sheathing continuity test.

Earth resistance test of all the phases and neutral.

All tests shall be carried out in accordance with relevant Indian Standard Code of practice and Indian Electricity Rules. The Vendor shall provide necessary instruments, equipments and labour for





conducting the above test and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the client and results shall be recorded in the prescribed forms.

### **3.8 CABLE MARKING**

EMBOSSING ON OUTER SHEATH :

The outer sheath shall be legibly embossed with following legend :

ELECTRIC CABLE : 1100 V, SIZE : 3.5 C x ----- mm <sup>2</sup>.

Manufacturer's Name & year of manufacturing.

### **3.9 SEALING, DRUMMING & PACKING**

After tests at the manufacturer's works, both ends of the cable shall be sealed to prevent the ingress of moisture during transportation and storage.

Cable shall be supplied in length of 500 ± 10% meters on packed non-returnable drums of sufficiently sturdy construction.

Cables of length more than 250 meters shall also be supplied on non-returnable drums.

The spindle hole shall be 110 mm minimum diameter.

Each drum shall bear on the outside flange, legibly and indelibly in the English literature, a distinguishing number, the manufacturer's name and particulars of the cable i.e. voltage grade, length, conductor size, cable type, insulation type and gross weight shall also be clearly visible. The direction for rolling shall be indicated by an arrow. The drum flange shall also be marked with manufacturer's name and year of manufacturing etc.



#### 4.0 LIGHTING FIXTURES & ACCESSORIES

The light fixtures and fittings shall be assembled and installed in position complete and ready for service, in accordance with details, drawings, manufacturer's instructions and to the satisfaction of the Project Manager.

##### 4.1 SCOPE :

Scope of work under this section shall include inspection at suppliers/manufacturer's premises at site, receiving at site, safe storage, transportation from point of storage to point of erection, erection and commissioning of light fittings, fixtures and accessories including all necessary supports, brackets, down rods and painting etc as required.

##### 4.2 STANDARDS :

The lighting and their associated accessories such as lamps, reflectors, housings, ballasts etc., shall comply with the latest applicable standards, more specifically the following:

General and safety requirements for Luminaries :

Part-1 Tubular fluorescent lamps	-	IS – 1913 (Part-1)
Bi-pin lamp holders for tubular fluorescent lamps	-	IS - 3323
Electronic Ballasts for fluorescent lamps – General & Safety requirement	-	IS – 13021 (Part-1)
Electronic Ballasts for fluorescent lamps – Performance requirement	-	IS – 13021 (Part-2)
Tubular Fluorescent lamps	-	IS - 2418 (Part-1 to4)
Luminaries – General requirement	-	IS – 10322 (Part-1)
Luminaries – Constructional requirement	-	IS – 10322 (Part-2)
Luminaries – Screw and Screwless termination	-	IS – 10322 (Part-3)
Luminaries – Methods of Tests	-	IS – 10322 (Part-4)
Particular requirement – General purpose Luminaries	-	IS–10322(Part-5 / Sec - 1)



Particular requirement – Recessed Luminaries - IS-10322 (Part-5/Sec-2)

Particular requirement – Luminaries for Road and Street lighting - IS-10322 (Part-5/Sec-3)

Particular requirement – Portable General purpose Luminaries - IS-10322 (Part-5/Sec-4)

#### 4.3 LIGHT FITTINGS-GENERAL REQUIREMENTS :

- a). Fittings shall be designed for continuous trouble free operation under atmospheric conditions without reduction in lamp life or without deterioration of materials and internal wiring. Degree of protection of enclosure shall be IP-65 for outdoor fittings except bulkhead fitting. Bulkhead fitting shall be provided with IP-54 protection.
- b). Fittings shall be so designed as to facilitate easy maintenance including cleaning, replacement of lamps/ ballasts.
- c). All fittings shall be supplied complete with lamps. All mercury vapour and sodium vapour lamp fittings shall be complete with accessories like ballasts, power factor improvement capacitors, starters, etc. Out door type fittings shall be provided with weather proof junction boxes (IP-55) and IP-54 Control gear boxes.
- d). Each fitting shall have a terminal block suitable for loop-out connection by 1100 V PVC insulated copper conductor wires up to 4 sq.mm. the internal wiring should be completed by the manufacturer by means of standard copper wire and terminated on the terminal block.
- e). All hardwares used in the fitting shall be suitably plated or anodized and passivated.
- f). Earthing : Each lighting fitting shall be provided with an earthing terminal. All metal or metal enclosed parts of the housing shall be bonded and connected to the earthing terminal so as to ensure satisfactory earthing continuity throughout the fixture.
- g). Painting/Finish : All surfaces of the fittings shall be thoroughly cleaned and degreased and the fittings shall be free from scale, rust, sharp-edges, and burns.
- h). The housing shall be powder coated/stove-enameled or anodised as required. The surface shall be scratch resistant and shall show no sign of cracking or flaking when bent through 90 deg. over 12 mm dia mandrel.



- i) Metal used in BODY of lighting fixtures shall be not less than 22 SWG or heavier if so required to comply with specification of standards. Sheet steel reflectors shall have a thickness of not less than 20 SWG. The metal parts of the fixtures shall be completely free from burns and tool marks. Solder shall not be used as mechanical fastening device on any part of the fixture.

#### 4.4. LIGHT FITTINGS – SPECIAL REQUIREMENTS

##### Box Channel Type Industrial Fittings

Box type slim line channel must be in screw less construction manufactured from M.S. CRCA sheet steel powder coated with MS CRCA cover, powder coated white. Light reflection surface in Box/Channel type fittings shall be in a POLYESTER PRECOATED STEEL having a reflection factor of not less than 80%. SCREWLESS DESIGN & CONSTRUCTION Light fixtures shall be preferred due to their ease of maintenance, especially for box/channel for box/channel type fixtures.

##### ***Moisture Proof Industrial Fittings***

Surface mounted totally enclosed moisture proof fixtures must be in polycarbonate body and diffuser with transparent prismatic interior and smooth exterior and frosted end. Fixture must be completely sealed with polyurethane double gasket to achieve IP 65 protection. Fixture is complete with CRCA steel white powder coated / enameled finish reflector.

##### 18 W / 36 W Fluorescent and 36 W CFL Low Glare Light Fittings

Recessed mounted, modular fluorescent lighting fixture made of CRCA Sheet steel powder coated (white) housing, electro chemically brightened and anodised reflector, three dimensional cross louvers with concave contours, fresnel top at louver saddle to increase efficiency. The luminance of  $<200 \text{ cd/M}^2$  at 63 degree viewing angle in all directions so as to confirm Cat-2 classification of CIBSELG3

#### 4.5 ACCESSORIES FOR LIGHT FITTINGS REFLECTORS

The reflectors shall be made of CRCA sheet steel/aluminium /Silvered glass/Chromium plated sheet copper as required. The thickness of reflectors shall be as per relevant standards. Reflectors made of steel shall have stove enameled/ vitreous enameled/epoxy coating finish. Aluminium used for reflectors shall be anodized/epoxy stove enameled /mirror polished. The finish for the reflector shall be as specified. The reflectors shall be free from scratches / blisters and shall have a smooth and glossy surface having optimum light reflecting coefficient. Reflectors shall be readily removable from the housing for cleaning and maintenance without use of tools.

#### 4.6 LAMPS

##### 4.6.1 TLD

Lamp shall be environment friendly low pressure mercury discharge lamp with mercury content less than or equal to 5 mg. The lamp shall have minimum lumen maintenance of 85 and CRI of 85. The



lamp must comply to ROSH (Restriction of Hazardous substances) and covered by WEEE. Lamp should be fully re-cyclable. The lamp should be low on maintenance with life of 40 K hours in case of electromagnetic ballast and 65 K hours in case of HF ballast up to 10% failure. The discharge glass shall be lead free.

TLD Lamps shall be minimum tri-phosphor type and have bi-pin bases. Colour spectrum of light shall be equivalent to "PHILIPS color 84 or color 86 color 82 or "OSRAM color 21 or color 11 or color 41 (as required at site)".

The fluorescent Tubes (TLD) should have cool daylight colour designation. But Architects reserve the right to prescribe either Cool Daylight or Bright White or Incandescent Colour Designations for TLD. NO extra payment will be made over the quoted rate of bidder for this. The 36 W fluorescent tubes will have Nominal Luminous Flux of not less than 3350 lumens whether so mentioned in the Schedule of Quantities or not.

#### T 5 – HIGH EFFICIENCY ECO-FRIENDLY LAMPS

T-5 lamp shall be environment friendly low pressure mercury discharge lamp with mercury content less than or equal to 3 mg. lamp should have lowest CO2 emission compared to any other comparable light source (40% less than a TL-D standard lamp, 26% less than TL-D / 80). T-5 lamp shall be 100% lead free. T-5 lamp shall be designed for operation with electronic gear and well suited for dimming. Maximum lumen output to be reached at approx 35°C in free burning position. T-5 lamp can be ignited from -15°C to + 50°C. Lamp should be fully recyclable and must comply to ROSH (Restriction of Hazardous substances) and shall be covered by WEEE. T-5 shall have 16 mm in diameter service life of TL-5 lamp should be 10% more than TL-D lamps. T-5 lamp shall have lumen efficacy of up to 104 Lux / W and shall have excellent colour rendering to En 12464 (Ra 80 to 89).

4.6.2 Compact fluorescent lamp shall have same luminous flux and power consumption as fluorescent tubes but less than half the length and more compact than U-shaped and circulator lamps. CFL shall be suitable for use with conventional control gear & standers and for HF electronic control gear. CFL lamp shall be non integral type of OSRAM / PHILIPS only.

#### 4.7 HIGH FREQUENCY ELECTRONIC BALLAST

High frequency electronic ballast shall be used with fluorescent / Compact Fluorescent Lamps wherever specified in the schedule of quantities. High frequency electronic ballast shall comply to the following:

- IEC 927, IEC 928 for  $\leq 10\%$  total harmonic distortion.
- EMI / RFI – Confirming to FCC / VDE Class A/B.
- Line Transient as per IEEE C62.41.
- Ballast Crest Factor C1.7%.



- No Stroboscopic Effect
- Constant Wattage / Light output between 240 V  $\pm$  10%.
- Circuit protection for surge current and inrush current.
- Short circuits, open lamp protection
- PF > 70 for fluorescent / T5 lamp and CFL.
- Deactivated lamp protection
- Suitable for use with single and twin lamps
- RFI < 30 MHz EN 55015
- Total Harmonic Distortion (THD)  $\leq$ 10%
- Immunity to interference EN 61547
- Safety EN 60928 / IEC 928 / IS 13021 (Part I)
- Performance EN 60929 / IEC 929 / IS 13021 (Part II)
- Vibrations & Bump tests IEC 68-2-6 FC  
IEC 9001
- Quality Standard ISO 9001
- Environmental Standard ISO 14001
- DC Operation EN 60924
- Emergency Lighting Operation VDE 0108

Total System consumption (lamps + ballast) for  
1 x 28 W T-5, shall not exceed 32 W

## 5. **EARTHING**

### 5.1 **EARTHING**

The system shall be TNS with four wire supply system (R,Y,B,N and 2 Nos. E) brought from the main L T Panel. All the non-current carrying metal parts of electrical installation and all metal conduits trunking, cable sheaths, switchgear, distribution panels, light fittings and all other parts made of metal shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system. All metal work such as pipe lines, ducts, cable trays, stair case railing etc shall be bonded to earth.

All earthing shall be in conformity with IS:3043 1987, and the basic system of earthing shall be TNS.

### 5.2 **EARTHING CONDUCTORS**

Earthing conductors shall be of copper / GI as mentioned in schedule of quantities and shall be protected against mechanical injury and corrosion.



### 5.3 SIZING OF EARTHING CONDUCTORS

The cross sectional area of earthing conductor shall not be smaller than half of the largest current carrying conductor subject to an upper limit of 80 Sq.mm. If the area of the largest current carrying conductor or bus bar exceeds 160 sq.mm then two or more earthing conductors shall be used in parallel, to provide at least half the cross sectional area of the current carrying conductor or bus bars. All fixtures, outlet boxes, junction boxes and power circuits up to 15 amps shall be earthed with PVC insulated copper wire.

All 3 phase switches and distribution panels up to 60 amps rating shall be earthed with 2 Nos. distinct and independent 4 mm dia copper / GI wires. All 3 phase switches and distribution panels up to 100 amps rating shall be earthed with 2 Nos. distinct and independent 6 mm dia copper / GI wires. All switches, bus bar, ducts and distribution panels of rating 200 amps and above shall be earthed with minimum of 2 nos separate and independent 25 mm x 3 mm copper / GI tape.

### 5.4 CONNECTION OF EARTHING CONDUCTORS

Main earthing conductors shall be taken from the earth connections at the main L T panel to an earth electrode with which the connection is to be made. All joints in tapes shall be with four rivets and shall be brazed in case of copper and by welding bolting in case of GI, wires shall be connected with crimping lugs, all bolts shall have spring washers. Sub- mains earthing conductors shall run from the main distribution panel to the sub distribution panel. Final distribution panel earthing conductors shall run from sub-distribution panel.

Circuit earthing conductor shall run from the exposed metal of equipment and shall be connected to any point on the main earthing conductor, or its distribution panel. Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to distribution panel at which they originate, or otherwise at the commencement of the run by an earthing conductor in effective electrical contact with cable sheathing. Where equipment is connected by flexible cord, all exposed metal parts of the equipment shall be earthed by means of an earthing conductor enclosed with the current carrying conductors within the flexible cord. Switches, accessories, lighting fitting etc. which are rigidly secured in effective electrical contact with a run of metallic conduit shall not be considered as a part of the earthing conductor for earthing purposes, even though the run of metallic conduit is earthed.

The plate/pipe electrode, as far as practicable, shall be buried below permanent moisture level but in no case not less than 2.5 M below finished ground level.

The plate/pipe electrode shall be kept clear of the building foundation and in no case, it shall be nearer by less than 2 M from outer face of the respective building wall / column.

The plate electrode shall be installed vertically and shall be surrounded with 150 mm. thick layers of Charcoal dust and Salt mixture.

19 mm. dia. G.I. pipe for watering, shall run from top edge of the plate / pipe electrode to the mid level of block masonry chamber.

Top of the pipe shall be provided with G.I. funnel and screen for watering the earth / ground through the pipe.



The funnel with screen over the G.I. pipe for watering to the earth shall be housed in a block masonry chamber as shown in the drawing.

The masonry chamber shall be provided with a Cast Iron hinged cover resting over the Cast Iron frame which shall be embedded in the block masonry.

Construction of the earthing station shall in general be as shown in the drawing and shall conform to the requirement on earth electrodes mentioned in the latest edition of Indian Standard IS : 3043, Code of Practice for Earthing Installation.

The earth conductors (Strips / Wires copper / Hot dip G.I.) inside the building shall properly be clamped / supported on the wall with Galvanised Iron clamps and Mild Steel Zinc Passivated screws / bolts. The conductors outside the building shall be laid at least 600 mm. below the finished ground level.

The earth conductors shall either terminate on earthing socket provided on the equipment or shall be fastened to the foundation bolt and / or on frames of the equipment. The earthing connection to equipment body shall be done after removing paint and other oily substances from the body and then properly be finished.

Over lapping of earth conductors during straight through in joints, where required, shall be of minimum 75mm. long.

The earth conductors shall be in one length between the earthing grid and the equipment to be earthed.

#### EARTH LEADS AND CONNECTIONS :

Earth lead shall be bare copper or Galvanised steel as specified with sizes shown on drawings. Copper lead shall have a phosphor content of not over 0.15 %. G.I strips buried in the ground shall be protected with bitumen and hessian wrap or polythene faced hessian and bitumen coating. At road crossing necessary Hume pipes shall be laid. Earth lead run on surface of wall or ceiling shall be fixed on saddles so that strip is at least 8 mm away from the wall surface.

The complete earthing system shall be mechanically and electrically bonded to provide an independent return path to the earth source.

#### 5.5 PROHIBITED CONNECTIONS

Neutral conductor, sprinkler pipes, or pipes conveying gas, water or inflammable liquid, structural steel work, metallic enclosures, metallic conduits and lightning protection system conductors shall not be used as a means of earthing an installation or even as a link in an earthing system. The electrical resistance measured between earth connection at the main L T panel and any other point on the completed installation shall be low enough to permit the passage of current necessary to operate or circuit breakers, and shall not exceed 1 ohm. All switches carrying medium voltage shall be connected with earth by two separate and distinct connections. The earthing conductors inside the building wherever exposed shall be properly protected from mechanical injury by running the same in G I pipe of adequate size. The overlapping in strips at joints where required shall be minimum 75 mm. The joints shall be riveted and brazed in case of





copper and by welding / bolting in case of GI in an approved manner. Sweated lugs of adequate capacity and size shall be used for termination of all conductor wires above 6 sq.mm size. Lugs shall be bolted to the equipment body to be earthed after the metal body is cleaned of paint and other oily substances and properly tinned. Equipotent bonding of all metallic structures shall be done.

## 5.6. **EARTHING**

The following must always be ensured in earthing system.

- All earths must be interconnected at the earth pits. This includes generator neutrals, transformer neutrals, transformer body, lightning protection system earths, UPS earths etc.
- Extraneous conductive parts such as gas pipes, other service pipes and ducting risers and pipes of fire protection equipment and exposed metallic parts of the building structure.

5.7 The Contractor shall get the soil resistivity test done at his own cost of the area where earthing pits are to be located before starting the installation.

## 5.8 **RESISTANCE TO EARTH**

The resistance of earthing system shall not exceed 1 ohm.

## 5.9 **SPECIFICATION FOR HOT DIP GALVANIZING PROCESS FOR MILD STEEL USED FOR EARTHING FOR ELECTRICAL INSTALLATION**

### GENERAL REQUIREMENTS

#### I. Quality of Zinc

Zinc to be used shall conform to minimum Zn 98 grade as per requirement of IS:209-1992.

#### II. Coating Requirement

Minimum weight of zinc coating for mild steel flats with thickness upto 6 mm in accordance with IS:6745-1972 shall be 400 g/sqm.

The weight of coating expressed in grams per square metre shall be calculated by dividing the total weight of Zinc by total area (both sides) of the coated surface.

The Zinc coating shall be uniform, smooth and free from imperfections as flux, ash and dross inclusions, bare patches black spots, pimples, lumpiness, runs, rust stains bulky white deposits, blisters.

Mild steel flats / wires shall undergo a process of degreasing pickling in acid, cold rinsing and then galvanizing. Jointing of earthing tape shall be by welding. All joints and cut ends shall be properly painted with aluminum paint.



#### 5.10 TEST :

The entire earthing installation shall be tested as per requirements of Indian Standard Specification IS : 3043.

The following earth resistance values shall be measured with an approved earth megger and recorded.

- 1) Each earthing station
- 2) earthing system as a whole
- 3) Earth continuity conductors

Earth conductor resistance for each earthed equipment shall be measured which shall not exceed 5 ohm in each case.

Measurements of earth resistance shall be carried out before earth connections are made between the earth and the object to be earthed.

All tests shall be carried out in presence of the client's representative.

### **Conformity to IE Act, IE Rules, and Standards**

All Electrical works shall be carried out in accordance with the provisions of Indian Electricity Act, 2003 and Indian Electricity Rules, 1956 amended up to date (Date of call of tender unless specified otherwise). List of Rules of particular importance to Electrical Installations under these General Specifications is given in Appendix C for reference.

## **1.0 PLANNING OF ELECTRICAL INSTALLATION**

### **1.1 Planning of Electrical Installation**

The design and planning of an electrical installation involve consideration of all prevailing conditions and is usually guided by the requirement of the consumer. A competent Electrical Engineer should take the responsibility of detailed designing and planning to meet the requirement of various functional needs, efficiency, economy, energy conservation, aesthetics, appropriate technology, safety and avoidance of possible fire hazards.

### **Coordination**

1.2.1 Before planning is started, coordination and collaboration is needed amongst the following Client/ / Civil contractor / Structural Engineer/ Architect / PMC / Electrical Designer

1.2.2 Based on the specific requirement and projected use of the building, conceptual coordinated detailed planning for the entire building will be finalized. The electrical portion has to fit into such integrated concept of the building.



### **Co-ordination with Local Supply Authority**

The power requirement should be assessed, in consultation with the owner/ users, and discussion should be held with the Electricity supply authority to decide on location/ space required for Electricity supply equipment/ meter and tariff involved.

## **2.0 ELECTRIC POWER DISTRIBUTION AND WIRING**

### **Point Wiring (Non-Modular Type for EWS housing Project)**

#### **2.1 Definition**

A point (other than socket outlet point) shall include all work necessary in complete wiring to the following outlets from the controlling switch or MCB.

Ceiling rose or connector (in the case of points for ceiling/exhaust fan points, prewired light fittings, and call bells).

Ceiling rose (in case of pendants except stiff pendants).

Back plate (in the case of stiff pendants).

Lamp holder (in the case of goose neck type wall brackets, batten holders and fittings which are not prewired).

#### **2.2 Scope**

Following shall be deemed to be included in point wiring:

20/25 mm Medium Duty Rigid PVC Conduit as the case may be, accessories for the same and wiring cables between the switch box and the point outlet, loop protective earthing of each fan/ light fixture.

All fixing accessories such as clips, screws, Phil plug, rawl plug etc. as required.

Metal or PVC switch boxes for control switches, regulators, sockets etc, recessed or surface type, and phenolic laminated sheet covers over the same.

Outlet boxes, junction boxes, pull-through boxes etc. but excluding metal boxes if any, provided with switchboards for loose wires/conduit terminations.

Control switch or MCB, as specified.

3 pin or 6 pin socket, ceiling rose or connector as required. (2 pin and 5 pin socket outlet shall not be permitted.)

Connections to ceiling rose, connector, socket outlet, lamp holder, switch etc.

(i) Interconnecting wiring between switches within the switch box on the same circuit.

#### **2.3 Wiring System**

**For Point/Independent Plug wiring above 10 mtr of Length, additional length will be added at rate of mains.**



**For point wiring in bathroom, washbasin and W/C area in residential quarters reduce overall rate by 50% of point wiring for light.**

Wiring shall be done only by the looping system. Phase/live conductors shall be looped at the switch box. For point wiring, neutral wire/earth wire looping for the 1st point shall be done in the switch box; and neutral/earth looping of subsequent points will be made from point outlets.

In wiring, no joints in wiring will be permitted any where, except in switch box or point outlets, where jointing of wires will be allowed with use of suitable connector.

The wiring throughout the installation shall be such that there is no break in the neutral wire except in the form of linked switchgear.

Light, fans and call bells shall be wired in the 'lighting' circuits. 15A/16A socket outlets and other power outlets shall be wired in the 'power' circuits. 5A/6A socket outlets shall also be wired in the 'power' circuit both in residential as well as non-residential buildings. Separate Live, Neutral, Earth wire run from DB and it is not count as mains.

#### **Joints in Wiring**

No bare conductor in phase and/or neutral or twisted joints in phase, neutral, and/or protective conductors in wiring shall be permitted.

There shall be no joints in the through-runs of cables. If the length of final circuit or submain is more than the length of a standard coil, thus necessitating a through joint, such joints shall be made by means of approved mechanical connectors in suitable junction boxes. Termination of multistranded conductors shall be done using suitable crimping type thimbles.

#### **Capacity of Circuits**

Power circuit in non-residential building will have only one outlet per circuit.

Load more than 1 KW shall be controlled by suitably rated MCB and cable size shall be decided as per calculations.

#### **Socket Outlets**

Socket outlets shall be 6A 3 pin, 16 Amp 3 pin or 16/6 Amp 6 pin. 5 pin socket outlets will not be permitted.

The third pin shall be connected to earth through protective (loop earthing) conductor. 2 pin or 5 pin sockets shall not be permitted to be used.

Conductors connecting electrical appliances with socket outlets shall be of flexible type with an earthing conductor for connection to the earth terminal of plug and the metallic body of the electrical appliance.

Every socket outlet shall be controlled by a switch or MCB, as specified. The control switch/MCB shall be connected on the 'live' side of the line.

5A/6A and 15A/16A socket outlets shall be installed at the following positions, unless otherwise specified.



*Kitchen* – 750mm above working platform and away from the likely positions of stove and sink.

*Bathroom* – No socket outlet is permitted for connecting a portable appliance thereto. MCB switch may be provided above 2 m for fixed appliances, and at least 1 m away from shower.

*Rooms in residences* – 1000 mm above floor level, or any other level in special cases as desired by the Engineer-in-charge.

Unless and otherwise specified, the control switches for the 6A and 16A socket outlets shall be kept along with the socket outlets.

#### 2.4 Providing Electrical Planning in Residential Areas in each Flat as mentioned below details:

(I) <b>Drawing Room :</b>	<b>LIG</b>	<b>EWS</b>
Double door type Distribution Board	1 Nos.	1 Nos.
(12 Way SPN DB Having Incomer: 25 A DP ELCB (30 mA)	1 Nos.	1 Nos.
Outgoing: 6-32 Amp , 10 kA SP MCB	6 Nos	6 Nos
Light Points (all points are Wall bracket points)	2 Nos	2 Nos
Bell points with Bell Buzzer	1 Nos	1 Nos
Fan points with Step type Regulator	1 Nos	1 Nos
5 Amp socket On board	1 Nos	1 Nos
Television Points with TV socket	1 Nos	1 Nos
2 Nos. 5 Amp Socket with Switch near TV points	2 Nos	2 Nos

(II) <b>Kitchen with Wash area</b>		
Light Points (all points are Wall bracket points )	2 Nos. (1 for kitchen + 1 for wash)	2 Nos. (1 for kitchen + 1 for wash)
Fan points with Step type Regulator	1 Nos	1 Nos
5 Amp socket on board	1 Nos	1 Nos



15 Amp Power Socket with Switch for Freeze	1 Nos	1 Nos
5 Amp Socket on kitchen platform for Water filter	1 Nos	1 Nos
<b>(III) Bedroom</b>		
Light Points ( all points are Wall bracket points )	2 Nos	2 Nos
Fan points with Step type Regulator	1 Nos	1 Nos
5 Amp socket on board	1 Nos	1 Nos
<b>(IV) Bathroom</b>		
Light Points (all points are Wall bracket points)	2 Nos. (1 for bathroom & 1 for Wash basin area)	2 Nos. (1 for bathroom & 1 for Wash basin area)
15 Amp Power Socket with Switch for geyser	1 Nos	-
<b>(V) Toilet</b>		
Light Points (all points are Wall bracket points)	1 Nos	1 Nos

### 2.5 Main Board of Each Quarter

It shall be MCB type with provision of ELCB with the incoming MCB. It shall be located in a niche with ventilated door cover, in the room connecting to the entry of the quarter. MCB DB shall be pre-wired type, for trouble free service.

### 2.6 Telephone Wiring

Telephone wiring is to be provided for each quarter. Such telephone wiring to be brought to a tag-block at a suitable point in ground floor. Provisions shall be kept for suitable entry-pipe for laying incoming telephone cable.

### TV Cabling

Internal TV cabling shall be provided, with one outlet up to quarters. Similarly, from suitable point at Terrace floor, TV cabling shall be provided. With use of suitable splitters, such TV cabling to be connected to each quarter.



***External Pipe Network for Laying Telephone and TV Cabling for the Colony***

Starting from a suitable room, pipe network may be provided to lay telephones/TV cables for the colony. Suitable road cross pipe and manholes to be provided for drawing such cables and their maintenance



**2.7 Following to be minimum requirement for electrification for each EWS -I site**

<p>Receiving power from State Electricity Board/GEB/Torrent</p>	<p>To receive power from SEB/GEB/Torrent power, as per the load requirement of site.</p> <p>Location of Substation Transformer and 11Kv HT breaker, on each site in line with requirement of SEB/GEB/TORRENT.</p> <p>Electrical load sheet to be submitted specifying the connected and demand loads. Sizing for the transformer to be done as per the same.</p> <p>The output of transformer i.e. LT at 433V, 3-phase+Neutral, 50 Hz will be further distributed through FSP.</p>
<p>Cabling for different voltage– 11kv and 415v</p>	<p>LT Cable shall be 1.1KV, XLPE Armoured cable as per IS 7098 (P-1), 1988 and IEC rules.</p> <p>Laying of cable shall be Minimum 1200mm deep for 11kv, HT cable and 750mm deep for LT cable.</p>
<p>Receiving power to Feeder Section Pillar (FSP)</p>	<p>LT power (433Volts) to be received at Feeder Section Pillar.</p> <p>Underground cabling to be done with proper size chambers for cabling pulling. Spare cabling to be done as per the requirement of GEB or Torrent.</p>
<p>Metering</p>	<p>Power from FSP shall be received on Bus bar chambers to LT meters.</p> <p>Meters to be provided on hollow plinth and ground floor.</p> <p>Proper arrangement of all switchgears, meters to be done as per requirement of GEB/Torrent.</p>
<p>Electrical Shaft</p>	<p>Electrical shaft of proper size to be provided. The mains from electrical meter to each unit shall be routed through electrical shaft. 25/32 mm PVC MMS conduits to be used for mains connecting from meter to unit in concealed or open as per required.</p> <p>1 No of 25/32mm PVC MMS conduit to be provided for mains for each of the unit.</p>





LT Cabling and wiring for mains	<p>LT Cable to be sized for full load current and Voltage drop.</p> <p>From Transformer to FSP : 0.5%</p> <p>From FSP to Meter : 1.5 %</p> <p>From Meter to Unit (DB within house) : 1.5 %</p> <p>From DB to end point : 1.5 % (Total drop 5%)</p>
Common Area LT meter and distribution	<p>Separate LT meter for common service for each block to cater lift, common lighting of foyer and stair case area.</p> <p>Separate LT meter for metering of street lighting and for utility load for the site.</p>
Common Area Lighting and distribution	<p>Common Area distribution Board to be planned for common area Lighting, external area lighting bracket points, Lifts. Power to common area distribution board to be supplied from common area meter.</p>
External area lighting	<p>The external area lighting to be done using power efficient light fixtures to achieve LUX of 10 – 12 LUX for internal streets.</p> <p>External Lighting to be designed using wall bracket mounted lights on periphery of each building or using GI poles.</p> <p>Illumination for hollow plinth or ground floor to be done to</p>



	<p>achieve lux of 40 – 50LUX.</p> <p>Foyer Min. Of 100 LUX.</p> <p>Circuit distribution to be done in 2 to 4 circuits to achieve LUX level in ratios of 33% to 50% to 100% to achieve energy saving.</p>
<p>Wiring for mains</p>	<p>Power from LT meter to be received to Distribution Board.</p> <p>Minimum wire sizes for mains</p> <p>2 nos. 1 core 4.0 sq. mm copper flexible FRLS wire (Phase + Neutral) &amp; 1 nos. 1 core 2.5 sq. mm copper flexible FRLS wire (Earth)</p> <p>In case of High rise and as per voltage drop calculation the sizes of mains shall increase 2 nos. 1 core 6.0 sq. mm copper flexible FRLS wire (Phase + Neutral) &amp; 1 nos. 1 core 4.0 sq. mm copper flexible FRLS wire (Earth).</p> <p>Voltage drop shall be as per mentioned above.</p> <p>No wires less than 1.5 sq mm to be used. Cables if necessary shall also be used.</p>
<p>Internal electrification and wiring</p>	<p>In case of Single phase power distribution, suitable ampere rated DP MCB + ELCB as incomer to be provided in distribution board to provide safety to the human beings as per safe practice. Each outgoing circuit shall be SP MCB.</p> <p><b><u>Wire sizes:</u></b></p> <p>For Lighting circuits: Mains wiring : 2 No. 2.5 sqmm Cu (FRLS) flexible wire (P&amp;N) + 1 No. 1.5 sqmm Cu (FRLS) flexible wire (E)</p> <p>OFF Wiring: 1 No. 1.5 sqmm Cu (FRLS) flexible wire.</p> <p>For Power circuits: (Refrigerators, kitchen etc.) Mains wiring : 2 No. 2.5 sqmm Cu (FRLS) flexible wire (P&amp;N) + 1 No. 1.5 sqmm Cu (FRLS) flexible wire (E)</p> <p>For Geyser circuits: Mains wiring : 2 No.4.0 sqmm Cu (FRLS) flexible wire (P&amp;N) + 1 No. 2.5 sqmm Cu (FRLS)</p>



	flexible wire (E)
Switches and Accessories	Non modular type switches and accessories to be installed from specified Make List.
TV and Telephone systems	Conduit provision will be provided for landline telephone system. 1 No of PVC, MMS conduit of 20mm for each unit for ELV system. Conduit provision will be done from ground floor terminal box to each floor junction box.
Earthing and protection	3Mtr Deep GI pipe/ 600x600x6.3 mm GI PLATE earthing to be provided for Body earthing of panels, electrical devices, pump rooms, lifts etc. Plate earthing to be provided for neutral earthing like Transformer and DG sets. Lightening protection system to be provided as required.



## **DIESEL GENERATOR SET**

### **SCOPE OF WORK**

This specification covers the design, construction features, manufacture and performance of emergency diesel generator. The scope includes supply, installation, testing and commissioning of D.G. set along with fuel pipeline, residence type exhaust pipe insulation and all the accessories required for trouble free operation.

### **CODES & STANDARDS**

The design, material, construction, manufacture, inspection, testing and performance of DG set shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed.

The equipment shall also conform to the latest applicable standards and codes of practice.

The DG set shall meet the requirements of the following standards and rules

<b>Sr.</b>	<b>Item</b>	<b>Relevant IS</b>
1	Designation for type of construction and mounting arrangement of rotating electrical machines.	IS: 2253
2	Degree of protection providing by enclosures of rotating electrical machinery.	IS: 4691
3	Terminal marking of rotating electrical machines.	IS: 4728
4	Guide for testing 3 Phase Synchronous Machines.	IS: 7132
5	Turbine type generators.	IS: 5422
6	Methods of determination of efficiency of Rotating electrical machines.	IS: 4889
7	Insulating materials for Electric machinery And apparatus in relation to their thermal Stability service, classification.	IS: 1271
8	Specification for rotating electrical machines.	IS: 4722

### **TECHNICAL SPECIFICATIONS FOR DIESEL GENERATOR SET**

Supplying and erecting, commissioning and testing diesel generating set having

1. continuous rating, 3 phase, 415 volts, 50 cycles A.C. supply comprising of a totally enclosed air/water cooled diesel engine with multi-cylinders developing suitable BHP not less than following capacity :



Continuous Rating KVA	BHP not less than
25	32
30	42
40	50.5
50	65.8
62.5	76
75	91

For other ratings R&B SOR shall be referred.

2. at 1500 RPM with 10% overload for one hour in 24 hours
3. with standard accessories like fly wheel, lubricating oil cooler, "A" class governor, heavy duty fuel wheel and lubricating oil filter, oil bath air filler, lubricating oil pressure gauge, end exhaust manifold, standard set of tools with adjustable spanners, screw drivers, feeder gauge, cylinder head to cover, joint cylinder head to exhaust, element lube oil filter,
4. 12/24 volts electric starting equipment complete with standard battery & Battery Charger, cut-outs, ammeter, necessary wiring, pressure gauge, starter etc and heavy duty Residential type exhaust silencer and vertical hot air duct both logged with asbestos rope, save oil trays, exhaust piping of required length, standard fuel level indicator and piping
5. and drip proof alternator, self excited, self regulated, screen protected, with excitation system, capable of delivering the rated system output at 415 volts, 3 phase, 0.8 PF, 50 Hz, 4 wire, running at 1500 RPM, conforming to IS-4722- 1968 with voltage regulation +/- 5% of rated voltage from no load to full load.
6. Both the engine and alternator fitted on a common fabricated steel base plate with anti vibration mounting engine and alternator both connected to each other by flexible flange coupling
7. and with floor/wall mounted control panel box comprising of voltmeter ammeter, selector switches, ACB / MCCB / MCB of adequate capacity, indicator lamps duly wired with HRC fuses.
8. The alternator & control panel shall be connected with provided suitable capacity armoured cable
9. and complete with Acoustic enclosure (canopy) made out of 18 SWG CRCA Sheet, sound absorbing material Rockwool of 64 density & 100 mm thick conforming to IS:8183 The resin bonded rockwool covered from inside the canopy by perforated sheet with 3/4 mm holes, sound level not more than 75 dB at a distance of 1 mtr, as per CPCB norms.



10. Erection, commissioning and satisfactory testing as per requirement with first filling of fuel, oil, etc. **with guarantee of complete system for One year. & with obtaining all necessary certificate from Electrical Inspector.**

DATA SHEET FOR D.G.SET		
Technical Specification	Unit	Details/Remarks
<b>Design Philosophy</b>		<p>A.D.G. Set is meant to run emergency load.</p> <p>B.D.G SET should be suitable to cater the total load consisting of followings:</p> <ol style="list-style-type: none"> <li>1. One number of lift</li> <li>2. One number of Water pump</li> <li>3. Common lighting like passage, stair case, street light etc..</li> <li>4. 10% additional load of (1+2+3) above</li> </ol> <p>C. One number of D.G. Set shall be provided for ' actual' or 'imaginary' section of building.</p>
<b>General</b>		
Rating	KVA	As per detail specs
Rated Voltage	Volts	415
Rated Frequency	Hz.	50Hz
<b>Design Condition</b>		
Summer outdoor design temperature	Deg C	<b>50</b>
<b>DG SET</b>		
DG Set Make		As per Vendor List
Engine Make		As per Vendor List
Speed	RPM	1500 PRM
<b>Alternator</b>		
Make		As per Vendor List
Rating	KVA	As per detail specs
Voltage	Volts.	415V
Frequency	Hz.	50Hz
Phases		3
Power Factor		0.8lagging
Voltage Regulation	%	1 % From no load to full load at



		lagging power factor f 0.1 to 1.0
Over Load Capacity		10 % over load for 1 Hour after every 12 Hours.
Enclosures Protection		IP-23
No. of Poles / Speed		4 pole/1500 rpm
Embedded Temperature detector		As per standard.
Space Heaters		As per mfg. std.
Insulation		As per detail specs
<b>Control Panel</b>		
Metering equipment		Required
Indicating Instruments		Required
Local switch Gear (MCCB) for receiving DG		Required
Battery Charger		Required
Lub. Oil motor Start / Stop, if motor driven lub. Oil system		Required
Generator control panel with KW meter with demand indicator		Required
<b>AMF Panel</b>		
Automatic transfer switch BASED AMF Panel		Not required
<b>Battery</b>		
Type		Maintenance Free
Voltage	V	12 V
Capacity at 10 hr. Rate	Ah	As per mfg standard
<b>Battery Charger</b>		
Type		SMPS or as per mfg. std.
<b>Acoustic Enclosure</b>		
Noise level	<u>db @ 1</u> <u>mtr</u>	As per latest CPCB norms
<b>Testing</b>		1. Required at manufacturer works. QAP to be got approved. 2. All commissioning checks at sites as per mfg norms.
<b>Tool kits</b>		Required



<b>Literature (Two sets each)</b>		
a) Operation & maintenance manual		Required
b) Parts catalog / list		Required

#### HANDING OVER DOCUMENTS

The supplier shall submit following:

1. GA drawing
2. Foundation layout
3. Rating and Diagram Plate
4. Data sheet indicating results of tests
5. Test reports
6. O & M manuals

#### METHOD OF MEASUREMENT

Supply of the D.G Set including transport to site, loading and unloading etc. as specified will be treated as one unit for measurement and payment.

#### TRANSPORT, DELIVERY & STORAGE

The prices shall be F.O.R. site basis including packing & forwarding charges. The quoted price must include all the costs for necessary mode of transportation up to the final location of DG SET or site store. The DG SET should be supplied with required storage arrangements suitable for placing in open storage yard. All incidental expenses during transportation shall be part of quoted prices including transit insurance. The charges for loading and unloading of equipments at site should form part of offer.

The transportation for any auxiliary item or detachable part of equipment should be simultaneous and carry necessary instructions for assembling and storage requirements.

All metal surfaces shall be thoroughly cleaned of scale, rust and grease etc. Prior to painting. Cleaned surfaces shall be given two coats of primer and prepared for final painting. Final finish shall be free from all sorts of blemishes

The equipment shall be shipped to site suitably packed to prevent any damage. Each package shall have labels to show purchaser's name, purchase order and equipment no. suitable lifting lugs etc. shall be provided and lifting points shall be clearly marked on the package. Packing shall be suitable for storage at site for a minimum period of 6 months

#### GUARANTEE & WARRANTY

The Bidder shall stand guarantee for the performance of entire equipment and components for twelve (12) months from the date of commissioning or eighteen (18) months from the date of dispatch, whichever is earlier, as agreed up on and as reproduced in the purchase order within the tolerance specified or as permitted by the relevant standards for the equipment in his scope of supply. The Purchaser also reserves the right to use the rejected equipment or part thereof until the new equipment meeting the guaranteed performance is supplied by the Bidder.





TESTS:

#### FACTORY TEST

Complete tests at full load and 10% over load shall be carried out at the manufacture's works to determine the performance and operating characteristics of the assembled generating set and accessories to determine whether or not the guarantees have been met. Unless otherwise specified, all routine tests shall be carried out in accordance with the standards and shall be witnessed by the representatives of the purchaser. Manufacturer test certificate with manual in triplicate shall be supplied by the vendor.

SITE TEST:

After installation at site, the set should be tested for full load for eight hour.

Copies of all documents like routine and type test certificate of the equipment for the tests carried out at manufactures premises shall be furnished, as required.

OTHER APPLICABLE STANDARDS.

- (i) 3043/1987 - code of practice for earthing
- (ii) 4412/1981 -Specification for copper , wires for general engineering purpose.
- (iii) 5216/part I & part II /1982 guide for safety procedure and practice in electrical work.
- (iv) 2551/1982 - Danger notice boards

MAINTENANCE / SERVICE AFTER SALES:

DURING WARRANTY PERIOD.

The schedule for servicing of the DG set should be strictly adhered to after the installation of the D.G. set till the warranty period as per in schedule prescribed by the manufacturer.

ATTENDING BREAKDOWN / RECTIFICATION WORKS:

Any break down calls so received from the concerned Officers through FAX/ Telephonic message should be taken care of in arranging to attend them within Six hours from the time of receipt of such intimation.

The name of the servicing personnel available nearer to the installed site should be mentioned along with contact number for any emergency / exigency services. These personnel should be instructed accordingly.



## **LIFT**

Supplying, Erecting, Testing & Commissioning the Automatic passenger / stretcher lift having following main features:\

[1] GEAR LESS LIFT DRIVE comprising of High Starting torque Lift duty 3 phase 440 V A. C. Permanent magnetic synchronous motor of proper rating with high efficiency shall be used.

[2] Micro processor based / PLC, ACVVV, 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 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.

[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 criss / crossing light beams shall be provided.

[8] Automatic Rescue Device (ARD) shall be provided accordingly of passenger capacity.

[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 with automatic sleep timer shall be provided.

[12] Voice annunciater 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, 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 in 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. Power supply of 3 phase 440 V shall be made available by department in lift machine room.

[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] As per statutory requirement of Got. Of Gujarat lift & escalator act 2000, lift agency has to provide

1. Car top safety barricade
2. Push & talk communication system.
3. Fireman's switch operation at Ground Floor

#### **1. ABOUT SPECIFICATIONS:**

1. This specification covers the requirement of design, manufacture, supply, erection, testing and commissioning of Passenger/Fire lift as specified.
2. It is not the intent to specify completely herein all details of the equipment. Nevertheless, the equipment shall be complete and operative in all aspects and shall conform to highest standard of engineering, design and workmanship.
3. Any material or accessory which may not have been specifically mentioned but which is necessary or usual for satisfactory and trouble free operation and maintenance of the equipment shall be furnished without any extra charge.

#### **2. CODES & STANDARDS:**

1. All equipment and materials shall be designed, manufactured and tested in accordance with the latest applicable Indian Standards (IS) except where modified and/or supplemented by this specification. Generally, the equipment should meet the requirements of the following standards and rules :



- a) IS : 14566 – Electric Traction Lifts
  - b) Gujarat Lifts and escalator act 2000 and Gujarat Lift and escalator rules 2001 with latest amendments.
  - c) National Building Code 2005 with latest amendments.
  - d) Indian Electricity Acts and Rules.
2. In addition, other national/international rules and regulations as applicable to the equipments/work shall be followed. In case of any discrepancy, the more restrictive rule shall be binding.

### 3. BRIEF SCOPE OF WORK

- I. Supply, installation, testing and commissioning the elevator of required specifications
- II. To provide all necessary scaffolding
- III. Minor and Major civil works like creating holes in the walls, grouting of all bolts, fixing of steel members, indicators, button boxes etc.
- IV. Supplying, fabricating and installation of all kinds of steel works required installing and commissioning the elevators including machine rooms
- V. Providing and fixing necessary electrical works, wiring etc for elevators, hoist way and machine room.
- VI. Supply and erection of shaft reducer steel channels, if necessary.
- VII. All necessary approval from government authorities.
- VIII. All inclusive maintenance and breakdown service from the date of handing over.

### 4. DESIGN AND CONSTRUCTIONAL FEATURES:

Supplying, Erecting, Testing & Commissioning the passenger/Fire lift having following main features:

- [1] GEAR LESS LIFT DRIVE comprising of High Starting torque Lift duty 3 phase 440 V A. C. Permanent magnetic 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 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.
- [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 criss / crossing light beams shall be provided.
- [8] Automatic Rescue Device (ARD) shall be provided accordingly of passenger capacity.
- [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] As per statutory requirement of Got. Of Gujarat lift & escalator act 2000, lift agency has to provide
  - Car top safety barricade
  - Push & talk communication system.
  - Fireman's switch operation at Ground Floor

## 5. DETAILED SCOPE OF WORKS:

1. Design, manufacture, supply, erection, testing and commissioning of Passenger/Fire lift as specified.

### 2. Schedule of Materials

- 1 The contractor shall be responsible for unloading, storage, safe custody, accountability, testing etc.
- 2 The quantity for measurement will be actual and invisible loss; wastage etc shall not be paid or billed.
  - I) The contractor shall bear all incidental charges for the storage and safe custody of the materials at site at his own responsibility.
  - II) The contractor shall make arrangement at the site to protect from damage by rain, dampness, fire, theft etc.
  - III) In case any materials get damaged the contractor shall replace the same at his own cost.
  - IV) The contractor shall maintain a day-to-day account of the material supplied by



Owner/Contractor in the prescribed Performa and it should be submitted along with RA bills.

**6. Clearance of site on completion.**

On completion of the works, the contractor shall clear away and remove from the site, all surplus materials, rubbish and temporary works of every kind and leave the whole site and works clean and in workman like condition to the satisfaction of Owner at his own cost. If the contractor fails to clear the site within 15 days after virtual completion/ submission of final bill whichever is earlier, it shall forfeit all his claims and the owner may get the site cleared at contractor's cost..

**7. Statuary Approval**

The contractor shall obtain necessary statutory approval from relevant government agency / lift inspector / electrical inspector. The statutory fees shall be paid by the contractor initially and same shall be reimbursed by SMC on submission of supporting document.

**8. Submission of the license or Commissioning certificate by TPI shall be treated as the final completion date , whichever is later.**

**9. Submission of the preliminary and final layout drawings and technical details**

The contractor shall submit the preliminary layout and technical details based on the Surat Municipal Corporation drawings for approval and shall submit the final layouts incorporating all comments. Execution will be allowed only after approval of the drawings. Prior approval from Surat Municipal Corporation shall be required for installation of each elements / accessories going to be installed inside CAR i.e. light fitting, floor mat, hand rail etc.

Drawing, Document to be submitted, in general:

- Outline dimensional drawing showing general arrangement, space requirements
- Bill of Materials.
- Typical installation plan.
- Technical leaflets on & complete specifications & OEM address for bought out items.
- QAP
- Any other details furnished by manufacturer

**10. Supervision**

The work shall have to be carried out in best workman like manner and supervised by competent erection engineers having adequate experience in the similar kind of work.

**11. Insurance & Indemnification**

The contractor shall take adequate insurance cover for his equipment, material, installation and personnel for transport and storage, till the completion of the project; and indemnify the Surat Municipal Corporation against any claims or liabilities that may arise due to any cause whatsoever. The indemnification shall cover, but not be limited to, accidents, injuries, loss, theft, etc. of items, properties and human beings.

**12. Free Maintenance**



The contractor shall provide free maintenance service for the period of 12 months from the date of handing over. Contractor shall supply the electrical cable, with necessary protective switch gears for the elevator as per requirement

13. Necessary Steel Channels for reduction of shaft (if required) shall also be in scope of the bidder. No extra payment shall be made for this to bidder.

**14. Testing and commissioning:**

**The installation, testing and commissioning of the equipment AT SITE shall be carried out in accordance with IS: 14665.**

**Quality Assurance Plan shall be got approved. The safety gear equipment and other parts as per approved QAP shall be tested as per relevant IS specifications AT THE MANUFACTURERS FACILITY in the presence of authorized representative of TPI and Surat Municipal Corporation, prior to dispatch for site.** All the expenses incurred for the same shall be borne by the contractor. At least 15 days prior notice should be given to TPI and Surat Municipal Corporation so as to enable them to depute a representative for the work. The above testing procedure does not relieve the contractor from his commitment/ contractual obligation / guarantee etc.

**15. Operation and maintenance manual:**

Operation and maintenance manual and drawings IN SOFT COPY AND HARD COPY (IN TRIPLICATE) shall be submitted.

**16 . Announcing System :**

Lift Announcing solid state system in the Passenger/ Stretcher lifts having AC2/ACVV/ACVF drives & automatic doors only. The system comprising following features & facilities.

- (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.
- (iii) Instrumental Music between floor announcing.
- (iv) Announcement in English / Hindi & Gujarati Languages..
- (v) Flexible to accommodate special pre-programmed message such as name of the building /office.
- (vi) Volume adjustment control

**17. Overload Protection**

Providing & erecting approved make overload non-start feature & overload warning Indicator system in the lift with making use of sound isolated floating platform & 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 & without changing the existing capacity speed stops, travel & operation of the desired lift

#### **18. ARD (Automatic Rescue Device):**

Supplying and erecting approved make, solid stat inbuilt emergency rescue Device, for automatically rescues Passengers trapped in the lift car in between floors in the event of power failure having following features.

- (i) Automatic operation & immediate action in the event of mains failure capable to move the lift to the nearest landing, opens the automatic doors of the lift car & floor.
- (ii) Sealed, maintenance free battery back-up of suitable size with automatic charging unit & auto change over device on mains failure.
- (iii) 'RESCUE OPERATION' message indicator in the lift car
- (iv) Applicable to Passenger, Goods cum Passenger, Stretcher cum Passenger lifts with AC2, ACVV, ACVVVF drives & automatic doors.

#### **19 GENERAL TERMS AND CONDITIONS:**

1. Tenderers are requested to submit necessary documents to prove their eligibility. Surat Municipal Corporation reserves right to accept or reject any offer without giving any reason.
2. Contractor shall furnish the test certificates for Machine, Motor, Motor Generator Set, Ropes, Safeties, Controller, selectors, Governors, Buffers, etc.
3. If there is any deviation, the bidder shall have to submit a deviation sheet along with technical bid only. If there shall not be any deviation sheet along with the technical bid, it shall be presume that bidder is agree with terms, conditions & specifications demanded by Surat Municipal Corporation.
4. Detail technical specifications of all parts of the elevators shall be submitted along with the technical bid of the tender.
5. Make and Manufacturer's name for all major items and parts shall be specified and submitted along with the tender.
6. Finished sizes of all members shall be as per the drawing and should fit with site conditions wherever specified.
7. Unless otherwise specified, all metal surfaces shall be treated with zinc chromate primer.
8. The rates are inclusive of necessary scaffolding, tools and tackles, taxes, duties, levies, transportation etc. No other payment shall be made other than rates quoted in the price bid.
9. Electricity & water required for executing this work shall be in scope of contractor.





10. The rates shall be firm and not subject to exchange variations, labour conditions, fluctuations in railway freights or any conditions whatsoever. It shall also include for sales tax, VAT, excise duty, octroi and any other taxes/duty or other levy levied by the Central or State Governments or local authorities, sales tax on works contract if applicable. No claim in respect to the above mentioned shall be entertained by the Surat Municipal Corporation except the statutory taxes.

If there is an upward revision of statutory taxes, Corporation will reimburse the additional expenses on providing of necessary proof/receipts. Similarly, if there is a downward revision, Corporation will deduct the amount equivalent to the difference from the bills submitted for payment.

11. During defect liability period, if any fault occurs in the lift, the contractor shall have to attend the lift within 2 hours from intimation and clear the fault at earliest.

12. The corporation shall not be responsible to any accident/injury to the staff of the contractor during work. No compensation shall be paid in such incidences by SMC. The contractor is responsible for the safety of his staff members working at corporation's site.

**DATA SHEET FOR PROPOSED PASSENGER/FIRE LIFT**

DUCT SIZE MUST BE		AS PER IS 14665
SR. NO	DESCRIPTION	As per Tender Specification
A	Standard Applicable	IS 14665
B	Passengers/ Load	6/420 Kg & 8 / 544 Kg (For Fire)
C	Speed	1.0 mps up to 7 floors. 1.5 mtr above 7 floors.
D	Leveling Accuracy	+/- 10 mm to 15 mm
E	Entrance Position	All on one side
F	Power Supply	AC 400/440V, 3P/1P, 50 Hertz
G	Operation/Control	Simplex full collective with advanced microprocessor technology
H	Type	Passenger lift to be used in residential complex.
I	Car Size	Suitable
J	Car Entrance	Min. 800 mm (W) x Min.2000 mm (H). Exact dimensions to be decided during detailed engineering.
K	Car Operating Panel and Landing Operating Panel	Full Height SS with Square / Round buttons with all control buttons. Bidder may offer touch sensitive panel instead.



L	Car Door Operation	Fully Automatic with Center opening.
M	Car Wall	SS Hairline finish
N	Flooring	Anti skid Flooring/Granite Flooring to be decided during detailed engineering.
O	Car Door Protection	Multi-Beam Full Height Infra-Red Detector
P	Position indicators	To be provided at all floors
Q	Direction indicator on floor	To be provided at all floors
R	Lighting	LED Lighting
S	Type of Ventilation	To be suggested by supplier. To be decided during detailed engineering.
T	Other features	Alarm, Emergency Light, Overload Indicator, Telephone, ARD, Hand Rails



## Horizontal Openwell Submersible Pumpsets

1. The job involves SETC of approved make portable Horizontal Openwell Submersible Pumpsets with its all accessories use in high rise building for water supply.
2. The pump should be 3 phase (415V, -15% & +6%), 50Hz, self priming and duty point of pump set shall be provided / shall be decided according to site situations.
3. Accessories: Submersible pump set complete with all accessories like portable stand, Cable size according to pump rating and cable length should be such that no joint is made inside the under ground water tank. submersible copper cable without joint and 30 Mtr. Long or as required , enclosed with suitable pipe minimum 50 mm dia or next higher size recommend by the pump mfg. with special /fittings /clamps/base plate etc. shall be provided.
4. Material of construction shall be as below:
  - Pump impeller : Stainless Steel / Graded Cast Iron & Dynamically balanced.
  - Casing : High Grade cast iron.
  - Wear Rings : High quality abrasion resistance Bronze.
  - Shaft : Stainless Steel of adequate diameter to ensure rigidity and ground to close tolerances.
  - Cable Sealing Arrangement : Designed so that no borewell water with sand can enter the motor.
  - Motor Body : Cast Iron / Stainless Steel
  - Journal Bearings : Leaded Bronze and Stainless Steel, Water Lubricated, having high load bearing capacity.
  - Thrust Bearing : Carbon Vs Stainless steel and water lubricated to withstand high axial thrust loads.
  - Fasteners: - Stainless Steel
  - Portable Stand (Skirt Base) :- M.S. fabricated & epoxy coated



## EXTERNAL LIGHTNING PROTECTION SYSTEM AS PER INDIAN/INTERNATIONAL STANDARDS

General

Lightning Protection System shall be in accordance with IEC 62305-3, IS:2309 & IS 3043

Zone of Protection

The zone of protection of a lightning conductor defines the space within which Air Terminal provides protection against a direct lightning strike with probability of protection as per LPL.

LPL (Lightning Protection Level)

LPL is a number associated with a set of lightning current parameters relevant to the probability that the associated minimum & maximum values do not exceed the normally occurring lightning. LPL can be determined by Risk analysis as explained in IEC 62305-2 .

LPL levels and probability of protection:

Lightning protection Class	Lightning current peak value MINIMUM	Lightning current peak value MAXIMUM	Interception probability
LPL 3:	10 kA	100 kA	88%

Components of External LPS

- 1.) Air terminal (as per rolling sphere or mesh or protective angle method or any combination thereof.)
- 2.) Down conductor
- 3.) Earthing

1) Air termination system:

No drilling or welding is allowed in the terrace for fixing the air terminal.

Values of Rolling sphere radius, Mesh size and protection angle as per Class of LPL/LPS.

Class of LPL/LPS	Rolling sphere radius(m)	Mesh size (m)	Protection angle
3	45	15*15	

If the structure height is more than 60 meters, top 20% of the height of the structure shall be protected with a lateral air termination system. This is needed because, the probability of

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flashes to the side is generally more for structures more than 60 meters in height. For structures of height more than 120 meters, ring has to be formed for every 20 meters height of the building above 60 meters height.

#### Material and Dimensions

Material of air terminal, down conductor, earth termination etc. shall be as below:

Material	May be destroyed by galvanic coupling with
Copper(Solid)	GI and Aluminium
Hot galvanized steel(Solid)	Copper
Stainless steel(Solid)	.....
Aluminium(Solid)	Copper

Dissimilar metals (For e.g. copper with Aluminium) must be connected only by using bimetal connectors.

Min Thickness of metal in air termination system for LPL /LPS -3

Material	Thickness (a) in mm	Thickness (b) in mm
Galvanized steel	4	0.5
Stainless steel	4	0.5
Copper	5	0.5
Aluminium	7	0.65

(a) Prevents puncture, hot spot or ignition

(b) Allowed only if it is not important to prevent puncture, hotspot or ignition

Material configuration and Min cross sectional area of air terminal and down conductors

Material	Type	Min cross section area	Remarks
Copper	Solid tape	50 sq mm	2mm min thickness
Copper	Solid round	50 sq mm	8mm dia
Aluminium	Solid tape	70 sq mm	3 mm min thickness
Aluminium	Solid round	50 sq mm	8 mm dia
GI	Solid tape	50 sq mm	3 mm min thickness
Stainless steel	Solid tape	50 sq mm	2 mm min thickness

#### Air terminal holder

Conductors shall be securely fixed on the terrace by means of air terminal holder which is fixed on the roof by adhesive of good quality taking care of varying weather conditions. Air

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conductor holder is an insulator & should be of minimum 50 mm height so that even small amount of water logging on terrace is below the level of conductor holder. Air terminal holder shall not be more than 0.5 m apart for a flat conductor & 1m for round conductor of at least 8mm diameter & 1.0 meter apart for vertical run.

Recommended distance between air terminal holders.

Arrangement	Recommended distance for SOLID TAPE	Recommended distance for ROUND conductors
Horizontal conductor on horizontal surface.	500 mm	1000 mm
Horizontal conductor on vertical surface	500 mm	1000 mm
Vertical conductor from Ground to 20m height	1000 mm	1000 mm
Vertical conductor above 20m height	500 mm	1000 mm

If antenna, air cooler or any other electrical equipment is present above terrace level, the same have to be protected by using vertical air terminal after calculating the safety or separation distance. The vertical air terminal has to have suitable supports to hold it. Vertical air terminal must be connected to horizontal air terminal by using suitable connectors.

At the crossings of the horizontal air terminals, suitable T or Cross connector has to be used for secure connection.

Safety or Separation distance.

It is must to calculate safety or separation distance in order to avoid flash over to the electrical equipment when the lightning current is passing through the vertical air terminal.

Safety/Separation distance (S) in m =  $(k_i * k_c * L) / k_m$

Coefficient  $k_i$  depends on class of LPL/LPS.

$k_i = 0.08$  for LPL1,

$k_i = 0.06$  for LPL 2,

$k_i = 0.04$  for LPL3 and 4.

Coefficient  $k_c$  depends on no of down conductors:

$k_c = 0.66$  for 2 down conductors

$k_c = 0.44$  for 3 or more down conductors

Value of coefficient  $k_m = 1$

Value of L is the total distance between the equipment to be protected ( for e.g. Antenna) to the equi-potential bonding bar situated just above the ground.

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### Need for Expansion piece

In order to take care the expansion of the metal in summer and contraction of the metal in winter, expansion piece with suitable connectors have to be used at every 20m distance of horizontal air terminal.

### Joints and Bonds

The lightning protective system shall have as few joints. As far as possible, air terminal & down conductor have to be straight. Where it is not possible, it should NOT be bent at 90 degree (right angles) & should have a curved path of 45 degree.

### Down conductor system

In order to reduce the probability of damage to electronic/electrical equipment, the down conductors shall be arranged in such a way that from the point of strike to earth, several parallel current paths should exist & length of the current path should be minimum .Down conductors can be installed separately or more wisely it can be part of natural components of the building Examples are steel reinforcement in RCC columns, metal facades, profile rails, metal doors & windows. Down conductors should be installed at each exposed corner of the structure.

Value of distance between down conductors as per Class of LPL / LPS.

Class of LPL/LPS	Typical distance (m)
3	15

### Test joints:

At the connection of the earth terminal, a test joint should be fitted on each down conductor, except in the case of natural down conductors combined with foundation earth electrode. The purpose of test joint is to measure the earth resistance value.

### Earth Terminations

Earth mat is most preferable. Where earth mat is not possible, ring earthing is the next best method. Ring earthing must be 1 meter away from the building and 0.5m below the ground level. The resistance of earthing system shall not exceed 10 ohm as per IEC 62305. Lower earth resistance is still better.

For earth termination system, 2 basic types of earth electrode arrangements are applicable. Type A & Type B arrangement.



Type A arrangement:

comprises of horizontal or vertical earth electrode installed outside the structure to be protected connected to each down conductor. In type A arrangement, the total number of earth electrodes shall not be less than two. Type A arrangement is suitable in places where electronic equipments are not located.

Type B arrangement:

This type of arrangement comprises either a ring conductor external to the structure to be protected, in contact with the soil for atleast 80% of its total length or a foundation earth electrode. Such earth electrodes can also be meshed. For structures with extensive electronic systems or with high risk of fire, type B earthing is most preferable method. Corrosion proofing band has to be used wherever down conductor is connected to earth termination system. Bitumen has to be applied at the point of inter-connection.

In potentially corrosive areas, Stainless steel must always be used.

References:

IEC62305 – PROTECTION AGAINST LIGHTNING:

Part 1: General Principles

Part 2: Risk Management

Part 3: Protection of structures

Part 4: Protection of Electrical & Electronic equipments within structure

IS 2309: 1989: Code of practice -Protection of Buildings & allied structures against lightning.

IS3043: 1987 : Code of practice for earthing

## **Octagonal street light pole**

Supply, erection, testing and commissioning of octagonal pole (G.I)

### **Design Considerations :**

The Octagonal Poles shall be designed for followings:

- To withstand the maximum wind speed of 47m/sec.
- Maximum stress at wind speed of 47 m/sec shall not exceed 80% of the strength of steel.
- The detail of top loading i.e. the weight and area of top luminaries are worked out based on this consideration.
- Maximum deflection of the pole shall meet the requirement of BS 5649: part 6 1982.

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### **Constructional Features:**

#### **Pole:**

- The pole shall be made from HR sheet and shall be hot dip galvanized as per IS 2629/IS 2633/IS 4759 standards with minimum coating thickness of 85 micron.
- The pole shaft shall have Octagonal cross section and shall be continuously tapered with single longitudinal welding. There shall not be any circumferential welding. The welding of pole shaft shall be done by Submerged Arc Welding process using state of the art know how.
- All Octagonal Pole shafts shall be provided with the rigid Flange plate of suitable thickness with provision for fixing four bolts. This base plate shall be fillet welded to pole shaft at two locations i.e. from inside and outside.
- 

#### **Embedded Termination Box:**

#### **Door (Termination Box):**

- Door height should be 2000 mm above from the bottom of the Pole and door opening should be hinged type with necessary special locking bolt.
- An adequate door opening shall be provided at the base of the pole and the opening shall be such that it permits clear access to equipment like termination plate, MCB, cables, etc. The door opening shall be complete with a close fitting, vandal resistant, weather proof hinged type with mechanical internal lock with special paddle key.
- The door shall have required width-having height of minimum 500 mm at the elevation of 500 mm from the Base Plate. The door shall be vandal resistance and shall be dust proof to ensure safety of inside connections. The door shall be flush with exterior surface and shall have suitable locking arrangement.
- The door opening shall be carefully designed and reinforced welded steel section, so that undue buckling of the cut section under heavy wind conditions.

#### **Terminal plate :**

- Terminal plate made up of Bakelite with appropriate current rating, SP MCB (L Series) and stud type terminal shall be mounted at the base of the pole. If a particular light fitting has to be manually operated the same can be done by this MCB provided at the base compartment.
- The provided terminal shall be suitable for loop-in-loop-out of max. 4 Core x 25 sq mm armoured cable. 1 No. of SP 6 Amp MCB (L Series) per luminary shall be provided having rupturing capacity  $\geq 9$  kA.
- The cable shall be terminated at connector in the pole using ISI Marked XLPE 1.1 KV grade insulating tape roll with appropriate colour code. All items shall be fixed on the Bakelite sheet of suitable size having 12 mm thickness. There shall also be welded a clip of size 40 x 40 x 4 mm for the purpose of earthing.

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- The pole shall be adequately strengthened at the location of the door to complete for the loss in section.
- Pole drawings (of manufacturer) must be got approved from concerned department.

### **MATERIAL OF CONSTRUCTION:**

Octagonal Poles : Steel conforming to St 35 or required grade

Foundation Bolts : As per relevant IS

Base Plate : IS 226 / IS 2062 steel

The steel used to manufacture steel poles is as per BSEN 10025 grade S355 Jo. Yield strength Min. 355 N/mm<sup>2</sup> and Tensile strength 490 – 630 N/mm<sup>2</sup>.

Please note that among the various standards mentioned, most stringent will apply.

Indicative Dimensions for 5 mtr height pole:

HEIGHT (Min.) - 5 meter

O.D. TOP (Min.) - 70 mm

O.D. BOTTOM (Min.) - 135 mm

THICKNESS (Min.) - 3 mm

BASE PLATE (Min.) - 200 x 200 x 12 mm (PCD 200 mm)

Dimensions mentioned above are for generally used poles and indicative only.

Illumination design (Which includes pole dimensions) shall be got approved.

### **AVIATIONLIGHT**

It is an Omni-Directional Aircraft Warning light which conforms to ICAO, Annexure-14 type 'B'. LED Medium Intensity Aircraft Warning Lights are known for their supreme aesthetics and energy efficiency.

The high power high flux solid state Lights give an exceptionally long life of more than 50,000 burning hours.

It combines the most modern concept of surface mounting solid state Lights Technology (High powered Lighting Diodes) from most reputed world source.

The system is highly energy efficient, which makes it very suitable for Solar powered LED aviation lighting system.

The Lights are mounted on very Durable Epoxy masked PCB's which enables easy replacement in case of failure.

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Efficient secondary optics is induced to generate Lens effect for proper light beam in horizontal plane and arrest unnecessary light dispersion in vertical plane as required by the lights specifications.

High quality Aviation Red color is directly emitted by the Aircraft Warning Light system thus eliminating the need for additional color filters, which otherwise get faded due to UV radiation of sun.

Efficient circuit designing reduces chances of total light blackout.

The Aircraft warning light housing is made from high grade Aluminum Alloy with protective painting.

Hardware is made from Corrosion resistant metals.

The light is protected from ingress of Dust and Moisture.

Bird Spike is provided at the top to protect the luminaire from bird droppings.

Very high quality copper conductor earthings connection is provided to divert any lightening surges.

Solid state Electronic Flasher is housed in separate weather protected enclosure.

Dusk to Dawn operation is enabled through Photo sensor or Electronic timer.

### Materials Used

Medium Intensity (LED) Obstruction lights are designed for stability with a high quality aluminium alloy with protective coating base. The dome is made of a Ultra Violet (UV) resistant acrylic and silicon sealant is used to ensure maximum life of the product. Best quality copper earthing connections are used for prompt and efficient lightening protection. All hardware cast in corrosion resistant metal alloys. Excellent dust and moisture sealing through EPDM gaskets.

<b>Minimum Autonomy</b>	<b>24 hrs.</b>
<b>Latitude Range</b>	<b>1000 meter</b>
<b>On/Off Level</b>	<b>Automatic</b>
<b>Illumination Technology</b>	<b>Photons generation with LED conduction</b>



Lifespan of LEDs	> 1,00,000 hrs.
Available Flash Patterns	20 - 60 FPM
Color Technology of LED	Depend upon Semiconductor material of LED

#### Environmental and Electrical

Temperature Range	- 40 ° C to + 50 ° C
Waterproof	Through EPDM Gasket and Sealant
Environment Protection Standard for Light	IP 65 Standard
Environment Protection Standard for Control Panel	IP 55 Standard

### **LED STREET LIGHT SPECIFICATIONS**

#### **SUPPLY, ERECTION AND COMMISSIONING OF DETACHABLE BRACKETS: -**

**2 (g) Single arm 1.0 m**

**2 (h) Double arm 1.0 m**

**2 (i) Triple arm 1.0 m**

**2 (j) Single arm 1.5 m**

**2 (k) Double arm 1.5 m**

**2 (l) Triple arm 1.5 m**

Providing Street Light pole bracket consisting of medium class MS pipe of 4.2 cms. Outside dia 2.9 W.T complete with suitable sleeve tubing (If required) 45 cms. long M.S. pipe (Medium Class). Suitable for 76.5 mm /80mm / required size of pole top/ Wall mounting having sufficient fasteners for fixing the brackets and having spread as mentioned and having inclination up to 115 deg. with vertical plane & suitable welded stays, reducer and with check nuts complete painted with one coat of Red oxide / PU base primer and two coats of Aluminium / PU paint.

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paint with required nos of arms.

The bracket shall be hot dip galvanized as per IS 2629/IS 2633/IS 4759 standards.

**SUPPLY, LAYING, TESTING AND CONNECTING UNARMoured CABLE:**

The item includes supply, laying, testing and commissioning of round 3 X 1.5 sq. mm for LED luminaries flexible unarmored single PVC insulated copper conductor cable 1100 V grade to be laid through the pole from luminaries to junction box by experienced technician without any damage. The cable joint shall not be allowed. Termination glands/lugs etc shall be included in the item.

**SITC OF LED STREETLIGHT LUMINAIRES:-**

**TECHNICAL SPECIFICATION FOR ENERGY EFFICIENT LED BASED LUMINAIRE UNIT FOR STREETLIGHT: -**

This specification is for technical and general requirements design, development, manufacturing, testing and supply of energy efficient LED luminaire for street light complete with all accessories, LED lamps with suitable current control driver circuit and required optics including mounting arrangement.

**CODES & STANDARDS: -**

- IEC 60529 Classification of degree of protections provided by enclosures (IP Codes)
- EN 55015, CISPR15 Limits and methods of measurement of radio disturbance characteristic of electrical lighting and similar equipment.
- IEC 62031 LED modules for general lighting-Safety requirements
- IEC 61547-EMC Immunity requirement
- IEC 60598-2-1 Fixed general purpose luminaries
- IEC 60598-1 Luminaries - General requirement and tests
- IEC 61000-3-2 Electro Magnetic compatibility (EMC)- Limits for Harmonic current emission -- (equipment input current  $\leq 16$  A per phase.
- IEC 60068-2-38 Environmental Testing: Test Z- AD: composite temperature/ humidity cyclic test
- IEC 61347-2-13 Lamp control gear: particular requirements for DC or AC supplied electronic control gear for LED modules.
- IS 10322 Specification for the luminaries
- IS 4905 Method for random sampling
- LM 79 LED luminaire photometry measurement.

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LM 80 Lumen Maintenance

IEC 62384 DC or AC supplied electronic control gear for LED modules performance requirements

IEC/ PAS 62612 Self-ballasted LED lamps for general lighting services- Performance requirements

#### **ENVIRONMENTAL CONDITIONS: -**

The LED streetlight is to be used in city of Surat. It is located in Southern part of Gujarat. It is well connected with rails & roads, situated on Mumbai Ahmedabad Railway and nearby road is NH # 8. The average atmospheric condition during the year is mentioned below. The equipment shall be designed to work in such environmental conditions:

- (i) Maximum ambient air temperature: **50° C**
- (ii) Minimum ambient air temperature: **10° C**
- (iii) Max. Relative humidity: **90%**
- (iv) Average Rainfall: **55 inches**
- (v) Atmosphere: **Dusty and Heavy chemical smoke at times in certain areas.**
- (vi) Coastal area: The equipment shall be designed to work in coastal area in humid, salt laden and corrosive atmosphere.

#### **CONSTRUCTIONAL FEATURES:**

##### **General:**

- a) Luminaries shall be made of die cast aluminium/ extruded Aluminium body with powder coated finish having safety.
- b) Heat sink used should be aluminium extrusion having high conductivity. Heat sink should be integrated within luminaries and efforts shall be made to keep the overall outer dimensions
- c) optimum such that it permits sufficient heat dissipation through the body itself so as to prevent abnormal temperature inside the luminaries and consequential damage to cover, gasket material, LEDs, lenses and drivers.
- d) LED must be mounted on Metal core PCB with suitable large area surface by means of fins to dissipate the conduct heat. The fins must be exposed to ambient flowing air.
- e) All luminaries shall be provided with toughened glass of min. 0.8 mm thickness of sufficient strength. UV stabilized Poly carbonate material is also acceptable. High



efficiency prismatic diffuser/Lens under the LED chamber to protect the LED and luminaries shall be provided.

- f) The minimum IK protection of optic cover shall be IK 05. The test material certificate shall be provided.
- g) Suitable number of LED lamps shall be used in the luminaries. The manufacturer shall submit the proof of procurement of LEDs from OEMs at the time of testing.
- h) Suitable reflector/ lenses may also be provided to increase the illumination uniformity and distribution.
- i) The electrical component of the LED and LED driver must be suitably enclosed in sealed unit to function in environment conditions mentioned earlier.
- j) The connecting wires used inside the luminaries, shall be low smoke halogen free, fire retardant e-beam cable and fuse protection shall be provided in input side.
- k) Design of the thermal management shall be done in such a way that it shall not affect the properties of the diffuser.
- l) The equipment should be compliant to IEC 60598-1, IEC 62031 and IEC/PAS 62612 depending on the type of luminary.
- m) The LED Module(s), Driver gear, etc. shall be designed in such a way so that temperature of heat sink shall not exceed 70° C.
- n) All the material used in the luminaries shall be halogen free and fire retardant confirming to standard.
- o) The infrastructure for Quality Assurance facilities to verify/ test/ prove above specifications must be available at the manufacturing facility. The compliance shall be indicated clearly in the tender itself.
- p) All fasteners must be of stainless steel.
- q) All glands inside/ outside luminaries must be metallic
- r) Heat sink must be thermally connected to MCPCB/ LED light source.

**High power and high lumen efficient LEDs suitable for following features shall be used:**

- a) The working life of the lamp at junction temperature of 85° C (max) at operating current shall be more than 50,000 working hours of accumulative operation and shall be suitable for continuous operation of 24 hours per day. These features shall be supported with datasheet.
- b) Adequate heat sink with proper thermal management shall be provided.
- c) Lumen maintenance report as per LM 80 guidelines shall be produced for the power LEDs used.



- d) Thermal management shall be in such a way that LED soldering point temperature shall not go beyond 75° C.
- e) The LED luminaries shall be free of glare.

**LED DRIVER specification used for streetlight:**

- a) Current waveform should meet relevant nation and international standard.
- b) LED Driver shall withstand, withstand voltage up to level mentioned elsewhere in tender and restore once normal working when normal voltage is applied.
- c) The life of the driver should more than 25000 Hrs.
- d) Maximum Temperature rise  $\leq 30^{\circ} \text{C}$  @  $45^{\circ} \text{C}$   $T_{\text{amb}}$ . With safety margin of  $10^{\circ} \text{C}$ .
- e) The control gear should be compliant to IEC 61347-2-13, IEC 62031 and IEC 62384 as per the requirements.
- f) The driver of the luminaries should have Short Circuit, Over Voltage, over current, over temperature, Under Voltage, String Open protections.

**The electronic components used shall be as follows:-**

- a) The protective cum adhesive coating used on PCBs should be cleared and transparent and should not affect colour code of electronic components or the product code of the company.
- b) The construction of PCBs and the assembly for components for PCBs should be as per IS standards.

**Illumination Level:**

The luminaries shall be so designed that the illumination level shall be evenly distributed and shall be free from glare. The lux distribution curve/ graph/ spatial distribution shall be submitted.





### DATA SHEET: LUMINAIRE

Sr. No.	Parameter	Data/ Details of LED luminaire	
(1)	Rated Input Power of LED luminaire (max.) Watts	20	45
(2)	Width of the road	3-6 m	6-12 m
(3)	Average spacing	25 m	22 m
(4)	Initial Output of System (including all losses) Lumen (min.)	2000	3500
(5)	Tilt Angle (wrt to horizontal surface)	0° to 15°	0° to 15°
(6)	Min. Uniformity Ratio ( $E_{min}/ E_{avg}$ )	0.3	0.3
(7)	Min Transverse Uniformity Ratio ( $E_{min}/ E_{max}$ )	--	0.2
(8)	Correlated Colour Temperature	5500° K $\pm$ 500° K (ANSI Binning)	
(9)	Colour Rendering Index (min.)	> 65	> 65
(10)	Illumination Regulation	<5% (w. r. t $T_a$ & Line Voltage)	<5% (wrt $T_a$ & Line Voltage)

### GENERAL DATA SHEET

Sr. No.	Parameter	Value/Detail
•	Rated Supply Voltage	230 V ~, 50 Hz
•	Input supply voltage range	120-270 V
•	Expected Input Frequency	50 Hz +/- 3%
•	Working Temperature	+5° to +50° C
•	Working Humidity	10% - 90% RH
•	Usage hours	Dusk to dawn
•	Power Factor	$\geq 0.90$
•	Index of Protection Level	IP 66 as per IEC 60529.
•	Surge Protection	4 KV

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•	LED Chip efficacy	≥ 120 lm/ W
•	Driver Efficiency	> 85%
•	Junction Temperature of LED	< 85° C
•	Rated Life @ L70	50,000 burning hours at 35° C ambient temperature
•	Nominal Correlated Colour Temperature	5000° K to 6000° K
•	Dispersion Angle	Minimum 120°
•	Tilting angle	Adjustable
•	Maintenance factor of luminaire	0.85
•	Colour Rendering Index	≥65
•	Total Harmonic Distortion	< 10 % (EMI/ EMC Certification)
•	LED MAKE	Cree/ Osram/ Nichia/ Philips Lumileds

**Particulars and Details to be submitted by the bidder:**

In order to properly assess and due diligence on submissions, the Bidder should provide following information on the quality and photometric of proposed luminaries.

1. **General Description**

Following details of the proposed luminary shall be submitted as per Annexure: II.

2. **Electrical specifications**

Electrical ratings of the proposed luminary product shall be submitted in Annexure: III.

3. **LED chip and driver information**

LED chip and driver information of the proposed luminary product shall be submitted in Annexure: IV.

4. **Photometric information to be submitted as per Annexure: V.**

5. **TESTS & CERTIFICATES:**

Tests are classified as:-

- Type test
- Acceptance test
- Routine rest.



The luminaries' should be tested as per IEC 60598-2-3: 2002 standards and following test reports should be submitted: -

- (i) Heat Resistance Test
- (ii) Thermal In SITU Test
- (iii) Ingress Protection Test
- (iv) Drop Test
- (v) Electrical/ Insulation Resistance Test,
- (vi) Endurance Test,
- (vii) Humidity Test,
- (viii) Electrical and Photometric Measurements Test Report (IES LM 79)
- (ix) LED Lumen Maintenance Test Report (IES LM 80)
- (x) Vibration test as per ANSI

**Type Test: -**

Type test certificates for both the luminaries' shall be provided with the technical-bid.

**Acceptance Tests: -**

These tests are carried out by an inspecting authority at the supplier's premises on sample taken from a lot for the purpose of acceptance of a lot. Acceptance tests shall not be carried out from particular size from the lot on which type tests have already been conducted. Recommended sampling plan is given below.

**Sample size and criteria for conformity**

The luminaries shall be selected from the lot at random. In order to ensure randomness of selection, procedures given in IS 4905-1968 (Reaffirmed 2001) may be followed.

**Routine Tests:**

These tests shall be performed by the manufacturer on each complete unit of the same type and the results shall be submitted to the inspecting agency, prior to offering the lot for acceptance test. The firm shall maintain the records with traceability.



**Test Scheme & Quality Assurance: -**

Sr. No.	Description of test	Prototype Test	Type Test	Acceptance Test	Routine Test
1	Visual and Dimensional check	Y	Y	Y	Y
2	Checking of documents of purchase of LED	Y	Y	Y	Y
3	Resistance to humidity	Y	Y	---	---
4	Insulation resistance test	Y	Y	Y	Y
5	HV test	Y	Y	Y	Y
6	Over voltage protection	Y	Y	Y	---
7	Surge protection	Y	Y	Y	---
8	Reverse polarity	Y	Y	Y	Y
9	Temperature rise Test	Y	Y	---	---
10	Ra (Colour Rendering Index) measurement test	Y	Y	---	---
11	Lux measurement	Y	Y	Y	Y
12	Fire retardant Test	Y	Y	---	---
13	Test for IP 65 protection	Y	Y	Y	---
14	Environmental tests	Y	---	---	---
15	Reliability Test	Y	---	---	---
16	Life Test	Y	Y	---	---
17	Endurance Test	Y	---	---	---
**	<b>Quality Assurance</b>				
18	Testing at	Approved govt. lab	Approved govt. lab	manufacturer works	manufacturer works
19	Testing by	---	---	SMC/TPI	SMC/TPI
20	Test frequency	---	As per Manufacturer	Lot wise.	Lot wise.
21	Lot size Not less than	---	---	1000 Nos. Of luminaries	40 Nos. Of luminaries'

Signature of Contractor



22	Test Sample Size	---	---	1 no Min.	Min.10%.
23	Documentation to be submitted	Whenever asked	With technical bid	During testing at Manufacturer works	During testing at Manufacturer works
24	LM 79 and LM 80 test report & result	----	Must to be submitted with technical bid	----	----

**Method of Testing: -**

**Visual and Dimensional Check:**

The unit shall be checked visually for all dimensions as per approved design and drawing.

General workmanship should be good; all the components properly secured and sharp edges shall be rounded off. Check the marking and quality of the workmanship visually. Check the rating and make of electronic/ electrical items.

**Checking of documents of purchase of LED**

Check Document of purchase of LED lamps of approved sources viz. NICHIA/ OSRAM/ PHILIPS LUMILEDS/ CREE.

**Resistance to humidity test**

This is carried out by suspending the painted panels in corrosion chamber maintained at 100% RH and temperature cycle of 42 to 48° C for 7 days and examining it for any sign of deterioration and corrosion of metal surface.

**Insulation resistance test**

The insulation resistance of the unit between earth and current carrying parts shorted together shall not be less than 2 MΩ when measured with 500 V megger.

**HV test**

Immediately after insulation resistance test, an AC voltage of 1.72 KV rms (1500 + 2 x rated voltage) of sine wave form of 50 Hz shall be applied for one minute



between the live parts and frame. There shall not be any kind of break down, flashover or tripping of supply.

#### **Over voltage protection**

The LED Driver Shall be cut off once voltage exceeds 288 V AC. It shall be reconnected when supply comes within limit.

#### **Surge protection**

It shall withstand a surge of 4 KV at the input terminals for all types.

#### **Reverse polarity**

The Luminaries' shall withstand polarity reversal. It shall be operated with reverse voltage for Min. 1 minute at maximum value of voltage range. At the end of this period, the supply shall be made correct polarity and Luminary shall operate in a normal way.

#### **Temperature rise Test:**

Temperature rise Test shall be conducted at 100 V ~ with full load. The temperature rise shall be recorded by temperature detectors mounted at the specified reference points on the body of semiconductors, capacitors and other components as agreed between purchaser and manufacturer. The maximum-recorded temperature under worst conditions shall be corrected to 55° C and compared with maximum permissible temperature (for power devices at junction). Under loading conditions as specified above, the corrected temperature of the power devices shall have a safety margin of minimum 10° C.

Temperature at junction shall not exceed 100° C when corrected to 55° C. The Luminaries' shall also be subjected for short time rating after continuous loading to ensure the temperature rise is within the permissible limit. The maximum temperature rise of the electronics devices on the PCBs shall be in limit for industrial grade components suitable for 85° C environment. In case of exceeding limit, use of MIL-grade component shall be considered keeping RDSO informed.

#### **Ra (Colour Rendering Index) measurement test**

The lumen is the unit of luminous flux, which is equal to the flux emitted in a solid angle of one steradian by a uniform point source of one candela.



The initial reading of the chromaticity co-ordinates x & y shall be within 5 SDCM (Standards Deviation for Colour matching) from the standardised rated value as per Annex: D of IEC 60081- 1997.

The initial reading of the general colour-rendering index (Ra) shall not be less than the rated value decreased by 3.

The lumen maintenance of the lamp shall not be less than 80% of the initial lumen after 20,000 burning hours and 70% of the initial lumen after 50,000 hours. The initial lumen will be taken after 100 hours aging.

Photometric test shall be conducted as per Annexure: B of IEC 60081-97.

The lumen maintenance test shall be done as per Annexure: C of IEC 60081-97.

#### **Fire retardant Test**

Fire Retardant test shall be conducted as per IEC 60332-1 of the wire used in the luminaries.

#### **Test for IP 65 protection**

This test shall be conducted as per IEC 60529.

#### **Environmental tests (Prototype Test)**

The Luminary shall meet the following tests as prescribed in IEC-60571.

- (i) Dry heat test.
- (ii) Damp heat test
- (iii) Test in corrosive atmosphere
- (iv) Combined dust, humidity and heat test

#### **Reliability Test**

The reliability can only be determined in actual service. However, the following tests shall be carried out on the prototype to simulate as close as possible, the service conditions.

There shall be no failure during this test.

- (i) The light unit shall be mounted in an oven maintained at 45° C.
- (ii) The light will be operated at the specified maximum voltage and at 45° C for a period of 100 hours.



**Photometry Test: -**

The test shall be carried out for Total Luminous Flux, Luminous Intensity Distribution, Electrical Power, Luminous Efficacy (calculation), Color Characteristics– Chromaticity, CCT & CRI etc. as per IES LM 79.

**Life Test**

The lumen maintenance & life test shall be done as per IES LM 80 for LEDs.

**Endurance Test**

The Luminaire shall be kept "ON" with input voltage of 250 V ~ for 200 hours. After this the Luminaire is subjected to 20,000 cycles of "ON" and "OFF", each cycle consisting of 3 seconds "ON" and 10 seconds "OFF" period. Luminaire should survive this test. Test is to be continued for 20,000 cycles, followed by performance test.

**Safety:**

The Luminaire shall comply with the safety requirements as per IEC 61195.

**All Tests defined for acceptance other than LM 79 and LM 80 are allowed to carry out at Manufacturer works.**

**6. INFRINGEMENT OF PATENT RIGHTS**

Surat Municipal Corporation shall not be responsible for infringement of patent rights arising due to similarity in design, manufacturing process, use of the components, used in design, development and manufacturing of these light luminaires and any other factor which may cause such dispute. The responsibility to settle any issue rises with the manufacturer.

**7. MARKING:**

The following information shall be distinctly and indelibly marked on the housing:

- Year of manufacture/ Batch Number/ Serial Number
- Name of Manufacturer (Engraving only, stickers not allowed)
- Rated watt and voltage
- Input frequency





## INSPECTION AND TESTING

### AT MANUFACTURER'S WORKS :

Inspection & testing shall be carried out in the presence of SMC / TPI person of all electrical and fire system related equipment, however contractor should have to submit company/ manufacturer test certificate for the same.

Each major component of the electrical and fire system related equipment shall be subjected to shop tests by the respective manufacturer and corresponding test reports/certificates shall be furnished by him along with supply document of equipments.

- Electrical and Fire system related equipment:

Each assembled equipment shall be shop tested by the manufacturer in presence of TPI/SMC's representative to determine the following characteristics within the operating range as specified.

- All Test Report
- Data Sheet
- Efficiency curve
- Total power consumed
- Motor-Pump set tested at works of pump manufacturer with VFD at 25Hz for 01hour.

All the test shall be conducted in accordance with the relevant IS / manufacturers testing standards and shall be witnessed by the end user at manufacturers works. Each equipment performance shall be documented by obtaining concurrent reading showing all electrical and mechanical parameters, and it should be match with its data sheet and must be followed the IS standards. Such reading shall be documented for at least 5 no of same equipment.

### POST INSTALLATION / PRE COMMISSIONING CHECKS:

All Electrical and Fire system related equipment shall be commissioned only after due pre-commissioning checks after installation. **For this, authorized and qualified representative of manufacturer shall oversee and confirm the workmanship of equipment installation. All pre commissioning checks, as enlisted in equipment manual, shall be witnessed by manufacturer's representative.**

**First time starting of the equipment (after pre commissioning checks) shall be carried out only after satisfactory installation certificate/acceptance by manufacturer representative. In any case, contractor shall not be allowed to commission the equipment without confirmation of installation and satisfactory pre commissioning checks by manufacturer representative.**



#### POST COMMISSIONING / FIELD TESTING :

After installation equipment offered will be subjected to testing in field for its satisfactory & trouble free working for maximum test working hours. If the field performance is found not to meet the requirement, then the equipment shall be rectified and / or replaced by the vendor.

#### **IS Code & Act for Electrical Work**

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, 1948.
- 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) IS : 694 - 1964 Part-II - PVC insulated cable with Aluminum conduits (revised) for voltages up to 1100 volts.
- 11) IS : 5908-1970 - Electrical installations in buildings, method of measurements of.



- 12) IS : 4237-1967 - General requirement for switchgear and control gear for voltage not exceeding 1000 volts.
- 13) IS : 1653-1964 - Rigid steel conduits for electrical wiring (revised).
- 14) IS : 2509-1973 - Rigid steel conduits for electrical installation. (First revision).
- 15) IS : 1258-1967 - Bayonet landholders (First revision)
- 16) IS : 418-1957 - Tungsten-Filament General service electric lamps (Third revision)
- 17) IS : 374-1966 - Fans and Regulators, ceiling type, electric (Second revision)
- 18) IS : 2667-1964 - Fittings for rigid steel conduits for electrical wiring.
- 19) IS : 3419-1976 - Fittings for rigid non-metallic conduits (First revision)  
National Electric Code, 1986

#### **SPECIAL CONDITION**

- (1) Point wiring shall be from the distribution box or fuse board, No sub main shall be measured.
- (2) Samples of materials shall be given to Engineer-in-charge and approval should be taken in writing before its use.
- (3) Fabrication drawing should be get approved from the Engineer-in -charge prior to Manufacturer.
- (4) Pipe laying lay out shall be as per consultants drawings.
- (5) There shall be no junction in wiring out let box shall be used after bond.
- (6) Electrical contractor shall make good the civil work if chased of damaged.
- (7) Electrical Engineer-in-charge opinion shall be final and binding on contractor.
- (8) Qualified labor and supervisors shall work at site.
- (9) Electrical Contractor shall not permit unqualified labor contractor to work at site. He shall observe Govt. rules regarding control of labor. He shall submit test report and carry our tests as required and furnish detailed drawings on completion of work. The responsible authorized person by the contractor should be available of site daily when work is in progress.

Signature of Contractor

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(10) The work shall be carried out during working days between 8.00 A.M. to 6.00 P.M. only. The cable trench should not remain open for more than 24 hours after excavation. If contractor intends to work on holiday or outside working hours specified, he shall take prior permission from the Engineer-in-charge. In that case overtime to the staff shall have to be paid by the Contractor. The Electrical appliance-materials shall be bear the ISI mark or declaration indicating manufacture's names and appliances material used having been manufactured in accordance with the manufactures' certificate issued by the Government of Gujarat and confirming to the standard specified by the I.S.I. shall be given by the contractor.

(11) Cost of all test should be bare by contractor/ Tenderer, carried out for Electrical and Fire System related equipment in presence of TPI/PMC/SMC's representative.

The conditions laid down under House Hold Electrical appliances (Quality control Act 1981) shall be followed.

I/We agree to carry out the above work at rates indicated above at \_\_\_\_\_ percentage above/below the rates indicated above i.e. I/We agree to carryout the above work at a total cost of Rs. \_\_\_\_\_ .

The Contractor shall provide test report and get the installation approved from Govt. Elect. Authority is required.

CONTRACTORS STAMP AND SIGNATURE.

## **SECTION XV - SPECIFICATIONS FOR FIRE SAFETY WORKS**

### **1. DESIGN PHILOSOPHY**

#### **1.1. Hazard Classification:**

As per NBC the LIG/EWS has been classified as a Residential Building , above 14m height

#### **1.2. Types of Systems Proposed:**

Following are the various Fire Protection systems proposed

- Campus wise Fire Water Tank and Fire Pump Room



- Wet Riser system
- Yard Hydrant with external ring main
- Fire Extinguishers

### 1.3. Fire Water Storage Tank:

Water Tank at Ground level near Fire pump house.

### 1.4. Fire Water Pumps:

Electrically Driven Main Pump for Hydrant system. **Fire pump capacity shall be decided as per NBC norms/Local /Local Authority Norms. Generally it shall be as below:**

- Minimum 900 LPM capacity discharge.
- Head shall be decided according to building height (static head), site situation (Length of ring main , friction head loss), residual pressure required at farthest end as per NBC.etc..
- Pump Arrangement shall be 1 running + 1 standby.
- Bidder shall submit and get approve the design parameters of fire pump, besides other details like curves, GA , MOC etc of fire pump.

### 1.5. Fire Hydrant System:

- Ring Main with isolation valve
- Wet Riser cum down comers
- Landing Hydrants

### 1.6. Wet/dry Riser come down comer System:

- Wet /dry riser cum down comer for every 1000 sq. mts floor area
- Landing Hydrants on all floors with single- headed hydrant valve, Alternately Hose reel and Rubber hose at each Floor.



### 1.7. Yard Hydrant:

- Yard Hydrants at most prominent locations maintaining maximum distance of 30 m. between two hydrants of periphery of the constructed building with single headed Hydrant valve, fire hoses with nozzle

### 1.8. Fire Extinguishers:

- Dry Chemical Powder Fire Extinguishers confirming to IS 2171 are provided at all the prominent location to extinguish the B & C class Fire
- Carbon Dioxide type Fire Extinguishers confirming to IS 2878 are provided at all the prominent location to extinguish the B & C Class fire in conjunction with DCP fire Extinguishers
- Water Expelled Carbon-dioxide type fire extinguisher confirming to IS 940 are provided to all the prominent location to extinguish the A class fire
- ABC Type fire extinguishers are provided in the individual offices confirming IS:13849

**1.9. Sizing for pipelines and valves and other peripherals for riser, ring main etc shall be decided as per NBC norms/Local /Local Authority Norms.**

**1.10. Qty of fire extinguisher, hose reel drum, hose pipe, hose box etc.. Shall be decided as per NBC norms/Local /Local Authority Norms.**

## 2. APPLICABLE CODES AND STANDARDS

Unless specifically mentioned otherwise, The installation shall conform in all respect to the following broad list of standards in general and in particular the materials used shall bear prevailing ISI marking:

a).	NBC	National Building Code of India Part 4, Fire & Life Safety
b).	IS:1239	Specification for M.S Pipe
c).	API 600 / BS 5163	Specifications for Gun Metal Gate, Globe and Check valves for Water Supply
d).	IS:800	Specifications for Structural steel
e).	IS:814	Specifications for covered electrodes for metal arc



		welding of structural steel
f).	BS:5155	Specifications for C.I butterfly valve
g).	IS:4927	Specifications for Canvas Hose Pipes for Fire Fighting purpose
h).	IS:636	Synthetic Jacketed hose pipes
i).	IS:903	Specifications for ranch Pipes Fire Hose coupling and auxiliary equipment
j).	IS:5290	Specifications for Hydrant Landing Valves
k).	IS:4853	Recommended practice for radiography inspection of fusion welded butt joints in steel pipes
l).	IS:2198	Control Panel
m).	IS:5	Specifications for Painting
n).	IS:9137	Specifications for horizontal end suction centrifugal pump
o).	BS:1965 Part I	Specifications for butt welded pipe fittings
p).	IS:8423	Controlled percolating hose for fire fighting
q).	IS:2871	Branch Pipe, Universal for fire fighting purpose
r).	IS:884	First aid Hose reel for Fire fighting
s).	IS:5132	Hose reel tubing for fire protection system
t).	IS:2190	Code of practice for selection, installation and maintenance of portable first aid fire extinguishers
u).	IS:937	Specifications for Washers for water fittings for fire fighting system
v).	IS:2171	Dry Chemical Powder Fire Extinguishers
w).	IS:940	Water type Carbon-dioxide Fire extinguisher



x).	IS:2878	Carbon-Dioxide type Fire Extinguishers
y).	IS:13849	ABC Type Fire Extinguishers

### 3. SCOPE OF WORK FOR JOB EXECUTION

Description of Work will be as follows which have to be supplied, erected, commissioned and validated. The system to conform requirements as per IS and National Building Code of India – 2005

- Fire Hydrant System consisting of M.S piping with fittings, valves, Fire Hoses, Hose Cabinets, Fire Nozzles, Hose reels, Anti Corrosion treatment, Painting and Accessories.
- Fire Extinguishers system consisting of Carbon Dioxide, Dry Chemical Powder, Water-CO2 and ABC type Fire Extinguishers

#### 3.1. Drawings:

The Contractor shall furnish detailed drawing necessary for approval. These shall be submitted for approval to the Architect/Consultants/Fire Department.

#### 3.2. Drawing/Information Required From Successful Tenderer :

- a) Drawing, literature and technical particulars of all bought out items.
- c) Schedule for valves and piping material.
- d) Pump GA & Cross sectional drawings.
- e) Performance curve for the pumps.
- f) Control logic diagram for pump to start.

#### 3.3. Inspection and Approval:

The contractor shall arrange all necessary inspection by the local Authority He shall also arrange for the entire test, obtain and deliver to the Owner any approval required as





per the standards It is the sole responsibility of the contractor to prepare & submit the drawings.

#### **3.4. Painting:**

All piping, furnished under this specification shall be properly painted with one coat of zinc chromate primer and two coats of synthetic enamel paint after installation and shall meet the requirements as outlined in Fire Protection Manual. Paint used for this work will be lead free quality.

#### **3.5. Guarantee:**

The contractor shall guarantee the material and workmanship of the entire system is of first class quality and shall correspond to standard Engineering Practice. All the equipments/apparatus shall be guaranteed to yield the specified rating and design capacities, speeds. Any defective equipment / material / workmanship found short of the specified quality shall be rejected contractor shall make good the rejected items at his own cost. Guarantee certificate of equipment from suppliers/manufacturers shall be handed over to the Owner.

#### **3.6. Defects & Liability:**

All the equipment/ material and the system shall be guaranteed against defective material and workmanship for a period of 12 months from the date of commissioning and handing over the Owners along with all relevant documentation. The contractor shall repair/ rectify or replace all the defective materials, components free of cost. In addition, normal maintenance shall be carried out periodically during the defect liability period including replacement of spares, as required.

#### **3.7. Instruction Manual/Completion Drawings/Training:**

The contractor shall furnish detailed instruction and operation manual in quadruplicate. The contractor shall also furnish detailed completion drawings as soft copy and hard copy on tracing sheet drawn to an approved scale. The drawings shall be inclusive of control schematic, if any. The contractor shall train the Employer's personnel in the operation and maintenance of the system for one month.



### **3.8. Testing:**

The contractor shall arrange to test the entire system as per the procedure enumerated under particular specifications, after the erection is completed as per standards, The tests shall be carried out to the satisfaction of Project Managers/Owners. The results of the tests shall be submitted to the Project Managers / Owner in triplicate. If the results of the tests are not found to be satisfactory by the Project Managers/Engineer-in-charge, necessary rectifications shall be done until the test results are found to be satisfactory. The installation shall be deemed to be completed only after the successful completion of the tests.

All material shall be tested at manufacturer works. QAP shall be got approved.

## **4. TECHNICAL SPECIFICATIONS FOR FIRE HYDRANT SYSTEM**

### **4.1. Without restricting to the generality of the foregoing, the fire hydrant system shall include the following:**

- Pumps, suction / delivery pipes, Valves, control panel and Instrumentation and pump set shall be in auto operation.
- Mild steel (M.S.) Class "C" (heavy grade) ring mains / riser main within the building and as well outside the building.
- Landing valves, external hydrant valves, hose reels, fire duct shutters. Hose cabinets, fire brigade connections and connections to pumps and appliances.
- All materials shall be of the best quality and brand new, conforming to these specifications / standards and subject to the approval of the Client / consultant.
- 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 and fittings shall be fixed to walls and ceilings by suitable clamps at intervals specified. Only approved types of anchor fasteners shall be used for RCC ceilings and walls.
- Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat manner.
- The pipes shall be supported by structural steel fabricated (like, channel / angle / flat / plate etc) supports with suitable anchor fasteners / suspended thread rods not less than M16 in size.
- Valves and other appurtenances shall be as located that they are easily accessible for operation, repairs and maintenance. Valves / other equipment fitted above the false ceiling shall be provided with trap / access doors.
- Pipes for wet risers within the Building shall be M.S. tubes conforming to IS 1239 (heavy duty 'C' class) with flanged/welded joints.
- Fittings for steel pipes shall be malleable iron or forged iron fittings with screwed / welded joints.
- Inter connection between system peripherals and hydrant pumps shall be carried out at discharge side with Check valve and isolation valves.
- All equipment should be confirmed with Technical data sheets as enclosed along with this tender.

#### **4.2. Piping**

All pipes inside the building and where specified, outside the building shall be M.S. tubes conforming to IS: 1239 - heavy duty. Fittings for pipes shall be as per IS: 1239, Part II (heavy grade) up to 150mm dia., 200 mm dia. and above shall be M.S. pipes as per IS: 3589 with minimum 6 mm wall thick & fittings shall be fabricated from pipes confirming to IS 3589. Pipes shall be carefully laid to the alignment, levels and gradients shown on the plan and sections and great care shall be taken to prevent any



sand, earth or other matter from entering the pipes during laying. Pipes shall be kept thoroughly clean during the course of laying. The ends of pipes shall be blocked with wooden plugs wedged home, at the end of each days work to prevent dirt and rodents, insects etc., entering the pipe. Pipes up to 50mm dia, tapered screwed / Socket welded / Butt welded type jointing shall be adopted, while for pipes above 50mm dia welded or flanged connections shall be used. Flanged joints shall be made with 3 mm thick insertion rubber washer / Gaskets. All boltholes in flanges shall be drilled & making hole by using gas cutting is not acceptable. The drilling of each flange shall be in accordance with relevant Bureau of Indian Standards.

Flanged joints shall be used for connections to vessel equipment, flanged valves and also on suitable straight lengths of pipeline at strategic points to facilitate erection and subsequent maintenance work.

**The Bolts /Nuts / Washers used in the system shall be Galvanized as per IS 1367 and suitable length & not more than 15mm beyond the Nut.**

#### **4.2.1. Pipe protection**

##### **4.2.1.1 Above Ground Pipes**

All pipes above ground and in exposed locations shall be painted with two coat of Zinc rich type primer and two or more coats (minimum film thickness of 75 microns) of synthetic enamel paint of approved shade. The pipes should be initially brushed to remove all foreign matter before applying paint / primer.

##### **4.2.1.2 Under Ground Pipes**

The pipes (buried) should be initially brushed to remove all foreign matter and apply the primer over the pipe. Primer is allowed to dry until the solvent evaporates and surface becomes tacky. The tape 2mm / 4mm thick and 150/250mm wide shall then be wound in a spiral fashion and bonded completely to pipe by thermo fusion process. The overlap is to be maintained at 15mm. 4 mm. Wrapping & Coating should be done to all the underground piping to protect it from moisture and other impurities.



#### **4.2.2. Excavation Of Trenches**

4.2.2.1 Pipelines shall be buried to a minimum depth of 1M (top of the pipe) from the finished ground level.

4.2.2.2 The contractor shall support all trenches or adjoining structures with adequate timber supports wherever required.

4.2.2.3 On completion of testing and painting of the pipelines, trenches shall be refilled with excavated fine earth in 20cms. Layers and consolidated by ramming and watering.

#### **4.2.3. Thrust Blocks**

Contractor shall provide suitable PCC blocks of suitable dimensions at Change – in – direction and regular intervals of 6 meters to support the pipes. Minimum Size of Blocks shall be 600mm x 600mm x 450mm.

#### **4.2.4. Pipe Supports**

Supports for above ground pipes of 65 mm dia and above shall be fabricated by structural steel of suitable sections with suitable fasteners. The spacing of supports shall be 3mts minimum and painted two coats of enamel paint of approved color over a coat of primer.

Suitable type hangers shall support pipes below 50 mm dia with clamps, anchor fasteners and suspended rods etc. In any case fasteners shall not be less than 12 mm in size.

### **4.3 Valves**

#### **4.3.1 Butterfly Valves**

Butterfly valves shall be as per BS 5155 & provided for pipes 50mm dia and above on down stream (delivery side) of the pumps. The valves shall be CI construction, seat shall be black nitrile rubber with insitu moulding. The valves shall be PN 1.6 rating.



#### **4.3.2 Gate Valves**

Gate valves shall be as per IS: 14846 / 780, with C.I. body and bronze / brass internal parts and shall be used on suction side of the pumps. Valve shall be flanged end type, PN 1.6 with Non-rising Spindle type with C.I hand wheel etc.

#### **4.3.3 Non – Return Valves**

Non – return valves shall be reflux swinging disc type with C.I. body and bronze / brass internals with PN 1.6 rating and as per IS: 5312.

#### **4.4 External Hydrants**

External (yard) hydrant valves shall be single headed as per IS: 5290 (Type A). The valves should be complete with hand wheels, quick coupling connections, springs and blank caps. The hydrants shall be fixed to stand posts of 80mm dia for single headed hydrants at 1.0M from ground level. External hydrant valves shall be consisting with 2 nos. fire Hoses of 15m long 63 mm dia, One No. Gun metal Branch pipe with Nozzle housed in the M.S cabinet and cabinet shall be mounted ( next to stand post) on free standing support fabricated by suitable structural steel / pipe of not less than 80 mm dia. Please refer the tender drawings for the details.

#### **4.5 Hose Reel**

Hose reel shall be swinging type for 180 deg with mounting base plate. Hose reel shall consist with 19mm dia high-pressure rubber braided hose of 36 mts length with gunmetal nozzles. Hose reel water shall be tapped off from the wet riser with Ball valve. The hose reel shall be installed in fire hose duct inside the building.

#### **4.6 Landing Hydrant Valve**

The landing valve (internal) shall be gunmetal double-headed type conforming to IS: 5290 complete with hand wheel, quick coupling, spring and blank cap. 2 Nos. of RRL type hose pipe of 63mm dia and 15 mts. length as per IS: 636 with 63mm dia instantaneous type



Gun metal heavy duty couplings & Gun metal Branch pipe and nozzle to be provided. Fire hoses and branch pipes shall be mounted inside the fire shaft with suitable supports.

The Fire shaft shall be sealed at all floors with fire retardant material as shown in the Drawings, Refer Typical standard details furnished along with Tender.

#### **4.7 Fire Hose**

Fire hoses shall be Reinforced Rubber Lined (RRL) type - A, as per IS: 636 & 63 mm dia and 15 mts long. Hoses shall be bounded by G.I wire to heavy-duty instantaneous gunmetal couplings as per IS 903.

#### **4.8 Branch Pipe With Nozzle**

Branch pipe shall be gunmetal, 63 mm dia with Nozzle of 19 mm dia made as per IS: 903 and suitable fitted with hoses as specified else where in this specifications.

#### **4.9 Hose Cabinet**

Hose cabinet shall be Made from MS sheet duly powder coating, fronted with double hinged door and lock. It shall be spray painted to post office red color with word fire. The hose cabinet shall be of suitable size.

#### **4.10 Air Release Valves**

Air release valve is 25mm screwed inlet GM single acting type and shall be fixed on all high points in the system (wet riser) with Ball valves or as shown on drawings.

#### **4.11 Drain Valves**

Gun metal Gate / Ball valve of 15 / 25 / 40 / 50mm dia as per IS; 778 with fittings as required for instruments / draining any water in the system / Risers in low points.



#### 4.12 Valve Chambers

Contractor shall provide suitable brick masonry chambers in cement mortar 1:5 (1 cement: 5 Coarse sand) on cement concrete foundations 150mm thick 1:5:10 mix (1 cement: 5 fine sand: 10 graded stone aggregate 20mm nominal size) 15mm thick cement plaster inside and outside finished with a floating coat of neat cement inside with cast iron surface box ( OR top cover fabricated by M.S. chequered plate of 6 mm thick with frame / stiffeners etc) approved by local fire brigade including excavation, back filling and additional Iron rungs for entering in to valve chamber etc, complete.

Valve chambers shall be 1200mm x 1200mm x 1500mm depth.

#### 4.13 Tests At Site

##### 4.13.1 . Piping

All piping in the system shall be tested to hydrostatic pressure of 1.5 times of the working pressure without drop in pressure for at least 120 minutes. The test should be made in the presence of and to the satisfaction of the Employers / consultants representatives. Any defects / leakage should be repaired or if necessary defective works / equipment should be replaced with new work / equipment. Tests should be repeated until work is done to the satisfaction of concern representatives.

**After testing all pipes shall be flushed with portable water to remove foreign materials.**

Under ground Pipes after lowered in to trenches shall be Holiday tested for damages of the anticorrosion treatment and damages should be rectified, bring it to the notice of the engineer – in –charge of site before closing the trenches.

Also the under ground pipes joints shall be tested for Radiographic for 10 % of the total under ground joints. The test results and films shall be submitted for approval and any defects found in the welding process shall be rectified the contractor with out any extra cost to the clients.





#### **4.14 Painting:**

All exposed surface of pipes, specials valves, Steel doors and windows, etc, shall have two coats of synthetic enamel paint of approved shade over a coat of red oxide primer etc all complete as approved and direction of the Engineer-in-charge.

#### **4.15 Pumps And Accessories:**

The pumps shall be exclusively used for fire fighting purposes and shall be BIS approved as mentioned in the BOQ. One set main pump for each hydrant & sprinkler system with electrical motor driven direct couple centrifugal pump of adequate discharge & head and in addition common standby Diesel engine driven direct coupled centrifugal pump of adequate discharge and head shall be provided. The suction / delivery pipes, valves, instrumentation and control panel shall be consider accordingly.

##### **4. 16.1 General Requirement:**

The pumps shall be horizontal centrifugal typedesigned for continuous operation and shall have a continuously dropping head characteristic without any zone of instability. The power capacity characteristic shall be non-over loading type.

The head vs. capacity, input power vs. capacity characteristics, etc., shall match toensure load sharing and trouble free operation throughout the range. In case of accidental reverse flow through the pump the driver shall be capable of bringing the pump to its rated speed in the normal direction from the point of maximum possible reverse speed. The pump shall be capable to discharge 150 percent of rated capacity at a total head of not less than 65 percent of the total rated head. The total shut off head shall not exceed 120 percent of total rated head on the pump. An automatic air release valve shall be provided to vent air from the pump discharge and also to admit to the pump to dissipate the vacuum there, upon stopping of the pump. This valve shall be located at the highest point in the discharge line between the pump and the discharge check valve. Pump coupled with motor or engine on a common base plate shall perform smoothly without any excessive noise or vibration. Also pump shall be provided with re-circulation piping with valves.



The contractor under this specification shall assume full responsibility in the operation of the pump and the drive as one unit.

#### **4.16.2. Pump Casing:**

The casing shall be cast iron to IS 210 and capable of withstanding to the maximum pressure developed by the pump at the pumping temperature.

#### **4.16.3. Impeller:**

The impeller shall be of standard bronze. The impeller shall be secured to the shaft with hydraulically balanced and shall be retained against circumferential movement by keying, pinning or lock rings. All screwed fasteners shall tighten in the direction of normal rotation.

#### **4.16.4. Shaft:**

Shaft size shall be selected on the basis of maximum combined shear stress. The shaft shall be of stainless steel AISI-410 ground and polished to final dimensions and shall be adequately sized to withstand all stresses from motor weight, hydraulic loads, vibrations and torque's coming in during operation. Pump Shaft-Motor Shaft Coupling shall be connected with adequately sized flexible couplings with spacer of suitable approved design. Necessary guards shall be provided for couplings. Pump shall be consisting with Gland plate for gland packing.

#### **4.16.5. Base Plate:**

A common base plate for mounting both the pump and drive shall be provided. The base plate shall be of rigid construction, shall be fabricated by M.S. channels. Base plate and pump supports shall be so constructed, the pumping unit shall be mounted so as to minimize misalignment caused by mechanical forces such as normal piping strain, hydraulic piping thrust etc.,

#### **4.16.6. Vibration And Balancing:**

The rotating elements shall be so designed to ensure least vibration during start and throughout the operation of the equipment. All rotating components shall be statically and



dynamically balanced at workshop. All the components of pumps of identical parameters supplied under these specifications shall be interchangeable.

#### **4.16.7. Instruction Manual And Tools/Spares:**

A comprehensive instruction manual shall be provided indicating detailed requirements for operation, dismantling and periodic operation and maintenance procedures. Recommended tools/spares shall be provided along with the Pump set.

### **5.0 Technical Specifications For Fire Extinguishers**

Work under this section shall consist of furnishing all labor material appliances and equipment necessary and required to install fire extinguishing hand appliances. Without restricting to the generality of the foregoing, the work shall consist of the following.

#### **General Requirements:**

Fire Extinguishers shall conform to the following Indian Standard specifications as revised and amended up to date.

- Dry Powder Type : IS:2171
- Carbon Di-oxide : IS 2878
- Water type : IS:940
- ABC Type : IS: 13849

Fire extinguishers shall be installed as per Indian Standard Code of practice for Selection, installation and maintenance of portable first aid appliances IS: 2190 (latest amendment). The appliances shall be installed in readily accessible locations with the appliances brackets fixed to wall by suitable anchor fasteners. Each appliance shall be provided with an inspection card indicating the date of illuminated and caused all reset or silenced, the control panel trouble buzzer will sound until such time as the manual station or automatic initiating device is returned to normal and the control reset switch is operated. Generally, fire extinguishers should be placed as near as possible to exits or stair lands without hindering the



escape routes. Wherever possible, advantage should be taken of normal routes of escape by placing these in positions where these shall readily be seen by persons following the natural impulse to get out of danger. Wall mounted fire extinguishers should be placed on the supporting wall or in wooden, metal or plastic cabinets in such a way that their 1000 mm bottom is above ground level.

When installed in the open, fire extinguishers should be placed on masonry platforms or in wooden/metal/plastic cabinets in such a way that their bottom is 1 000 mm above ground level.

## **6.0 Cutting & Welding Procedures**

### **6.1 Cutting:**

Pipe shall be cut mechanically (by saw or shear) or by oxy acetylene flame. No Electric metal arc cutting shall be allowed. All edges cut by oxy acetylene shall be cleaned of impurities prior to welding joints.

### **6.2 Cutting Tolerance Shall Be As Follows:**

- a) For pipe connected at both ends to - 1mm
- b) Elsewhere to - 3mm

The edge preparation for welding of members more than 1/2" thick shall be done by flame cutting & grinding. Cut faces shall not have cracks or irregular, below 1/2" thick shall be done by Grinding Machine.

### **6.3 Preparation of Members for Welding:**

Sharp edges, rust of cut edges, notches, irregularities fissures due to faulty cutting shall be chipped, ground over the length, edge of the affected area.



Edge preparation for welding joints shall be carefully & accurately made so as to facilitate a good joints. Generally no special edge preparation shall be required for members under 1/2" thick. Edge preparation beveling denotes cutting & grinding of the same so as to result in 'V' or 'X' shapes as per IS:823.

The members to be assembled shall be clean and dry on the welding edges. Under no circumstances shall wet, greasy rust or dirt covered parts be assembled joints shall be kept free from any foreign matter, likely to get into the gaps between members to be welded.

#### **6.4 Welding Procedure:**

Welding shall be carried out only by fully qualified welders as tested & approved by the architects. Any test carried out either by the architects or their representative or the inspectors shall constitute a right by them for such tests & the cost involved there on shall be borne by the contractor himself. When welding is carried out on open air, steps shall be taken to protect the place of welding against wind or rain, the welding electrodes and parts being welded shall be dry.

Before beginning the welding operation, each jointing shall be checked to ensure the parts to be welded or clean and root gaps provided as IS: 823. For single butt welds (in V) and double butt welds (in double V or U etc.). The re-welding of the root is mandatory but only the metal deposits of the root has been cleaned by back gauging or chipping. The welding joints shall be left to cool slowly. The contractor shall not be allowed to cool thewelds quickly by any other methods.

For multilayer welding, before welding the following layer, the formerly welded layer shall be cleaned metal bright by light chipping & wire brushing. Packing strips shall not be allowed i.e. All slag shall be removed.

#### **6.5 Welding Inspection:**

The welding joints shall satisfy not to have any defects such as cracks, incomplete penetration and fusion, under-cuts, rough surfaces, burns, blow holes & porosity etc .beyond permissible limits.

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## 8.0 SAFETY NORMS

Contractor has to comply in line with all the Safety Guidelines as given below during execution of the job.

- 1) Contractor shall ensure that his/her workmen do not smoke or chew tobacco within working area.
- 2) Contractor shall ensure proper use of all the required PPEs while carrying out jobs.
- 3) Contractor shall ensure that adequate resources in terms of PPEs and tools-tackles should be available with his/her workmen.
- 4) Contractor shall ensure that his/her all Lifting Tools and Tackles are certified by Competent person (e.g. Chain Blocks, Slings, D- Shackle, Wire Rope, Crain etc)
- 5) Contractor shall ensure that all his/her Electrical Appliances like Welding m/c, grinder, Drill m/c, Breaker etc. are be in good condition with proper industrial plug top with good cable. Contractor shall not bring any equipment with joint or damaged cable.
- 6) Contractor shall deploy one dedicated supervisor for the job under taken by his/her agency to take care of Safety of his/her employees
- 7) Contractual supervisor will ensure that work is started only after issue of required work permit for the same on daily basis and work will be carried out only during the validity period of the permit.
- 8) Contractor shall be equally responsible for his/her workmen's and others safety as an accept or of Work permit.
- 9) Contractor shall ensure that his/her all employees are covered under workmen compensation policy or ESI.
- 10) Contractor shall ensure that his/her workmen will start the job only after proper safety induction.



- 11) Contractor shall accept his/her responsibility to ensure that scrap generated from my activity will be disposed off at designated locations within the site only.
- 12) Contractor shall ensure full compliance with all the applicable legal requirements pertaining to his/her job as per 'Law of Land'
- 13) Contractor shall accept that his/her workmen / supervisor will ensure that no material is disposed off in the drains without permission of site management.
- 14) While handling with any hazardous waste like spent oil, grease, paint etc Contractor shall ensure that disposal of the same is done as per the guidelines of site management.

\* \* \* \* \*

## **SECTION XVI - SPECIFICATION FOR TERTIARY SEWAGE TREATMENT PLANT FOR REUSE IN TOILET FLUSHING AND GARDENING**

### **1. Basis of Design**

- 1.1. The process design, capacity/ rating of pumps and equipment etc. shall hold good for the capacity of 0.25 KLD/EWS Unit and shall be good for meeting the treated parameters as provided in the tender elsewhere. The various acts and guidelines provided hereunder shall be followed strictly as applicable.
  - a. Permissible limit as prescribed in IS: 2490 (Part-I)-1974 and environment (Protection) Rules 1986.
  - b. Water (Prevention and Control of Pollution) Act, 1977 & 1978.
  - c. Environment (Protection) Act, 1986.
  - d. Environment (Protection) Rules, 1986.
  - e. Hazardous Wastes (Management & Handling) Rules, 1989.
  - f. Manufacturer, Storage and Import of Hazardous Chemicals Rules, 1989.
  - g. Manufacturer, use import and storage and hazardous Micro-Organizers, Genetically Engineered organizations or Cell Rules, 1989.
  - h. Manual on sewage & sewage treatment - CPHEEO
  - i. The Public Liability Insurance Act, 1991.
  - j. All standards as laid down by Central Pollution Control Board and any other relevant statutory authority.
  - k. 100% recycle of waste water and removal of sludge in cake from,

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no water to be discharged outside the premises.

## 2. Design Consideration

- 2.1. Net Output Capacity : 0.25 KLD/EWS Unit  
 2.2. Peak Factor : 3.0  
 2.3. Area Available : Within premises of EWS Housing

- 2.4. Operation : Round the clock

### 2.5. Influent Sewage Characteristics

The influent wastewater characteristics to be used as the basis of design are provided below:

Influent Wastewater Characteristics*		
Parameters	Units	90%tile Values
pH		6.5-7.5
BOD5 at 20°C	mg/L	< 250
COD	mg/L	< 500
TSS	mg/L	< 350
TKN	mg/L	< 50
Total Phosphorus	mg/l	< 10
Total coliform	MPN/100 mL	10 <sup>1</sup> - 10 <sup>6</sup>

\* Please note that above values are indicative. The Tenderers are advising to obtain





the actual data from site. Moreover, the inlet parameters other than mentioned in the tender, shall have to be measured and verified by the bidder at its own. No arguments / objection shall be entertained later on for any parameters. It shall be solely contractor's responsibility to take care of it to achieve the desired treatment standards as mentioned in the tender.

#### 2.6. Final Treated Effluent Characteristics

<b>Treated Effluent Quality Requirements (at final outlet of TSTP)</b>		
<b>Parameter</b>	<b>Units</b>	<b>Values</b>
pH - instantaneous range		6.5 - 8.0
BOD (3 days at 27 deg C)	mg/L	≤ 5
TSS	mg/L	≤ 5
Total Nitrogen	mg/L	≤ 10
Total Phosphorus	mg/L	≤ 2
Turbidity	NTU	≤ 2
Oil & Grease		NIL
Total coliform	MPN/100 mL	≤ 25
E-coli		NIL
Odor	-	Odorless

Note: All other parameters as per present CPCB/GPCB norms for on land for irrigation or whichever is stringent.

The dewatered sludge shall have minimum sludge TSS as dry solids as 20% w/w.

### 3. Salient Features

- 3.1. The plant should be suitable for low/peak flow in line with usage.
- 3.2. The plant should not create any noise, with no nuisance on fly or mosquito and no foul odors.
- 3.3. The plant should work without the use of in-organic chemical additives (except for P removal and sludge dewatering)
- 3.4. The plant should be provided with territory treatment to provide zero bacteriological standard for reuse on:
  - a) Gardening
  - b) Irrigation system

### 4. Treatment Objectives:

Considering the raw sewage quality and the required treated effluent quality, the



Contractor shall furnish a process train to achieve the following objectives

- To achieve guaranteed treated effluent quality to reuse it in gardening / irrigation / farming, as defined in the tender elsewhere.
- To ensure that the offered treatment process is the most appropriate and state of the art in terms of both efficiency of treatment and cost (the Tenderer shall have to produce the performance records with the same treatment systems applied elsewhere.)
- To ensure that the process is cost effective from both capital and O&M costs consideration.
- To ensure that the sludge produced is dewatered to a "spade able" or "open body truck able" consistency – so that it can be easily disposed off.
- The process preferably should be free from utilization of chemical/any organic chemicals except for sludge removal process. No toxic chemical shall be used by the Contractor. He shall submit the toxicity test report from any govt. recognized laboratory at his own cost before using such chemical.
- Oils/lubes/fuels/media/chemicals etc. to be used will be defined by Tenderer.

#### 5. Treatment Technologies:

The treatment process proposed by Tenderer should be well-established and proven process for treatment of sewage in Indian Environmental condition.

The following processes shall not be accepted by the SMC.

- Oxidation pond (facultative/anaerobic/aerobic)
- Aerated Lagoons
- Trickling filters
- Rotating Biological Rotators (RBC)
- Anaerobic Treatment

**Tenderer must provide all information necessary for a complete evaluation of his technology by the SMC, including drawings, design calculations, technical specifications, datasheets proposed construction/installation methodology and other relevant details. Any bid without above information will be considered as nonresponsive and summarily rejected. Bid must satisfy the SMC's performance requirements as set out in the Bid documents. Tenderer shall include with their Bid evidence acceptable to the SMC of satisfactory past performance of same technology based plant designs and the associated equipment and processes offered and full details of similar plant capacities called for to enable proper evaluation of design.**

#### 6. Treatment Process

**The treatment process for TSTP under this contract is open.** Tenderer is free to adopt and use appropriate treatment process/technology for this project: However the technology selected should be such that the treatment parameters should meet the effluent standards as stipulated in the tender document and shall have proven track record of the same



technology for the desired treatment parameters for at least 5 years in India or abroad. The treatment technology should also include sludge treatment, as required and its safe disposal. Contractor shall provide a complete, fully functional facility designed for proper, easy, operation and to meet the stated performance requirements. This shall include any and all additional, ancillary, supporting, or other processes, components, equipment, or other items necessary to achieve these objectives, regardless of whether such items are explicitly listed in these bid documents or not. **As the residue of treated sewage shall be for toilet flushing and gardening purpose, no in-organic chemicals shall be allowed to use for sewage treatment.**

#### 7. Project Components / Units

The total units covered under scope of work are:

- Sewage Intake arrangement from near by sewerage network. The Intake arrangement shall consist of Intake sewer line, sump and pumps (2 working + 1 stand by).
- Sewage treatment: any proven open technology. It shall include preliminary, primary Biological, Tertiary including PSF, ACF, MF, UF etc. as required, disinfection and Sludge Treatment as the technology chosen by tenderer.
- The final treated effluent is to be disinfected compulsorily with UV before its further use.
- The contractor shall have to make sure that there shall not be any formation of odor or foul gases during the treatment. The contractor may make use of deodorant to control the odor.
- Treated effluent line up to Collection tank for reuse in Garden/toilet flushing etc.
- The entire water distribution network from TSTP to all respective locations alongwith all electrical/mechanical/pumping arrangement shall be in the scope of contractor.
- Sludge shall be dewatered through mechanical dewatering system only, as applicable and disposal shall be done in safe and hygienic manner. The dewatered sludge shall be disposed off within the limits of Ahmedabad Municipal Corporation, as directed by engineer-in-charge.
- Ground Water Harvesting through injection well – 2 nos. per building for balance treated sewage, i.e. after use of toilet flushing, gardening and other purposes. The tentative depth of bore well shall be 75 meters. However, the depth of bore well shall be finalised after only geo-physical survey and resistivity survey. This investigation is also in the scope of contractor.
- Execution of plumbing system for Toilet Flushing and wash water shall be of HDPE or UPVC material of suitable grade as approved by engineer-in-charge.
- All the necessary civil, mechanical, electrical, instrumentation, interconnecting piping works etc. as required to complete the job to achieve the desired objective of the project as mentioned elsewhere in the tender shall be part of this tender.
- Barricading / Compound wall all along the boundary of TSTP campus (i.e. around 400 sq.mt. area)



**8. Design Criteria**

The tenderer shall have to strictly follow the design criteria / norms as specified in the CPHEEO manual on Sewerage and Sewage Treatment. The design criteria considered other than CPHEEO manual shall not be considered valid and tender shall be rejected. The tenderer shall have to submit the design sheet along with the references considered for the design.

**9. Power :**

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

The Contractor shall have to make his own arrangement for getting electric power for construction and trial run of the TSTP. The SMC will issue only recommendation letter to the contractor if required. No compensation shall be paid for delay in getting power supply. All the rest formalities for getting the power supply, connection charges, deposits etc. shall be done and borne by the contractor. The necessary electrical connection for commissioning and operation of the STP shall be taken by contractor.

**SPECIFICATIONS FOR CIVIL AND STRUCTURAL WORKS**



## A. GENERAL

### I Scope :

- a. This specification gives the general design requirements and manners of construction of all civil and structural works, the scope of which is given separately.
- b. Placing in position and fixing of all mechanical items, insert plates, sleeves, anchor bolts are also part of work covered by this specification.
- c. Contractor shall be responsible for the designs and construction of all RCC works, structural steel and other relevant civil works.
- d. The contractor shall submit to the SMSS all the design calculations and drawings for substructure, superstructure and all other connected works for approval. However the approval of the drawings by the SMSS does not absolve the contractor of his responsibilities regarding the soundness of the structure.
- e. The contractor shall submit a schedule of drawings proposed to make in Line with the time schedule included elsewhere in these specifications. The contractor shall submit necessary prints at the time of submissions for approvals and final records.

### II Design :

- a. The design shall generally be on the basis of structural design specifications enclosed herewith.
- b. All structures/part of structures in contract with water shall be designed as water retaining structures as per IS 3370 parts I to IV [latest revision].
- c. Soil data to be used for the design of the structures shall be as per the enclosed recommendations.

### III Construction :

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

## DESIGN SPECIFICATIONS :

### Scope :

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

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#### IV Codes and Standards :

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

#### V. Soil and Foundation Data :

The soil investigation data is enclosed in tender.

#### B. GENERAL TECHNICAL SPECIFICATIONS :

##### 3.0.1 GENERAL :

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

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

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

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

### 3.0.2 DESCRIPTION OF WORK :

The work under the contract consists of providing and executing civil, mechanical, electrical, instrumentation, PLC works. Services to be executed for sewage treatment plant which includes the necessary items to be executed. The work also includes providing necessary inserts, brackets supports in walls are required for installing any other facilities to be provided by other agencies.

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

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

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

### 3.0.4 WATER SUPPLY FOR WORK ;

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

### 4.0 Water Harvesting Injection System

Before fixing the location, the contractor shall have to carry out the geophysical survey. Geophysical survey work is to be carried out to understand subsurface geology and feasibility at various locations by identifying the Zones which are favourable for water harvesting for recharge purpose. It is required to ascertain water bearing zones of shallow, deep horizons and salinity levels. In geophysical survey, electrical resistivity method is the



best and reliable for ground water prospecting and hence shall have to be adopted.

Bore well of 250 mm dia clear shall be drilled including fixing of casing pipes collars and cap with necessary cutting, threading and welding including transportation of rig and supporting vehicles crew charges and cost of consumables etc.

Providing and installing of minimum 160mm PVC ISI Pipe with 8 mm spirally perforated holes / Slotted casing at necessary level.

Installation of 'Wedge' V-WIRE SCREEN-0.75mm slots, LCG based, 1.0 mtr length - 6" Dia and at the top of pipe SS 304 12" 1 mtr. Length & Inner SS 304 6" 1 mtr. Screen Installation of the 'Wedge' Wire Screen by skilled – ISI Approved technicians only.

Earth work -digging the well 1500 mm dia- upto 2.35 mtrs deep

Reinforced concrete cement rings of minimum 1500 mm dia and minimum 50 mm thick to construct recharging well and to hold the excess treated sewage.

Before letting the water into the recharge well, proper filtration media is used. Filtration Media Installation for Injection well Unit 40-50 mm crushed stones / Gravel, & Sand Media. Reinforced perforated slab is used before filtration media.  
Providing and fixing 160 mm PVC end cap with Air Ventilated pipe.

4.0 Plumbing system for toilet flushing and wash water

Plumbing system of UPVC(schedule 40) material as per relevant IS shall have to be executed.

## **10. MECHANICAL SPECIFICATIONS**

### **PART I - GENERAL**

#### **GENERAL MECHANICAL REQUIREMENTS**

The following clauses specify general mechanical requirements and standards of workmanship for equipment and installation and must be read in conjunction with the particular requirements for Contract. These general specification clauses shall apply where appropriate except where redefined in the particular required sections of the Specification which shall be applicable.

#### **List of Standards**

Titles of various standards referred to in the specifications are indicated below. This list does not necessarily cover all the standards referred to:

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BS 5135	Specification for are welding of carbon manganese steels
BS 5316 Part-2	Specification for acceptance test for centrifugal, mixed flow and axial pumps – Test for performance and efficiency
BS 6072	Method for magnetic particle flow detection
BS 6405	Specification for non-calibrated short link steel chain (Grade 30) for general engineering purposes : Class 1 & 2
BS 6443	Method for penetrate flow detection
ASTM A-36	Specification for Structural Steel
ASTM A-216	Specification for Steel Castings, Carbon suitable for fusion welding for high temperature service
ASTM A-276	Specification or stainless steel and heat resisting steel bars and shapes
ASTM A-351	Specification for castings, Austenitic – Ferric (Duplex), for Pressure containing parts
ASTM A-743	Specification for castings, Iron – Chromium, Iron – Chromium – Nickel and Nickel Base Corrosion Resistant for general Application
ASTM A-744	Specification for castings, Iron Chromium – Nickel, Corrosion – Resistant
IEC – 189	Low frequency cables and wires with PVC insulation and PVC



Part 1 & 2	Sheath
AWWA C 501	Cast Iron Sluice Gates
IS 5	Colours for ready mixed paints and enamels
IS 210	Grey Iron Castings
IS 318	Leaded Tin Bronze Ingots and Castings
IS 325	Three Phase Induction Motors
IS 807	Code of Practice for Design, manufacture, erection and testing (Structural Portion) of cranes and hoists
IS 1239	Mild Steel tubes, tubular and other wrought steel fittings
IS 1536	Centrifugally Cast (Spun) iron pressure pipe for water gas and sewage
IS 1537	Vertically cast iron pressure pipes for water, gas and sewage
IS 1538	Specification for cast iron fittings for pressure pipes for water, gas and sewage
IS 1554	PVC insulated (Heavy duty) electric cables
IS 2062	Steel for general structural purposes
IS 2147	Degrees of protection provided by enclosures for low voltage switch gear and control gear
IS 3177	Code of practice of electric overhead traveling cranes and gantry cranes other than steel work cranes
IS 3624	Vacuum and Pressure gauges
IS 3815	Point hooks with shank for general engineering purposes
BS 2910	Methods for radiographic examination of fusion welded circumferential butt joints in steel pipes
BS 3017	Specification for mild steel forged ram shorn hooks
BS 3100	Specification for steel castings for general engineering purposes
BS 3923	Methods for ultrasonic examination of welds
BS 4360	Specification for weldable structural steels
BS 4772	Specification for ductile iron pipes and fittings
BS 4870	Specification for approval testing of welding procedures
BS 4871	Specification for approval the sting of welders working to approved welding procedures
BS 4942	Short chain link for lifting purposes
IS 5120	Technical requirements of roto dynamic special purpose pumps
IS 5600	Horizontal / vertical non clog type centrifugal pump for sludge handling
IS 7090	Guide lines for rapid mixing devices
IS 7208	Guide lines for flocculator devices
IS 10261	Requirements for clarifier equipment for waste water treatment



IS 8413	Requirements for biological treatment and equipment
Part-II	Activated sludge process and its modifications
IS 10037	Requirements for sludge dewatering equipment, sludge
Part-I	Drying beds, sand, gravel and under drains
IS 6280	Specification for Sewage Screens
IS 3938	Electric Wire rope hoists



## Materials

All materials incorporated in the works shall be the most suitable for the duty concerned and shall be new and of first class commercial quality, free from imperfection and selected for long life and minimum maintenance.

## Design and Construction

- a. The plant design, workmanship and general finish shall be of sound quality in accordance with good engineering practice, Design shall be robust and rated for continuous service, at the specified duties, under the prevailing operational site conditions.
- b. The general design of mechanical and electrical Plant, particularly which of wearing parts, shall be governed by the need for long periods of service without frequent attention but shall afford ready access for any necessary maintenance.
- c. Similarly items of Plant and their component parts shall be completely interchangeable. Spare parts shall be manufactured from the same material specification as the originals.
- d. No welding, filling or plugging of defective work will be permitted without the written permission of the Engineer. All welding spatter shall be removed.
- e. It shall be the responsibility of the contractor to ensure that all the equipment selected is fully compatible, mechanically, electrically and also with respect to instrumentation, control and automation.
- f. It shall be the responsibility of the contractor to ensure his equipment interfaces with other equipment correctly. Any interfaces must not affect the integrity of the equipment, or invalidate any warranties or guarantees.
- g. Each component or assembly shall have been proven in service in a similar application and under conditions no less than those specified therein.
- h. The equipment shall be compatible with the civil structure, when installed, with sufficient space for operator access and maintenance procedures.
- i. All materials shall be of the best commercial quality and free from any flaws, defects or imperfections.
- j. Materials shall be selected to eradicate or reduce corrosion to a minimum.



## DESCRIPTION

- A. The requirements of this Section are subject to the General Conditions of Contract. Other applicable sections of the Specifications shall be constructed to form a part of this Section where the context so requires. Specific characteristics, dimensions and other details applicable to any particular equipment shall be given in the Schedule to Technical data provided at the end of the relevant Section.
- B. The Contractor shall provide all the required labour, permanent equipment and materials, tools, construction plant and equipment, safety equipment, transportation and test equipment for supplying, installing, adjusting and fully testing all the mechanical work shown General Assembly Drawings, in detail included in these Schedules.

## QUALITY ASSURANCE

### A. STANDARDS

All mechanical equipment and the materials used therewith shall comply with the relevant Indian Standards unless a more rigorous requirement is specifically stipulated. If no applicable Indian Standard is available for any item of equipment or materials, the corresponding British Standards laid down by the regulating Authority in the United States dealing with the subject in question shall be adopted. In every situation the latest specifications, standards etc. shall apply unless otherwise stated. In instances where there is a conflict between two codes (the Indian Standards excepted), the more restrictive of the two shall apply.

### B. EXTRA WORK

Any item of equipment or materials not shown in the Drawings or specified elsewhere, but is clearly essential to make the system operable shall be supplied and installed by the Contractor

### C. QUALITY STANDARDS

Where the name of one or more manufacturers has been shown on the drawings or mentioned in these specifications, it has been so done to indicate type and quality required and acceptable. No restrictive choice is either implied or intended, and tenderers are free to offer other makes of equipment or materials provided they comply with these specifications and the requirements shown on the Drawings.



## DRAWINGS

### A. PROJECT DRAWINGS

The mechanical drawings are diagrammatic and indicate the general layout of the complete construction work.

1. Locations of equipment, inserts, anchors, motors, panels, conduits, stub-ups, fittings, fixtures, air, water and process inlets, unless specifically dimensioned on the drawings, shall be determined to suit site conditions encountered and the Contractor shall be responsible for ensuring clearances between pipes, equipment and similar appurtenances, without extra cost to the SMC.
2. The contractor shall review the Drawings and specifications of other trades and shall include the mechanical work shown thereon that shall be required for the installations.



3. Should there be a need to deviate from the Mechanical Drawings and Specifications, the Contractor shall submit written details and reasons for all changes to the Engineer-in-charge for approval before making such changes, Any extra cost to make such changes must be borne by the Contractor unless such changes are discussed, negotiated and finalized at the tender stage and included in the letter of Award of the Contract.
4. In the event of conflicting interpretations of the construction drawings, the Engineer-in-charge interpretation shall prevail.

#### B. SHOP DRAWINGS

1. Prior to fabrication of custom-made equipment or placing orders for available manufactured equipment, the Contractor shall obtain from the manufacturer and submit to the Consultation for his approval five copies of shop drawings for showing details of fabrication, assembly, foundation drawings, installations and data covering materials used, power drive assembly, parts, devices and other accessories forming a part of the equipment to be furnished. Unless otherwise specified, these shall constitute data covering materials used, power drive assembly, parts, devices and other accessories forming a part of the equipment to be furnished. Unless otherwise specified, these shall constitute the initial submittals.
2. The Contractor will submit six (6) copies of certified performance or certified test curves as specified for all pumps, blowers or com-pressers furnished, unless otherwise specified with the tender. The Contractor shall notify the Engineer-in-charge three (3) weeks prior to any testing, should the Engineer-in-charge elect to witness the tests or have the tests witness by an authorized representative on his behalf.

#### C. RECORD DRAWINGS

1. The Contractor shall maintain a complete and accurate record set of drawings for the mechanical installation and construction work.
2. Record all work that is installed differently than shown on the project drawings.
3. Upon completion of the work, the contractor shall submit to the Engineer-in-charge in triplicate complete set of "Record Drawings". These shall be a clean, legible and unambiguous set of drawings with all changes from the approved project drawings distinctly shown in these two descriptions shall be used throughout the Contract.
4. All underground piping shall be located by the dimensions, baseline stationing, approximate elevation and other pertinent data required to facilitate the relocation of the pipes or fittings when later necessary.



#### ADAPTATION OF EQUIPMENT

Should the equipment selected require any revision to the structure, piping, electrical or other shown on the drawings, the Contractor shall include the cost of such revisions in his bid for the equipment and no extra payment shall be made for such revision. All such revisions shall be subject to the approval of the Engineer-in-charge. It should however be noted that no equipment will be accepted which require any major structural, piping electrical or other changes.

#### UTILITY SERVICE INTERRUPTION

All utility service interruptions initiated by the Contractor in the course of execution of his work shall be scheduled in advance and approved by the Utility Authority and the Engineer- in-charge.

#### MANUALS

##### A. QUANTITY AND PROCEDURE

The Contractor shall obtain from the manufacturer and hand over to the Engineer-in-charge three sets of Instruction and Maintenance Manual's for the equipment furnished under these Specifications, to provide adequate information for proper installation, operation and maintenance of the equipment. This requirement shall cover all equipment furnished. The Engineer-in-charge shall approve the manuals for the adequacy of the contents and the format and return one (1) set to the contractor for his use in the start-up of the equipment.

If any errors or inadequacies discovered are of minor nature, extra sheets or addenda shall be supplied by the contractor in consultation with the Engineer-in-charge. If gross inadequacies are detected, the Engineer-in-charge shall point these out, together with brief comments on the short comings, to the Contractor who shall then have the manuals recast and improved to a general level of acceptance.

The extra sheets, addenda or revised manuals shall all be resubmitted to the Engineer-in-charge for reviewing and approval within fourteen (14) days of date on which the Engineer-in-charge's comments are conveyed to him.

##### B. SCHEDULE

Manuals for approval shall be submitted to the Engineer-in-charge not later than the date of dispatch from factory.





### C. CONTENTS

The Instruction Manuals shall contain, but not limited, to at least the following information, where applicable.

1. General introduction and over all equipment description, purpose, functions, simplified theory of operations etc.
2. Specifications.
3. Installation, instruction and precautions
4. Start-up procedures
5. Operation procedures
6. Shut down procedures
7. Short and long term inactivation procedures
8. Maintenance, calibration and repair instructions
9. Parts lists and spare parts recommendations
10. Name and address of critical spare parts and repair facility.
11. Preventive and predictive maintenance schedule of each items as per the manufacturer standard.

### D. FORMAT

The Instruction and Maintenance information shall be assembled into binders of not more than 100 mm th. and shall be arranged and indexed in the order as in these specifications. The first sheet shall contain the booklet index and be of laminated plastics. Each volume shall have the project name and volume embossed into the cover in gold colour. The format and designs shall be shown to and the approval obtained from the Engineer-in-charge before the binders are finalised.

Each different section shall be headed with a laminated plastic page containing the following information.

1. Manufacturer's name

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2. Local address and telephone number
3. The year of purchase
4. Equipment model and serial number of all such items as motors, pumps, variable speed drives etc.

A master table of contents should be given in Volume Drawings and pictorials shall illustrate the text sufficiently to ensure a clear brief presentation. In the event that a manual covers a family of similar equipment, the inapplicable information shall be struck off neatly or the relevant sections emphasized by use of thick arrows, circles or boxes, whichever is cleanest and neatest.

#### E. BINDERS

Binders shall be of type approved, after an inspection of samples, by the Engineer-in-charge. In general they have an expanding back and be of simulated blue leather. The information on the cover shall be as described in sub-division and approved by the Engineer-in-charge.

#### F. EQUIPMENT GUARANTEE

This requirement shall conform to the General Conditions of Contract. Unless specified otherwise elsewhere, the Contractor shall furnish and replace, at no cost to the SMC any component of the equipment that is defective or shows undue wear within one (1) year from the date of acceptance of the work by the Engineer-in-charge. In addition to performance guarantees, processes or systems shall comply with the requirements stipulated in the relevant sections of the Specifications.

### PART 2 - PRODUCTS

#### MATERIALS AND WORKMANSHIP

All equipments furnished under this or allied sections shall be new guaranteed free from defects in materials, design and workmanship. In inadequate information is provided in the specifications, it shall be the manufacturer's responsibility to ascertain the conditions shall be successful. All parts of the equipment shall be adequately proportioned to safely withstand all stresses that may occur or be induced in them during fabrication, erection and intermittent or continuous operation.

All equipment shall be designed, fabricated and assembled in accordance with the best current engineering and workshop practice. Individual parts shall be manufactured to standard sizes and gauges so that spares, furnished at any time, can be installed the field. Corresponding parts of duplicate units shall be fully inter changeable. Equipment shall not

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have been in service at any time prior to delivery, except as required for tests. All materials used shall be appropriate for the service conditions. Iron casting shall be tough, close-grained gray iron free blow-holes, flaws or excessive shrinkage and shall comply with the requirements of I.S. 210.

Except where otherwise specified structural and miscellaneous fabricated steel used in items of equipment shall conform to the relevant Indian Standards. All structural members shall be considered as subject to shock or vibratory loads. Unless otherwise specified all steel which will be submerged, in part or fully, during normal operation of the equipment shall have a minimum nominal thickness of 6.0 mm. The location of the fabricator and his shop schedule shall be furnished to the Engineer-in-charge prior to commencement of fabrication to enable him to schedule shop inspections if he so decides.

#### SAFETY GUARDS

All belt or chain drives, fan blades, couplings, exposed shafts, and other moving or rotating parts shall be covered on all sides by safety guards which shall be free of sharp edges and corners.

Each guard shall be designed for easy installation and removal. All necessary supports and accessories shall be provided for each guard. Supports and accessories, including bolts, shall be hot-dipped galvanised. All safety guards in out-door locations shall be designed to prevent the entry of rain and dripping water.

The canopy of 14 SWG Galvanised sheet be provided over and around the motor & gear boxes with proper louvers ventilation in order to protect from direct rain fall and the cost of the same shall be included in the cost of the equipment. All the canopy shall be painted with epoxy paint.

Above all safety guards should be supplied and fitted free of cost.

#### EQUIPMENT BASES AND BEDPLATES

A heavy cast iron or welded steel base shall be provided for each item of equipment which is to be installed on a concrete foundation. Equipment assemblies, unless otherwise specified or shown on the drawings, shall be mounted on a single, heavy cast iron or welded steel bedplate. Bases or bedplates shall be provided with machined support pads, tapered dowels for alignment or making adjustments, adequate opening to facilitate grouting and openings for electrical conduits. All seams and contact edges between steel plate and shapes shall be continuously welded and ground smooth.



## JACKING SCREWS AND ANCHOR BOLTS

Jacking screws shall be provided in the equipment bases and bedplates to aid in leveling prior to grouting.

Equipment suppliers shall provide anchor bolts, nuts, washers and sleeves of adequate design as required for proper anchorage of the bases and bedplates to the concrete bases. Sleeves shall be minimum of one and a half times the diameter of the anchor bolts. Unless otherwise shown or specified, anchor bolts for items of equipment mounted on base-plates shall be long enough to permit 38 mm of grout beneath the base plates and to provide adequate anchorage into structural concrete. Anchor bolts shall be 316 stainless steel and no bolts of other material shall be permitted except with the written permission of the Engineer-in-charge.

Anchor bolts, together with template or setting drawings, shall be delivered sufficiently early to permit setting the bolts accurately in place when the structural concrete is placed.

## **11. SPECIFICATION OF ELECTRICAL WORKS – ELECTRICAL DESIGN CRITERIA**

### PART - 1

#### 1.0 GENERAL

##### 1.1 Provisions

1.1.1 Other applicable sections including the General and part of electrical requirements as if repeated in this Section.

##### 1.2 Work included

1.2.1 The Contractor shall provide all the required labour, project equipment and materials, tools, construction equipment, safety equipment, transportation, test equipment and satisfactorily complete all the electrical work included in these Specifications. Provide and install wiring for equipment that will be furnished and installed by other Sections of these Specifications.



1.2.2 All works shall be executed strictly in accordance with the latest National Electrical Code.

### 1.3 Regulations

1.3.1 All the electrical equipments and materials including their installation shall conform to the following applicable latest codes and standards.

- i Indian Electricity Rules 1956.
- ii The Indian Electricity Act 1910.
- iii Fire Insurance Regulations.
- iv Regulations laid down by the Electrical Inspector of the Government of Gujarat,
- v Regulations laid down by Factory Inspector of Gujarat.
- vi Indian Standards Institution's Specifications.
- vii Factory Act.
- viii Any other Rules & regulations and Condition of Supply laid down by the Local Electric Supply Company viz. Dakshin Gujarat Vij Company Limited (DGVCL) or Torrent Power- (TPSECo.)

### 1.4 Variances

1.4.1 In instances where two codes are at variance, the more restrictive requirements shall apply.

### 1.5 Contractor's Expense

1.5.1 The contractors shall obtain and pay for the required bonds, insurance, licenses, permits and inspections, and pay all taxes, fees and utility charges that shall be required for the electrical construction work. The contractor shall obtain at his own expenses the necessary certificate for the approval of the total work carried out from the Electrical Inspector. SMC will pay all the legal fees for obtaining the power from DGVCL / T.P.S.E.Co. No any penalty shall be paid by SMC.

### 1.6 Contractor responsible for supply of Equipment and Materials

1.8.1 If during the period of erection, the contractor or his workmen damage or destroy any part of the building structure or materials, the Contractor shall be completely responsible for the damages and he will have to make rectification / replacement at his own cost. The decision of the Engineer-in-charge will be final.

1.8.2 Final options to select any particular make shall rest with SMC No disputes in this regards shall be entertained at later date.

### 1.9 Record Drawings

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1.11.1 The contractor shall maintain a complete and accurate record set of drawings for the electrical construction work.

1.11.2 Records all work that is installed differently than shown on the Drawings.

1.11.3 Upon completion of the work, transfer all marked changes to a clean set of drawings with red ink.

Mark the drawings "Record" and submit them to the Engineer-in-charge when the electrical work is completed in 7 sets.

#### 1.12 Service Manuals

Service manuals shall be furnished with the equipment. One (1) shall be given with the equipment, and a minimum of seven (7) copies given to the Engineer separately.

Additional copies shall be provided where so stated in the purchases order. Service manuals shall contain all necessary data for operation and maintenance of the equipment. A recommended spare parts list shall be furnished with the manual. A complete set of shop drawings shall be folded and inserted in each manual.

#### PART -2

2.0 The materials supplied and installed shall be genuine only and as per the specifications. If the same are not found satisfactory the same shall have to be replaced "Free of Cost". Manufacturer's certificate towards genuineness of material shall have to be supplied (if required by the department) otherwise the material shall be rejected. In case of doubt/dispute the Corporation shall ask the contractor to send the material/equipment to the manufacturer's work for testing genuineness. The decision/report received from the manufacturer shall be conclusive and binding on both the parties i.e. the Corporation and the contractor. If the material / equipment sent for testing is not found to be genuine then the whole expenses for testing shall be borne by the contractor and the contractor shall replace the whole lot of materials/ equipments supplied by him free of cost.

2.1 The entire installation shall be got approved by the Government Electrical Inspector prior to commissioning. All formalities including preparation and submission of all drawings, getting approval, arranging visits of Electrical Inspector and obtaining permission to energize the installation, etc. shall be done by the Contractor for which no extra payment shall be claimed by the contractor.

2.2 The responsible authorised person of the contractor should be available at site daily when work is in progress. The Corporation shall not be responsible for any accident or damage



done to the workman/staff of the contractor. No compensation of any kind shall be paid by the Corporation. The contractor shall observe Govt. Rules regarding labour, etc.

2.3 L.T. switch gear shall be painted with final coat of paint using spray machine at site before commissioning without any extra cost, if required.

2.4 All the equipments shall be tested for tests as per latest relevant IS in presence of Corporation's representative prior to dispatch and certificate thereof shall be supplied.

If required by the Corporation, the equipment shall be sent to recognized test lab for ascertaining the guaranteed parameters. The Contractor should agree to the same. The test results so obtained shall be binding to the Corporation and to the Contractor.



2.5 All motors should be with duty S1, Totally Enclosed Fan Cooled type only. Unless otherwise specified, motors shall be provided with class 'F' insulation as a minimum. In case of motors with class 'F' insulation the permissible temperature rise above the specified ambient temperature shall be limited to class 'B'.

**However, for motors operating with Variable Frequency Drive, winding shall be vacuum impregnated and Class H insulation only and with forced cooling arrangement.**

2.6 Efficiency of equipment and energy saving is one of the important aspect of consideration of tender. Hence, SMC hereby reserves its right to decide final selection of make upon the energy saving aspect. In this regard the decision of Additional City Engineer will be final and no dispute of the contractors will be entertained at a later date for the same.

2.7 The successful Tenderer shall have to submit CPRI test certificate for minimum 2000 Amp. busbar with 50 KA short circuit capacity for 1 sec. from the L.T. panel contractor selected by him. Otherwise L.T. panel shall not be accepted.

2.8 All power cables shall be Copper Armoured Cables only.

## **12. GENERAL CONDITIONS FOR EQUIPMENT ERECTION AND COMMISSIONING**

9.1 In accordance with the specific installation structions, as shown on manufacturer's drawings or as directed by the Corporation's Representative, the Contractor shall unload, erect, install, site test and place into commercial use all the electrical equipment included in the contract. Equipment shall be installed in a neat, workman like manner so that it is level, plumb, square and properly aligned and oriented. Tolerances shall be as established in manufacturer's drawings or as stipulated by the Corporation. No equipment shall be permanently bolted down to the foundation or structure until the alignment has been checked and found acceptable to the Corporation.

9.2 The Contractor shall furnish all supervision, labour, tools, equipment, rigging materials and incidental materials, such as bolts, wadges, anchors, concrete inserts etc. required to completely install, test and adjust the equipment.

9.3 Manufacturer's drawings, instructions and recommendations shall be correctly followed in handling, setting, testing and commissioning of all equipment.

9.4 The Engineer may engage the manufacturer's erection Engineers to supervise the erection of the relevant equipment referred to in the Technical Specification. The Contractor shall erect and commission the equipment as per the instructions of the Erection Engineer(s) and shall extend full co-operation to him.





- 9.5 In case of any doubt / misunderstanding as to correct interpretation of a manufacturer's drawings of instruction, necessary clarifications shall be obtained from the Corporation. The Contractor shall be held responsible for any damage to the equipment consequent to not following a manufacturer's instructions correctly.
- 9.6 The Contractor shall move all equipment into the respective building through the regular doors or floor opening provided specifically for the equipment. The Contractor shall move the equipment from the storage site to the crane, attach to the crane hook and install in final location. The Contractor shall make his own arrangements for the listing of equipment.
- 9.7 Where assemblies are supplied in more than one section, the Contractor shall make all the necessary mechanical and electrical connections between sections including the connections between busbars/ wires. The Contractor shall also carry out the necessary adjustments /alignments isolators and their operating mechanisms. All insulators and bushings shall be protected against damage during installation. Insulators or bushings chipped, cracked or damaged due to negligence or carelessness shall be replaced by the Contractor at his own expense.
- 9.8 The Contractor shall take utmost care in handling instruments, relays and other delicate mechanisms. Wherever the instruments and relays are supplied separately, they shall be mounted only after the associated control panels/desks have been erected and aligned. The blocking materials/mechanism employed for the safe transit of the instruments and relays shall be removed after ensuring that the panels/desks have been completely installed and no further movements of the same would be necessary. Any damage to relays and instruments shall be immediately reported to the Corporation.

### **13. SPECIFICATION FOR ERECTION, TESTING & COMMISSIONING OF ELECTRICAL EQUIPMENTS AND ACCESSORIES**

#### 10.1.1 Scope :

This specification is intended to cover complete installation, testing and commissioning of electrical equipments i.e. motor control centres, control panels/ switchgears, motors, push button stations out door sub -station etc. complete.

#### 10.1.2 Codes and Standards :

- i. The installation, testing and commissioning of all electrical equipments shall comply with all currently applicable statutory regulations, fire insurance and safety



codes in the locality where the work will be carried out. Nothing in this specification shall be construed to relieve the Contractor of his responsibility.

ii. Unless otherwise specified, the work, material and accessories shall conform to the latest applicable Indian, British or IEC Standards, some of which are listed below :

IS : 3072 Installation and maintenance of switchgear.

IS : 900 Installation and maintenance of Induction motors.

IS : 3106 Selection, installation and maintenance of fuses.

IS : 1886 Installation & maintenance of transformers.

IS : 1180 Distribution Transformers.

IS : 4029 Guide for testing three phase induction motors.

IS : 335 Insulating oil for transformers & Switch-gears.

IS : 5124 Installation & maintenance of A.C. Induction Motor starters upto 1.1

KW. IS : 226 Specification for structural steel.

IS : 5216 Guide for safety procedure and practices in electric

work. IS : 3202 Climate proofing of electrical equipment.

IS : 2274 Code of practice for electrical wiring installations.

IS : 6665 Code of practice for industrial lighting.

IS : 1866 Code of practice for maintenance of insulating

oil. IS : 1653 Rigid steel conduits for electrical wiring.

IS : 2667 Fittings for rigid steel conduits for electrical wiring.

10.1.3 Good workmanship shall be in accordance with best engineering practice to ensure satisfactory performance and service life.

10.1.4 Detailed Requirement of Installations :

a. Switchgear, Control Panel etc.

All alignment, levelling, grouting, anchoring adjustments shall be carried out in accordance with manufacturers instructions and/or as directed by the purchaser.

All modules shall be taken out and internals shall be cleaned preferably with vacuum cleaner.

All connections and fixing of equipments in switch-gear.

In some cases, minor modifications may have to be carried out at site in the wiring and mounting of the equipment to meet the requirements of the desired control scheme and the contractor shall have to do the same at no extra cost.

b. Motors :

The installation of Motors shall be carried out in accordance with manufacturer's instructions and/or as directed by the purchaser.

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Checking and cleaning of bearings and charging/filling of lubricants, wherever necessary.

Cleaning of core the winding, varnishing out the windings and measurement of air gap for motor assembly at site if demanded.

Motors shall be run on un-coupled condition for few hours before coupling them with the drive equipment.

Motors shall be coupled with drive, adjusted and shall be tested on load.

c. Miscellaneous Items :

The contractor shall install miscellaneous items such as motor starters, local start/stop push button stations etc.

The equipment will be generally wall, column or stand mounted.

The exact location will be as shown in the final drawings.

All supports or brackets needed for installation shall be fabricated and painted by the Contractor.

All welding, cutting, chipping and grinding as & when necessary shall be carried out by the Contractor.

d. Installation of Cables :

Cables shall be laid in accordance with layout drawings and cable schedule etc. to be supplied by Contractor and approved by the SMSS High voltage, medium voltage and control cables shall be separated from each other by adequate spacing or running through independent pipes.

and instructions issued by the Corporation's representative. Cables shall be laid directly buried in earth, on cable racks, on cable trays, in conduits, on walls etc. as per the requirements.

All cables routes shall be carefully measured and cables cut to required lengths, leaving sufficient length for the final connection of the cable to the terminals of the equipment.

The various cable lengths cut from the cable reels shall be carefully selected to prevent undue wastage of cables.

Cables shall be laid in trenches at requisite depths. Before cables are placed, the



trench bottom shall be filled with a layer of sand. This sand shall be covered with 150 mm of sand, on top of the largest diameter cables, the sand shall be lightly pressed. A protective covering of approved type of brick shall be laid. The remainder of the trench shall then be back filled with soil, rammed and levelled.

As each row of cables is laid in place and before covering with sand every cable shall be given an insulation test in the presence of Engineer-in-charge. Any cable which proves defective shall be marked and replaced with a new cable and the end of defective cable sealed to avoid leakage of water, if it is not feasible to remove the defective cable altogether.

When cable rises from trenches to motor, push button, lighting panels etc. it shall be taken in GI pipes for mechanical protection upto a minimum of 150 mm above grade etc. The top of the pipe shall be filled with PUTTI after pulling of cable for sealing purpose.

Straight through joints if required shall be made by using epoxy resin type torpplain or M-seal.

Cables shall be neatly arranged and dressed in the trenches in such a manner so that criss-crossing is avoided and final take off to the motor/switchgear is facilitated.



All cables will be identified close to their termination points by cable numbers as per cable schedule. Cable numbers will be punched on AL strips [2 mm thick] securely fastened to the cable wrapped round it.

Each underground cable shall be provided with identifying tags of lead securely fastened every 20 m of its underground length with atleast one tag at each end before the cable enters the ground, at each bend or turning and the road crossing.

In unpaved area,cable trenches shall be identified by means of cable marker. These posts shall be placed at location changes, in the direction of cables and at interval of not more than 50 m.

A minimum clearance of 300 mm shall be maintained between cable trench and parallel runs of underground piping.Cables which enter building below ground level shall pass through the building foundation in G.I. pipes. Space between the cable and pipe shall be sealed so as to be liquid tight. Sealing compound used shall be impervious to liquids that may be in the ground.

Following guide shall be used for sizing the pipe size :

- a. 1 cable in pipe 53% full
- b. 2 cable in pipe 31% full
- c. 3 or more cables 43% full
- d. Multiple cable 40% full

At road crossing and other places where cables enter pipe sleeves adequate bed of sand shall be given so that the cables do not slack and get damaged by pipe ends. All cable entry places to the buildings shall be suitably sealed as instructed by the Engineer-in-charge.

Drum number of each cable from which it is taken shall be recorded along with the cable number in the cable schedules. As proper register to indicate the drum No., type of cables, size of cable, length cut and laid, the points between which the lengths are laid and corresponding dates etc. shall be prepared and maintained in consultation with the Engineer-in -charge.

A similar register for cable termination and jointing work shall also be prepared and maintained.

e. Tray and Supports for Cables :

Armoured cables which run exposed above ground shall generally be run in cable racks or cables trays except individual cables or groups of upto two or three running along structures may be attached directly to the structures. In the cable trenches below the switchgears,cable racks and trays shall be used for supporting cables.Cable trays shall be ladder type of steel construction with ladder runs of 450 mm centres or the trays



may be perforated type. Lengths shall preferably be 6 meters [approx. depending on fabrication facilities] in widths of 150, 300 and 450 mm as per design requirements for greater width, trays may be bolted together. Side heights shall be sufficient to provide mechanical protection for the cables.

Cable trays shall be supported at every 300 mm or less longitudinal run [based on maximum uniform loading of 35 kg per meter length for 3 meter span] shall be so fouted that there is no danger of mechanical damage.

They shall be kept separate as far as possible from major piping and where practicable at elevation above the top level. Routings shall follow the major structure axes.

Where more than one level of cable trays is required, levels shall have a minimum of 450 mm clear space between top of cable layer and bottom of next higher load tray. Top level shall also have 450 mm clearance to any overhead construction running immediately over and parallel to it. This is to allow adequate access to all cables. A 300 mm clearance is satisfactory for short obstruction of 300 mm or less.

Cable trays and inaccessible portion of supporting steel shall be painted if necessary, before laying of cables. The painting shall be done with one coat of red lead paint and two coats of aluminium white paint.

Cable laid in horizontal trays shall be fixed to the tray at intervals not exceeding 1 meter where cables are run individually or structures strapping intervals shall not exceed 600 mm. Vertical runs shall have strapping at intervals.

Outdoor cable trays shall be galvanised and the cable fixing straps, bolts, nuts, washers etc. shall also be galvanised.

f. Cable Termination :

Cable termination shall include the following :

- a. Making necessary holes in the bottom/top plates for fixing cable gland/box.
- b. Fixing double compress cable gland/box, connecting armour clamp to cable armour.
- c. Dressing of cables, pouring compound etc. wherever necessary to make termination complete.
- d. Putting cable lugs, crimping them on to cores of cables, taping bare conductors upto lugs, wherever necessary.
- e. Terminating to equipment terminals.
- f. Supply and fixing of cable and core identification ferrules.

Wherever purchaser has not provided M.S. plates for fixing cable tray supports, contractor shall install approved concrete fasteners for fixing cable tray supports.



g. Conduits & Pipes :

Contractor shall supply and install conduits, pipes as specified and as shown in drawings prepared by him and approved by purchaser. All accessories/fittings required for making installation complete shall be supplied by contractor. Flexible metallic conduits shall be used for termination to equipment which are likely to be disconnected at periodic intervals.

Conduits or pipes shall run along walls, floors and ceilings on steel supports embedded in soil, floor, wall or foundation, in accordance with relevant layout drawings. Under ground position of conduit installation to be embedded in the foundation or structural concrete shall be installed in close coordination with co-lateral work. Exposed conduit shall be neatly run and evenly spaced.

Exposed conduit shall be adequately supported by racks, clamps, straps or by other approved means. These fittings shall be of same material as conduits.

Each conduit run shall be marked with its designation as indicated on the drawings. Identification shall be made where possible

When one or more cables are drawn through a conduit, cables shall fill not more than 50% of the internal cross sectional area of the conduit.

The entire system of conduit after installation shall be tested for mechanical and electrical continuity throughout and permanently connected to earth by means of earthing clamp efficiently fastened to the conduit.

For jointing purpose, contractor shall have available at site, dies for threading, pipe or conduit. All such threaded ends shall be cleaned after threading and anticorrosive paint applied.

10.2 Specification for Erection, Testing and Commissioning Illumination System :

10.2.1 Scope :

This specification covers complete installation, testing and commissioning of indoor and outdoor illumination system.

10.2.2 Code and Standards :

The wiring, installation and commissioning of complete illumination system shall comply with all currently applicable statutory regulations, fire insurance and safety codes in the locality where the work will be carried out. Nothing in this specification shall be construed to relieve contractor of his responsibility.

Signature of Contractor

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- 10.2.3. Unless otherwise specified, the work, material and accessories shall conform to the latest applicable Indian, British or IEC standards, some of which are listed below :
- |                            |   |
|----------------------------|---|
| IS : 2274 & 732            | Electrical Wiring installation  |
| IS : 1653                  | Specification for conduits  |
| IS : 694                   | PVC insulated [light duty] electric cables for working upto 1100V           |
| IS : 3961 Part V<br>cables | Recommended current ratings for PVC insulated [light duty]                  |
| IS : 2208                  | HRC cartridge fuse links  |
| IS : 1293                  | 3 pin plugs and socket outlets  |
| IS : 3854                  | Switches for domestic and similar purpose                                   |
| IS : 5133                  | part I Steel & cast Iron boxes for the enclosure of electrical accessories. |
| IS : 5216                  | Guide for safety procedures and practices in electrical work                |
| IS : 6665                  | Code of practice for industrial lighting                                    |





IS : 1913	General safety requirements for electric light fittings.
IS : 3202	Climate proofing of electrical equipments
IS : 3387	Accessories for rigid steel conduits
IS : 3480	Flexible steel conduit for electrical wiring.
IS : 2509	Rigid non-metallic conduits
IS : 3419	Fittings for rigid non-metallic conduits.
IS : 2667-1964	Fittings for rigid steel conduits for electrical wiring.

10.2.4 Good workmanship will be in accordance with best engineering practices to ensure satisfactory performance and service life.

10.2.5 General Requirements :

Except as specifically approved by the site office, installation of conduits and lighting fixtures shall be taken only after all major services such as piping, structural work etc. in that particular area have been completed.

Location of lighting fixtures, switches and receptacles shown on the drawing are indicative and shall be relocated to suit site condition.

Except as noted mounting height of various lighting equipment from finish floor level shall be as follows :

- i] Lighting Panels 1200 mm
- ii] Lighting control switches 1000 mm
- iii] Receptacle with switch
  - a] For indoor 500 mm
  - b] For outdoor 1000 mm

All cables and conduits from lighting panel upto first lighting fixture shall be identified with aluminium tags giving circuit reference number.

Lighting panel number shall be indicated when more than one panel for an area is to be provided.

A number of lighting panels shall be marked separately for supplying power to the space heaters mounted in the various switchgear panels and motors.

Steel surfaces exposed to weather shall be thoroughly cleaned for removal of rust and shall be given a primary coat of zinc chromate and two finishing coats of paint. All metal parts not accessible for painting shall be made of corrosion resistant material.

Cable/Conduit separators shall be provided at an interval of 500 mm for horizontal runs and 750 mm for vertical runs.



Cable/Conduits shall be kept, wherever possible atleast 300 mm away from pipes, heating devices and other equipments.

For the purpose of calculating connected loads of various circuits a multiplying factor of 1.25 will be assured to account the losses in the control gear.

Contractor shall supply junction boxes, pull boxes, terminal blocks, glands, conduits and accessories [elbows, tees, bends etc.] and supporting anchoring, materials to make the installation complete.

Contractor shall work in co-ordination with the civil contractor when opening sleeves are required in walls and floors. Holes made by contractor shall necessarily be patched in a good and approved manner.

All types of wiring concealed or unconcealed shall be capable of easy inspection. In all types of wiring due consideration shall be given for neatness and good appearance.

In hazardous areas, the grounding wire shall run along the conduits throughout the installation and all conduits and fixtures shall be effectively grounded. Conduits shall be grounded at the ends adjacent to switch at which they originate.

Wherever specified, Delighting system shall be installed to provided necessary illumination in case of an emergency. Emergency lighting cables shall run in a separate conduit system.

A street lighting, steel tubular poles conforming to I.S. complete with fixing brackets shall be used. These poles shall be coated with bituminous preservative paint on the inside surface as well as embedded on outside surface.

Exposed outside surface shall be painted as with red lead primer and two coats of Aluminium paint.

Before a complete installation is put into service, installation tests stipulated in I.S.2274 and other codes of practices shall be carried out by contractor in the presence of corporation's representative.

#### 10.2.6 Working in Conduits :

Individual lighting circuits inside building shall be wired with 250/440 V grade copper/aluminium conductor of approved make PVC insulated flexible wires/cables. The circuit wire shall be colour coded as follows :

White - Phase or DC positive wire

Black - Neutral or DC negative wire.



Full wires in a conduit shall be drawn simultaneously. No subsequent drawings are permissible. Necessary pull wires shall be provided by the Contractor.

Wires shall not be pulled through more than two equivalent 90 deg.bends in a single conduit run.

Wiring shall not be spliced at any place other than junctions boxes with approved type connectors of terminal strips and for lighting fixtures, connections shall be Tee off through suitable roundconduit or junction box.



For vertical run of wires in conduit, wires shall be suitably supported by means of wooden plays at each pull junction boxes.

#### 10.2.7 Outdoor Lighting :

Lighting for all outlying areas shall be carried out using 1.1 KV grade aluminium conductor, PVC insulated steel wire armoured cables between lighting panel and junction box near the lighting fixture.

All lighting poles shall be stopped tubular steel poles type ITSTP as per IS:2713 and shall be painted.

Cables for road and out-door lighting shall be directly buried in ground at a depth of 900 mm or routed in available cable trenches.

#### 10.2.8 Earthing :

For outdoor earthing of lighting poles, masts etc. cut G.I. wire shall be used. The wire shall be run buried in ground at a depth of 900 mm.

Lighting fixtures, receptacles, junction boxes, switches, conduits and hand rails shall be earthed using G.I.wire of minimum size 12 SWG.

The earthing wire shall run over the entire length.

#### 10.2.9 Testing and Commissioning :

After completion of the work, complete illumination system shall be thoroughly checked and tested by contractor in presence of the Corporation's representative as per check list.

The contractor shall provide all tools, materials, labour and supervising personnel for carrying out the test.

The contractor shall carry out all rectifications, repairs or adjustment work, found necessary during testing and commissioning.

The contractor shall record the test results on approved proforms and furnish test reports/results [4 copies] for approval.

On successful commissioning of the system and carrying out necessary rectification work, the purchaser will take over the installation either wholly or in parts as the case may be.



## 14. SPECIFICATION FOR INTERCONNECTING PIPING

### 11.1 General :

All pipe work shall be in conformity with the requirements of the applicable drawings and this specification. Velocities shall be adopted as per standard practice and shall be approved by Engineer-in-charge.

All the pipeline shall be as defined in the tender elsewhere and as per the latest IS, except specified hereunder.

All chemical dosing pipes shall be of HDPE material of class III. All water supply and distribution piping to various utility services shall be GI-Class C. The relevant applicable standards to be adopted for supply, laying, jointing of various type of pipes, notation and description are as under:-

S.No.	Notation	Description	Relevant IS code
	C.I.	Centrifugally cast [spun] iron pipes & fittings for water, gas and sewage	IS-1537 & IS-153
	C.I.	Code of practice for laying Cast Iron Pipes.	IS-3114
	C.I.	CastIron Sluice Valves	IS-780
	G.I.	Galvanised iron pipes and fittings	IS-1239
	H.D.P.E	High Density Poly Ethylene Pipes.	IS-4984
	H.D.P.E	HDPE Fittings	IS-8008
	H.D.P.E	Code of Practice for laying HDPE pipes	IS-7634
	H.D.P.E	Testing of HDPE Pipes	IS-7634
	M.S.	Mild Steel hexagonal bolts and nuts.	IS-1367
	M.S.	Steel pipe flanges	IS-6392
	M.S.	M.S. Pipes - Steel for manufacture	IS:2062:1992
	R.C.C.	Supply of Reinforced Cement Concrete NP3 Class pipes.	IS-458
		Code of practice for RCC Pipe	IS-783
		Rubber for flanged joints.	IS-638
	G.R.P.	Glass Reinforced Plastic Pipe	IS 14402: 1996 IS 13916 : 1994
	UPVC	Unplasticised PVC Pipe	IS 13592 IS 4985



## 15. SPECIFICATIONS FOR PLC AND INSTRUMENTATION

This section outlines the Instrumentation System. The Scope of Instrumentation, Control and Automation works for TSTP under this contract shall comprise of design, manufacture, programming, configuration, supply, installation and erection, testing and commissioning of the entire system as per the scope of work. The scope of work also includes the 5 years of O&M of Instrumentation System.

### SCOPE OF WORK FOR INSTRUMENTATION:

#### General

A complete instrumentation and control system shall be provided for semi automatic operation of the Sewage treatment plant as specified. The Tenderer shall take into consideration the following aspects:

- 1) Complete System Integration including Design, Supply and Installation of all field instruments, PLC system for the complete Process control of the Sewage Treatment Plant shall be done by one agency. The Tenderers shall identify this agency and provide their credentials in advance.
- 2) Wherever Civil, Electrical or Mechanical inputs are required, the same can be provided by the respective disciplines as per the Automation system integrator's requirement.
- 3) The Equipment Cabinets, system Cabinets, Panels, Power distribution Cabinets, etc. in the complete Project shall be sourced from One Approved Enclosure Supplier and shall be assembled & wired by one Approved Control Panel Contractor thus providing uniform documentation and uniform Look & Feel for Operation and Maintenance.
- 4) The Tenderer to provide documentary evidence of undertaking given by their identified Automation system integrator for comprehensive support (Warranty) including all services, spares and consumables for a period of 120 months after taking over the system.

#### Reference Standards:

Unless otherwise approved, instrumentation shall comply with relevant quality standards test procedures and codes of practice collectively referred to as Reference Standards including those listed below in accordance with the requirements detailed elsewhere in this specification.

IEC -1:1982	Analogue signals for process control systems. Specification for direct current signals.
IEC 60947-4-1:2000	Specification for low-voltage switchgear and control gear. Contactors and motor starters. Electromechanical contactors and motor starters.
IEC 60947-4-2:1999	Specification for low-voltage switchgear and control gear. Contactors and motor-starters. AC semiconductor motor controllers and starters.



IEC 60947-4-3:1999	Specification for low-voltage switchgear and control gear. Contactors and motor-starters. AC semiconductor controllers and contactors for non-motor loads.
IEC 60770-1:1999	Transmitters for use in industrial process control system. Methods for performance evaluation.
IEO 6817:1997	Measurement of conductive liquid flow in closed conduits. Method using electromagnetic flow meters.
BS EN 837-1:1998	Pressure gauges. Bourdon tube pressure gauges. Dimensions, metrology, requirements and testing.
BS EN 60529:1992	Specification for degrees of protection provided by enclosures (IP code).
BS EN 60546-1:1993	Controllers with analogue signals for use in industrial-process control system. Methods for evaluating performance.
BS EN 60584-2:1993	Thermocouples. Tolerances.
BS EN 60654 : 1998	Operating conditions for industrial –process measurement and control equipment. All relevant parts.
BS EN 61000-6:2001	Electromagnetic compatibility (EMC). Generic standards. Emission standard for industrial environments.
BS 89:1990	Direct acting indicating analogue electrical measuring instruments and their accessories. All parts.
BS 90:1975	Specification for direct-acting electrical recording instruments and their accessories.
BS 1042-1.4:1992	Measurement of fluid flow in closed conduits. Pressure



	differential devices. Guide to the use of devices specified in sections 1.1 and 1.2.
BS 1041-2.1 :1985	Code for temperature measurement. Expansion thermometers. Guide to selection and use of liquid-in-glass thermometers.
BS 1041-2.2 :1989	Code for temperature measurement. Expansion thermometers. Guide to selection and use of dial-type expansion thermometers.
BS 1041-3 :1989	Temperature measurement. Guide to selection and use of industrial resistance thermometers.
BS 1042-1.4 :1992	Measurement of fluid flow in closed conduits. Pressure differential devices. Guide to the use of devices specified in sections 1.1 and 1.2.
BS 1553-1:1977	Specification for graphical symbols for general engineering. Piping systems and plant.
BS 1646-1 :1979	Symbolic representation for process measurement control function and instrumentation. Basic requirements.
BS 1646-2:1983	Symbolic representation for process measurement control functions and instrumentation. Specification for additional basis requirements.
BS 1646-3 :1984	Symbolic representation for process measurement control functions and instrumentation. Specification for detailed symbols for instrument interconnection diagrams.
BS 1646-4:1984	Symbolic representation for process measurement control functions and instrumentation. Specification for basis symbols for process computer, interface and shared display/control functions.
BS 2765:1969	Specification for dimensions of temperature detecting elements and corresponding pockets.
BS 3680	Measurement of liquid flow in open channels. All relevant parts.
BS 3693:1992	Recommendations for design of scales and indexes on analogue indicating instruments.
BS 4675-2:1978	Mechanical vibration in rotating machinery. Requirements for instruments for measuring vibration severity.
BS 4999-142:1987	General requirements for rotating electrical machines. Specification for mechanical performance vibration.
BS 6739:1986	Code of practice for instrumentation in process control systems installation design and practice.

Instrument Society of American Standards and Recommended Practices:

S 5.1	Instrumentation symbols and identification.
S 5.4	Instrumentation loop diagrams.
S 7.3	Quality standard for instrument air.
RP 16.1	Terminology, dimensions and safety practices for indicating variable 2, 3 area meters.
RP 16.4	Nomenclature and terminology for extension type variable area meters (Rota meters)
RP 16.5	Installation, operation, maintenance instructions for glass tube variable area meters (Rota meters)
RP 16.6	Methods and equipment for calibration of variable area meters

	(Rota meters)
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RP 18.1	Specifications and guides for the use of general purpose annunciators.
S 26	Dynamic response testing of process control instrumentation.
S 37.1	Electrical transducer nomenclature and terminology.
S 37.3	Specifications and test for strain gauge pressure transducers.
S 50.1	Compatibility of analog signals for electronic industrial process instruments.
S 51.1	Process instrumentation terminology.
RP 60.08	Electrical Guide for Control Centers.

## 16. OPERATION & MAINTANANCE (O&M) OF TSTP

Operation and maintenance of the treatment plant is very much essential for sustainability of the treatment plant and to achieve discharge standards. The operational aspects include regular checking of the performance of the units including the electrical and mechanical equipment, to identify any non-functionality of the units to evolve the strategic measures to be taken to make the plant fully functional to meet the stipulated standards. Plant shall be operated as per design criteria. Variance in input value of design criteria should recorded.

The O&M contract shall comprise all expenses for operation and maintaining the Facilities, as provided in this tender document. In addition to the cost of material/equipment spares, repair/replacement of equipment and labour, all other expenses such as expenses for patrolling, administration and management, permanent & temporary staff, running office, maintenance of all structures, updating of operation and maintenance manual, etc. and all other incidental and indirect expenses for the works detailed in this tender document or for works otherwise required as per good engineering practices for Operation and Maintenance of the entire system including Electricity cost are included in the quoted rates.

1. **The contract includes operation and maintenance of entire Tertiary Sewage Treatment Plant on round the clock basis for a period of 24 Calendar Months (Two Year) on terms and conditions described under this tender. However, the same contract may be extended for another 12 Calender Months (One Years) on mutually agreed upon basis between Association of beneficiaries and the Contractor.**
2. The Tertiary Sewage Treatment Plant set up on turnkey basis shall be operated and maintained by the contractor including all Electrical and Mechanical works. Contractor has to incur all the costs, taxes, vat, duties, transportation, labour, machining, welding, repairing, replacing and making good any and all parts/plant equipment, consumables, motors, pumps, aerators, gear unit, capacitor, HT/LT switchgear, PLC panel, lighting system, cables, battery charger, battery, instruments, meters, chemicals for laboratory etc.
3. The Contractor will be held responsible for O & M and satisfactory performance of the TSTP by all means. Major components and works shall include the following but not limited to:
  - a) Operate the plant efficiently for a period mentioned above, including all consumables parts or components, labour transportation and other charges including cost of electric power. Raw sewage shall be collected by contractor from nearby sewerage network.
  - b) The contractor shall have to record analysis report for Raw & Treated sewage samples on daily and monthly basis. The contractor is responsible for submission of records of O & M report as and when asked by the SMC.
  - c) Contractor shall submit six copies of the O & M Manual for approval of SMC which may be modified if required by SMC and two copies would be returned by SMC duly



approved and signed.

- d) The contractor shall carry out cement paint/ enamel paint/ white wash for exterior finish of civil units once at the end of contractual O & M period of the plant. Also contractor shall carry out painting on mechanical equipment/above ground pipe lines/hand railing at the end of contractual O & M period of plant.
- e) The contractor shall hand over the plant back to Resident Welfare Association (RWA) on expiry of his contract in fully working condition satisfying the requirement of treated sewage. All the electrical, mechanical and instrumentation including standby shall be in perfect working condition.
- f) Contractor shall provide manpower as per requirement.
- g) Insurance Certificates

Within 14 days of the acceptance of this tender the Contractor shall produce to the SMC a certificate or certificates signed by the Contractor's insurers or their duly authorised agents covering all the persons with accidental policy of sufficient amount as per their grade (30 times monthly salary)

5. The Contractor will comply with all safety rules and regulations and all inter-disciplinary measures as followed by the SMC. The SMC will not be responsible for any accident / injury to the staff or any person of the Contractor or loss or damage to any property.
6. All Central / State Government / Semi-Government / Local Body's rules and regulation pertaining to this contract, all legal formalities pertaining to provident fund, factory act, all legal formalities shall be followed and observed by the Contractor without any extra cost to the SMC. Please note that failure in complying so, all liabilities arising as per laws will be to the Contractor's account.
7. The quoted rate shall include cost towards O&M. No price variation / escalation shall be entertained.
8. Payment of O&M charges will be made as stipulated under chapter on "Schedule of Payment".
9. First Aid Box

The Contractor shall at his own cost provide and maintain at the Site of Works standard first aid boxes as directed and approved by the SMC at site as stipulated by local regulations. Contractor shall arrange to train all their staff in first aid treatment within 3 months.

#### 10. Measurement And Analysis

The SMC has the right to perform any analysis or inspection as deemed necessary. The Contractor shall be responsible for the security and protection of measuring and analysis meters/equipment at the designed point. If there is any malfunctioning of the meters, action will be initiated.

# **SURAT MUNICIPAL CORPORATION**

**(PRADHAN MANTRI AWAS YOJNA)**



## **Tender**

**For**

**CONSTRUCTION OF 550 EWS-I RESIDENTIAL FLATS INCLUDING ALL INTERNAL INFRASTRUCTURE SERVICES & SITE DEVELOPMENT WORK AT T.P. SCHEME NO. 19 (PARVAT-MAGOB), F.P. NO. 100 & T.P. SCHEME NO. 41 (DINDOLI), F.P. NO. 29, UNDER "SMART CITY MISSION" ON ENGINEERING-DESIGNING, PROCUREMENT AND CONSTRUCTION BASIS (EPC MODE)**

**VOLUME II - FINANCIAL BID**

**THE CHIEF ACCOUNTANT,  
SURAT MUNICIPAL CORPORATION, MUGLISARA  
SURAT – 395 003.**

## SCHEDULE FOR QUOTING THE RATES (Financial Bid)

**NAME OF WORK:** CONSTRUCTION OF 550 EWS-I RESIDENTIAL FLATS INCLUDING ALL INTERNAL INFRASTRUCTURE SERVICES & SITE DEVELOPMENT WORK AT T.P. SCHEME NO. 19 (PARVAT-MAGOB), F.P. NO. 100 & T.P. SCHEME NO. 41 (DINDOLI), F.P. NO. 29, UNDER "SMART CITY MISSION" ON ENGINEERING-DESIGNING, PROCUREMENT AND CONSTRUCTION BASIS (EPC MODE).

Item	Total Nos. of DUs. (Minimum)	Rate per DU	Total Amount
Works of CONSTRUCTION OF 550 EWS-I RESIDENTIAL FLATS INCLUDING ALL INTERNAL INFRASTRUCTURE SERVICES & SITE DEVELOPMENT WORK AT T.P. SCHEME NO. 19 (PARVAT-MAGOB), F.P. NO. 100 & T.P. SCHEME NO. 41 (DINDOLI), F.P. NO. 29, UNDER "SMART CITY MISSION" ON ENGINEERING-DESIGNING, PROCUREMENT AND CONSTRUCTION BASIS (EPC MODE), Including, necessary engineering survey, structural designing, and all constructing activities like excavation, construction of all types of structure, finishing works like masonry work, plastering, painting, flooring etc, doors, windows, grills, and all internal & external amenities, electrification, water supply, drainage, Tertiary treatment plant (STP), storm water drain, R.C.C. roads, path, water proofing treatment, anti termite treatment, lift-elevators, compound wall, Entry gate, fire fighting system, landscaping, rainwater harvesting, Gas line network with all material and labour etc. as per minimum required specifications stated in tender documents and Architectural Planning and design approved by SMC, including all taxes, charges, royalties, etc. complete as mentioned in the scope of work of the tender documents.	550		

**Note:** - Nothing Extra shall be paid over and above the quoted rate by the agency for completion of entire project.

I/we am / are willing to carry out the above work at Rs..... (in words Rs.....) Per Nos. of D U of the scheme.

I/We have read the conditions mentioned in this tender and agree to abide by the same.

**[Note: These rates to be quoted on line only]**

**Special Note:-**

While quoting the rate, bidders are requested to visit the location of site / plot condition and also read carefully the tender clauses, scope of work, schedule of payment, minimum acceptable specifications, clauses of defect liability period, retention money, performance guarantee, security deposit etc. for purpose of estimating of quantity / rates.

Price rise, price variation, price escalation will not be given.

Signature of Bidder(s)

***GENERAL TECHNICAL  
SPECIFICATIONS  
FOR  
BUILDING WORKS  
BOOK***

# ***GENERAL TECHNICAL SPECIFICATIONS***

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

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

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

In recording dimensions of work the sequence of length, width and height (depth) or thickness shall be followed.
5. The distance which constitutes lead shall be determined along the shortest practical route and note necessarily the route actually taken The decision of the Engineer-in-charge in this regard shall be taken as final.
6. Where no lead is specific, it shall mean "all leads"
7. Lift shall be measured from plinth level.
8. Up to "floor two level" means actual height of floor (Maxi 4 M) up to 3 Mt. above plinth level.
9. Definite particulars covered in the items of work, though not mentioned or elucidated in its specifications shall be deemed to be included therein.
10. Reference to specifications of materials as made in the detailed specification of the items of works is in the form of a designation containing them under the specification of the material and prefix 'M' e.g. 'M-5',
11. Approval to the samples of various materials given by the Engineer-in-charge shall not absolve the contractor from the responsibility of replacing defective material brought on site or materials used in the work found defective at a later date. The contractor shall have no claim to any payment or compensation whatsoever on account of any such materials being rejected by the Engineer-in-charge.
12. The contract rate of the item of work shall be for the work completed in all aspects.
13. No collection of materials shall be made before it is got approved from the Engineer-in-charge.
14. Collection of approved materials shall be done at site of work in a systematic manner. Materials shall be stored in such a manner as to prevent damage, deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work.
15. Materials, if and when rejected by the Engineer-in-charge, shall be immediately removed from the site of work.
16. No materials shall be stored prior to, during and after execution of a structure in such a way as to cause or lead to damage or overloading of the various components of the structure.
17. All works shall be carried out in a workmanlike manner as per the best techniques for the particular item.
18. All tools, templates, machinery and equipment for correct execution of the work as well as for checking lines, levels, alignment of the works during execution shall be kept in sufficient numbers and in good working condition on the site of the work.
19. The mode, procedure and manner of execution shall be such that it does not cause damage or over-loading of the various components of the structure during execution or after completion of the structure.
20. Special modes of construction not adopted in general Engineering practice if proposed to be adopted by the Contractor, shall be considered only if the contractor provides satisfactory evidence that such special mode

Of construction is safe, sound and helps in speedy construction and Completion of work to the required strength and quality. Acceptance of the same by the Engineer-in-Charge shall not, however absolve the contractor of the responsibility of any adverse effects and consequences of adopting the same in the course of execution of completion of the work.

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

## **BUILDING WORKS SPECIFICATIONS**

All the specifications to be followed for execution of work shall be as per the specifications of R & B Department/ GWSSB, Govt. of Gujarat Relevant, IS Specification shall be followed for construction of

buildings. In case, IS Specifications are not available, the decision of the SMC shall be final. The ambiguity in regards to interpretation of specification(s), the decision of the SMC shall be final and binding. Wherever, any reference to any Indian Standard specification occurs in the documents relating to this contract the same shall be inclusive of all amendments issued thereto or revisions thereof, if any, up to the date of receipt of tenders. Samples of building materials, door and window fitting, sanitary ware, electrical items, mechanical items, fire safety items **and** other articles required for completion of work shall be got approved from Engineer-in-charge before their use in the work. Preference shall be given to those articles which bears IS certification mark. In case articles bearing IS certification mark are not available, the quality of the sample brought by contractor shall be judged by the standard laid down in the relevant IS specification, all materials and articles brought by the contractor (s) to the site for use shall confirm to sample approved, which shall be preserved till the completion of work.

## **ELECTRICAL & MECHANICAL WORKS SPECIFICATIONS**

All the specifications to be followed for execution of work shall be as per the specifications of R & B Department, Govt. of Gujarat & DGVCL Torrent power.

## **INFRASTRUCTURE SPECIFICATIONS**

All the specifications to be followed for execution of work shall be as per the specifications of GWSSB (for water supply, sewerage, drainage, storm water drainage, rain water harvesting and mini sewerage

treatment plant) and Ministry of Surface transport, Govt. of Gujarat (for development of roads) and specifications of R & B Department/SMC, Govt. of Gujarat.

## **HORTICULTURE SPECIFICATIONS**

All the specifications shall be as per relevant GDCR of DIRECTORATE of HORTICULTURE or as per the direction by SMC Garden department.

Relevant IS Specification shall be followed for the execution of this project.

In case, IS Specifications are also not available, the decision of the Executive Engineer, SUC, shall be final.

General - The general technical specification shown in this volume –III is for guideline only .The mode of measurement shall be as shown in Section-XII (schedule of payment at various stages)

## SPECIFICATIONS OF MATERIALS

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

- 1.1. Water shall not be salty brackish and shall be clean, reasonably clear and free objectionable quantities of silt and traces of oil and injurious alkalis, salts, organic matter and other deleterious material which will either weaken the mortar of concrete or cause efflorescence or attack the steel in R.C.C. Container for transport, storage and handling of water shall be clean. Water shall conform to the standard specified in I.S. 456-1978.
- 1.2. If required by the Engineer-in-Charge it shall be tested by comparison with distilled water Comparison shall be made by means of standard cement tests for soundness time of setting and mortar strength as specified in I.S. 269-1976. Any indication of unsoundness change in time of setting by 30 minutes or more or decrease of more than 10 per cent in strength, of mortar prepared with water sample when compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.
- 1.3. Water for curing mortar, concrete or masonry should not be too acidic or too alkaline .  
It shall be free of elements which significantly affect the hydration reaction or otherwise interfere with the hardening of mortar or concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces
- 1.4. Hard and bitter water shall not be used for curing
- 1.5. Potable water will generally found suitable for curing mortar or concrete.

### **M-2. Lime**

- 2.1. Lime shall be hydraulic lime as per I.S. 712-1973 Necessary tests shall be carried out as per I.S. 6932 (Parts I to X) 1973
- 2.2. The following field tests for limes are to be earned out:
  - (1) A very rough idea can be formed about the type of lime by its visual examination i.e. fat lime bears pure white colour, lime in form of porous lumps of dirty white colour indicates quick lime, and solid lumps are the un burnt lime stone.
  - (2) Acid tests for determining the carbonate content in lime Excessive amount of impurities and rough determination of class of lime.
- 2.3. Storage shall comply with J.S. 712-1973 The slaked lime, if stored, shall be kept in a weather proof and damp-proof shed with impervious floor and sides to protect it against rain, moisture, weather and extraneous materials mixing with it. All lime that has been damaged" in any way shall be rejected and all rejected materials shall be removed from site of work.
- 2.4. Field testing shall be done according to I.S 1624-1974 to show the acceptability of materials.

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

- 3.1. Cement shall be ordinary Portland slag cement as per I.S.269-1976 or Portland slag cement as per I.S. 455-1976

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

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

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

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

### **M-6 Sand**

- 6.1. Sand shall be natural sand, clean, well graded hard strong, durable and gritty particles free from injurious amounts of dust, clay kankar nodules, soft or flaky particles shale, alkali salts organic matter, loam, mica or other deleterious substances and shall be got approved from the Engineer-in-Charge. The sand shall not contain more than 8 percent of silt as determined by field test, if necessary the sand shall be washed to make it clean.
- 6.2. Coarse Sand :The fineness modulus of coarse sand shall not be less than 2.5 and shall not exceed 3.0. The sieve analysis of coarse sand shall be as under.

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

### 6.3. Fine Sand :

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

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

### M-7. Stone Dust

7.1. This shall be obtained from crushing hard black trap or equivalent. It shall not contain more than 8% of silt as determined by field test will measuring cylinder. The method of determining silt contents by fields test is given as under :

7.2. A sample of stone dust to be tested shall be placed without drying in 200 mm. measuring cylinder. The quantity of the sample shall be such that it fills the cylinder up to 100 mm. mark. The clean water shall be added up to 150 mm. mark. The mixture shall be stirred vigorously and the content allowed to settle for 3 hours.

7.3. The height of silt, visible as settled layer above the stone dust shall be expressed as percentage of the height of the stone dust below The stone dust containing more than 8% silt shall be washed so as to bring the content within the allowable limit.

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

### M-8. Stone Grit

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

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

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

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

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

### M-9. Cinder

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

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

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

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

**M-10. Lime Mortar**

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

**10.2. Proportion of Mix:**

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

**10.3. Preparation of mortar;**

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

**10.4. Storage:**

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

**10.5. Use:**

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

**M-11. Cement Mortar**

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

**11.2. Proportion of Mix**

**11.2.1.** Cement and sand shall be mixed to specified proportion, sand being measured by measuring boxes, the proportion of cement will be by volume on the basis of 50 Kg/Bag of cement being equal to 0.0342 Cu.m. The mortar may be hand mixed or machine mixed as directed.

**11.3. Proportion of Mortar :**

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

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

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

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

**12.2.** The aggregate shall generally be cubical in shape Unless special stones of particular quarries are mentioned aggregates shall be machine crushed from the best black trap or equivalent hard stone as approved Aggregate shall have no deleterious reaction with cement. The size of the coarse aggregate for plain cement and ordinary reinforced cement concrete shall generally be as per the table given below.

However, in case of reinforced cement concrete the maximum limit may be restricted to 6 mm. less than the minimum lateral clear distance between bars or 6- mm. less than the cover whichever is smaller.

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



- Note :** This percentage may be varied some what by the Engineer-in-charge when considered necessary for obtaining better density and strength of concrete.
- 12.3.** The grading test shall be taken in the beginning and at the change of source of materials. The necessary tests, indicated in I.S. 383-1970 and 456-197f shall have to be carried out to ensure the acceptability. The aggregates shall be stored separately and handled in such a manner as to prevent the intermixing of different aggregates. If she aggregates are covered with dust, they shall be washed with water to make them clean. .
- M-13. Black Trap or Equivalent Hard Stone Coarse**
- 13.1.** Aggregate For Design Mix Concrete . Coarse aggregate shall be of machine crushed stone of black trap or equivalent hard stone and be hard, strong, dense, durable, clean and free from skin and coating likely to prevent proper adhesion of mortar.
- 13.2.** The aggregates shall generally be cubical in shape. Unless special stones of particular quarries are mentioned, aggregates shall be machine crushed, from the best, black trap or equivalent hard stones as approved, Aggregate shall have no deleterious with cement
- 13.3.** The necessary tests indicated in I S. 383-1970 and I.S.456-1978 shall have to be carried out to ensure the acceptability of the material.
- 13.4.** If aggregate is covered with dust it shall be washed with water to make it clean.
- M-14. Brick Bats Aggregate**
- 14.1.** Brick bat aggregate shall be broken from well burnt or slightly over burnt and dense bricks. It shall be homogeneous in texture, roughly cubical in shape, clean and free from dirt of any other foreign material. The brick bats shall be of 40 mm - 50 mm. size unless otherwise specified in the item The under burnt or over burnt brick bats shall not be allowed.
- 14.2.** The brick bats shall be measured by suitable boxes or as directed.
- M-15. Bricks**
- 15.1.** The bricks shall be hand or machine molded and made from suitable soils and kiln burnt. They shall be free from cracks and flaws and nodules of free lime they shall have smooth rectangular faces with sharp corners and shall be of uniform colour.  
The bricks shall be- moulded with a frog of 100 mm. x 40 mm. and 10 mm. to 20 mm. deep on one of its flat sides. The bricks shall not break when thrown on the ground from a height of 600 mm.
- 15.2.** The size of modular bricks shall be 190 mm.x 90 mm.x 90 mm.
- 15.3.** The size of the conventional bricks shall be as under :  
( 9" x 4.38" x 2.34" ) 225 x 110 x 75 mm.
- 15.4.** Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the conventional size adopted in a particular work.  
Length  $\pm$  1/8" ( 3.0 mm.) Width  $\pm$  1/16" ( 1.50 mm. ) Height  $\pm$  1/16" ( 1.50 mm. )
- 15.5.** The crushing strength of the bricks shall not be less than 35 Kg/Sq. Cm. The average water absorption shall not be more the 20 percent by weight Necessary tests for crushing strength and water absorption etc. shall be carried out as per I.S. 3495 ( Part-I to IV ) - 1976
- M-16. Stone**
- 16.1.** The stone shall be of the specified variety such as Granite/Trap Stone/ Quartzite or any other type of good hard stones. The stones shall be only from the approved quarry and shall be hard sound, durable and free from defects like cavities, cracks, sand holes, flaws injurious veins, patches of loose or soft materials etc., and weathered portions and other structural defects Or imperfections tending to affect their soundness and strength. The stone with round surface shall not be used. The percentage of water absorption shall not be more than 5% of dry weight. When tested in accordance with I.S. 1124-1974. The minimum crushing strength of stone shall be 200 Kg/.Sq. Cm. unless otherwise, specified
- 16.2.** The samples of the stone to be used shall be got approved before the work is started
- 16.3.** The Khanki facing stone shall be dressed by chisel as specified in the item for khanki facing in required shape and size. The face of the stone shall be-so dressed that the bushing on the exposed face shall not project by more than 40 mm. from the general wall surface and on face to be plastered it shall not project by more than 19 mm. nor shall it have depressions more than 10 mm. from the average wall surface
- M-17. Laterite Stone**
- 17.1.** Laterite stone shall be obtained from the approved quarry it shall be compacted in texture sound, durable and free from soft patch. It shall have minimum crushing strength of 100 Kg/Sq. Cm. in its dry condition. It shall not absorb water more than 20% of its own weight, when immersed for 24 hours in water. After quarrying, the stone shall be allowed to weather for some time before using in work.
- 17.2.** The stone shall be dressed into regular rectangular blocks so that all faces are free from waviness and unevenness, and the edges true and square
- 17.3.** Those types of stone in which white clay occurs should not be used
- 17.4.** Special corner stones shall be provided where so directed.

**M-18. Mild Steel Bars**

- 18.1.** Mild steel bars reinforcement for R.C.C. work shall conform to I.S. 432 (Part -II) 1966 and shall be of tested quality. It shall also comply with relevant part of I.S. 456-1978.
- 18.2.** All the reinforcement shall be clean and free from dirt, paint, grease, mill scale or loose or thick rust at the time of placing
- 18.3.** For the purpose of payment, the bar shall be measured correct up to 10 mm. length and weight payable worked out at the rate specified below :

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

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

- 19.1.** High yield strength steel deformed bars shall be either cold twisted other rolled and shall conform to I.S. 1786-1966 and I.S. 1139-1966 respectively.
- 19.2.** Other provisions and requirements shall conform to specification No. M-18 for Mild Steel Bars.

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

- 20.1.** The high tensile wires for use in pre stressed concrete work shall conform to I.S.2090-1962.
- 20.2.** The tensile strength of the high tensile steel bars shall be as specified in the item. In absence of the given strength the minimum strength shall be taken as per Para 6-1 of the I.S. 1785-1962. Testing shall be done as per I.S. requirements.
- 20.3.** The high tensile steel shall be free from loose mill scale, rust, oil, grease, or any other harmful matter. Cleaning of steel bars may be carried out by immersion in solvent solution, wire brushing or passing through a pressure box containing Carborundum.
- 20.4.** The high tensile wire shall be obtained from manufacturers. in coils having diameter not less than 350 times the diameter of wire itself so that wire springs back straight on being uncoiled .

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

- 21.1.** The mild steel wire shall be of 1.63 mm. or 1.22 mm. ( 16 to 18 gauge ) diameter and shall conform to I.S. 280-1972.
- 21.2.** The use of black wire will be permitted for binding reinforcement bars. It shall be free from rust oil paint, grease loose mill scale or any other undesirable coating which may prevent adhesion of cement mortar

**M-22. Structural Steel**

- 22.1.** All structural Steel! shall conform to I.S. 226-1985: The steel shall be free from the defects mentioned in I.S 226-1975 and shall have a smooth finish. The material shall be free from loose mill scale, rust pits or other defects affecting the strength and durability. River bars shall conform to I.S. 1148-1973.
- 22.2.** When the steel is supplied by the Contractor test certificate of the manufacturers shall be obtained according to I.S. 226-1975 and other relevant Indian Standards.

**M-23. Galvanised Iron Sheets**

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

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

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

**M-24. Asbestos Cement Sheets**

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

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

- 25.1.** The mangalore pattern tiles shall conform to I S 654-1972 for Class AA or Class A type as specified in item. Samples

of the tiles to be provided shall be got approved from the Engineer-in-charge. Necessary tests shall be carried out as directed.

**M-26. Shuttering**

- 26.1.** The shuttering shall be either of wooden planking of 30 mm. minimum thickness with or without steel lining or of steel plates stiffened by steel angles The shuttering shall be supported on battens and beams and props of vertical bullies properly cross braced together so as to make the centering rigid. In places of bullies props, brick pillar of adequate section built in mud mortar may be used
- 26.2.** The form work shall be sufficiently strong and shall have camber so that it assumes correct shape after deposition of the concrete and shall be able to resist forces caused by vibration of live load of men working over it and other incidental loads associated with it. The shuttering shall have smooth and even surface and its joints shall permit leakage of cement grout
- 26.3.** If at any stage of work during or after placing concrete in the structure, the form work sags or bulges out beyond the required shape of the structure, the concrete shall be removed and work redone with fresh concrete and adequately rigid form work The complete form work shall be got inspected by and got approved from the Engineer-in-charge, before the reinforcement bars are placed in position
- 26.4.** The props shall consist to bullies having 100 mm .minimum diameter measured at mid length and 80 mm. at thin end shall be placed as per design requirement. These shall rest squarely on wooden sole plates 40 mm. thick and minimum bearing area of 0-10 sq m laid on sufficiently hard base.
- 26.5.** Double wedges shall further be provided between the sole plate and the wooden props so as to facilitate tightening and easing of shuttering without jerking the concrete
- 26.6.** The timber used in shuttering shall not be so dry as to absorb water from concrete and swell or bulge nor so green or wet as to shrink after erection. The timber shall be properly sawn and planed on the sides and the surface coming in contact with concrete Wooden form work with metal sheet lining or steel plates .stiffened by steel angles shall be permitted
- 26.7.** As far as practicable, clamps shall be used to hold the forms together and use of nails and spikes avoided.
- 26.8.** The surface of timber shuttering that would come in contact with concrete shall be well wetted and coated with soap solution before the concreting is done Alternatively coat of raw linseed oil or oil of approved manufacture may be applied in place of soap solution In case of steel shuttering either soap solution or raw linseed oil shall be applied after thoroughly cleaning the surface. Under no circumstances black or burnt oil shall be permitted.
- 26.9.** The shuttering for beams and slabs shall have camber of 4 mm per meter ( 1 in 250 ) or as directed by the Engineer-in-charge so as to offset the subsequent deflection For cantilevers, the camber at free end shall be 1/50 of the projected length or as directed by the Engineer-in-charge.

**M- 27. Expansion Joints - Premoulded filler**

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

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

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

**M-29. Teak wood**

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

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

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

The non-teak wood shall be chemically treated, seasoned as per I.S. Specifications and of good quality. The type of wood shall be got approved before collecting the same on site Fabrication of wooden members shall be started only after approval.

For this purpose wood of Bio, Kalai, Sires. Saded, Behda, Jamun, Sisoo will be used for door where as only Kalai. Sires, Halda. Kalam etc. will be permitted for shutters after proper seasoning and chemical treatment.

The non-teak wood shall be free from large loose dead of cluster knots, flows, shakes, warps, bends or any other defects, It shall be uniform in substance and of straight fibers as far as possible It shall be free fro rots, decay, harmful fungi and other defects of nature which will effect the strength, durability or its usefulness for the purpose for which it is required. The colour of wood shall be uniform as far as possible. The scantlings planks etc. shall be saw in straight lines and planes in the direction of grain and of uniform thickness. The department will use the Agency to produce certificate from Forest Department in event of dispute and the decision of the Department shall be final and binding to the contractor. The tolerance in the dimension shall be allowed at 1.5 mm. per face to be planed.

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

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

**30.2.** The face-pane! of the shutters shall be formed by gluing by the hot press process on both faces of the core with either plywood or cross-bands and face veneers. The<sup>1</sup> hopping, rebating. opening of glazing, venation etc., shall be provided if specified in the drawing.

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

**30.4.** The shutters shall be tested for-

**(1) End immersion test:** The test shall be carried out as per I.S.2202 ( part-1 ) 1980 There shall be no delamination at the end of the test.

**(2) Knife Test :** The face panel when tested in accordance with I.S 1659-1979 shall pass the test.

**(3) Glue adhesion test :** The flush door shall be tested for glue adhesive test in accordance with I S 2202 ( part -I ) 1980. The shutters shall be considered to have passed the test, if no delamination occurs in the glue lines in the plywood and if no single determination more than 80 mm in length and more than 3 mm in depth has occurred in the assembly glue lines between the plywood face and the style and rail. Delamination at the corner shall be measured continuously around the corner Delamination at the knots, knot hole and other permissible wood defectects shall not be considered in assessing the sample.

**30.5.** The tolerance in size of scud core type flush door shall-be as under :

In Nominal thickness  $\pm 1.2$  mm. In Nominal height  $\pm 3$ mm

**30.6.** The thickness of the shutter shall be uniform throughout with a permissible variation of not more than 0.8 mm when measured at any points.

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

**31.1.** Aluminum alloy used in the manufacture of extruded window sections shall conform to I.S. designation HEA-WP of I.S. 733-1975 and also to I.S. Designation WVG-WP of I.S 1285-1975 The section shall be as specified in the drawing and design. The fabrication shall be done as directed

**31.2.** The hinges shall be cast or extruded aluminum hinges of same type as in window but of larger size.

**31.3.** The hinges shall normally be of 50 mm. projecting type. Non-projecting type of hinges may also be used if directed. The handles of door shall be of specified design A suitable lock for the door Operable either from outside or inside shall be provided. In double shutter door, the first closing shutter shall have concealed aluminum alloy bolt at top and bottom.

**M-32. Rolling Shutters**

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

**32.2.** Guide channels shall be of mild steel deep channel section and of rolled pressed or built up ( fabricated ) joint less construction The thickness of sheet used shall not be less than 3 15 mm.

**32.3.** Hood covers shall be made of M.S. Sheets not less than 0.90 mm. thick. For shutters having width 3.5 Meter and above, the thickness of M.S. sheet for the hood cover shall be not less than 1 25 mm.

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

- screws bolts etc.
- 32.5.** The rolling shutters shall be of self rolling up to 8 Sq. m. clear area without ball bearing and up to 12 Sq.m. clear area with ball bearing. If the rolling shutters are of larger, then gear operated type shutters shall be used.
- 32.6.** The locking arrangement shall be provided at the bottom of shutter at both ends The shutters shall be opened from outside.
- 32.7.** The Shutters shall be completed with door suspension shafts, locking arrangements, pulling hooks, handles and other accessories.
- M-33. Collapsible Steel Gate**
- 33.1.** The collapsible steel gate shall be in one or two leaves and size as per approved drawings or as specified. The gate shall be fabricated from best quality mild steel channels, flats etc. Either steel pulleys or ball-bearings shall be provided in every double channel Unless otherwise specified the particulars of collapsible gate shall be as under.
- (a) Pickets : These shall be of 20 mm. M.S. channels of heavy sections unless otherwise shown on drawings. The distance centre to centre of pickets shall be 12 cms .with an opening or 10 Cms
- (b) Pivoted M.S. flats shall be 20 mm x6 mm
- (c) Top and bottom guides shall be from tee of flat iron of approved size.
- (d) The fittings like stoppers fixing, locking cleats, brass handles and cast iron rollers shall be of approved design and size
- M-34. Welded Steel Wire Fabric**
- 34.1** Welded steel wire fabric for general purpose shall be manufactured from cold drawn steel wire "as drawn" or galvanized steel conforming to I.S. 226-1975 with longitudinal and transverse wire securely connected at every intersection by a process of electrical resistance welding and conforming to I.S.4948-1974. it shall be fabricated and finished in workmanlike manner and shall be free from injurious defects and shall be rust proof The type of mesh shall be oblong or square as directed The mesh sizes and sizes of wire for square mesh as well as oblong welded steel wire fabric shall be as directed The steel wire fabric in panels shall be in one whole piece in each panel as far as stock sizes permit.
- M-35 Expanded Metal Sheets**
- 35.1.** The expanded metal sheets shall be free from flaws joints broken strands laminations and other harmful surface defects. Expanded metal steel sheet shall conform to IS-412-1975. except that blank sheets need not be with guaranteed mechanical properties The size of the diamond mesh of expanded metal and dimensions of strands (width and thickness) shall be as specified. The tolerance on nominal weight of expanded metal sheets shall be of  $\pm$  10 percent.
- 35.2.** Expanded metal in panels shall be in one whole piece in each panel as far as stock sizes permit. The expanded metal sheets shall be coated with suitable protective coating to prevent corrosion.
- M-36. Mild Steel Wire ( Wire Gauze Jali )**

**36.1.** Mild steel wire may be galvanized as indicated. All finished steel wire shall be well cleanly drawn to the dimensions and size of wire as specified in item. The wire shall be sound free from splits surface flaws, rough jagged and imperfect edges and other harmful surface defects and shall conform to I.S. 280-1978.

**M-37. Plywood**

- 37.1.** The plywood for general purpose shall conform I.S. 303-17-1975.  
Plywood is made by cementing together than boards or starts of wood into panels. There are always an odd number of layers, 3,5,7,9, ply etc. The piles are placed so that grain of each layer is at right angles to the grain in the adjacent level.
- 37.2.** The chief advantages of plywood a single board of the same thickness is the more uniform strength of the plywood, along the length and width of the plywood and greater resistance to cracking and splitting with charge in moisture content.
- 37.3.** Usually synthetic resins are used to gluing, phenolic resins are usually cured in a hot press which compresses and simultaneously heats the plies between hot plates which maintain a temperature of 90 degree C to 140 degree C and a pressure of 11 to 14 Kg/ Sq. Cm on the wood. The time of heating may be anything from 2 to 60 minutes depending upon thickness
- 37.4.** When water glue are used the wood absorbs so much water that the finished plywood must be dried carefully. When synthetic resins are used as adhesive the finished plywood must be exposed to an atmosphere of controlled humidity until the proper amount of moisture has been absorbed.
- 37.5.** According to I.S. 303-1975 the plywood for general purpose shall be of the grades namely BWR, WWR and CWR depending up to the adhesives used for bonding the veneers and it will be further classified into six types namely AA, AB, AC, BB, BC and CC based on the quality of the two faces each face being of three kinds namely A, Band C After pressing, the finished plywood should be reconditioned to a moisture content not less than 8 percent and not more than 16 percent.
- 37.6.** Thickness of plywood Boards.

**TABLE**

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

**M-38. Glass**

- 38.1.** All glass shall be of the brief quality, free from specks, bubbles, smokes veins, air holes blisters and other defects. The kind of glass to be used shall be as mentioned in the item or specification or in the special provision or as shown in detailed drawings. Thickness of glass panes shall be uniform. The specifications for different kinds of glass shall be as under.
- 38.2. Sheet Glass**
- 38.2.1.** In absence of any specified thickness or weight in the item or detailed specifications of the item of work, sheet glass shall be weighing 7.5 Kg/Sq. m for panes up to 600 mm x 600 mm.
- 38.2.2.** For panes larger than 600 mm x 600 mm and up to 800 mm x 800 mm the glass weighing not less than 8.75 Kg/Sq m shall be used For bigger panes up to 900 mm x 900 mm. glass weighing not less than 8.75 Kg/Sq. m shall be used. For bigger panes up to 900 mm x 900 mm. glass weighting not less than 11.25 Kg/Sq. m. shall be used
- 38.2.3.** Sheet glass shall be patent flattened glass of best quality and for glazing and framing purposes shall conform to I.S. 1761-1960. Sheet glass of the specified colours shall be used, if so shown, on detailed drawings or so specified For important buildings and for panes with any dimension over 900 mm plate glass of specified thickness shall be used
- 38.3. Plate Glass:**
- 38.3.1.** When plate glass is specified it shall be "polished patent plate glass" of best quality It shall have both the surface ground flat and parallel and polished to obtain clear undisturbed vision and reflection The plate glass shall be of the thickness mentioned in the item or as shown in the detailed drawing or as specified. In absence of any specified thickness, the thickness of plate glass to be supplied shall be 6 mnn. and a tolerance of 0.20 mm shall be admissible
- 38.4. Obscured Glass:**
- 38.4.1.** This type of glass transmits light so that vision is partially or almost completely obscured. Glass shall be plain rolled, figured, ribbed of fluted, or frosted glass as may be specified as required. The thickness and type of glass shall be as per details on drawings or as specified or as directed.
- 38.5. Wired Glass:**
- 38.5.1.** Glass shall be with wire netting embedded in a sheet of planet glass. Electrically welded 13 mm Georgian square mesh shall be used Thickness of glass shall not be less than 6 mm Wired glass shall be of type and thickness as specified

**M-39. Acrylic Sheets**

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

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

**M-40. Particle board**

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

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

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

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

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

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

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

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

(2) Hessian cloth or Kraft paper for keeping out dust

(3) G.I wire netting, suitable for surfaces to be plaster over

**M-43. Fixtures and fastenings****43.1. General:**

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

**43.1.2.** They shall be of iron, brass, aluminum chromium plated iron, chromium plated brass, copper oxidised iron, copper oxidised brass or anodised aluminum as specified

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

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

**43.1.5.** Brass and anodised aluminium fixtures and fastenings shall be bright finished

**43.2. Holdfasts:**

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

**43.3. Butt hinges:**

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

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

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

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

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

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

**43.6. Door Latch:**

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

**43.7. Bathroom Latch:**

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

**43.8. Handle:**

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

**43.9. Door Catch:**

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

**43.10. Door Stoppers:**

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

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

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

**43.12. Casement Window Fastener:**

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

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

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

**43.14. Ventilator Catch:**

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

**43.15. Pivot:**

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

**M-44. Paints:**

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

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

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

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

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

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

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

**M-45. French Polish**

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

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

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

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

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

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

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



## **M-47. Flooring Tiles**

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

- 47.1.1.** The plain cement tiles shall be of general purpose type. These are the tiles in the manufacture of which no pigments are used. Cement used in the manufacture of tiles shall be as per Indian Standards.
- 47.1.2.** The tiles shall be manufactured from a mixture of cement and natural aggregates by pressure process. During manufacture the tiles shall be subjected to pressure of not less than 140 Kg/Sq. Cm. The proportion of cement to aggregate in the backing of the tiles shall be not less than 1 .3 by weight The wearing face, through the tiles are of plain cement, shall be provided with stone chips of 1 to 2 mm. size. The proportions of cement to aggregate in the wearing layer of the tiles shall be three parts of cement to one parts chips by weight. The minimum thickness of wearing layer shall be 3 mm. The colour and texture of wearing layer shall be uniform throughout its face and thickness. On removal from mould, the tiles shall be kept in moist condition continuously at least for seven days and subsequently, if necessary, for such long period as would ensure their conformity to requirements of I.S.1237-1980 regarding strength resistance to wear and water absorption.
- 47.1.3** The wearing face of the tiles shall be plane, free from projections, depressions and cracks and shall be reasonably parallel to the back face of the tile. All angles shall be right angle and all edges shall be sharp and true.
- 47.1.4.** The size of tiles generally be square shapes 24.85 Cm x24.85 Cm. or 25 Cm x 25 Cm The thickness of tiles shall be 20 mm.
- 47.1.5.** Tolerance of length and breadth shall be plus of minus one millimeter Tolerance on thickness shall be plus 5mm.
- 47.1.6.** The tiles shall satisfy the tests as regards transverse strength, resistance to wear and water absorption as per I.S 1237-1980.

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

- 47.2.1.** The tiles shall have the same specification as for plain cement tiles as per (A) above expect that they shall have a plain wearing surface wherein pigments are used. They shall conform it I.S. 1237-1980.
- 47.2.2.** The pigments used for colouring cement shall not exceed 10 percent by weight of cement used in the mix. The pigments, synthetic or otherwise, used for colouring tiles shall have permanent colour and shall not contain materials detrimental to concrete
- 47.2.3** The colour of the tiles shall be specified in the item or as directed

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

- 47.3.1.** These tiles have same specification as per plain cement tiles except the requirements as stated below
- 47.3.2.** The marble mosaic tiles shall conform to I.S 1237-1980. The wearing face of the tiles shall be mechanically ground and filled. The wearing face of tiles shall be free from projections depressions and cracks and shall be reasonably parallel to the back face of the tiles. All angles shall be right angles and all edges shall be sharp and true.
- 47.3.3.** Chips used in the tiles be from smallest up to 20 mm. size. The minimum thickness of wearing layer of tiles shall be 6 mm. For pattern of chips to be had on the wearing face, a few samples with or without their full size photographs as directed shall be approved by the Engineer-in-charge, for approval.
- 47.3.4.** Any particular samples if found suitable shall be approved by the Engineer-in-charge, or he may ask for a few more samples to be presented The samples shall have of be made by the contractor till a suitable sample is finally approved for use in the work. The Contractor shall ensure that the tiles supplied for, the work shall be in conformity with the approved sample only, in terms of its dimensions, thickness of backing layer and wearing surface, materials, ingredients, colour, shade, chips, distribution etc. required.
- 47.3.5.** The tiles shall be prepared form cement conforming to Indian Standards or coloured port land cement generally depending upon the colour of tiles to be used or as directed.

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

- 47.4.1.** Chequered tiles shall be plain cement tiles or marble mosaic tiles. The former shall have the same specification as per (A) above and the latter as per marble mosaic tiles as per (C) except as mentioned below
- 47.4.2.** The tiles shall be of nominal size of 250 mm. x 250 mm. or as specified. The centre to centre distance of chequer shall not be less then 25 mm. and not more than 50 mm. The overall thickness of the tile shall be 22 mm
- 47.4.3.** The grooves in the chequers shall be uniform and straight. The depth of the grooves shall not be less than 3 mm. The chequered tiles shall be plain coloured or mosaic as specified The thickness of the upper layer measured form the top of the chequers shall not be less than 6 mm. The tiles shall be given the first grinding with machine before delivery to site
- 47.4.4.** Tiles shall conform or relevant I.S 1237-1980. **47.5. (E)**

### **Chequered Tiles For Stair Cases :**

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

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

**M-48. Rough Kotah Stone**

- 48.1. The Kotah stones shall be hard even, sound, and regular in shape and generally uniform in colour. The colour of the stone shall generally be green Brown coloured shall not be allowed for use They shall be without any soft veins, cracks or flaws.
- 48.2. The size of the stones to be used for flooring shall be of size 600 mm x 600 mm and/or size 600 mm. x 450 mm as directed However smaller sizes will be allowed to be used to the extent of maintaining required pattern. Thickness shall be as specified
- 48.3. The edges of minus 30 mm on accounts of chisel dressing of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be  $\pm 3$  mm
- 48.4. The edges of stones shall be truly chiseled and table rubbed with coarse sand before paving. All angles and edges of the stones shall be true, square and free from chipping and surface shall be true and plain
- 48.5. When machine cut edges are specified, the exposed and the edges at joints shall be machine cut The thickness of the exposed machine cut edges shall be uniform

**M-49. Polished Kotah Stone**

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

**M-50. Dholpur Stone Slab**

- 50.1. Dholpur stone slab shall be of best quality as approved by the Engineer-in-charge The stone slab shall be without any veins, cracks, and flaws The stone slab shall be even sound and durable regular in shape and of uniform colour
- 50.2. The size of the stone shall be as specified in the item or detailed drawing or as approved by the Engineer-in-charge The thickness of the stone shall be as specified in the item of work with the permissible tolerance of plus or minus 2 mm. The provision in respect of polishing as for polished kotah stone shall apply to polished Dholpur stone also. All angles and edges of the face of the stone slab shall be fine chiseled or polished as specified in the item of work and all the four edges shall be machine cut All angles and edges of the stone slab shall be true and plane
- 50.3. The sample of stone shall be got approved by the Engineer-in-charge for a particular work It shall be ensured that the stones to be used in a particular work shall not differ much in shade or tint from the approved sample

**M-51. Marble Slab**

- 51.1. Marble slab shall be white or of other and of best quality as approved by the Engineer-in-charge
- 51.2. Slabs shall be hard, close, uniform and homogeneous in texture. They shall have even crystalline grain and free from defects and cracks. The surface shall be machine polished to an even and perfect plane surface and edges machine cut true and square. The rear face shall be rough to provide key for the mortar
- 51.3. Marble slabs with natural veins, if selected shall have to be laid as per the pattern given by the Engineer-in-charge. Size of the slab shall be minimum 460 mm x450 mm and preferably 600 mm 'x 600 mm. However, smaller sizes will be allowed to be used to the extent of maintaining required pattern.
- 51.4. The slab shall not be thinner than the specified thickness at its thinnest part. A few specimen of finished slab to be used shall be deposited by the Contractor in the office for reference
- 51.5. Except as above the marble slabs shall conform to I.S. 1130-1969

**M-52. Granite Stone slab**

- 52.1. Granite shall be of approved colour and quality. The stone shall be hard, even sound and regular in shape and generally uniform in colour. It shall be without any soft veins, cracks or flaws
- 52.2. The thickness of the stone shall be specified in items
- 52.3. All exposed faces shall be double polished to tender truly smooth and even reflecting surface. The exposed edges and corners shall be rounded off as directed The exposed edges shall be machine cut and shall have uniform thickness.

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

- 53.1. P.V.C. sheets for P.V.C., floor covering shall be of homogenous flexible type conforming to I S 3462-1966. The P.V.C. covering shall neither develop any toxic effect while put to use nor shall give off any disagreeable odour.
- 53.2. Thickness of flexible type covering tiles shall be as specified in the description of the item

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

(a) Thickness  $\pm$  015 mm.

(b) Length or Width

(1)	300 mm. Square tiles	$\pm$ 0.20 mm.	(3)	900 mm Square tiles	$\pm$ 0.60 mm.
(2)	600 mm. Square tiles	$\pm$ 0 40 mm.	(4)	Sheets and roll	$\pm$ 0.10 percent.

**53.4. Adhesive:**

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

**M-54. Facing Tiles**

**54.1.** The facing tiles (burnt clay facing bricks) shall be free from cracks, and nodules of free lime. They shall be thoroughly burnt and shall have plane rectangular faces with parallel sides and sharp straight right angled faces. The texture of the finished surface that will be exposed when in place shall conform to an approved sample consisting not less than for stretcher bricks each representing the texture desired. The facing tiles shall have a pleasing appearance, sufficient resistance to penetration by ram and greater durability than common bricks. The tiles shall conform to I.S. 2691-1972.

**54.2.** The standard size of facing brick tiles shall be 19 x 9 x 4 cms. The facing brick tiles shall be provided with frog which shall conform to I.S. 11077-1976.

**54.3.** The permissible tolerance in dimensions specified above shall be as follows:

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

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

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

**54.5.** The average compressive strength obtained as a sample of five tiles when tested in accordance with the procedure laid as per I S 1077-1976 shall be not less than 175 Kg/Sq Cm. The average compressive strength of any individual bricks shall be not less than 160 Kg / Sq.Cm.

**54.6.** The average water absorption for five bricks tiles shall not exceed 12 percent of average weight of brick before testing. The absorption for each individual bricks shall not exceed 25 percent.

**54.7.** The brick tiles when tested in accordance with I.S. 1077-1976, the rate of efflorescence shall not be more than "Slightly effloresced"

**M-55. White glazed tiles**

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

**55.2.** The tiles shall be nominal size of 150 mm x 150 mm unless otherwise, specified. The maximum variation the stated sizes other than the thickness of tile shall be plus or minus 1.5 mm. The thickness of tile shall be 6 mm. Except as above the tiles shall conform to I.S. 1977-19/0

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

66.1. The cast iron flushing cistern shall be of 15 liters capacity. It shall conform to I.S. 774-1971. The flushing cistern shall be of best quality free from any defects. The flushing cistern shall have outlet of 32 mm diameter. The lead pipe shall conform to I.S 404 (Part-I) - 1962; For fixing G.I. inlet pipes and overflow pipe 20 mm. dia. inlet and outlet shall be provided The flushing cistern shall be provided with galvanised iron chain and pull of sufficient length and shall be got approved from the Engineer-in-charge. The cast iron flushing cistern shall be painted with one coat of anticorrosive paint and two coats of paints The flushing cistern shall be fixed on two C I brackets The C [.brackets shall conform to I S 775-1970.

**M-67. Flush cock.**

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

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

68.1. All soil water, vent and anti syphonage pipes and fitting shall conform to I S.1729-1964. The pipes' shall have spigot and socket ends with head on spigot end. The pipes and fitting shall be true to shape smooth, cylindrical, their inner and outer surfaces being as nearly as' practicable concentric. They shall be sound and nicely cast and shall be free from cracks, laps, pinholes or there imperfection and shall be neatly dressed and carefully fettled.

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

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

**68.4. Tolerances :**

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

Sr. No.	Nominal dia. of bore	Thickness	Overall 1.5 m. long	Weight of pipe 1.8 m long	excluding ears 2.m long
1.	75 mm.	5.0 mm.	12.38 Kg.	16.52 Kg.	18.37 Kg.
2	100. mm.	5.0 mm.	18.14 Kg.	21.67 Kg.	24.15 Kg.

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

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

**M-69. Nahni Trap**

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

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

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

**M-70. Gully Trap**

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

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

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

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

71.1. The pipes and fittings shall be of best quality as approved, by the Engineer-m-charge. The pipe shall be of best

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

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

**M-72. Wall Peg Rail**

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

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

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

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

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

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

**M-75. Crydon Ball valve**

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

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

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

**M-77. Selected Earth**

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

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

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

**M-78. Barbed Wire**

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

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

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

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

## SECTION -4

### Excavation

#### **4.0.0. (A) Excavation for foundation up to 1.5 M. depth including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 meter lead in loose or soft soil.**

##### **1.0. General**

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

##### **2.0. Clearing the site**

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

2.2. The rate of 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 centre 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 up to 1.5 m 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 50 M. and all 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

#### **4.0.0. (B): Excavation for foundation up to 1.5 M. depth including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 meter lead in dense or hard soil.**

##### **1.0. Dense or Hard 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.

##### **2.0. Workmanship**

The relevant specifications of item No. 4.0.0.(A) shall be followed except that the excavation work shall be carried out in dense or hard soil,

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

3.1. The relevant specifications of item No. 4.0.0. (A) shall be followed

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

#### **4.0.0.(C):Excavation for foundation up to 1.5 M. depth including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 meter lead in hard murrum.**

##### **1.0. Hard murrum.**

The hard murrum shall be clean of good binding quality and of approved quality obtained from approved quarries of disintegrated rocks which contain some materials and natural mixture of clay of clastic origin. The size of hard murrum shall not be more than 20 mm.

##### **2.0. Workmanship**

The relevant specification of item No. 4.0.0.(A) shall be followed except that the excavation work shall be carried in hard murrum.

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

3.1. The relevant specifications of item No. 4.0.0. (A) shall be followed.

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

#### **4.0.0.(D): Excavation for foundation up to 1.50 M. depth including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 meter lead-soft rock not requiring blasting.**

**1.0. Workmanship**

- 1.1. The relevant specifications of item No. 4.0.0.(A) shall be followed except that the excavation shall be earned out for foundation upon 1.5 M lift in soft rock not requiring blasting
- 1.2. The excavation in soft or disintegrated rock shall be carried out by crow bars, pickaxes or pneumatic drills or any other suitable means
- 1.3. If contractor desires to resort to blasting, he can do so with permission of the Engineer-in-charge but nothing extra shall be paid to him.
- 1.4. The materials available from soft excavation shall be properly stacked within 50 M. lead and 1 5 m. lift and shall be the property of department.
- 1.5. The classification of strata of the foundation soil shall be done by the Engineer-in-charge and shall be acceptable to the contractor
- 1.6. However this shall include the type of rock and boulder which may quarried or split with crow bars. Laterite and conglomerate also come under this category.

**2.0. Mode of measurements & Payment**

- 2.1. The relevant specifications of item No. 4.0 0 (A) shall be followed.
- 2.2. The rate shall be for a unit of one cubic metre.

**4.0.0.(E):Excavation for foundation up to 1.5 M. depth including sorting out and stacking of useful material and disposing of the excavated stuff up to 50 meter lead in hard rocks.**

**1.0. Workmanship**

- 1.1. The relevant specification of item No. 4.0.0.(A) shall be followed except that the excavation for foundation work shall be carried our in hard rock.
- 1.2. Excavation shall be done by blasting to the dimensions shown in the drawings or as directed. The blasting shall be carried out only with written permission of the Engineer-in-charge. All the laws, regulations etc,- pertaining to the precautions, acquisition, transport, landing and use of explosive shall be rigidly followed. The Magazine for the storage for the explosive shall be built to the design and specifications of explosive authority and located at the approved site No unauthorised persons shall be admitted into the magazine and when not in use it shall be kept securely locked No matches or inflammable materials shall be allowed in Magazine. The Magazine shall have an-effective lightning conductor. The rules of explosive 1940 revised from time 10 time shall be followed strictly for obtaining starting, handling, undertaking blasting work.
- 1.3. The contractor shall be responsible for damage to property, workmen public due to any accident due to use of explosives and operations

**1.4. Precautions**

- 1.4.1. The blasting operation shall remain in charge of competent and experienced supervisor and workmen who are thoroughly acquainted with the detail of handling explosive and blasting operations. The blasting shall be carried our during fixed hours of the day, preferably during the mid-day lunch hours or at the close of the work as ordered in writing by the Engineer-m-charge. The hours of blasting shall be notified in advance to the people in the vicinity. All the charges shall be prepared by the man in charge only.
  - 1.4.2. Red danger flags shall be displayed prominently in all direction during the blasting operations.
  - 1.4.3. People except those who actually light the fuse shall be prohibited from entering into this area. The flags shall be stationed at 200 m. from the firing-site in all directions and all persons including workmen shall be excluded form the flagged area at least 1.0 minutes before the firing warning whistle being sounded for this purpose
  - 1.4.4. During excavation in rock by blasting, the lowest 15 cm. of stratus shall be blasted with light charge so as not to shatter or weaken the underlying rock on which the foundation will be actually laid If excavation in rock in done to large widths and length than those shown on the drawings or as directed, no payment shall be made for such over break. If excavation is done to depths greater than shown on the drawings or directed, excess depth shall be made up with foundation grade concrete as directed at the contractor's cost.
  - 1.4.5. The charged hole shall be drilled to the required depth and in suitable places when blasting is done with powder, the fuse cut to the required length shall be inserted in the holes and the powder dropped in. The powder shall be gently tamped with copper rod with rounded ends. The explosive powder shall then be covered with trapping materials which shall be tamped lightly out firmly. When blasting is done with dynamite and other high explosive, dynamite cartridges shall be prepared by inserting the square cut ends of fuse into the detonator, and finished with dippers at the open ends The detonator should be gently pushed into the detonator and finished with dippers at the opened ends. The detonator should be gently pushed explosive. Bore holes shall be of such size that the cartridges can be easily passed down. The holes shall be cleared of all debris and explosive inserted The space for about 20 cams, above the charge shall then be gently filled with dry clay pressed home and rest of tamping is with firmed any convenient materials gently packed with a wooden cover.
  - 1.4.6. At a time not more than 10 such charge shall be prepared and fired. The man in charge shall blow a whistle in a recognised manner for cautioning the people. All the people shall then be required to move to number of explosions. He shall satisfy himself that all the charges have been exploded before allowing the workmen to go to the work site.
  - 1.4.7. The contractor shall be fully responsible to strictly follow the prevailing rules and procedures regarding blasting procedures
- 1.5. Misfire**
- 1.5.1. In case of a misfire the following procedure shall be observed :



- 1.5.2. Sufficient time shall be allowed to account for the delayed blast. The man in charge shall inspect all the charges and determine the missed charge.
- 1.5.3. If it is the blasting powder charge it shall be completely flooded with water. A new hole shall be drilled at, about 45 cm. from the old and fired. This should blast the old charge Should^ it not blast the old charge, the procedure shall be repeated till the old charge is blasted.
- 1.5.4. In case of charge of gelatins, dynamite etc, the man in charge shall gently remove the tamping and the primer with detonator and primer shall then be used to blast the charge. Alternatively the hole may be cleared of one foot of tamping and the direction then ascertained by placing a stick in the hole Another hole may then be drilled 15 cm away and parallel to it. The man in charge shall report to the office all cases of misfire and cause of the same and what steps were taken in connection therewith.
- 1.5.6. If a misfire has been found to be due to defective or dynamite, the whole quantity in the box from which defective article was taken must be sent to authority as directed for inspection to ascertain whether all the remaining materials in the box are also defective or not.
- 1.6. **Accidents:**
- 1.6.1. The contractor shall be solely responsible for any accident during the entire procedure of handling explosive and blasting and shall pay necessary compensation to persons affected or damage to lands or property etc, due to the blasting, without extra claims on the department.
- 1.7. **Account:**
- 1.7.1. A careful and day to day account of explosives shall be maintained by the contractor in an approved manner and shall be open to inspection of the Engineer-in charge Surprise visits may also be paid by the Engineer-in-charge to the storage and in case of any unaccountable shortage or unsatisfactory accounting, the contractor shall be liable to be penalised by forfeiture of part or whole of his Security Deposit or by cancellation of tender in which case he shall not be entitled for any compensation .-
- 1.8. **Disposal of Excavated Materials:**
- 1.8.1. No materials excavated from foundation trenches of whatever kind they may be, are to be placed even temporarily nearer than 1.5 m. or distance prescribed by the Engineer from the outer edge of excavation. All materials excavated shall remain the property of Government. Rate for excavation includes sorting out of useful materials and stacking them separately as directed within the specific lead. Materials suitable and useful for backfilling or other use shall be stacked in convenient places but not in such a way as to obstruct free movement of men, animals and vehicles or encroach upon the area required for constructional purpose. The site shall be left clean of all debris on completion.
- 1.8.2. Disposal of excavated materials is subject to the following :
- Unsuitable materials obtained from clearing site and excavation shall be disposed off within a lead of 50 meters as directed. Useful materials obtained from clearing site and excavation shall be stacked within a lead of 50 M beyond the building areas as directed. Materials suitable for back-filling shall be stacked at convenient places within a lead of 50 M. from the structure for reuse. Useful stones from rock excavation shall be stacked neatly. within a lead of 50 M. and will be allowed to be used by the contractor on payment at rates laid down in the contract or if not so laid down, at scheduled rates of the Division or at a mutually agreed rates if there are no such rates in the schedule of rates.
- 1.8.3. If surplus materials are required to be conveyed beyond 50 M, conveyance will be paid for under a separate item
- 2.0. **Mode of measurements & Payment**
- 2.1. The work shall be measured for the work limited to the dimensions shown on drawings or directed Excavation to dimension in excess of the above will not be measured or paid for and if so ordered by the Engineer the contractor shall have to fill up the excess depth with cement concrete specified for foundation without extra payment.
- 2.2. Driving of sounding bars, drill holes to explore the nature of substratum up to a total length of meter distributed in 2 or 3 places in each foundation if necessary, will be considered incidental work and will not be paid for separately.
- 2.3. Removal of slips and blows in the foundation trenches will not be measured or paid for.
- 2.4. if it is necessary in the opinion of the Engineer-in-charge to carry foundation below the levels shown on the plans, the excavations for the 1.5 M of addition depth will be included in the quantity for the particular classification and will be paid for as extra at rate to be decided under the general conditions of contract unless, the contractor is willing to accept payment as tendered rates.
- 2.5. The rate shall be for a unit of one cubic meter
- 4.0.0.1.(A): **Excavation for foundation for depth from 1.5 M. to 3.0 M. including sorting out and stacking or useful materials and disposing of the excavated stuff up to 50 M. lead-loose or soft soil.**
- 1.0. **Workmanship**
- 1.1. The relevant specifications or item No. 4 0.0. (A) shall be followed except that the excavation work shall be carried out to loose or soft soil with lift 1.5 M. to 3.0 M.
- 2.0. **Mode of Measurement & Payment**
- 2.1. The relevant specifications of item No. 4.0 O.(A) shall be followed.
- 2.2. The excavation work of from 1.5 M. to 3.0 M. shall be measured under this item
- 2.3. The rate shall be for a unit of one cubic meter
- 4.0.0.1.(B): **Excavation for foundation for depth from 1.5 M. to 3.0 M. including sorting out and stacking of useful materials and disposing of excavated stuff up to 50 M. lead in Dense or Hard soil.**

- 1.0. Workmanship**  
The relevant specifications of item No. 4.0.0.(B) shall be followed except that the excavation work shall be carried out with 1.5 M. to 3.0 M. lift in dense or hard soil.
- 2.0 Mode of Measurement & Payment**
- 2.1** The relevant specifications of item No.4.0.0.(A) shall be followed.
- 2.2.** The excavation work from 1.5 to 3.0M shall be measured under this item
- 2.3.** The rate shall be for a unit of one cubic meter.
- 4.0.0.1.(C): Excavation for foundation for depth from 1.5 M. to 3.0 M. including sorting out and stacking of useful materials and disposing of excavated stuff up to 50 M. lead in Hard murrum.**
- 1.0. Workmanship**  
1.1. the relevant specifications of item No. 4.0.0. (A) shall be followed except that the excavation work shall be carried out from 1.5 M. to 3.0 M lift in hard murrum.
- 2.0. Mode of Measurement & Payment**
- 2.1.** The relevant specifications of item No. 4.0.0. (A) shall be followed.
- 2.2.** The excavation work from 1.5 M to 3.0 M shall be measured under
- 2.3.** The rate shall be for unit of one cubic meter
- 4.0.0.1.(D): Excavation for foundation for depth 1.5 M. to 3.0 M. including sorting our and stacking of useful materials and disposing of excavated stuff up to 50 M. lead in soft rock not required blasting.**
- 1.0. Workmanship**  
The relevant specifications item No. 4.0.0.(D) shall be followed except that the excavation work shall be earned out from 1.5 M. to 3.0 M. lift in soft rock not required blasting.
- 2.0. Mode of Measurement & Payment**
- 2.1.** The relevant specifications of item No 4.0.0.(A) shall be followed.
- 2.2.** The excavation work from 1.5 M, to 3.0 M lift shall be measured under this item.
- 2.3.** The rate shall be for a unit of one cubic meter
- 4.0.0.1.(E): Excavation for foundation for depth 1.5 M. to 3.0 M. including sorting out and stacking of useful materials and disposing of excavated stuff up to 50 M. lead in hard rock**
- 1.0. Workmanship**  
1.1. The relevant specifications of item No. 4.0.0.(E) shall be followed except that the excavation work shall be carried out from 1.5 M. to 3.0 M. lift in hard rock.
- 2.0. Mode of Measurement & Payment**
- 2.1.** The relevant specifications of item No. 4.0.0. (A) shall be followed.
- 2.2.** The excavation-work from 1.5 M, to 3.0 lift shall be measured under this item
- 2.3.** The rate shall be for a unit of cubic meter
- 4.0.0.2. (A): Excavation for foundation for depth from 3.0 M. to 5.0 M. including sorting out and stacking of useful materials and disposing of the excavated stuff Upton 50 M. lead in loose or soft soil.**
- 1.0. Workmanship**  
1.1. The relevant specifications of item No. 4.0.0.(A) shall be followed except that the excavation work shall be carried out from 3.0 M. to 5.0. M. lift in loose or soft soil.
- 2.0. Mode of Measurement & Payment**
- 2.1.** Relevant specifications of item No. 4.0.0.(A) shall be followed.
- 2.2.** The excavation work from 3.0 M. to 5.0 M. lift shall be measured under this item.
- 2.3.** The rate shall be for a unit of one cubic meter.
- 4.0.0.2.(B):Excavation for foundation for depth from 3.0 M. to 5.0 M. including sorting our and stacking of useful materials and disposing of the excavated stuff up to 50 M. lead in Dense or Hard soil.**
- 1.0. Workmanship**  
1.1. The relevant specifications of item No. 4.0.0.(B) shall be followed except that the excavation work shall be carried out from 3.0.m. to 5.0.m. lift in Dense or Hard soil.
- 2.0. Mode of Measurement & Payment**
- 2.1.** The relevant specifications of item No. 4.0.0.(A) shall be followed:
- 2.2.** The excavation work from 3.0. M. to 5.0 M. lift shall be measured under this item.
- 2.3.** The rate shall be for a unit of one cubic metre.
- 4.0.0.2.(C):Excavation for foundation for depth from 3.0 M. to 5.0 M. including sorting out and stacking of useful material and disposing of the excavated stuff up to 50 M. lead in Hard murrum.**
- 1.0. Workmanship**  
1.1. The relevant specifications items No. 4.0.0. (C) shall be followed except that the excavation work shall be carried out from 3.0 m to 5.0 M in Hard murrum.
- 2.0. Mode of Measurement & Payment**
- 2.1.** The relevant specifications of item No. 4.0.0.(A) be followed.
- 2.2.** The excavation work from 3.0 M. to 5.0. lift shall be measured under this item.
- 2.3.** The rate shall be for a unit of one cubic metre.

**4.0.0.2.(D)Excavation for foundation for depth from 3.0 M. to 5.0 M. including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 M. in soft rock not required blasting.**

**1.0. Workmanship**

1.1. The relevant specification-of item NO 4 0.0.(D) shall be followed except that the excavation work shall be carried out from 3.0. M to 5.0. M soft rock not requiring blasting

**2.0. Mode of Measurement & Payment**

2.1. The relevant specification of item No. 4.0 O.(A) shall be followed.

2.2. The excavation work from 30 M. to 5 0 M. lift shall be measured under this item.

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

**4.0.0.2.(E): Excavation for foundation depth from 3.0 M. to 5.0 M. including sorting out and stacking of useful material land .disposing of the excavated stuff up to 50 M. lead in Hard rock.**

**1.0. Workmanship**

1.1. The relevant specifications of item No 4.0.0.(E) shall be followed except that the excavation work shall be earned out from 3.0. M. to 5.0 M in hard rock

**2.0. Mode of Measurement & Payment**

2.1. The relevant specification of item No. 4.0.0.(A) shall be followed.

2.2. The excavation work from 3.0. M to 5.0 M. lift shall be measured under this item.

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

**4.0.0.3.(A): Extra for additional depth more than 5.0 M. for excavation for foundation including sorting out and stacking of useful material disposing of the excavated stuff up to 50 M. lead in loose or soft soil.**

**1.0. Workmanship**

1.1. The relevant specification of item. No 4 0.0 (A) shall be followed except that the excavation work shall be earned out from more than 5 0 M. lift in loose or soft soil

**2.0. Mode of Measurement & Payment**

2.1. The relevant specifications of item No. 4.0.0.(A) shall be followed

2.2. The rate shall be paid extra over and above the rate of item No. 4 0 0.2.(A) for carrying' out excavation work for additional depth from 5.0 M. and above.

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

**4.0.0.3.(B):Extra for additional depth more than 5.0 M. for excavation for foundation including sorting and stacking of useful materials disposing of excavated stuff up to 50 M. lead in Dense or Hard soil.**

**1.0 Workmanship**

1.1. The relevant specifications of item No. 4.0.0.(B) shall be followed except that the excavation work shall be carried out from more than 5.0. M. lift in dense or hard soil.

**2.0. Mode of Measurement & Payment**

2.1. The relevant specifications of item No. 4 0.0 (A) shall be followed.

2.2. The rate shall be paid extra over and above the rate of item No 4 0.0 2.(B) for carrying out excavation work for additional depth from 5 0 M. and above.

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

**4.0.0.3.(C): Extra for additional depth more than 5.0 M. for excavation for foundation including sorting out and stacking of useful materials disposing of excavated stuff up to 50 M. lead in Hard murrum.**

**1.0. Workmanship**

1.1. The relevant specification of item No. 4.0.0 (C) shall be followed except that the excavation work shall be carried out from more than 5 0 M. lift in hard rnurrum.

**2.0. Mode of Measurements & Payment**

2.1. The relevant specification of item No. 4.0.0.(A) shall be followed.

2.2. The rate shall be paid extra over and above the rate item No 4.0.0 2.{C}for carrying out excavation work for additional depth from 5 0 M. and above.

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

**4.0.0.3.(D): Extra for additional depth more than 5.0 M. for excavation for foundation including sorting out and stacking of useful materials disposing of excavated stuff up to 50 M. lead in soft rock not requiring blasting.**

**1.0. Workmanship**

1.1. The relevant specifications of Item No. 4.0.0.(D) shall be followed except that the excavation work shall be carried out from more than 5.0 M. lift in soft rock not requiring blasting.

**2.0. Mode of Measurement & Payment**

2.1. The relevant specifications of item No. 4.0.0.(A) shall be followed.

2.2. The rate shall be paid extra over and above the rate of item No. 4.0.0.2.(D) for carrying out excavation work for additional depth from 5 0.(M) and above.

2.3. The rates shall be for a unit of one cubic meter per meter

**4.0.0.3.(E): Extra for additional depth more than 5.0 M. for excavation for foundation including sorting out and stacking of useful material disposing of excavated stuff up to 50 M. lead in hard rock.**

**1.0. Workmanship**

1.1. The relevant specification of item No 4.0.0(E) shall be followed except that the excavation work shall be carried out from more than 50 m. lift in hard rock

- 2.0. Mode of Measurement & Payment**
- 2.1.** The relevant specifications of item No.4.0 O.(A) shall be followed.
- 2.2.** The rates shall be paid extra over and above the rate of item No. 4.0.0 2.(E) for carrying out excavation work for additional depth from 5.0. M. and above.
- 2.3.** The rate shall be unit of one cubic meter per meter
- 4.12. Filling available excavated earth (excluding rock) in trenches, plinth sides of foundations, etc., in layers not exceeding 20 CM. depth, consolidating each deposited 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 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 shall be for a unit of one cubic meter.
- 4.24. Filling in plinth with sand under floors including watering, ramming consolidating and dressing etc. complete.**
- 1.0. Materials**
- 1.1.** Sand shall conform to M 6
- 2.0. Workmanship**
- The relevant specifications of item No. 4.12 shall be followed except that sand shall be filled in under floors, including watering, ramming, consolidating and dressing etc , complete.
- 3.0. Mode of Measurements & Payment**
- 3.1.** The relevant specifications of item No. 4.12 shall be followed.
- 3.2.** The rate includes cost of collecting, carting sand with all lead and labour for filling the same in plinth under floors.
- 3.3.** The rate shall be for a unit of one cubic meter.
- 4.0.0.4. Filling in foundation arid plinth with murrum or selected soil in layers of 20 cm. 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 pots/ quarries of disintegrated rocks which contain silicon material and natural mixture of clay of clarions origin. The size of murrum shall not be more than 20 mm.
- 2.0. Workmanship**
- 2.1.** The relevant specifications of item No. 4.12 shall be followed except that the murrum or selected soil shall be filled in foundations and plinth in 20 cms layer including consolidating, ramming, watering, dressing etc. complete
- 3.0. Mode of Measurements & Payment**
- 3.1.** The relevant specifications of item No. 4.12 shall be followed-
- 3.2.** The rate includes cost of collecting and carting murrum / or selected earth of approved quality with all lead and labour required for filling in trenches and plinth.
- 3.3.** Rate shall be for a unit of one cubic meter.
- 4.0.0.5. Filling in foundation and plinth with brick-bats / chhara in layers of 20 cms. thickness including watering, ramming and consolidating etc. complete.**
- 1.0. Materials**
- Brick bats shall conform to M.14
- 2.0. Workmanship**
- The relevant specification of item No. 4.12 shall be followed except that brick bats of-burnt bricks shall be filled in foundation and plinth in 20 cms layer including watering, ramming, consolidating etc.,\*complete.
- 3.0. Mode of Measurements & Payment**
- 3.1.** The relevant specification item No. 4 12 shall be followed.
- 3.2.** The rate includes cost of collecting and carting brick bats/chhara with all lead and labour required filling in trenches and plinth.
- 3.3.** The rate shall be for a unit of one cubic meter

- 4.27. Boring holes 3.5 M. deep in ordinary soil (for cast in situ piles) and getting out the soil disposal of the surplus excavated soil as directed within a lead of 50 M. for following diameter for piles, (i) 200 mm. (ii) 250 mm, (iii) 300 mm.**
- 1.0. Workmanship**
- 1.0.** The ground shall be roughly leveled and after making the position of piles, the holes shall be bored with a spiral angle to the 3.5 M. depth and specified diameter using boring guide.
- 2.0.** The bore holes shall be truly vertical and uniform bore through out of specified diameter, After boring to the required depth, the bore shall be cleared off the loose soil and disposal of surplus excavated stuff as directed within a lead of 50 M. . 2.0? Mode of Measurement & Payment
- 2.1.** The rate for boring holes shall include :
- (a) roughly leveling the ground in positions where piles are to be provided (b) Making the position of piles by pegs and boring guide and also for shifting of boring guide. (c) Bailing out water, if any met with during boring, (d) Disposal or surplus excavated soil within a lead of 50 M and'(e) All tools, plants, equipments and labour required for satisfactory completion or. work.
- 2.2.** The rate shall be for a unit of one Number.
- 4.28. Extra for under ramming inside the bore holes for under rammed piles of following nominal diameter :(i) 200 mm. (ii) 250, (iii) 300 mm.**
- 1.0. Workmanship**
- The relevant specifications of item No. 4.27 shall be followed except that after boring to the required depth, the bore shall be enlarged at the bottom by an under rammer 2 to 2 1/2 times the diameter of the bore as directed It shall be ensured that the bore for the pile shall be enlarged to the correct diameter.
- 2.0.** Mode of Measurement & Payment
- 2.1.** The relevant specification of item No. 4.27 for under reaming the piles.
- 2.2.** The rate shall be paid extra over and above the rate of item No. 4.27 for under ramming the piles.
- 2.3.** The rate shall be for a unit of one number.

**SECTION 5**  
**Plain & RCC Work**

**5.1.6. Providing and laying in foundation and plinth/under floors lime concrete with hard broken aggregate 40 mm. nominal size and 40% mortar comprising of 1 Lime putty : 2 fine sand and curing complete excluding cost of form work.**

**1.0. Materials**

Water shall conform to M-1. Sand shall conform to M-6 Lime shall conform to M-2. Graded aggregate 40 mm. nominal size shall conform to M-12

**2.1. General**

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

**2.2. Proportion of Mix**

**2.2.1.** The proportion of lime, sand and aggregate shall be specified in the item of the work and shall be measured by volume.

**2.2.2.** The lime mortar shall consist of proportion of 1 lime putty : 2 sand by volume. The lime mortar shall be prepared by wet process. Power driven mill shall be used for preparation of lime mortar. The slaked lime shall be placed in the mill in even layer and ground for 180 revolutions with sufficient water. The water shall be added as required during grinding and care shall be taken not to add more water so that it will bring the mixed materials to a consistency of stiff paste, thoroughly wetted sand shall then be added evenly and the mixture ground for another 180 revolutions.

**2.2.3.** Lime mortar shall be kept, protected from sun and rain till used-up, covering it by tarpaulin or open sheds.

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

**2.3. Mixing:**

**2.3.1.** The concrete shall be mixed in mechanical mixer. Mixing shall be continued until there is uniform distribution of the materials and the mass is uniform in colour and consistency but in no case mixing shall be done for less than 2 to 3 minutes.

**2.4. Laying & Compacting:**

**2.4.1.** The concrete shall always be used while quite fresh It shall be laid (not thrown) in layers not exceeding 150 mm. in thickness and shall be well and quickly rammed with wooden or iron rammers, till the required compaction is achieved. The concrete laid shall not be of too fluid consistency. After it has been mixed no more water shall be added, but the surface during and after compaction shall be kept damp. In laying consecutive layers, the layer cast shall be well watered and made rough before the upper layer is laid. The concrete shall be kept continuously wet for period of 7 days from the date of placing of until it- is built over whichever is more.

**2.5. Mode of Measurement & Payment :**

**2.5.1.** The concrete work shall be measured in length, breadth and depth as specified on drawing or as directed, correct up to nearest centimeter and cubical content shall be worked out nearest up to two places of decimals.

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

**5.1.8. Providing and laying in foundation and plinth/under floors lime concrete with graded bricks aggregate 40 mm. nominal size and 40% mortar comprising of 1 lime putty : 2 fine sand and curing complete, excluding cost of form work.**

**1.0. Materials**

**1.1.** Water shall conform to M-1. Lime mortar shall conform to M-10. Brick bats aggregate 40 mm. nominal sizes shall conform to M-14.

**2.0. Workmanship**

**2.1.** The relevant specification of item No. 5.1.6. shall be followed except that brick aggregate shall be used instead of graded stone aggregate.

**3.0. Mode of Measurements & Payment**

**3.1.** The concrete work shall be measured in length, breadth and depth as specified in drawing or as directed. Correct up to nearest centimeter and cubical content shall be worked out up to two places of decimals.

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

**5.3.2.(A) Providing and laying cement concrete 1.3.6. (1 cement : 3 coarse sand : 6 graded stone aggregate 40 mm. nominal size) and curing complete excluding the cost of form work in foundations 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. Stones aggregate 40 mm. nominal size shall conform to M-12.

**2.0. Workmanship**

**2.1. General**

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

**2.2. Proportion of Mix:**

- 2.2.1.** The proportion of cement, sand and coarse aggregate shall be one part of cement. 3 parts of sand and 6 parts of stone aggregates and shall be measured by volume.
- 2.3. Mixing:**
- 2.3.1.** The concrete shall be mixed in a mechanical mixer at the site of work. Hand mixing may however be allowed for smaller quantity of work if approved by the Engineer-in-charge. When hand mixing is permitted by the Engineer-in-charge in case "of break-down of machineries and in the interest of the work, it shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in 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.
- 2.7. Mode of Measurement & Payment:**
- 2.7.1.** The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plan or as directed.
- 2.7.2.** The rate shall be for a unit of one cubic meter.
- 5.3.3.(A) Providing and laying cement concrete 1:4:8 (1 cement: 4 coarse sand : 8 graded stone aggregate 40 mm. nominal size) and curing complete, excluding cost of form work in foundations 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 stone aggregate 40 mm. nominal size shall conform to M-12.
- 2.0. Workmanship**
- 2.1.** Relevant Specifications of item No. 5.3.2 shall be followed except that cement concrete shall be mixed in the preparation of 1:4:8 instead of 1:3.6 by volume.
- 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
- 5.3.14.(A) Providing and laying cement concrete 1.3.6 (1 cement : 3 coarse sand : 6 crushed stone aggregate 20 mm. nominal size) and curing complete including cost of form work in wall caps/coping.**
- 1.0. Material & Workmanship**
- 1.1.** The relevant specification of item No. 5.3.2. (A) shall be followed except that the work shall be carried out for coping and wall caps, except the stone aggregate 20 mm. nominal size shall be used. The concrete work of wall caps/coping.
- 2.0. Mode of measurements and payment**
- 2.1.** The relevant specification of item No. 5.3.2. (A) shall be followed except that the rate includes cost of necessary form work.
- 2.2.** The rate shall be for a unit of one cubic meter.
- 5.3.3. Providing and laying brick bats cement 1:4:8 (1 cement : 4 coarse sand : 8 graded bricks bats), and curing complete excluding the cost of form work in foundation and plinth.**
- 1.0. Materials**
- 1.1.** Water shall be conform to M-1 Cement shall conform to M-3. Sand shall conform to M-6 Brick bat shall conform to M-14
- 2.0. Workmanship**
- 2.1.** The specification of this item shall be followed as per item No 5.3.14 (A) except that the proportion of brick bat cement concrete shall be 1 4:8 i e 1 part of cements 4 part of coarse sand and 8 parts of graded brick bat by volume, using graded brick bat as coarse aggregate instead of stone aggregates
- 3.0. Mode of Measurements & Payment**
- 3.1.** The concrete work shall be measured in length, breadth and depth as specified on drawing limiting dimensions to those specified on drawings or as directed.
- 3.2.** The rate shall be for a unit of one cubic meter.
- 5.3.4.(A) Providing and laying cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded stone aggregate 40 mm. nominal size) and curing complete, excluding the cost of form work, for 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 Stone aggregate 40 mm nominal size shall conform to M-12.

- 2.0. Workmanship**
- 2.1.** The relevant specification of item No. 5.3.2. (A) shall be followed for the work except that the work is to be carried out in cement concrete 1:5:10
- 3.0. Mode of Measurement & 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.
- 5.3.8.(A) Providing and laying cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 graded brick bats 10 mm. nominal size) and curing complete excluding, cost of form work in foundation and plinth.**
- 1.0. Materials**
- 1.1.** Water shall conform to M-1 Sand shall conform to M-6 Cement shall conform to M-3. Brick bats shall conform to M-14.
- 2.0. Workmanship**
- 2.1.** The relevant specification of item No 5.3.4 shall followed except that brick bats aggregate shall be used instead of stone aggregate.
- 3.0. Mode of Measurement & Payment**
- 3.1.** The relevant specification of item No 5.3.4 shall be followed
- 3.2.** The rate shall be for a unit of one cubic meter
- 5.3.2.(B) Providing and laying brick bat cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 graded-brick bats) and curing complete excluding cost of form work in foundation and plinth.**
- 1.0.** The specification of item No 5 3.2 (A) shall be followed except that the brick bats shall be used as coarse aggregate instead of stone aggregates.
- 2.0. Mode of Measurement & Payment**
- 2.1.** The relevant specification of item No 5.3.5 (A) shall be followed for mode of measurements and payment except that it excludes the cost of form work.
- 2.2.** The rate shall be for a unit or one cubic meter.
- 5.4.18. Providing throating or plaster drip and molding to R.C.C. Chhajjas.**
- 1.0. Materials**
- 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.** The work shall be carried out as directed. The proportion of mix for finishing shall be in C.M. 1:2 by volume. Curing shall be done for not less than 7 days. The work shall be carried out in best workman like manner. The throating or plaster drip and mounding shall be one centimeter in thickness.
- 5.7.5. Extra for providing and mixing Water Proofing material in cement concrete in mix proportions recommended by the manufacturers.**
- 2.0. Workmanship**
- 2.1.** The proportions of materials for the cement concrete shall be mentioned with the specifications of that item. The quantity of water proofing materials to be added and the method of addition shall be as specified by manufacturers.
- 2.2. Mixing:**
- 2.2.1.** The mixing of the water proofing materials in cement, water or concrete shall be done according to the specifications of the manufacture.
- 3.0. Mode of Measurements and Payment**
- 3.1.** The payment is extra over and above the rate of concrete for mixing water proofing proper.
- 3.2.** The rate shall be for a unit of one lithe or kg. per quintal of cement in which water proofing material is added.
- 5.7.1. Providing and laying damp proof course 25 mm. thick cement concrete 1:2:4 (1 cement : coarse sand : 4 stone aggregate 10 mm. nominal size) and curing complete.**
- 1.0.** The specifications of item No. 5.3.13. (A) of ordinary concrete with or without reinforcement shall be followed except that the size of the stone aggregate shall be 10 mm nominal size and the concrete work shall be carried out in 25 mm. thick damp proof course
- 2.0. Mode of measurements & payment**
- 2.1.** The rate includes cost of all materials and labour required to complete the item
- 2.2.** The rate shall be for a unit one sq. meter.
- 5.3.13. Providing and laying cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) and curing complete excluding cost of form work in (A) foundation and plinth, (B) Independent piers, columns and pillars up to floor two level.**
- 1.0. Materials**
- Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Grit shall conform to M-8. Graded stone aggregate 20 mm nominal size shall conform to M-12.
- 2.0. General**
- 2.1.** The concrete mix is not required to be designed by preliminary testes. The proportion of the concrete mix shall be 1:2:4 (1 cement : 2 coarse sand : 4 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 designation ordinary M-100, M-150, M-200, M-250 specified as per I.S. correspond approximately to 1:3:6, 1:2:4, 1:1:1/2:3 and 1:1:2 nominal mix of ordinary concrete by volume respectively
- 2.3. The ingredients required for ordinary concrete containing one bag of cement of 50 kg. by weight (0.0342 Cu M.) for different proportions of mix shall be as under:

Grade of concrete	Total quantity of dry aggregate by volume per 50 kgs. of cement to be taken as the sum of individual volume of fine and coarse aggregates, maximum	Proportion of fine aggregate to coarse aggregate	Quantity of water per 50 Kgs. of cement maximum
1	2	3	4
M-100 (1:3:6)	300 Liters	Generally 1:2 for fine aggregate to coarse aggregate by volume	34 Liters
M-150 (1:2:4)	220 Liters	1:1.1/2 but subject to an upper limit of 1:1.1/2 and lower limit	32 Liters
M-200 (1:1.1/2:3)			30 Liters
M-250 (1:1:2)	100 Liters		1:3 27 Liters

- 2.4. The water cement ratios shall not be more than specified in the above table. The cement content of the mix specified in the table shall be increased if the quantity of water in mix has to be met eased to overcome the difficulties of placements and compaction so that the water-cement ratio specified in the table is not exceeded.
- 2.5. Workability of the concrete shall be controlled by maintaining a water -cement-ratio that is found to give a concrete mix which is just sufficient wet to be placed and compacted without difficulty with the means available.
- 2.6. The maximum size of coarse aggregate shall be as large as possible within the limits specified but in no case greater than one fourth of the minimum thickness of the member provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and to fill the corners of the form.
- 2.7. For reinforced concrete work; coarse aggregates having a nominal size of 20 mm. are generally considered satisfactory.
- 2.8. For heavily reinforced concrete members as in the case of ribs of main beams, the nominal maximum size of coarse aggregate should usually be restricted to 5 mm. less than the minimum clear distance between the main bar or 5 mm. less than the minimum cover to the reinforcement whichever is smaller.
- 2.9. Where the reinforcement is widely spaced as in solid slabs, limitations of size of the aggregate may not be so important, and the nominal maximum size may some times be as great as or greater than the minimum cover.
- 2.10. Admixture maybe used in concrete only with approval of Engineer-in-charge based upon the evidence that with the passage of time neither the compressive strength of concrete is reduced nor are other requisite qualities of concrete and steel impaired by the use of such admixtures.
- 3.0. Workmanship**
- 3.1. Proportioning : Proportioning shall be done by volume, except which shall be measured in terms of bags of 50 kg. weight, the volume of one such bag being taken as 0.0342 cu. meter Boxes of suitable size shall be used for measuring sand aggregate. The size of boxes (internal) shall be 35 x 25 cms. and 40 cms deep while measuring the aggregate and sand the boxes shall be filled without shaking ramming or hammering. The proportioning of sand shall be on the basis of its dry volume and in case of damp saner, allowances for bulk age shall be made.
- 3.2. Mixing :**
- 3.2.1. For all work, concrete shall be mixed in a mechanical mixer which along with other accessories shall be kept in first class working condition and so maintained throughout the construction Measured quantity of aggregate, sand and cement required for each batch shall be poured into the claim of the mechanical mixer while it is continuously running. After half a minute of dry mixing measured quantity of water required for each batch of concrete mix shall be added gradually and mixing continued for another one and a half minute Mixing shall be continued till materials are uniformly distributed and uniform colour of the entire mass is obtained and each individual particle of the coarse aggregate shows complete coating of mortar containing its proportionate amount of cement. In no case shall the mixing be done for less than 2 minutes after-oil ingredients have been put into the mixer.
- 3.2.2. When hand mixing is permitted by the Engineer-in-charge for small jobs or for certain other reasons, it shall be done on the smooth watertight platform large enough to allow efficient tuning over the ingredients of concrete before and after adding water Mixing platform shall be so arranged that no foreign material gets mixed with concrete nor does the mixing water flow out. Cement in required number of bags shall be spread in a layer of uniform thickness on the mixing platform. Dry coarse and fine aggregate and cement shall then be mixed thoroughly by turning over to get a mixture of uniform colour. Specified quantity water shall then be added gradually through a rose can and the mass turned over till a mix of required consistency is obtained. In hand mixing quantity of cement shall be increased by 10 percent above that specified
- 3.2.3. Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before putting in a new batch. Unless otherwise agreed to by the Engineer in-charge the first batch of concrete from the mixture shall contain only two thirds of normal quantity of coarse aggregate Mixing plant shall be thoroughly cleaned before changing from one type of cement to another
- 3.3. Consistency:**
- 3.3.1. The degree of consistency which shall depend upon the nature of the work and methods of vibration of concrete, shall be determined by regular slump tests in accordance with I.S. 1199-193. The slump of 10 mm. to 25 mm shall be adopted when vibrators are used and 80 mm. when vibrators are not used.

**3.4. Inspection:**

**3.4.1.** Contractor shall give the Engineer-in-charge due notice before placing any concrete in the forms to permit him to inspect and accept the false work and forms as to their strength, alignment and general fitness but such inspection shall not relieve the contractor of his responsibility for the safety of men machinery materials and for results obtained immediately before concreting all forms shall be thoroughly cleaned.

**3.4.2.** Centering design and its erection shall be got approved from the engineer-in-charge. One carpenter with helper shall invariably be kept present throughout the period of concreting. Movement of labour and other persons shall be totally prohibited for reinforcement laid in position. For access to different parts suitable mobile platforms shall be provided so that steel reinforcement in position is not disturbed. For ensuring proper cover, mortar blocks of suitable size shall be cast and tied to the reinforcement. Timber kapachi or metal pieces shall not be used for this purpose.

**3.5. Transporting and laying:**

**3.5.1.** The method of transporting and placing concrete shall be as approved. Concrete shall be so transported and placed that no contamination, segregation or loss of its constituent material takes place. All form work shall be cleaned and made free from standing water dust, snow or ice immediately before placing of concrete. No concrete shall be placed in any part of the structure until the approval of the engineer-in-charge has been obtained.

**3.5.2.** Concreting shall proceed continuously over the area between construction joints. Fresh concrete proper contraction joint is formed. Concrete shall be compacted in its final position within 30 minutes of its discharge from the mixer. Except where otherwise agreed to by the engineer-in-charge, concrete shall be deposited in horizontal layers to a compacted depth of not more than 0.45 meter when internal vibrators are used and not exceeding 0.30 meter in all other cases.

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

**3.5.4.** All concrete shall be compacted to produce a dense homogeneous mass with the assistance of vibrators, unless otherwise permitted by the Engineer-in-charge for exceptional cases, such as concreting under water, where vibrators cannot be used. Sufficient vibrators in serviceable condition shall be kept at site so that spare equipment is always available in the event of breakdowns. Concrete shall be judged to be compacted when the mortar fills the spaces between the coarse aggregate and begins to cream up to form an even surface. Compaction shall be completed before the initial setting starts i.e. within 30 minutes of addition of water to dry mixture. During compaction, it shall be observed that needle vibrators are not applied on reinforcement which is likely to destroy the bond between concrete and reinforcement.

**3.6. Curing:**

Immediately after compaction, concrete weather including rain, running water, shocks, vibration, traffic, rapid temperature changes, frost and drying out process. It shall be covered with wet sacking or jute or other similar absorbent material approved, soon after the initial set, and shall be kept continuously wet for a period of not less than 14 days from the date of placement. Masonry work over foundation concrete may be started after 48 hours of its laying but curing of concrete shall be continued for a minimum period of 14 days.

**3.7. Sampling and testing of concrete:**

**3.7.1.** Samples from fresh concrete shall be taken as per I.S. 1199-1959 and cubes shall be made, cured and tested at 7 days and 28 days as per requirements in accordance with I.S. 526-1959. A random sampling procedure shall be adopted to ensure that each concrete batch shall have a reasonable chance of being tested i.e. the sampling should be spread over the entire period of concreting and cover all mixing units. The minimum frequency of sampling of concrete of each grade shall be in accordance with following:

Quantity of concrete in the work.	No of samples	Quantity of concrete in the works	No of samples
1-5 cmt.	1	16-30 cmt.	3
6-15 cmt.	2	31-50 cmt.	4
51 and above	4± one additional for each additional 50 mm. or part thereof.		

**Note :** At least one sample shall be taken from each shift, Ten test specimens shall be made from each sample, five for testing at 7 days and the remaining five at 28 days. The samples of concrete shall be taken on each day of concreting as per above frequency. The number of specimens may be suitably increased as deemed necessary by the Engineer-in-charge when procedure of tests given above reveals a poor quality of concrete and in other special cases.

**3.7.2.** The average of the group of cubes cast for each day shall not be less than the specified cube strength of 150 K/g Cm<sup>2</sup> at 28 days. 20% of the cubes cast for each day may have value less than the specified strength provided the lowest value is not less than 85% of the specified strength. If the concrete made in accordance with the proportions given for a particular grade does not yield the specified strength, such concrete shall be classified as belonging to the

appropriate lower grade. Concrete made in accordance with the Proportions given for a particular grade shall not, however be placed in a higher grade on the ground that the test strength are higher than the minimum specified.

**3.8. Stripping:**

**3.8.1.** The Engineer-in-charge shall be informed in advance by the contractor of his intention to strike the form work. While fixing the time of removal of form work, due consideration shall be given to local conditions, character of the structure, the weather and other conditions that influence the setting of concrete and of the materials used in the mix. In normal circumstances (generally where temperatures are above 20°C) and where ordinary concrete is used, forms may be struck after periods specified in item No.9.1 (A) for respective item of form work.

**3.8.2.** All form work shall be removed without causing any shock or vibration as would damage the concrete. Before the soft and struts are removed, the concrete surface shall be gradually exposed, where necessary in order to ascertain that concrete has sufficiently hardened. Centering shall be gradually and uniformly lowered in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually. Where internal metal tiles are permitted, they or their removable parts shall be extracted without causing any damage to the concrete and remaining holes filled with mortar. No permanently embedded metal part shall have less than 25 mm. cover to the finished concrete surface. Where it is intended to re-use the form work, it shall be cleaned and made good to the satisfaction of the Engineer-in-charge. After removal of form work and shutting, the Executive Engineer shall inspect the work and satisfy by random checks that concrete produced is of good quality.

**3.8.3.** Immediately after the removal of forms, all exposed bolts etc. passing through the cement concrete member and used for shuttering or any other purpose shall be cut inside the cement concrete member to a depth of at least 25 mm. below the surface of the concrete and the resulting holes be filled by cement mortar, all fins, caused by form joints, all cavities produced by the removal of form tiles and all other holes and depressions, honeycomb spots, broken edges or corners and other defects, shall be thoroughly cleaned, saturated with water and carefully pointed and rendered true with mortar of cement and fine aggregate mixed in proportions used in the grade of concrete that is being furnished and of as dry consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure thorough filling in all voids. Surface which are pointed shall be kept moist for a period of 24 hours. If rock pockets/honeycombs in the opinion of the Engineer-in-charge are of such an extent or character as to effect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of the portions of structure affected.

**4.0. Mode of Measurement & Payment**

**4.1.** 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, gables, purling trusses, corbels and steps etc., up to 500 Sq. Cm. in section.

**4.2.** The rate includes cost of all materials labour, tools and plant required for mixing, placing in position, vibrating and compacting, finishing, as directed, curing and all other incidental expenses for producing concrete of specified strength. The rate excludes the cost of form work.

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

**5.4.1.** **Providing and laying cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) and curing complete excluding cost of form work and reinforcement for reinforced work in : (A) Foundations, footing base of columns and mass concrete. (C) Slabs, landings, shelves, balconies, lintels, beams, girders and cantilever up to floor two level. (D) Columns, pillars, posts, and struts up to floor up to floor two level (E) Staircase up to floor two level (K) Vertical and horizontal fins up to floor two level.**

**1.0. Materials & Workmanship**

**1.1.** The relevant specifications of item No. 5.3.13 shall be followed except that the work shall be carried out for reinforced concrete work for work as specified in item 1.2. In addition, the following stipulations shall be followed for:

(a) The bars shall be kept in position by the following methods :

(i) In case of beam and slab construction, sufficient number of precast cover blocks in cement mortar 1:2 (1 cement : 2 coarse sand) about 4 cms. x 4 cms. section and of thickness equal to the specified cover shall be placed between the bars and shuttering as to secure and maintain the requisite cover of concrete over the reinforcement. In case of cantilevered or doubly reinforced beams or slabs, the main reinforcing bars shall be held in position by introducing chain spacers or supports bars at 1.0 to 1.2 meter centers.

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

**1.2.** AH bars projecting from pillars, columns, beams, slabs etc, to which other bars and concrete are to be attached or bounded to later on, shall be protected with a coat of thin neat cement grout, if the bars are not likely to be incorporated with succeeding mass of concrete within the following 10 days. This coat of thin neat cement shall be removed before concreting.

**2.0. Mode of Measurement & Payment**

- 2.1. The relevant specifications of item No. 5.3.13 shall be followed.
- 2.2. The volume Occupied by reinforcement shall not be deducted from R.C.C. work.
- 2.3. The rate shall be for a unit of one cubic meter.

**5.4.4. Providing and laying cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) for reinforced concrete chhajas not exceeding 10cms. thickness up to floor two level including finishing the exposed surface with cement mortar 1:3 (1 cement : 3 fine sand) to give a smooth and even surface, centering and form work and curing complete excluding cost of reinforcement.**

**1.0. Materials & Workmanship**

- 1.1. The cement mortar shall conform to m-11.
- 1.2. The relevant specification of item No. 5.3.13 and 5.4.1 shall be followed except that the work shall be carried out for reinforced concrete chhajas not exceeding 10 cms. in thickness.
- 1.3. The specifications for form work and centering shall be as per item No. 9.1.
- 1.4. The finishing work in cement mortar 1:3 (1 cement : 3 fine sand) shall be carried out as per specifications of item No. 17.49 (I), Before the plastering is done, the surface of the concrete shall be raked for proper bond.

**2.0. Mode of measurements & payment**

- 2.1. The relevant specification of item No. 5.3.13 and 5.4.1 shall be followed except that the work of chhajas up to 10 cms. shall be earned out including centering form work and finishing the surface with cement mortar 1:3 (1 cement : 3 fine sand).
- 2.2. The rate shall be for a unit of one cubic meter,

**5.4.10. Providing an Mild Steel reinforcement for R.C.C. work including bending binding and placing in position etc. complete up to floor two level.**

**1.0. Materials**

- 1.1. Mild Steel bars shall conform to M-18. Mild steel binding wires shall conform to M-21.

**2.0. Workmanship**

- 2.1. The work shall consist of furnishing and-placing reinforcement to the shape and dimensions shown as on the drawings or as directed
- 2.2. Steel shall be clean and free from rust and loose mill scale at the time of fixing in position and subsequent concreting.
- 2.3. Reinforcing steel shall conform accurate to the dimensions given in the bar bending schedules shown on relevant drawings. Bars shall be bent cold to specified shape and dimensions or as directed, using a proper bar bender, operated by hand of 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 on the work. They shall not be heated to facilitate bending Unless otherwise specified a "U" type hook at the end of each bar shall invariably be provided to main reinforcement. The radius of the bend shall not be less than twice the diameter of the round bar and the length of the straight part of the bar beyond the end of the curve shall be at least four times the diameter of the 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 splitting of the concrete.
- 2.4. All the reinforcement bars shall lie accurately placed in exact position shown on the drawings, and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm in size, and by using stay blocks or metal chair spacers, metal hangers supporting wires or other approved devices at sufficiently close intervals, Bars shall not be allowed to sag between supports nor displaced during concreting or any other operations of the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal supports shall not extend to the surface of concrete, except where shown on drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed Pieces of broken stone of brick and wooden blocks shall not be used Layers of bars shall be separated by spacer bars, precast mortar blocks or other approved devices Reinforcement after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement from corrosion, concrete cover shall be provided as indicated on drawings. All the bars 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.
- 2.5. Bars crossing each other where required shall be secured by binding wire (annealed) of size not less than 1 mm. in such a manner that they do not slip over each other at the time of fixing and concreting.
- 2.6. As far possible, bars of full length shall be used. In case this is not possible. Over lapping of bars shall be done as directed When practicable, overlapping bars shall not touch each other, but be kept apart by 25 mm. Where not feasible, overlapping bars shall be bound with annealed wires not less than 1 mm. thick twisted tight. The overlaps shall be staggered for different bars and located at points, along the span where neither shear nor bending moment is maximum.
- 2.7. Whenever indicated on the drawings or desired by the Engineer-in-charge, bars shall be jointed by couplings which shall have a cross-section sufficient to transmit the full stresses of bars. The ends of the bars that are joined by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than the normal cross-section of the bar. Threads shall be standard threads Steel for coupling shall conform to I.S. 226.

2.8. When permitted or specified on the drawings, joints of reinforcement bars shall bull-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 piece which excludes air from the molten metal and conforms to any or all other special provisions for the work shall be accepted. Suitable means shall be provided for holding bars securely in position during welding. It shall be ensured that no voids are left in welding and when welding is done in two or three stages, previous surface shall be cleaned properly. Ends of the bars shall be cleaned of all loose scale, rust, stains, paint and other foreign matter before welding. Only competent welders shall be employed on the work. The M.S. electrodes used for welding shall conform to I.S. 814. Welded pieces of reinforcement shall be tested. Specimen shall be taken from the actual site and their number and frequency of test shall be as directed.

**3.0. Mode of Measurements & Payment**

3.1. For the purpose of calculating consumption, wastage shall not be permitted beyond 5 percent. Excess consumption over 5% will be charged at penal rate.

3.2. Reinforcement shall be measured in length including overlaps, separately for different diameters as actually used in the work. Where welding or coupling is resorted to in place lap joints, such joints shall be measured for payment as equivalent length of overlap as per design requirement. From the length so measured, the weight of reinforcement shall be calculated in tones on the same basis as per M-18 even though steel is supplied to the contractor by the department on actual weight. Length shall include hooks at the ends. Wastage and annealed steel wire for binding shall not be measured and the cost of these items shall be deemed to be included in the rate for reinforcement.

3.3. The rate for reinforcement includes cost of steel binding wires, its carting from Department store to work site, cutting, bending, placing, binding and fixing in position as shown on the drawings and as directed. It shall also include all devices for keeping reinforcement in approved position, cost of joining as per approved method and all wastage and spacer bars.

3.4. The rate shall be for a unit of One Kg.

**5.4.11. High yield deform bars steel reinforcement for R.C.C. work including bending, binding and placing in position complete up to floor two level.**

**1.0. Materials**

1.1. Cold twisted steel bars (high yield strength deformed bars) shall conform to M-19. Mild steel binding wires shall conform to M-21.

**2.0. Workmanship**

2.1. The specifications of item No. 5.4.10 shall be followed except that the cold twisted steel bars shall be used with or without hooks at the ends. Deformed bars without hooks shall, however, comply with relevant anchorage requirements.

**3.0. Mode of Measurement & Payment**

3.1. The relevant specifications of item No. 5.4.10 shall be followed.

3.2. The rate shall be for a unit of One kg.

**5.4.13. Extra for additional lift of concrete for all R.C.C. work above floor two level excluding cost of reinforcement.**

**1.0. Materials & Workmanship**

The relevant specifications for item No. 5.4.1 shall be followed for the work except that the R.C.C. work shall be done for ground floor i.e. above plinth level to first floor level.

**2.0. Mode of Measurement & Payment**

2.1. The relevant specifications of item No. 5.4.1 shall be followed except that rate shall be for extra lift above plinth to floor two level over and above the rate of concrete at floor two level.

2.2. The rate shall be for a unit of one cubic meter per floor.

**5.4.13.(A) Extra for additional lift of reinforcement steel for all R.C.C. work above floor two level.**

**1.0. Materials & Workmanship**

1.1. The relevant specifications of item No. 5.4.10 as may be applicable, shall be followed except that the work shall be carried out above floor two level for each floor.

**2.0. Mode of measurement & payment**

2.1. The relevant specifications of item No. 5.4.10 or 5.4.11 as may be applicable shall be followed except that the work shall be carried out above floor two level.

2.2. The rate shall be for a unit of one kg. per floor.

**5.6.2. Providing up to floor two level precast cement concrete or grill 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 6 mm: nominal size) reinforced with 1.6 mm. dia mild steel size wire including roughening, cleaning fixing and finishing in cement mortar 1:3 and curing complete.**

**(A) 50 mm. thick (B) 40. mm. thick (C) 25. mm. thick (E) 100 mm. thick.**

**1.0. Materials**

1.1. Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Mortar shall conform to M-11. Aggregates shall conform to M-12. Mild steel wire shall conform to M-21. Shattering shall conform to M-26.

**2.0. Workmanship**

It shall be cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 6 mm. nominal size), reinforced with 1.6. mm. dia mild steel wire unless otherwise specified. The thickness of the jali shall be as specified.

in the item. The jali shall be set in position true to line and level before the jambs sills and soffits to the opening are plastered. It shall then be properly cemented with cement mortar 1:3 (1 cement : 3 sand) and rechecked for levels. Finally the jambs, sills and soffits shall be plastered gripping the jali uniformly on all sides.

**3.0. Mode of measurement of payment**

3.1. The item shall be measured in square meter.

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

5.8.1. **Providing and laying controlled concrete M-150 and curing complete excluding the cost of form work and reinforcement for reinforced concrete work in:**

**(A) Foundation, footings, base of columns, and mass concrete, (B) Walls from top of foundation/level up to floor two level. (C) Slabs, pillars, posts and struts, up to floor two level (E) Staircase up to floor two level. (F) Vertical and horizontal fins up to floor two level.**

**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 Course aggregate shall conform M-12.

**2.0. General**

2.1. The relevant specification of item No. 5.4.1. of ordinary concrete shall be followed except that the concrete mix shall be designed from preliminary tests. 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 150 mm. cubes of the mix expressed in Kg./Cmt.

2.2. The proportion of cement, sand and coarse aggregate shall be determined of weight. The weight 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 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	440	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 property compacted with means available except where ft 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 shah 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-3 in plain concrete and not less than 250 kg/M-3 in reinforced concrete.

**4.0. Mode of measurement & payment**

4.1. The relevant specifications of item No.5.4.1 shall be followed, except that the controlled concrete R.C.C. work as specified in item shall be measured under this item. The rate excludes cost of form work.

- 5.8.2. **Providing and laying controlled cement concrete M-200 and curing complete, excluding the cost of form work and reinforcement for reinforced concrete work in :**  
**(A) Foundations, footings base of columns, and mass concrete. (B) walls from top of foundation up to floor two level (C) Slabs, landings, shelves, balconies lintels, beams, girders and cantilever up to floor two level, (D) Columns, pillars, posts and struts upto floor two level (E) Stair cases up to floor two level (K) Vertical and horizontal fins upto floor two level.**
- 1.0. **Materials & Workmanship**  
The relevant specifications of item No. 5.8.1 shall be followed except that the grading of concrete shall be controlled concrete M-200 grades for works 35 specified in item.
- 2.0. **Mode of measurement and payment**
- 2.1. The relevant specifications of item No, 5.8.1. shall be followed.
- 2.2. The rate shall be for one cubic meter.
- 5.8.3. **Providing and laying controlled cement concrete M-250 and curing complete excluding the cost of reinforcement of reinforced concrete work in:**  
**(A) Foundations, footings, bases of columns, and the like and mass concrete (B) Walls from, top of foundation level up to floor two level (C) Slabs, landing, shelves, balconies, beams, girders and cantilever up to floor two level (D) Columns, pillars, struts up to floor two level.**
- 1.0. **Materials & Workmanship**
- 1.1. The relevant specifications of item No. 5.8.1. shall be followed except the grading of concrete shall be controlled concrete M-250 grades for the works as specified in the item.
- 2.0. **Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 5.8.1. shall be followed.
- 2.2. The rate shall be for a unit of one cubic meter.
- 5.00.1. **Providing and laying ordinary concrete 1:2:4 (1 cement : 2 coarse sand :4 graded stone aggregates 20 mm. nominal size) and finishing smooth with curing etc., complete including the cost of form work but excluding the cost of reinforcement for R.C.C. work in: (I) Slabs up to 8 cms. thickness (II) Slabs having more than 8 cms. and up to (III) Slabs having more than 10 cms. and up to 13 cms. thickness (IV) Slabs having more than 13 cms. and up to 15 cms. thickness.**
- 1.0. **Materials & Workmanship**
- 1.1. The relevant specifications for item No. 5.4.1. shall be followed for concrete work and relevant specifications of item No. 9.1. shall be followed for form work and centering. The concrete surface shall be smooth finished with cement mortar 1:3 (1 cement: 3 fine sand) as per item No. 17.59 (I) The thickness shall be as specified in the item.
- 2.0. **Mode of measurement & payment**
- 2.1. The relevant specification for item No. 5.4.1 shall be followed except that item shall include the item providing from work and centering work as directed.
- 2.2. The rate shall be for a unit of one cubic meter.
- 5.00.2. **Providing and laying controlled cement M-150 and finishing smooth with curing etc. complete including the cost of form work but excluding the cost of reinforcement for R.C.C. work in :**  
**(I) slabs up to 8 cms. thickness (II) Slabs more than 8 cms. 10 cms. (III) Slabs more the 10 cms. and up to 13 cms. (IV) Slabs more than 13 cms. and up to 15 cms.**
- 1.0. **Materials & Workmanship**
- 1.1. The relevant specifications of item No. 5.8.1. shall be followed for concrete work and item No. 9.1. shall be followed for form work and centering. The concrete surface shall be smooth finished with cement mortar 1:3 (1 cement : 3 fine sand) as per No. 17.59 (I) The thickness shall be as specified in the item.
- 2.0. **Mode of Measurement & Payment**
- 2.1. The relevant of item No. 5.8.1. shall be followed except that the item shall include the cost and from work and centering.
- 2.2. The rate shall be for a unit of one cubic meter.
- 5.00.3. **Providing and laying ordinary cement concrete 1:2:4 (1 cement: 2 coarse sand : 4 graded stone aggregates 20 mm. nominal size) exposed work with curing etc. complete. including the cost of work but excluding the cost of reinforcement for R.C.C. work in : (I) Slabs up to 8 cms. thickness (II) Slabs having more than 8 cms.-and up to 10 cms. thickness (HI) Slabs having more than 10 cms. and up to 13 cms. thickness. (IV) Slabs having more than 13 cms. and up to 15 cms. thickness.**
- 1.0. **Materials & Workmanship**
- 1.1. There relevant specifications of item No. 5.4.1. shall be followed for concrete work and that of form work and centering work shall be followed as per item No. 9.1. and 9.7. the thickness of the slab shall be as specified in the item.
- 2.0. **Mode of Measurement & Payment**
- 2.1. The relevant specifications of item No. 5.4.1. shall be followed except that form work and centering work shall be included in the item.
- 2.2. The rate shall be for a unit of one cubic meter.

- 5.00.4. Providing any laying controlled cement concrete M-150 exposed work with curing etc., complete including the cost of form work but excluding the cost of reinforcement for R.C.C. work in : (I) Slabs up to 8 cms. thickness (II) Slabs having more than 8 cms. and up to 10 cms. thickness (III) Slabs having more than 10 cms. and up to 13 cms. thickness. (IV) Slabs having more than 13cms. and up to 15 cms. thickness.**
- 1.0. Materials & Workmanship**
- 1.1.** The relevant specification of item No 5.4.1. shall be followed for controlled concrete and the relevant specifications of item No. 9.7. and 9.1. shall be followed for exposed concrete form work and centering work. The thickness of the slab shall be as specified in the item.
- 2.0. Mode of Measurement & Payment**
- 2.1.** The relevant specifications of item No. 5.8.1. shall be followed except that the form work and centering work shall be included in the item.
- 2.2.** The rate shall be for a unit of one cubic meter.
- 5.00.5. Providing and laying ordinary cement concrete 1:2:4 ( 1 cement : 2 coarse sand : 4 grades stone aggregate 20 mm. nominal size) for R.C.C. lintel including finishing smooth with curing etc. complete including the cost of form work but excluding the cost of reinforcement.**
- 1.0. Materials & Workmanship**
- 1.1.** The relevant specifications of item No. 581. shall be followed for concrete work, relevant specifications of item No. 17.59.(I) for finishing work and relevant specifications of item No. 9.1. shall be followed for form work and centering work The concrete work shall be followed for the form work and centering work for exposed concrete work.
- 2.0. Mode of measurement & payment**
- 2.1.** The relevant specification of item No. 5.3.1. shall be followed except that the item includes the cost form work for exposed concrete work
- 2.2.** The rate shall be for a unit of one cubic meter.
- 5.00.6. Providing and laying cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) and finishing smooth with curing etc., complete, including the cost of form work but excluding reinforcement for R.C.C. work in : (A) Beams : (I) Having cross sectional areas 0.05 to 0.08 Sq. meter. (II) Having cross sectional area more than 0.08 Sq. up to 0.12 Sq. mt (III) Having cross sectional area more than 0.12 Sq. Mt. and up to 0.18 Sq. Mt (B) Column; (I) Having cross sectional area 0.05. to 0.08 Sq. mt. (II) Having cross sectional area more than 0.12 Sq.Mt. and up to 0.18 Sq.mt.**
- 1.0. Materials & Workmanship**
- 1.1.** The relevant specifications of item No. 5.4.1. shall be followed for concrete work and item No. 9.1. shall be followed for form work and centering work. The finishing shall be done in cement mortar 1:3 (1 cement: 3 fine sand) as per item No. 17.59(1). The cross sectional area of beam shall be specified in item.
- 2.0. Mode of measurement & payment**
- 2.1.** The relevant specification of item No. 5.4.1. shall be followed but the form work and centering work shall be included in the item.
- 2.2.** The rate shall be for a unit of one cubic meter.
- 5.00.7. Providing and laying controlled cement concrete M-150 exposed work with curing etc. complete, including the cost of form work but excluding the cost of reinforcement for R.C.C. work in : (A) Beams : (I) Having cross sectional area 0.05 to 0.08 Sq. mt. (II) Having cross sectional area more than 0.08 Sq. mt. up to 0.12 Sq.mt (II) Having cross sectional area more than 0.12 Sq. mt. and up to 0.18 Sq.mt.: (B) Columns; (I) Having cross sectional area of 0.05 to 0.08 Sq.mt (II) Having cross sectional area more than 0.08 sq.mt. and up to 0.12 sq.mt. (II) Having cross sectional area more than 0.12 Sq.Mt and up to 0.18 Sq.mt.**
- 1.0. Materials & Workmanship**
- 1.1.** The relevant specifications of item No. 5.8.1. shall be followed for controlled concrete work as specified in item for M-150 and relevant specifications of item 9.1 shall be followed for the form work centering work for exposed cement work.
- 2.0. Mode of measurement & payment**
- 2.1.** The relevant specifications of item No. 5.8.1 shall be followed except that the form work and centering work shall be included in the item.
- 2.2.** The rate shall be for a unit of one cubic meter.
- 5.00.8. Providing and laying controlled cement concrete M-200 exposed work with curing etc. complete, including the cost of form work but excluding the cost of reinforcement for R.C.C. work in (A) Beams : (I) Having cross section area 0.05 to 0.08 Sq. mt (II) Having cross sectional area 0.08 Sq.mt and up to 0.12 Sq. mt. (III) Having cross sectional area 0.12 Sq, and up to 0.18 Sq. Mt. (B) Columns : (I) Having cross sectional area 0.05 to 0.08 Sq.Mt. (II) Having cross sectional area more than 0.08 Sq.Mt and up to 0.12 Sq.Mt. (II) Having cross sectional area more than 0.12 Sq. mt. and up to 0.18 Sq.Mt.**
- 1.0. Materials & Workmanship**
- 1.1.** The relevant specifications of item No. 5.8.1. shall be followed for controlled concrete work for work as specified in item for M-200 and relevant specifications of item 9.7 and 9.1 shall be followed for the form work and centering work for exposed cement work.



**2.0. Mode of measurements & payment**

2.1. The relevant specification of item No. 5.8.1. shall be followed except that the item includes the cost of form work and centering work for exposed work.

2.2. The rate shall be for a unit one cubic meter.

5.00.9. **Providing and laying controlled cement concrete M-250 exposed work with curing etc. complete including the cost of form work but excluding the cost of reinforcement for R.C.C. work in :** (A) Beams : (I) Having cross sectional area 0.05 to 0.08 Sq.mt.(II) Having cross sectional areas more than 0.08 Sq.mt. and up to 0.12 Sq. mt (III) Having cross sectional area more than 0.12 Sq.mt. and up to 0.18 Sq. Mt. (5) Columns :(I) Having cross sectional area 0.05 to 0.08. Sq.Mt (II) Having cross sectional area more than 0.08 Sq. mt. and up to 0.12 Sq. mt. (III) Having cross sectional area more than 0.12 Sq.mt. and up to 0.18 Sq.mt.

**1.0. Materials & Workmanship**

1.1. The relevant specifications of item No. 5.8.1. shall be followed for controlled concrete work for the work as specified in the item for M-250 and the relevant R.C.C. lintels shall be carried out.

**2.0. Mode of measurement & payment**

2.1. The relevant specifications of item No. 5.4.1 shall be followed except that the cost of form work finishing and centering shall be included in the item.

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

## SECTION – 6

### Masonry Work

**6.12 (A) Brick work using common burnt clay building bricks having crushing strength not less than 35 Kg/Sq. Cm. in foundations and plinth in cement mortar 1:5 (1 cement :5 fine sand) modular bricks.**

**1.0. Materials**

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Brick 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 1:5 (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.

**3.0. Mode 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 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.

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

- 6.12. (B) Brick work using common burnt clay building bricks having crushing strength not less than 35 Kg/Sq. Cm. in foundations and plinth in cement mortar 1:5 (1 cement : 5 fine sand) conventional bricks.**
- 1.0. Materials**  
Cement mortar of proportion 1:5 shall conform to M-11. Conventional bricks shall conform to M-15.
- 2.0. Workmanship**  
The relevant specification of item No. 6.12 (A) shall be followed except that the bricks to be used shall be modular bricks and the proportion of cement mortar is 1:6.
- 3.0. Mode of measurements & payment**
- 3.1.** The relevant specifications of item No. 6.12(A) shall be followed.
- 3.2.** The rate shall be a unit of one cubic meter.
- 6.13.(A) Bricks 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) with conventional bricks.**
- 1.0. Materials**  
Water shall conform to M-1. Cement mortar shall conform to M-11. Bricks shall conform to M-15.
- 2.0. Workmanship**
- 2.1.** The relevant specification of item No. 6.12 (A) shall be followed except that the bricks to be used shall be conventional bricks and proportion of cement mortar shall in C.M. 1:6.
- 3.0. Mode of measurements & payment**
- 3.1.** The relevant specification of item No. 6.12(A) shall be followed.
- 3.2.** The rate shall be for a unit of one cubic meter.
- 6.0.0.1(A) 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 1:8 (1 cement : 8 fine sand), with Modular bricks.**
- 1.0. Materials**  
Water shall conform to M-1. Brick shall conform to M-15. Cement mortar shall be conform to M-11.
- 2.0. Workmanship**
- 2.1.** The relevant specification of item No. 6.12(A) shall be followed except that the proportion of cement mortar shall be cement mortar 1:8 and bricks used shall be conventional bricks.
- 3.0. Mode of measurements & payment**
- 3.1.** The relevant specification of item No. 6.12(A) shall be followed.
- 3.2.** The rate shall be for a unit of one cubic meter.
- 6.00.1.(B) 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 1:8 (1 cement : 8 fine sand), with conventional bricks.**
- 1.0. Materials**  
Water shall conform to M-1. Brick shall conform to M-15, cement mortar shall be conform to M-11.
- 2.0. Workmanship**
- 2.1.** There relevant specifications of item No. 6.12(A) shall be followed except that the proportion of cement mortar shall be cement mortar 1:8.
- 3.0. Mode of measurement & payment**
- 3.1.** The relevant specifications of item No. 6.12(A) shall be followed.
- 3.2.** The rate shall be for a unit of one cubic meter.
- 6.0.0.1.(A) Brick work using common burnt clay building bricks having crushing strength not less than 35 Kg./Sq. Cm. in foundation and plinth in lime mortar 1:1.5 (1 Lime putty : 1.5 fine sand) modular bricks.**
- 1.0. Materials**  
Lime mortar of proportion (1:1.5) shall conform to M-10. Bricks shall conform to M-15.
- 2.0. Workmanship**
- 2.1.** The relevant specification of item No. 6.12(A) shall be followed except that the proportion of cement mortar shall be cement mortar 1:8 and bricks used shall be conventional bricks.
- 3.0. Mode of measurements & payment**
- 3.1.** The relevant specification of item No. 6.12(A) shall be followed.
- 3.2.** The rate shall be for a unit of one cubic meter.
- 6.001.(B) Brick work using common burnt clay building having crushing strength not less than 35 Kg/Sq. Cm. in foundation and plinth in cement mortar 1:8 (1 cement: 8 fine sand), with conventional bricks.**
- 1.0. Materials**  
Water shall conform to M-1. Brick shall conform to M-15, Cement mortar shall be conform to M-11.
- 2.0. Workmanship**
- 2.1.** The relevant specifications of item No. 6.12. (A) shall be followed except that the proportion of cement mortar shall be cement mortar 1:8.
- 3.0. Mode of measurements & payment**
- 3.1.** The relevant specifications of item No. 6.12. (A) shall be followed.
- 3.2.** The rate shall be for a unit of one cubic meter.
- 6.0.0.2.(A) Brick work using common burnt clay building bricks having crushing strength not less than 35 Kg./Sq. Cm. in foundation and plinth in lime mortar 1:1.5 (1 Lime putty: 1.5 fine sand) modular bricks.**

- 1.0. Materials**  
Lime mortar of proportion (1:1.5) shall conform to M-10. Bricks shall conform to M-15.
- 2.0. Workmanship**  
The relevant specification of item No. 6.12. (A) shall be followed except the masonry work shall be carried out in lime mortar 1:1.5 (1 lime putty 1.5 fine sand) in foundation and plinth.
- 3.0. Mode of measurements & payment**
- 3.1.** The relevant specification of item No. 6.12. (A) shall be followed.
- 3.2.** The rate shall be for a unit of one cubic meter.
- 6.0.0.2.(B) Brick work using common burnt clay building bricks having crushing strength not less than 35 Kg/Sq. Cm. in foundation and plinth in lime mortar 1:1.5 (1 Lime putty : 1.5 find sand) conventional bricks.**
- 1.0. Materials & Workmanship**  
The relevant specification of item No. 6.12(A) and 60.02(A) shall be followed except that the masonry work shall be carried out by using conventional bricks in lime mortar 1:1.5 (1 Lime putty: 1.5 fine sand) in foundation and plinth.
- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specification of item No. 6.12(A) shall be followed.
- 2.2.** The rate shall be for a unit of one cubic meter.
- 6.0.0.3.(A) Brick work using common burnt clay building brick having crushing strength not less than 35 Kg. Sq. Cm. in foundation and plinth in lime mortar 1:2 (1 lime putty :2 find sand) modular bricks.**
- 1.0. Materials & workmanship**  
The relevant specification of item No. 6.12(A) and 6.0.0.(A) shall be followed except that the masonry work shall be carried out in lime mortar 1:2 (1 Lime putty : fine sand) in foundation and plinth,
- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specification of item No. 6.12 (A) shall be followed.
- 2.2.** The rate shall be for a one cubic meter.
- 6.0.0.3(3) Brick work using burnt clay building bricks having crushing strength not less than 35 Kg/Sq. Cm. in foundation and plinth in lime mortar 1:2 (1 Lime Putty : 2 find sand) modular bricks.**
- 1.0. Materials & Workmanship**  
The relevant specifications of item No. 6.12 A and 6.0.03 shall be followed except that the masonry work shall be carried out in lime mortar 1:2 (1 lime : 2 find sand) using conventional bricks in foundation and plinth.
- 6.19.(A) Brick work using common burnt clay building brick having crushing strength not less than 35 kg/sq.cm. for super structure above plinth level up to floor two level in cement mortar 1:5 (1 cement: 5 find sand) modular bricks.**
- 1.0. Materials**  
Bricks shall conform to M-15. Cement mortar shall conform to M-11.
- 2.0. Workmanship**
- 2.1.** The relevant specification of item No. 6.12 (A) shall be followed except that the masonry work shall be carried out above plinth level to floor two level i.e. for ground floor.
- 2.2.** 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.
- 2.3.** 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.
- 2.4.** For the face of brick work, where plastering is to be done, joints shall be racked 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. i.e. above plinth level to floor two level shall be measured and paid under this item.
- 3.2.** Brick work in parapet shall be included in the corresponding masonry item of store immediately below the floor above which the parapet is built.
- 3.3.** No deduction shall be made from quantity of brick work nor nay 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.
- 6.19.(B) Brick work using common burnt clay building bricks having crushing strength not less than 35 kg/sq. cm. for super structure above plinth up to floor two level in cement mortar 1:5 (1 cement: 5 fine sand) conventional bricks.**
- 1.0. Materials & Workmanship**  
The relevant specification of item No. 6.19(A) shall be followed except that brick masonry work shall be carried out with conventional bricks.
- 2.0. Mode measurement and payment**
- 2.1. The relevant specification of item No. 6.19 (A) Shall be followed.
- 2.2. The rate shall be for a unit of one cubic meter per meter.
- 6.20 Extra for brick in super structure above floor two level.**
- 1.0. Materials and workmanship**  
The relevant specifications of item masonry work to be earned out shall be followed except that this work is for additional lift of one floor above two level.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specification of item No. 6.19 (A) masonry work shall be followed.
- 2.2. The extra payment shall be made for additional lift above floor two level to each additional floor over and above the rate of masonry work.
- 2.3. The rate shall be for a unit of cubic meter per floor.
- 6.30.I(A) Half brick masonry in common burnt clay building having crushing strength not less than 35 kg/sq.cm. in cement mortar 1:4 (1 cement : 4 coarse sand) for super-structure above plinth level up to floor two level with conventional bricks.**
- 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. 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.
- 3.3. The rate shall be for a unit of one sq. meter.
- 6.30.I.(B) Half brick masonry in common burnt clay building bricks crushing strength not less than 35 kg/sq. cm. in cement mortar 1:4 (1 cement :4 coarse sand) for super-structure above plinth level up to floor two level with conventional bricks.**
- 1.0. Materials and Workmanship**
- 1.1. The relevant specifications of Item No. 6.30.1 (A) shall be followed for bricks, wetting, laying of bricks, joints, curing, curing, except that the bricks to be used shall be conventional bricks instead of modular bricks.
- 2.0. Mode of measurement and payment**
- 2.1. The limiting dimensions shall not exceed those shown in the plan or as directed. Any work done extra over specified dimensions shall be ignored.
- 6.30.II.(A) Half brick masonry in common burnt clay building bricks having crushing strength not less than 35 kg/sq.cm. in cement mortar 1:5 (1 cement : 5 coarse sand) with modular bricks in foundations and plinth.**
- 1.0. Materials & workmanship**  
The relevant specifications of item No. 6.30.I (A) shall be followed except the half brick masonry work shall be carried out in cement mortar 1:5 (1 cement : 5 coarse sand) with modular bricks in foundation and plinth.
- 2.0. Mode of measurement and payment**
- 2.1. The relevant specifications of item no. f, 30. I (A) shall be followed.
- 2.2. The rate shall be for a unit of one cubic meter.
- 6.30.II.(B) Half brick masonry on common clay building bricks having crushing strength not less than 35 kg/sq. cm. in cement mortar 1:5 (1 cement : 5 coarse sand) in foundation and plinth using conventional bricks.**
- 1.0. Materials & workmanship**
- 1.1. The relevant specifications of item No. 6.30.I (A) shall be followed for bricks, wetting, laying of bricks, joints, curing, except that the bricks to be used shall be conventional bricks instead of modular bricks.

- 2.0. Mode of measurement and payment**
- 2.1.** The relevant specifications of item No. 6.30.I (A) shall be followed.
- 2.2.** The rate shall be for a unit of one sq. meter.
- 6.30 HI.(A) Half brick masonry in common burnt clay building having crushing strength not less than 35 kg/sq. cm. in lime mortar 1:15 (1 lime putty : 1.5 coarse sand) in foundation and plinth with modular bricks.**
- 1.0. Materials & workmanship**  
The relevant specifications of item No. 6.30 (I)-A shall be followed except that the half bricks work shall be carried out in cement 1:5 (1 cement: 5 coarse sand) in foundation and plinth using conventional bricks.
- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specifications of item no. 6.30 (I)-A shall be followed.
- 2.2.** The rate shall for a unit of one sq. meter.
- 6.30.III(A) Half brick masonry in common burnt clay building having crushing strength not less than 35 kg/sq. cm. in lime mortar 1 :1.5 (1 lime putty : 1.5 coarse sand) in foundation and plinth with modular bricks.**
- 1.0. Materials**  
Modular bricks shall conform to M-15 water shall conform to M-1. Lime mortar or proportion L.M. 1:1.5 (1 Lime putty : 1.5 coarse sand) shall conform to M-10.
- 2.0. Workmanship**  
The relevant specifications of item No. 6.30 (I) (A) shall be followed except that the half brick masonry work shall be carried out in lime mortar 1:1.5 (1 Lime putty : 1:1.5 coarse sand) in foundation and plinth using modular bricks.
- 3.0. Mode of measurements & payment**
- 3.1.** The relevant specification of item No. 6.30 (I) A shall be followed.
- 3.2.** The rate shall be for a unit of one sq. meter.
- 6.30.111(8) Half brick masonry in common burnt clay building bricks having crushing strength not less than 35 kg/sq. cm. in mortar 1: 1.5 (1 Lime putty : 1.5 coarse sand) in foundation and plinth with conventional bricks.**
- 1.0. Materials**  
Conventional bricks shall conform to M-15, water shall conform to M.1. Lime mortar or proportion L.M. 1:1.5 (1 Lime putty : 1.5 coarse sand) shall conform to M-10.
- 2.0. Workmanship**  
The relevant specifications of item No. 6.30 (I)-A shall be followed except that half brick masonry work shall be carried out in Lime Mortar 1:1.5 (1 Lime putty : 1.5 coarse sand) in foundation and plinth using conventional bricks.
- 3.0. Mode of measurements and payment**
- 3.1.** The relevant specifications of item No. 6.30 (I)-A shall be followed.
- 3.2.** The rate shall be for a unit of one sq. meter.
- 6.30 II(A) Half brick masonry in common burnt clay building bricks having crushing strength not less than 35 kg/sq. cm. in cement 1:5 ( 1 cement : coarse sand) with hoop iron 25 mm. x 1.6 mm. or equivalent reinforcement at every third coarse embedded in cement mortar in foundation and plinth with modular bricks.**
- 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. M.S. reinforcement shall conform to M-18.
- 2.0. Workmanship**
- 2.1.** Relevant specifications of bricks, wetting and laying of bricks, joints, curing, scaffolding etc. shall conform to item No. 6.30 (I)-A except the following :
- 2.2.** Cement mortar used in masonry work shall be in proportion to 1 part of cement and 5 parts of sand by volume and shall conform to M-11, and this work is for half brick thickness for partitions walls.
- 2.3.** The hoop iron 25 mm x 1.6 or equivalent reinforcement shall be provided at every third course. The ends of reinforcement shall be fully embedded in main walls on both sides as directed. Reinforcement shall be placed on the top of the bottom most course. Laps shall be of 15 cms. of mild steel bars or hoop iron.
- 2.4.** The joints in the course where reinforcement is placed shall admit of mortar cover to the reinforcement.
- 3.0. Mode of measurements and payment**
- 3.1.** The rate shall be for half brick masonry work providing specified reinforcement, the limiting dimensions not exceeding those in the plan or as directed. The length shall be measured nearest to one cm.
- 3.2.** Any work done extra over specified dimensions shall be ignored.
- 3.3.** The rate shall be for a unit one sq. meter.
- 6.30.II(B) Half brick masonry in common burnt clay building having crushing strength not less than 35 kg/sq.cm. in cement mortar 1:5 (1 cement : 5 coarse sand) with hoop iron 25 mm. x 1.6 mm. or equivalent reinforcement at every third course embedded in cement mortar in foundation and pith, with conventional bricks.**
- 1.0. Materials & Workmanship**
- 1.1.** The relevant specifications of item No. 6.30 I (A) shall be followed except that the work is to be carried out with conventional bricks instead of Modular bricks.
- 2.0. Mode of measurements and payment**

- 2.1. The rate shall be for half brick work, including providing specified reinforcement, the limiting dimensions out with conventional bricks instead of Modular bricks.
- 2.2. The work done extra over specified dimensions shall be ignored.
- 2.3. The rate shall be for a unit of one sq. meter.
- 6.33.(A) Extra for half brick masonry in superstructure above floor two level. Modular bricks.**
- 1.0. Materials & Workmanship**
- 1.1. The relevant specifications for item No. 6.30 A & 6.30. B shall be followed except that this work is for additional lift over and above the payment of work up to floor two level.
- 1.2. The rate shall be for a unit of one sq. meter per floor.
- 6.33.(B) Extra for half brick masonry work in superstructure above floor two level. Conventional bricks.**
- 1.0. Materials & Workmanship**
- 1.1. The relevant specifications for item No. 6.30 A & 6.30. B shall be followed except that this work is for additional lift of each floor two level using conventional bricks.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specification of item No. 6.33 (A) shall be followed.
- 2.2. The rate shall be for a unit of one sq. meter per floor
- 6.55 (1) Half brick thick Honey-comb brick work with burnt work with burnt clay building bricks having crushing strengths not less than 35 kg/sq.cm. in C.M. 1:4 (1 cement : 4 coarse sand)**
- 1.0. Materials**
- Bricks shall conform to M-15 Cement mortar of proportion shall conform to M-11.
- 2.0. Workmanship**
- The relevant specifications of item No. 6.32(A) shall be followed except that the masonry work shall be carried out Honey-comb in thickness of half bricks in cement mortar 1:4 (1 cement: 4 coarse sand) and as and where directed with all lifts.
- 3.0. Mode of measurements and payment**
- 3.1. The honey-comb work shall be measured in sq. meters. The full area of honey comb work shall be measured without with all lifts.
- 3.2. The rate shall be for a unit of one square meter of wall surface.

## SECTION-7 Rubble Masonry Work

### 7.6(1) Uncoarsed rubble masonry with hard stone approved quality in foundations and plinth in cement mortar 1:6 (1 cement : 6 coarse sand) including leveling etc. complete.

#### 1.0. **Materials:**

The cement mortar shall conform to M-11. Stone shall conform to M-16.

#### 2.0. **Workmanship**

##### 2.1. **Dressing of stones:**

Stone used for uncoarsed rubble masonry work shall be hammer dressed on the sides, and beds in which such a way as to close with the adjacent stone in the masonry work as strongly as possible. The face stones shall be dressed in such a manner as to give a specified pattern such as polygonal facing etc. The face of the stones shall be so dressed that bushing on the exposed face shall not project by more than 40 mm. from the general wall surface and on the face to be plastered, it shall not project by more than 19 mm., not shall have depressions more than 10 mm. from the average wall surface.

##### 2.2. **Laying:**

All the stone shall be sufficiently wetted before laying to prevent absorption of water from mortar. The wall shall be built true to plumb (of true to required batter when so specified). All connected walls in a structure shall be raised up informally and regularly. However if for any specific reason, one part of masonry is required to be left behind the wall shall be racked back at an angle not steeper than 45. Vertical toothed joints in masonry shall not be allowed. The work shall be carried out regularly and masonry of any day wall not be raised by more than 1 meter in height.

2.3. The stone shall be laid in an uncoarsed fashion, or random facing etc. However the masonry is required to be brought to level at various stages viz. plinth level window sill level, roof level and any other level specifically shown in the drawings. This may be done first by adjusting the laying of stone to one level and then by providing leveling course of cement concrete 1:6:12 (1 cement: sand : 12 graded stone aggregate 20 mm. nominal size) or as otherwise specified.

2.4. Proper bonding shall be achieved by closely filling in adjacent stones as well as by using bond stones or through stones as described herein below. Face stones shall extend back sufficiently, and bond well with the masonry. The stone shall be carefully set so as to break joints and avoid formation of vertical joints. The depth of stone from the face of wall inwards shall not be less than weight or breadth at the face. The hearing or interior filling of the wall shall consist of rubble stones which may be of any shape. Neither the face stone nor the hearing stone shall be so small to pass through circular ring of 150 mm. internal diameter in any direction nor shall any of them shall have minimum thickness 100 mm.

2.5. All stone shall be carefully laid, hammered down by a wooden mallet into position and solidly embedded in mortar, chips and spawns of stone may be used wherever necessary to avoid thick mortar beds or joints at the same time ensuring that no hollow space is left anywhere in the masonry. The chips used shall not be more than 20% by volume of masonry. The hearing shall be laid nearly level with face stones except that at about one meter intervals vertical bond stone or plumes projecting about 150 to 200 mm. shall be firmly embedded to from vertical bounding in masonry.

##### 2.6. **Bond stone:**

Bond stones or through stones running right across the thickness of the wall shall be provided in wall up to 600 mm. thick. In thicker walls two stones overlapping each other by at least 150 mm. shall be provided across the thickness of the wall to form bond stones. There shall be at least one bond stone for every 0.5 sq. mt of wall surface. The bond stone shall be marked by a distinguishing letter during construction for subsequent verification and shall be laid staggered in subsequent layers.

##### 2.7. **Quoins:**

The quoins or corner stones shall be selected stone neatly dressed with hammer and/or chisel to form the required corner angle and laid header and stretcher alternatively, The bed top surface of quoins shall be chiseled dressed to give horizontal joints. The quoins shall have a uniform chisel draft of at least 25 mm. width at four edges of each exposed face, all the edges of the same face being in one plane. No quoins stone shall be smaller than 0.025 cum. in volume.

##### 2.8. **Jamb Stones:**

The jamb stone shall be made with stone specified for quoins, that the stone provided on the jambs shall have their length equal to thickness of wall up to 600 mm. and a line of headers shall be provided for walls thicker than 600 mm. as specified for bond.

##### 2.9. **Joints:**

All the joints shall be completely filled with mortar and width shall not exceed 25 mm. when plastering or pointing is not required to be done, the joints shall be struck flush and finished simultaneously while laying the stone. Otherwise the joints shall be racked to a minimum depth of 20 mm. by a racking tools, during progress of laying while the mortar is still green.

##### 2.10. **Scaffolding:**

Single or double scaffolding shall be used. The scaffolding shall be strong and sound. The holes left in masonry for supporting scaffolding shall be filled and made good before plastering.



- 2.11. Curing:**  
Green work shall be protected from rains by covering the same. Masonry shall be kept constantly moist on all the faces for a period of at least 7 days. The top of masonry shall be flooded at close of the day.
- 3.0. Mode of measurements and payment**
- 3.1.** All work shall be measured on the basis of finished dimensions and measured net except where otherwise specified. Only specified dimensions shall be allowed. Anything extra shall be ignored. The masonry work in foundation and plinth shall be measured under this item. No deduction shall be made, not extra payment made for the following:
- Ends of joints, beams, spots, girders, rafters, purloins, trusses, corbels, etc. each up to 500 sq. cm. in section.
  - Opening each up to 0.1 sq.m.
  - Wall plates and bed plates, bearing of chhaja and like up to 10 cm. depth (bearing of floor and roof slabs shall be deducted from masonry).
  - Drain holes and recesses for cement concrete blocks to embed hold fasts for doors windows.
  - Building in the masonry iron fixtures pipes up to 300 mm. dia. hole fasts of doors and windows.
  - Forming theses in masonry up to section of 350 sq.cm.
- 3.2.** The rate shall be for a unit of one cubic meter.
- 7.6.(II) Uncoursed rubble masonry with hard stone of approved quality in foundation and plinth in cement mortar 1:5 (1 cement : 5 coarse sand) including leveling up etc. complete.**
- 1.0. Materials and workmanship**  
The relevant specification of item No. 7.6(1) shall be followed except that the proportion of cement mortar shall be in C.M. 1:5 (1 cement : 5 coarse sand)
- 2.0. Mode of measurements and payments**
- 2.1.** The relevant specifications of item No. 7.6(1) shall followed.
- 2.2.** The rate shall be a unit of one cubic meter.
- 7.6.(III) Uncoursed rubble masonry with hard stone of approved quality in foundation and plinth in lime mortar 1:1.5 (1 lime putty : 1.5 coarse sand) including leveling etc. complete.**
- 1.0. Materials:**  
Lime mortar shall conform to M-10. The rubble shall conform to M-16.
- 2.0. Workmanship**  
The relevant specifications of item No. 7.6 (I) shall be followed.
- 3.0. Mode of measurement and payment**
- 3.1.** The relevant specifications of item No. 7.6 (I) shall be followed.
- 3.2.** The rate shall be for a unit of one cubic meter.
- 7.17(A) Coursed rubble masonry with hard stone of approved quality in foundation and plinth in cement mortar 1:6 (1 cement : 6 coarse sang) etc. complete.**
- 1.0. Materials**  
Cement mortar shall conform to M-11. The stone shall conform to M-16.
- 2.0. Workmanship**
- 2.1. Dressing of stones:**  
The face stone shall be hammer dressed so as to give approximately rectangular blocks. They shall be squared on bed and side joints. The bed joints shall be rough chisel dressed for a depth of at least 50 mm. back from the faces and the side joints shall be so dressed to a depth of at least 40 mm. back from the face, such that no portion of the dressed surface is more than 10 mm. from a straight edge held against the surface. The remaining portions of surface shall not project above the chisel dressed bed and side joints. The bushing on the face shall not project by more than 40 mm. on an exposed face and 10 mm. on a face to be plastered. The hammer dressed stone shall also have a rough tooling for a minimum with of 25 mm. along the four edges of the face of the stone.
- 2.2. Laying:**
- 2.2.1.** All stones shall be wetted before laying. The watt shall be built up truly plumb (or to required better where so specified.)  
All connected masonry in a structure shall normally be raised up uniformly and regularly. However, if for any specific reasons one part of wall is required to be left behind, such wall shall be raked back at an angle not steeper than 45°. vertical toothed joints in masonry shall not be allowed. The work shall be carried up regularly and masonry on any day shall not be raised by more than 1 meter in height.
- 2.2.2.** All the courses shall be laid truly horizontal. The height of course shall not be less than 150 mm. nor more than 300 mm. Face stone shall be laid in alternate header and stretcher fashion. They shall be so arranged as to break joints by at least 75 mm. Stones shall be laid with grains horizontal so that the load is transmitted along the direction of their maximum crushing strength. The depth of stone shall not be less than the height or breadth. The breadth of a face stone shall also be not less then the breadth. The breadth of a face stone shall also be not less the 150 mm. Each face stone shall be of the same height in any give course. The courses shall be not less the 150 mm. Each face stone shall be of the same height in any give course. The courses shall be built in perpendicular to the pressure which the masonry will bear. In case of battered walls (such as retaining walls) the beds of the stone and the plate of courses shall be laid with their bed perpendicular to the battered face.

- 2.2.3. The hearting or the interior filling of the wall shall consist of flat bedded stones carefully laid on their proper beds in mortar, chips and spawns of stone being used where necessary to avoid excessive use of mortar, care being taken to see that no hollow space is left anywhere in the masonry. Chips shall not be used below the hearting stone to bring these up to the level of stones. The use of chips shall be restricted to be filling of interstices between the hear tiling stone but the volume of chips shall be limited to 15% of the total volume of the masonry.
- 2.3. **Bond Stones:**  
The relevant specification of item No. 7.6 (I) Para 2.6 shall be followed except that the bond stone shall be provided for at least 1.8. m. length of every courses.
- 2.2.4. **Quoins:**  
The quoins, which shall be of the same height as the course to which it belongs shall be formed from selected stone of at least 400 mm. length. They shall be laid square or beds on stretchers and headers alternatively. The beds shall be rough, chisel dressed to a depth of at least 100 mm. These stones shall have a minimum uniform chisel draft of 25 mm. width at four edges being in the same plane, quoin stone shall not be smaller than 0.025 cum. in volume and it shall also be not less than 300 mm. in length, 25 % of them being not less 500 mm. in length.
- 2.5. **Joints:**  
All the bed joints shall be horizontal and all shall be vertical. Face joints shall not be more than 10 mm. thick. All joints shall be properly and completely filled with mortar. On faces where no plastering or pointing is required to be done the joint shall be flush and finished simultaneously while laying stones. In other cases the joints shall be raked to a minimum depth of 20 mm. by raking tools during the progress of work while the mortar is still green.
- 2.6. **Curing:**  
The relevant specification of item No. 7.6 (I) area Para 2.9 shall be followed
- 3.0. **Mode of measurements & payment**
- 3.1. The relevant specification of item No. 7.6 (I) shall be followed.
- 3.2. The rate shall be for a unit of one cubic meter.
- 7.17.(B) **Coursed rubble masonry with stone of approved quality in foundation and plinth in cement mortar 1:5 (1 cement : 5 coarse sand) etc. complete.**
- 1.0. **Materials & Workmanship**  
The relevant specifications of item No. 1.17 (A) shall be followed except that the proportion of cement mortar shall be C.M. 1:4 (1 cement : 5 coarse sand)
- 2.0. **Mode of measurement & payment**
- 2.1. The relevant specification of item No. 7.17 (A) shall be followed.
- 2.2. The rate shall be for a unit of one cubic meter. t
- 7.17 (C) **Coursed rubble masonry with stone of approved quality in foundation and plinth in C.M. 1:4 (1 cement : 4 coarse sand) etc. complete)**
- 1.0. **Materials & workmanship**  
The relevant specifications of item No. 7.17 (A) shall be followed except that the proportion of mortar shall be C.M. 1:4 (1 cement : 4 coarse sand)
- 2.0. **Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 7.17 (A) shall be followed.
- 2.2. The rate shall be for a unit of one cubic meter.
- 7.17(D) **Coarsed rubble masonry with stone of approved quality in foundation and plinth in c.m. 1:3 (1 cement : 3 coarse sand) etc. complete.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specification of item No. 7.17 (A) shall be followed except that the proportion of mortar shall be C.M. 1:3 (1 cement : 3 coarse sand)
- 2.0. **Mode of measurement & payment**
- 2.1. The relevant specification of item No. 7.17 (A) shall be followed.
- 2.2. The rate shall be for a unit of one cubic meter.
- 7.19(A) **Coarsed rubble masonry with stone of approved quality for structure above plinth level up to floor two level in C.M. 1:6 (1 cement : 6 coarse sand) etc. complete.**
- 1.0. **Materials & Workmanship**
- 1.1. The relevant specification of item No. 7.17 (A) shall be followed except that the coursed rubble masonry work shall be carried out for superstructure above plinth level up to floor two level.
- 1.2. Single or double scaffolding may be used. The scaffolding shall be strong and sound. In case single scaffolding is used, the holes shall be carefully made good as directed.
- 2.0 **Mode of measurement & payment**
- 2.1. The relevant specifications of item No. 7.17 (A) shall be followed.
- 2.2. The rate shall be for a unit of one cubic meter.
- 7.75. **Precast concrete block masonry (including quoin block, jamb blocks, closer etc.) with solid concrete blocks of approved size made of cement concrete 1:3:6 Mix. (1 cement : 3 coarse sand : 6 graded stone aggregate of 20 mm. and down gauge) in foundation and plinth in cement mortar 1:6.**

## **1.0. Materials**

- (a) Aggregate shall conform to M-12. (b) Sand shall conform to M-6. (c) Cement shall conform to M-3.
- 1.1. The solid cement concrete blocks shall be precast with concrete of 1:3:6 mix (1 cement: 3 coarse sand : 6 graded stone aggregate)
  - 1.2. A block shall be deemed to be solid if the solid materials is not less than 75% of the total volume of the blocks calculated from overall dimensions.
  - 1.3. The concrete mix used for block shall be one of the following:
  - 1.4. The actual size of the block shall be one of the following:  
Size : A. 39 x 30 x 19 cms. Size-B 39 x 20 x 19 cms. Size C 39 x 10 2 19 cms.  
The size other than those specified above may be used with the approval of Engineer-in-charge.
  - 1.5. The blocks may be either machine made or hand made. The concrete mix, the mixing of concrete the manufacture of blocks, curing and drying shall be in accordance with para-6 to 10 under I.S. : 2185-1967.
  - 1.6. Faces of blocks shall be flat and rectangular Surface finish shall be rendered smooth or plastered with cement mortar 1:3 coarse sand)
  - 1.7. The average compressive strength of eight blocks when determined in the manner described-in I.S. 2185 -1967 shall not be less than 50 Kg/Sq. Cm. of gross area. The strength of lowest individual block shall not be less than 75 percent of average compressive strength of eight blocks.
  - 1.8. Concrete blocks shall be stored and stacked properly in such a way as to avoid any contact with moisture at site. They shall be stock plied on planks or other supports free from contact with ground and covered to protect against wetting. Cement mortar of proportion 1:6 shall conform to M-11.

## **2.0. Workmanship**

- 2.1. The blocks need not wetted before of during laying in the walls. In case climatic conditions so required, the top and the sides of block may only be slightly moistures so as to prevent absorption of water from the mortar and ensure the development of required bond with mortar.
- 2.2. Operations of laying precast cement concrete block masonry shall be carried out in accordance with instructions detailed in I.S. : 6042 -1952. The mortar shall not be spread so much ahead of the actual laying of the units that it tends to stiffen and loose, its plasticity, thereby resulting in poor bond. For most of the work, the joints, both horizontal and vertical shall be 10 mm. thick except in the case of extended joint, construction, the mortar joints shall be struck off flush with wall surface and when the mortar has stated stiffening, it shall be compressed with rounded or U-shaped tool. The mortar shall be pressed against the units with a jointing tool after the mortar has stiffened in effect intimate contact between the mortar and the masonry unit arid obtained a weather tight joint.

## **2.3. Quoins and closures:**

- Special quoins blocks (with a return face equal to half the length of normal face) shall be cast for ail building blocks and slabs for external work. Proper half closures shall be cast and not cut form full size blocks. The returned ends of blocks for door windows revels and quoins shall be finished with a fair face in the mould.
- 2.4. Only double scaffolding shall be used. The scaffolding be strong and sound. No holes in the masonry for supporting shall be allowed.

**2.5. Curing :** The curing of concrete block masonry shall be carried our for 7 days.

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

- 3.1. The relevant specifications of item No. 7.6 (I) shall be followed.
- 3.2. The work of concrete block masonry in foundation and plinth shall be measured under this item.
- 3.3. The rate shall be for a unit of one cubic meter.

## **7.82 (A) Precast concrete block masonry in partition walls 10 cms. thick with solid block of approved size (including quoins, blocks, jamb blocks closer etc) made of C.C. 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregates 20 mm. and down gauge) in C.M. 1:4.**

### **1.0. Materials:**

- 1.1. The relevant specification of item No. 7.75 shall be followed except that the precast concrete blocks shall be of size suitable for 10 cms. size partition wall i.e. size c and the proportions of cement mortar shall be in cement mortar 1:4 (1 cement : 4 coarse sand).

### **2.0. Workmanship**

The relevant specifications of item No. 7.75 shall be followed except that the work shall be for precast concrete block partition walls of 10 cms. thickness.

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

- 3.1. The relevant specifications of item No. 7.75 shall be followed.
- 3.2. The rate shall be for a unit of one cubic meter.

## **7.0.0.1. White stone .masonry block in coarse in superstructure with stone of approved quality in lime mortar 1:1.5 (1 Lime putty 1:5 find sand) including raking out joints etc. complete.**

### **1.0. Materials:**

- 1.1. The stone or bela shall be white hard sand stone or block. The stone shall be sound hard rough and durable. It shall be free form skin. The thickness of bela or block shall not be less than 15 cms. or as directed. The mortar used shall consist. One part of lime putty and 1.50 parts of fine sand. Lime mortar shall conform to M-10.

- 2.0. Workmanship**
- 2.1. Dressing of stone:**  
Stone shall be chiseled on all the sides so that all six sides shall be in a rectangular shape and all the stones shall be so dressed that the bushing of the exposed face shall not project nor depressions for the general wall surfaces. The size of bela or block shall be as per thickness of the wall to be constructed or as directed.
- 2.3. Laying:**  
All the stone shall be sufficiently wetted before laying to prevent absorption of water from mortar. All connected Walls in a structure shall normally be raised up uniformly and regularly. The vertical joint shall not be allowed and also it shall not be more than 12 mm. in thickness.
- 2.3.** Proper bonding shall be made by laying bela or block side by side each other with lime mortar on bed as well as in between two bela or block vertically.
- 2.4. Bond stones:**  
Bond stones or through stones running right across the thickness of the wall shall be provided in walls up to 450 mm. thick. In thicker walls two bela or blocks or laying each other by at least 150 mm. each other shall be provided across the thickness of the wall to bond stone. Such bond stone shall be at least one for every 1.0 sq. mt. area of the wall surface.
- 2.5. Joints:**  
All the joints shall be completely filled up with mortar and their thickness shall not exceed by 12 mm. When plastering or pointing is not required to be done, the joints shall be struck flush and finished, simultaneously while laying the stone. Otherwise the joints shall be raked to a minimum depth of 20 mm. during process of laying while mortar is still green.
- 2.6. Scaffolding:**  
Single or double scaffolding shall be used. It shall be strong and sound. The holes left in masonry for supporting shall be made good before plastering.
- 2.7. Curing:**  
Green work shall be cured fir a period of 7 days continuously.
- 3.0. Mode of measurements & payment**
- 3.1.** The work shall be measured on the basis of finished dimensions. No deduction shall be made nor extra payment shall be made for the following:
- (a) Ends of joint, beams, posts, girders, rafters, purlins, corbels etc., each up to 500 sq.cms. in section (b) Opening each up to 0.10 Sq.m.(c) Small plates and bed plates, bearing of chhajas and like up to 10 cms. depth (bearing or floor and roof shall" be deducted from masonry), (d) Drain holes and recesses for cement concrete blocks to embedded hold fasts of one cubic meter.
- 7.0.0.2. White stone bela masonry work in partition walls up to 15 cms. thickness in C.M. 1:4 (1 cement : 4 coarse sand.)**
- 1.0. Materials and workmanship**  
The relevant specifications of item No. 7.0.0.1 as above shall be followed except that the proportion of mortar shah be in C.M. 1:4 (1 cement : 4 coarse sand.)
- 2.0. Mode of measurement & payment**
- 2.1.** The relevant specifications of item No. 7.6 (l) shall be followed.
- 2.2.** The rate shall be for a unit of one cubic meter.
- 7.0.0.3. White stone bela masonry block in coarse in superstructure with stone of approved quality in C.M. 1:5 (1 cement: 5 coarse sand) including raking the joints etc. complete.**
- 1.0. Materials and Workmanship**  
The relevant specifications of item No. 7.0.0 1. as above, except that the proportion of cement mortar shall be in C.M. 1:5 ( 1 cement : 5 coarse sand)
- 2.0. Mode of measurement & payment**
- 2.1.** The relevant specifications of item No. 7:6 (l) shall be follow d
- 2.2.** The rate shall be for a unit of one cubic meter.
- 7.0.0.4. White stone bela masonry block in coarse in superstructure with stone of approved quality in C.M. 1:6 (1 cement : 6 coarse sand) including raking the joints etc. complete.**
- 1.0. Materials and Workmanship**  
The relevant specifications of item No. 7.0.0.1 shall be followed except that the proportion of cement mortar shall be 1:6 (1 cement : 6 coarse sand)
- 2.0. Mode of measurement & payment**
- 2.1.** The relevant specifications of item No. 7.6. (l) shall be followed.
- 2.2.** The rate shall be for a unit of one cubic meter.

## SECTION -9

### Centering & Form Work

- 9.1.(A) Providing form work of ordinary timber planking so as to give a rough finish including centering strutting and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same for in situ reinforced concrete and plain concrete work in foundation, footings, bases of columns, and mass concrete.
- 1.0. **Materials**
- 1.1. The shuttering to be provided shall be of ordinary timber plank and shall conform to M-26.
- 1.2. 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. **Workmanship**
- 2.1. 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 safe-guard 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.
- 2.2. **Clearing and Treatment of forms:**
- 2.2.1. 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.
- 2.3. **Stripping time:**
- 2.3.1. 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 mm.....14 days.
- (d) Removal of props t beams and Arches:
- (i) Spanning up to 6 mm.....14 days.
- (ii) Spanning over 6 m.....21 days.
- 2.4. **Procedure when removing the form work:**
- 2.4.1. 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
- 2.5. **Centering:**
- 2.5.1. 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.
- 2.5.2. The props of centering shall be provided on firm foundation or base of sufficient strength to carry the loads without any settlement.
- 2.5.3. 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.
- 2.6. **Scaffolding:**
- 2.6.1. All scaffolding, hoisting arrangements and ladders etc., required for the facilitating of conceding 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 with stand 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. 2.6.2. The scaffolding, hoisting arrangements and ladder shall allow easy approach to the work spot and afford easy inspection.
- 2.6.3. 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.

- 2.7. Re-Use:**
- 2.7.1.** Before re-use, all from 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.
- 3.0. Mode of Measurements & Payment**
- 3.1.** From 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.
- 3.4.** From work to secondary beams shall be measured up to the sides of main beams but no deduction shall be made form the form work of the main beam at the inter section point. No deduction shall be made form the form work of a column at inter section of beams.
- 3.5.** The rate is for the completed item
- 3.6.** The rate shall be for a unit of one sq. meter.
- 9.1.(A) (i)** **Extra for providing from work of ordinary timber planking so as to give a rough finish including centering, shuttering and propping etc., height of propping and centering below supporting floor to ceiling is between 4 to 5 m. and removal of the same for in situ reinforce or plain concrete work in foundations, footings, bases of columns etc. and mass concrete.**
- 1.0. Materials workmanship**
- 1.1.** The relevant specification of item No. 9.1. (A) shall be followed except they the height of propping and centering below supporting floor to ceiling exceeding 4 m. but not exceeding 5 m.
- 2.0. Mode of measurements and payment**
- 2.1.** The payment shall be made extra over and above the payment made up to 4 m. height. The relevant specifications of item No. 9.1.(A) shall be followed. The rate shall be for a unit of one sq. meter.
- 9.1.(B)(i)** **Providing from work of ordinary timber planking so as to give a rough finish including centering, below supporting floor to ceiling not exceeding 4 m. and removal of the same for in situ reinforced and plain concrete work in flat surface such as soffits of slabs, landing and the like floors etc. up to 200 mm. in thickness.**
- 1.0. Materials & Workmanship**
- 1.1.** Relevant specifications of item 9.1. (A) shall be followed except that work is to be carried out for flat surfaces such as soffits of slabs, landings, and the like fop floors etc. up to 200 mmm, in thickness.
- 2.0. Mode of measurement and payment**
- 2.1.** The relevant specifications of item No. 9.1 (A) shall be followed.
- 2.2.** The rate shall be for a unit of one sq. meter.
- 9.1.(B)(ii)** **Providing form work of ordinary timber planking so as give a rough finish including centering shuttering, strutting and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same for in situ reinforced and plain concrete work in flat surface such as soffits of slabs, landings, and the like floors etc. above 200 mm. in thickness.**
- 1.0. Materials and Workmanship**
- 1.1.** Relevant specifications of item No. 9.1 (A) shall be followed except that the work is to be carried out for flat surfaces such as soffits of slabs, landings, and the like for floors etc. up to 200 mm. in thickness.
- 2.0. Mode of measurement and payment**
- 2.1.** The relevant specifications of item No. 9.1 (A) shall be followed.
- 2.2.** The rate shall be for a unit of sq. meter.
- 9.1.(C)** **Proving form work of ordinary timber planking so as to give a rough finish including centering shuttering, strutting and propping etc. height of propping and centering below supporting floor to ceiling not excluding 4 m. and removal of the same for in situ reinforced concrete and plain concrete work in vertical surface such as walls (any thickness) partitions.**
- 1.0. Materials and Workmanship**
- The relevant specifications of item 9.1 (A) shall be followed except that the form work shall be carried out for vertical surfaces such as walls of any thickness, partitions etc.
- 2.0. Mode of measurement and payment**
- 2.1.** The relevant specifications of item No. 9.1 (A) shall be followed"
- 2.2.** The rate shall be for a unit of sq. meter.
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specifications of item No.9.1 .(A) shall be followed.
- 1.2.** The rate shall be for a unit on one sq. meter.
- 9.1.(G)(i)** **Providing form work of ordinary timber planking so as to-give a rough finish including centering, shuttering and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same for in situ reinforced and plain concrete work columns, pillars, ports, and struts, square rectangular, polygonal in plan.**
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specification of item No. 9.1. (A) shall be followed except that the work is for columns, pillars, posts and struts, square, rectangular, polygonal in plan.

- 2.0. Mode of measurement and payment**
- 2.1.** The relevant specification of item No. 9.1. (A) shall be followed.
- 2.2.** The rate shall be for a unit of one sq. meter.
- 9.1.(H)(I) Providing form work of ordinary planking so as to give a rough finish including centering, shuttering, strutting and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same for in situ reinforced and plain concrete work in side and soffits of beam haunchings, cantilevers, girders, bressumers, and lintels not exceeding 1 m. depth.**
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specification of item No. 9.1 (A) shall be followed except that the .work is for sides and soffits of beams, haunting cantilevers girders, bressumers and lintels not exceeding 1 M. in depth.
- 2.0. Mode of measurement and payment**
- 2.1.** The relevant specifications of item No. 9.1 (A) shall be followed.
- 2.2.** The rate shall be for a unit of one sq. meter.
- 9.1.(H)(2) Providing form work of ordinary timber Planking so as to give a rough finish including centering, shuttering, strutting and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same for in situ reinforced and plain concrete work in sides and soffits of beams, haunchings, cantilevers, girders, bressumers and lintels exceeding 1 m. in depth.**
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specifications of item No. 9.1.(A) shall be followed except that the work is for side and soffits of beam hunchings, girders, bressumers and lintels, exceeding 1 m. in depth.
- 2.0. Mode of measurement and payment**
- 2.1.** The relevant specifications of item No 9.1.(A) shall be followed except that the work is for side and soffits of beams haunting cantilevers, girder bressumers and lintels, exceeding 1 m. in depth.
- 2.2.** The rate shall for a unit of one sq. meter.
- 9.1.(i) Providing from work of ordinary timber planking so as to give a rough finish including centering, shuttering and propping etc. height of propping and centering below supporting floor toe ceiling not exceeding 4 m. and removal of the same for situ reinforced and plain concrete work in edges of slabs and breaks in floor and walls.**
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specifications of item No. 9.1. (A) shall be followed except that the work is for edges of breaks in floors and walls.
- 2.0. Mode of measurements and payment**
- 2.1.** The length and breadth shall be measured nearest to one Cm.
- 2.2.** The. rate shall be for a unit of one Sq. meter.
- 9.1.(K) Providing form work of ordinary timber planking so as to give a rough finish including centering shuttering, strutting and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same in situ reinforced and plain concrete in small surface such as cantilevers ends, brackets and ends of the steps., caps and bases to pilasters and columns and the like.**
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specifications of item No. 9.1.(A) shall be followed except that work is for small as cantilever ends, brackets and ends of steps, caps and bases to pilasters and columns and the like.
- 2.0. Mode of measurement and payment**
- 2.1.** The relevant specification of item No. 9.1.(A) shall be followed.
- 2.2.** The rate shall be unit of one sq. meter.
- 9.1.(l) Providing form work of ordinary timber planking so as to give a rough finish including centering, shuttering, strutting and propping .etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same for in situ reinforced and plain concrete in chullah hoods, weather sheds, chhajas, corbels etc. including edges.**
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specifications of item No. 9.1 (A) shall be followed except that the work is for chullah hoods, weather-sheds, chhajas, corbels, etc. including edges of the same.
- 2.0. Mode of measurements and payment**
- 2.1.** The relevant specification of item No. 9.1. (A) shall be followed.
- 2.2.** The rate shall be for a unit of one square meter.
- 9.1.(M) Providing from work of ordinary timber planking so as to give a rough finish including centering, shuttering and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same for in situ reinforced and plain concrete work in staircase with slopping or stepped soffits including risers and stringers excluding landing.**
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specifications of item No. 9.1.(A) shall be followed except that the work is for staircases, with slopping or stepped including risers and stringers excluding landing.

**2.0. Mode of measurements and payment**

2.1. The relevant specifications of item No. 9.1. (A) shall be followed.

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

**9.1.(Q) Providing form work of ordinary timber planking so as to give a rough finish including centering shuttering, strutting and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same for In situ reinforced and plain concrete work in vertical fins and vertical sun-breakers.**

**1.0. Materials and Workmanship**

1.1. The relevant specifications of item No. 9.1. (A) shall be followed except that the work is for vertical fins and vertical sun breakers.

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

**9.7. Extra for providing form work with sweating of steel sheets so as to give a fair finish in :**

(A) Foundation, footings, base of columns etc. mass concrete.

(B) Flat surfaces such as soffits, of slab landing and the like.

(i) Floors etc. up to 200 mm. in thickness.

(ii) Floors etc. above 200 mm. in thickness.

(C) Vertical surfaces such as walls (Any thickness) partitions.

(D) Columns, pillars posts and struts.

1. Square, rectangular, bressumers, and lintels not exceeding 1 mm. depth.

2. Sides and soffits and beams, beam haunchings, cantilevers, girders, breassumers and lintels exceeding 1 mm. in depth.

(I) Edges of slabs, and breaks in floors and walls.

(K) Small surfaces such as cantilever ends, brackets, and ends of steps, caps and bases to pillars and columns including edges.

(L) Chollar woods, weather sheds, chhajjas, corrodes etc. and the like.

(M) Stair cases sloping or stepped soffits, including risers, skimmers excluding landing.

(Q) Vertical fine and vertical sun breakers.

**1.0. Materials and Workmanship**

1.1. The relevant specification of item No. 9.1 (A) to (Q) shall be followed except that the extra rate shall be paid for using sheathing of steel sheets, and plates of steel or plywood instead of ordinary timber plank, to obtain a desired smooth exposed finish of surface. The surface shall be presentable without further treatment.

**2.0. Mode of measurements and payment**

2.1. The measurement of form work shall be taken for the work done with steel sheathing, extra over and above the rate of form work of respective item ' from work done. The relevant specification of respective item No. 9.1. (A) to (Q) shall be followed.

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



## SECTION 10

### Wood Work, Doors & Windows

#### 10.1.(A) Providing wood work in frames of doors, windows, clerestory windows and other similar work, Wright, framed and fixed in position, Indian Teak wood.

##### 1.0. Materials

Wooded in frames shall conform to M-29.

##### 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 planed 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 post 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.

##### 3.0. Mode of Measurements and payment

3.1. The linear dimensions shall be measured correct up to 1 cm. The quantity shall be worked out correct to places of decimals of cu. m.

3.2. The rate shall be for a unit of 10 cu. diameter.

#### 10.4.(A) Providing work in trusses, purloins, falters, posts, post plates, wall plates, and like wrought, framed, hoisted and fixed in position, Indian teak wood.

##### 1.0. Materials

The teak wood shall conform M-29.

##### 2.0. Workmanship

2.1. The relevant specifications of item No. 10.1.(A) shall be followed except that wood work shall be carried mi\* in trusses, purloins, falters, posts, plates, wall plates and like wrought framed.

2.2. The work shall be carried out as per detailed drawings supplied by the Department as directed;

2.3. The length of the each member shall be in one piece or as directed.

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

The length, breadth and depth shall be measured nearest to 1 cm. of unfinished member. The rate shall be for a unit of 10 cubic Decimeter.

#### 10.5. (A) Providing wood work in frames of false ceiling partition etc. swan and put up in position, Indian teak wood.

##### 1.0. Materials

The teak wood shall conform to M-29.

##### 2.0. Workmanship

The relevant specification of item No. 10.1.(A) shall be followed except that the wood work shall be for false, ceiling, partitions, etc. swan and put in position.

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

3.1. The relevant specifications of item No. 10.1.(A) shall be followed.

3.2. The rate shall be for a unit of Ten cubic Decimeter.

#### 10.12.(A)(i) Providing and fixing 35 mm. thick fully paneled shutters for doors, windows and clerestory windows including anodised aluminum butt hinges with necessary screws. Indian Teak Wood.

- 1.0. Materials.**
- 1.1. Wood for shutter shall conform to M-29. 2. Glass shall conform to M-38. 3. Anodised aluminum butt hinges shall conform to M-43.
- 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 anodised butt hinges including fixing with iron screws. The size and number of hinges shall be as per table given in annexure-1.
- 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.
- 19.12.(A)(II) Providing and fixing 35 mm. thick fully shutters for doors, windows and clear story windows including anodised aluminum butt hinges with necessary screws, Indian teak wood.**
- 1.0. Materials**
- Teak wood shall conform to M-29 Glass shall conform to M-38. Anodised aluminum butt hinges shall conform to M-43.
- 2.0. Workmanship**
- 2.1. The relevant specifications of item No. 10.12 (A) I shall be followed except that the 35 mm. thick shutters full glazed for doors, windows and clear story windows including anodised aluminum butt hinges with necessary screws.
- 2.2. Glazing:**
- 2.2.1. The glass panels shall be embedded in putty and secured to the rebate by wooden beads, or moulding shape and size as approved with counter sunk screws of suitable size.
- 2.2.2. The glass panels shall be properly cut to fit the rebates of the frames and sashes fully with a slight minus margin of about 1.5. mm. on all sides. Before blazing, the frame shall be primed and prepared for painting so that wood may not draw oil out of putty. The rebate shall be putted to an extent to provide bedding all round the glass.
- 2.2.3. The glass shall then be bedded in putty and fitted to frames with wooden heads or moulding as directed and secured with counter sunk screws. The screws shall be spaced not more than 100 mm. from each corner and not more than 200 mm. apart.
- 2.2.4. The size of the rebate in the frame and size and shape of beads of moulding shall be as per detailed drawings or as directed. The beads or mouldings shall have mitred corners.
- 3.0. Mode of measurement and payment**
- 3.1. The relevant specifications of item No. 10.12 (A) (I) shall be followed.
- 3.2. The rate shall be for a unit of one sq. meter.
- 10.12(A)(III) Providing and fixing 35 mm. thick partly paneled and party glazed shutters, or doors, windows, including anodized aluminum butt hinges with necessary screws, Indian teak wood.**
- 1.0. Materials**
- Teak wood shall conform to M-29. Glass shall conform to M-38. Anodised aluminum butt hinges shall conform to M-43.
- 2.0. Workmanship**
- The relevant specifications of item No. 10.12.(A) (II) shall be followed except that the 35 mm. thick shutter shall be partly paneled and partly glazed for doors, windows, clear story windows etc. as per drawings.
- 3.0. Mode of measurement and payment**
- 3.1. The relevant specifications of item No. 10.12 (A) (I) shall be followed.
- 3.2. The rate shall be for a unit of one sq. meter,

- 10.13.(A)(I) Providing and fixing 35 mm. thick full paneled, shutters for doors, windows and clear story windows including black enameled M.S. Butt, hinges with necessary screws, Indian Teak Wood.**
- 1.0. Materials & Workmanship**
- 1.1.** The relevant specifications of item No. 10.12 (A) (I) shall be followed except that the hinges shall be of black enameled M.S. Butt hinges. The hinges, bolts and other items of iron mongery with moving parts shall be properly oiled by the contractor before handing over the building.
- 2.0. Mode of measurement and payment**
- 2.1.** The relevant specifications of item No. 10.12 (A) (I) shall be followed.
- 2.2.** The rate shall be for a unit of one sq. meter.
- 10.13.(A)(II) Providing and fixing 35 mm. thick full glazed shutters for doors, windows and clear story windows including black enameled M.S. Butt, hinges with necessary screws, Indian Teak Wood.**
- 1.0. Materials & Workmanship**
- 1.1.** The relevant specifications of item No. 10.12 (A) (II) shall be followed except that the hinges shall be of black enameled M.S. Butt hinges. The hinges bolts and other items of iron mongery with moving parts shall be properly oiled by the contractor before handing over the building.
- 2.0. Mode of measurement and payment**
- 2.1.** The relevant specifications of item No. 10.12 (A) (I) shall be followed:
- 2.2.** The rate shall be for a unit of one sq. meter.
- 10.13(A)(III) Providing and fixing 35 mm. thick partly paneled and partly glassed shutters for doors, windows, and clearstory windows including black enameled M.S. Butt hinges with necessary screws, Indian Teak Wood.**
- 1.0. Materials & Workmanship**
- The relevant specification of item No. 10.12 (A) (III) shall be followed except that the hinges shall be of black enameled M.S. butt hinges, bolts and other items of ironmongery with moving parts shall be properly oiled by the contractor before handing over the building.
- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specifications of item No. 10.12. (A) (I) shall be followed.
- 2.2.** The rate shall be for a unit of one sq. meter.
- 10.15.(A)(I) Providing and fixing 25 mm. thick paneled, shutters for cup-boards etc. including anodised aluminum butt hinges with necessary screws, Indian Teak Wood.**
- 1.0. Materials**
- First class Indian teak wood for shutters shall conform to M-29. Glass shall conform to M-38. Anodised aluminum butt hinges shall conform to M.43.
- 2.0. Workmanship**
- 2.1.** The relevant specification of item No. 10.12. (A) (I) shall apply except that the thickness of shutter shall be 25 mm. for cup-boards.
- 3.0. Mode of measurement & payment**
- 3.1.** The relevant specifications of item No. 10.12 (A) (I) shall be followed.
- 3.2.** The rate shall be for a unit of one sq. meter.
- 10.15.(A)(H) Providing and fixing 25 mm. thick fully glazed shutters for cup-boards etc. including anodised aluminum butt hinges with necessary screws, Indian teak wood.**
- 1.0. Materials & Workmanship**
- The relevant specifications of item No. 10.12.(A) (I) and 10.12 (A) (II) shall be followed except that the thickness of shutters shall be 25 mm. thick and partly paneled and partly glazed shutters as per drawings for cup-boards.
- 2.0. Mode of measurements and payment**
- 2.1.** The relevant specifications of item No. 10.12 (A)(I) shall be followed.
- 2.2.** The rate shall be for a unit of one sq. meter.
- 10.15.(A)(IH) Providing and fixing 25 mm. thick partly paneled and partly shutters for cub-boards etc. including anodised aluminum butt hinges with necessary screws, Indian teak wood.**
- 1.0. Materials & Workmanship**
- The relevant specifications of item No. 10.12.(A) (I) and 10.12 (A) (II) shall be followed except that the thickness of shutters shall be 25 mm. thick and partly paneled and partly glazed shutters as per drawings for cupboards.
- 2.0. Mode of measurements and payment**
- 2.1.** The relevant specifications of item No. 10.12 (A)(I) shall be followed.
- 2.2.** The rate shall be for a unit of one sq. meter.
- 10.16.(A)(I) Providing and fixing 25 mm. thick fully paneled, shutters for cup-boards etc., including black enameled M.S. butt hinges with necessary screws, Indian Teak Wood.**
- 1.0. Materials & workmanship**
- 1.1.** The relevant specifications of item No. 10.12 (A) (I) shall apply except that the wood for shutters shall be Indian teak wood and black enameled M.S. Butt hinges are to be used instead of anodised aluminum butt hinges and thickness of shutter shall be 25 mm.
- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specifications of item No. 10.12. (A) (I) shall be followed.
- 2.2.** The rate shall be for a unit of one sq. meter.

- 10.16.(A)(H) Providing and fixing 25 mm. thick fully glazed shutters for a cup-boards etc., including black enameled M.S. Butt hinges with necessary screws, Indian Teak Wood.**
- 1.0. Materials & Workmanship**  
The relevant specifications of item No. 10.15.(A) (I) shall be followed except that the fully glazed shutters of 25 mm. thickness shall be of India Teak Wood fixed in position with black enameled butt hinges for cup-boards.
- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specifications of item No. 10.12 (A) (I) shall followed.
- 2.2.** The rate shall be for a unit of one sq. meter.
- 10.16.(A)(III) Providing and fixing 25 mm. thick partly paneled and partly glazed shutters for cupboards etc., including black enameled M.S. butt hangs with -necessary screws. Indian Teak Wood.**
- 1.0. Materials**  
The relevant specifications of item No. 10.15 (A) (I) & 10.15 (A) (II) shall be followed except that the shutters shall partly paneled and partly glazed of 25 mm. thickness of Indian Teak Wood fixed with black enameled butt hinges for cup-boards.
- 2.0. Mode of measurement & payment**
- 2.1.** The relevant specifications of item No. 10.12 (A)-shall be followed. 12. The rate shall be for a unit of one sq. meter.
- 10.23. Providing and fixing 35 mm. thick paneled glazed or paneled and glazed shutters for doors, windows, and clearstory windows including anodised aluminum butt hinges with necessary screws. Indian Teak Wood shutters with (A) Plywood,(B) Particle, (C) Hard Board, (D) Asbestos Sheet panels.**
- 1.0. Materials**  
Indian teak wood for shutters shall conform to M-29. Glass shall conform to M-38.  
(A) Plywood shall conform to M-37.  
(B) Particle board shall conform to M-40. Anodised aluminum butt hinges shall conform to M-43.  
(C) Hard board shall of best quality and shall be as approved by Engineer-in charge.  
(D) A.C. sheet shall conform to M-24.
- 2.0. Workmanship**
- 2.1.** The relevant specifications of item No. 10.12 (A) (I) shall apply to this item except that the work is shuttered with (A) plywood (B) particle board (C) hard board panels (D) A.C. sheets panels as specified in item.
- 2.2.** The shutter shall be prepared by fittings styles and rails (top, bottom, lock and frieze) as for paneled leaves with simple chamfer on edge only. The styles and rails shall be grooved with just sufficient width for receiving panels and plain panels of specified type panels shall be fitted into the grooves.
- 3.0. Mode of measurements & payment**
- 3.1.** The relevant specifications of item No. 10.t2 (A) (I) shall be followed.
- 3.2.** The rate shall be for a unit of one sq. meter.
- 10.24. Providing and fixing 35 mm. thick paneled, glazed or paneled and glazed shutters for doors, windows and clearstory windows including black enameled M.S., butt hinges with necessary screws. Indian Teak Wood shutters with (A) Plywood (B) Particle board (C) Hard Board (D) Asbestos panels.**
- 1.0. Materials & Workmanship**
- 1.1.** The relevant specifications of item No. 10.23 shall be followed except that the hinges shall be of back enameled M.S. Butt hinges instead of anodised aluminum butt hinges and shutter with (A) Plywood (B) Particle board (D) Hard Board (D) Asbestos sheet panels as specified in item.
- 2.0. Mode of measurement & payment**
- 2.1.** The relevant specifications of item No. 10.12 (A) (I) shall-be followed.
- 2.2.** The rate shall be for a unit of one sq. meter.
- 10.30. Providing & fixing flush door shutters, solid core construction with frame of 1st class hard wood with cross band and face veneer or plywood face panels including anodised aluminum butt hinges with necessary screws (B) Non-decorative type and block board core. (2) 35 mm. thick.**
- 1.0. Materials**  
Flush door shall conform to M-30. Plywood shall conform to M-37. Anodised 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.
- 2.2.** Ready made 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 & payment**
- 3.1.** The relevant specification of item No. 10.12 A (I) shall be followed.
- 3.2.** The rate shall be for a unit of one sq. meter.
- 10.37. Extra for using bright finished M.S. Piano hinges instead of anodised aluminum butt hinges in flush door shutter (A) Nickel Plated Piano hinges.**
- 1.0. Materials and workmanship**

- 1.1. The relevant specification of item No. 10.30 shall be followed except that the nickel plated piano hinges shall be provided and fixed. It shall conform to the latest Indian Standards and shall be got approved by the Engineer-in-charge.
- 2.0. Mode of measurement & payment**
- 2.1. The extra payment shall be made on sq. M. basis of door over and above item No. 10.30 for providing finish M.S. planed hinges instead of anodised aluminum butt hangs.
- 2.2. The rate shall be for a unit of one sq. meter.
- 10.39. Extra for providing vision panel not exceeding 0.1 sq. m. in all types of flush doors. (A) Rectangular square.**
- 1.0. Materials and workmanship**
- 1.1. The relevant specification of item No. 10.30 shall be followed except that the vision panel not exceeding 0.1 sq. m. shall be provided.
- 1.2. The glass panels shall conform to M-38 and this item is extra work of providing vision panel rectangular or square not exceeding 0.1 sq. in all types of flush doors.
- 2.0. Mode of measurements & payment**
- 2.1. The payment shall be made over of item No. 10.30 for this extra work on shutter in which visions panels are provided.
- 2.2. The rate shall be for a unit of one sq. meter of door area.
- 10.51. Providing and fixing 30 mm. thick wire gauze shutters using galvanised M.S. Wire of I.S. gauze designation 85-G with wire of 0.56 mm. dia butt hinges with necessary screws : Indian Teak Wood.**
- 1.0. Materials**
- Wire gauze all shall conform to M-36. The teak shall conform to M-29. Anodised aluminum butt hinges shall conform to M-43.
- 2.0. Workmanship**
- 2.1. Specification for item No. 10.12 A(I) shall be adopted for shutter and fixtures and fastenings except thru 30. mm. thick wire gauze shutter shall be provided.
- 2.2. Wire gauze shuttering:**
- 2.2.1. The finished sizes of the wooden components like styles, rails, mountings, shall be as per the paneled doors. Each leaf shall have 2 panels of wire gauze as per drawings or as directed.
- 2.2.2. The styles, rails etc. shall be rebated 12 mm. along the side where they receive the gauze The galvanised iron webbing of 0.56 mm. dia mesh shall be used unless otherwise specified. The webbing shall be at 90 to 12 mm. along both sides of the rebate and fixed securely to the styles and rails and fillets of the size 10 mm x 10 mm, shall be securely and neatly fixed with small screws, spaced about 7.5. cm. centers round the rebate for each panel of webbing,- After the fillets are pressed well into the angle or hole the gauze on two faces, the exposed edge of fillets shall be neatly rounded. The gauze shall be tightly stretched during fixing The space between the fillet and the rebate where the webbing is bent shall be neatly finished with putty, so that cut end of webbing may not be visible. Each shutter shall be fitted with a pair of anodised aluminum butt hinges with necessary iron screws.
- 3.0. Mode of measurement & payment**
- 3.1. The relevant specifications of item No. 10.12 shall be followed.
- 3.2. The rate shall be for a unit of one sq. meter.
- 10.53. Providing and fixing 30 mm. thick wire gauze shutters using galvanised M.S. wire of wire gauze designation 85 G with wire of 0.56 mm. dia. for doors, windows, and clerestory windows including bright finished or/and black enameled M.S. butt hinges with necessary screws. Mango wood or equivalent quality.**
- 1.0. Materials & workmanship**
- The relevant specification of item No. 10.51 shall be followed except that the hinges to be used shall be bright finish or/and black enameled M.S. butt hinges with screws and the wood shall be used of Mango wood or equivalent quality of non teak wood.
- 2.0. Mode of measurement and payment**
- 2.1. The relevant specification of item No. 10.12 shall be followed.
- 2.2. The rate shall be for a unit of one sq. meter.
- 10.54. Extra for providing and fixing galvanised M.S. gauze of I.S. gauge designation 140 G. to doors windows and clerestory windows with wire of dia 0.71 mm. instead of I.S. gauge designation 85 G. with wire of dia. 0.56 mm.**
- 1.0. Materials & workmanship**
- 1.1. The relevant specification for item no. 10.51 & 10.53 shall be followed for this item except that the diameter of wire shall be 0.71 mm. of I.S. gauge designation 140 G. instead of 596 G. diameter I.S. gauge designation 85 G.
- 2.0. Mode of measurements and payment**
- 2.1. The payment shall be made extra over and above the payment for galvanised M S wire gauge.
- 2.2. The rate I.S. gauge designation 85 G. shall of one sq. mt of size of doors and windows shuttles

**10.74. Providing and fixing 12 mm. thick and 100 mm. wide pellet of flat pressed 3 layer veneered particle board solid core with 25 mm. diameter aluminum curtain rod brackets including fixing with 25 mm. x 3 m. M.S. flat 10 long and plug etc. comp.**

**1.0. Materials**

(1) 3 layers veneered particle board solid core snail-conform to M-40 25. mm. diameter aluminum curtain rod and 25 mm. x 3 mm. x 10 cms. long M.S. flat and plugs shall of best approved quality as directed.

**2.0. Workmanship**

The work shall be done as per drawing and description given in the item of work. The wooden planks shall be planed smooth and oven on the exposed surface.

The pellet shall be fixed Jo level by means of 10 cms. long x 25 mm. x 3 mm. M.S. flat brackets lent in the form of angle and wooden plug fixed in the walls using wood screws. For pelmet up to 1.5 meter long two such brackets shall be used and additional bracket provided for longer pelmet at the rate of one per meter length extra. The curtain rods be fixed by suitable brackets at the ends to the pelmet as directed.

**3.0. Mode of measurement and payment**

**3.1.** Pelmets shall be measured in running meters along the sides and face.

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

**10.84. Providing and fixing 40 mm. paneled, glazed or paneled and glazed partitions fixed to frames with iron screws etc., complete with India teak wood (Frames to be paid separately)**

**1.0. Materials**

Indian Teak wood shall conform to M-29. Glass shall conform to M-38. Iron screws on shall of best approved quality. Plywood asbestos shall conform to relevant specification of materials.

**2.0. Workmanship**

The work shall be done as per detailed drawing or as directed. The wooden frames shall be of sizes as indicated in the drawing and description of item. They shall be planed and finished smooth and even. The vertical styles and rails shall be framed by tenon and mortise joints.

The panels which may be of planks, asbestos, plywood, glass or any other materials specified shall be fixed in the grooves made in styles and rails or by means of rebate and beading fixed by suitable screws. When glazing is used as panels the glass shall be fixed by using putty in addition to beading, (he putty shall be used before applying material.

**3.0. Mode of measurement and payment**

Partitions shall be measured in square meters of the net area of the tiller materials provided. The rate shad be for a unit of one sq. meter.

**10.85. Providing and fixing decorative plywood 4 mm. thick in portions including fixing to frames with screws etc., complete with 50 mm. x 12 mm. teak wood beading (Frames to be paid separately)**

**1.0. Materials**

4 mm. thick decorative plywood shall be of best approved quality. Teakwood beading and screws shall of best approved quality as directed.

**2.0. Workmanship**

The relevant specifications shall be same, as per that of item No. 10.84 expect that partitions shall be with 4 mm. thick decorative plywood and with teakwood beading.

**3.0. Mode of measurements and payment**

The specifications shall be same as that of item No. 10.84. The rate shall be for a unit of one square meter.

**10.86. Providing an fixing plain Asbestos cement sheet 6 mm. thick in partition including fixing to frames with screws etc., complete with 50 mm. x 12 mm. deodar wood beading (Frames to be paid separate)**

**1.0. Materials**

Plain A.C. Sheets shall conform to M-24. Deodar wood beading shall conform to M-29. A.

**2.0. Workmanship**

The relevant specification of item No. 10.84 shall be followed same except that plain asbestos cement sheet 6 mm. thick shall be used in partition and Deodar wood beading of size 50 x 12 mm. size shall be used.

**3.0. Mode of measurement and payment**

**3.1.** The relevant specifications of item No. 10.84 shrill pp followed except that the rate excludes cost of frame work.

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

**10.88. Providing and fixing in partition 4 mm. thick medium hard board approved quality including fixing to frames with screws etc., complete with 50 x 12 mm. Teak wood beading (Frame to paid separated)**

**1.0. Materials**

The hard board shall be 4 mm. thick and of best quality and made as approved. Teak wood beading shall conform to M-29.

**2.0. Workmanship**

The relevant specifications of item No. 18.84 shall he followed except that the hard board of 4 mm. thickness shall be used in partition and teak wood beading 50 x 12 mm. size shall be used.

**3.0. Mode of measurements and payment**

**3.1.** The relevant specifications of item No. 10.84 shall be followed except that the rate excludes cost of frame work.

- 3.2. The rate shall be for a unit of one square meter.
- 10.96. **26 mm. thick wooden shelves supported on 40 x 40 x 6 mm. T or Iron brackets fixed at suitable distances not exceeding 75 cms. apart with Mango wood or equivalent quality.**
- 1.0. **Materials**  
The mango wood shall conform to M-29-A. Structural steel shall conform to M-22
- 2.0. **Workmanship**  
The mango wood or equivalent quality not) teak wood shelves shall be prepared from 25 mm. thick planks. The planks shall be planed smooth. The planks shall be used in single piece up to 30 cms. width. The shelves shall be fitted in position by fixing 40 x 40 x 6 mm. T or L Iron brackets. The spacing of brackets shall not be more than 75 cms. The 40 x 40 x 6 mm. T or L Iron brackets shall be fixed firmly in position by imbedding the same in concrete. The shelves shall be fixed as directed. The season teak wood buttons of size 35 x 12 mm. shall be fixed on open side as directed.
- 3.0. **Mode of measurements and payment**
- 3.1. The shelves shall be measured in Sq. meter. The length and breadth of shelves shall be measured net.
- 3.2. The rate is inclusive of button provided:
- 3.3. The rate shall be for a unit of one sq. meter.
- 10.97. **40 mm. thick wood shelves supported on 40 x 40 x 6 mm. T or L Iron brackets fixed at suitable distance but not exceeding 75 cms. apart with mango wood or equivalent quality.**
- 1.0. **Materials & Workmanship**  
The relevant specifications of item No. 10.96 shall be followed except that the thickness of shelves shall be 40 mm Thick teak wood buttons shall be provided of 50 x 12 mm. on all open sides.
- 2.0. **Mode of measurements & payment**
- 2.1. The relevant specifications of item NO. 10.96 shall be followed.
- 2.2. The rate shall be for a unit of one square meter.
- 10.99. **Providing and fixing M.S. round or square bars with M.S. flats at required spacing in wooden frames of windows and clerestory windows.**
- 1.0. **Materials**  
M.S. bars and flats shall conform m. 18 and M-22 respectively.
- 2.0. **Workmanship**
- 2.1. The M.S. bars shall be fabricated as shown in the drawing or as directed. It shall conform to I.S. 226-1975 and I.S. 96 and I.S. 1977-1975. The M.S. bars shall be fixed at the required spacing in mild steel flats, after drilling holes in the latter. The diameter and spacing of these bars shall be as mentioned in the drawing or as directed. The bars shall be passed through drill holes drilled into the mild steels flats, fixed in the recess in frames. The flats shall be fixed with iron screws.
- 3.0. **Mode of measurements & payment**
- 3.1. The rate shall be for the M.S. round or square bars with M.S. flats provided and fixed in position as per the specifications for the completed item.
- 3.2. The rate shall be for a unit of one Kg
- 10.100.(A) **Providing and fixing M.S. Grills of required pattern to wooden frames of windows etc., with M.S. flats at required spacing and frame around, square, or round bars with round headed bolts and nuts or by screws : 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.
- 10.100.(B) **Providing and fixing M.S. Grill of required pattern to wooden frames of windows etc. with" M.S. plates, at required spacing and frame around, square or round bars with round headed bolts and nuts or by screws and with ornamental grill.**
- 1.0. **Materials & Workmanship**
- 1.1. The relevant specification of item no. 10.100 (A) shall be followed except that the work is for of ornamental grill.
- 2.0. **Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 10.100 (A) shall be followed.
- 2.2. The rate shall be for a unit of one Kg.

- 10.102. Providing and fixing hard drawn steel wire fabric 75 x 25 mm. mesh of weight not less than 7.75 kg. per sq.M to window frames etc, including 60 x 20 mm. beading of teak wood.**
- 1.0. Materials**  
Hard drawn steel wire of 75 x 25 mm. mesh shall conform to M-34. Teak wood beading shall conform to M-29.
- 2.0.** The steel wire fabric 75 x 25 mm. mesh of weight of not less than 7.75 kg per Sq.M. to windows frames etc. shall be fabricated as per detail drawings. The wire fabric shall be fixed to windows frame by teak wood beading of 60 x 20 mm. size be by means of screws.
- 3.0. Mode of measurements & payment**
- 3.1.** The wire mesh (Hard drawn) shall be measured net clear opening of frame of windows in which mesh is fitted. Nothing shall be paid extra for fixing mesh in groove below teak woods-beading.
- 3.2.** The rate shall be for a unit of one sq. meter.
- 10.103. Providing and fixing fly proof galvanised M.S. Wire gauge of I.S, Gauge designation 85 G. with wire of dia. 0.56 mm. to windows and clerestory windows including 60 x 20 mm. beading of Indian Teak Wood.**
- 1.0. Materials**  
The fly proof galvanised M.S. wire gauge shall conform to M-36. Teak wood .beading shall conform to M-29. 2.0. Workmanship  
The relevant specifications of item No. 10.102 Shall be followed except that fly proof galvanised M.S. wire gauge of I.S. gauge designation 85-G with wire of 0.56 mm. shall be provided.
- 3.0. Mode of measurement & payment**
- 3.1.** The relevant specifications of item No. 10.102 shall be followed.
- 3.2.** The rate shall be for a unit of one square meter.
- 10.120. Providing and fixing first class Indian teak wood, 75 x 60 mm. moulded hand rails in , straight lengths completed.**
- 1.0. Materials**  
First class Indian teak wood shall conform to M-29.
- 2.0. Workmanship**  
The teak wood hand rail shall be of size 75 x 60 mm. The hand rail shall be prepared from first class Indian teak wood. The hand rail shall be moulded as per detail drawings. The hand rail shall be fixed in straight length as per detail drawings with screws. The relevant specifications of item No. 10.4 shall be followed except that the teak wood work shall be for a railing of specified size.
- 3.0. Mode of measurements & payment**
- 3.1.** The hand rail shall be measured in running meter.
- 3.2.** The rate shall be for a unit of one running meter.
- 10.0.0.(I) Providing and fixing glazed louvered Glass windows and ventilators with teak wood frame 10 x 75 mm. 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**  
The relevant specifications of item No. 10.1 (A) 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 450.
- 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.
- 3.3.** The rate shall be far a unit of one square meter.
- 10.0.0.(II) Providing & fixing with wooden louvers plank 12 mm. thick windows and ventilators with teak wood frame 10x7 cms. size including 3 coats of oil painting to wood etc complete.**
- 1.0. Materials & Workmanship**  
The relevant specifications of item No. 10.00 (I) shall be followed except that the teak wood planks 12.00 thick louvers shall be provided.
- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specifications of item No. 10.00 (I) shall be followed.
- 2.2.** The rate shall be for a unit of one square meter



## SECTION-11

### Steel Shutters, Windows, Ventilators

**11.2. (A) Steel work riveted, in built up sections, framed work including cutting, hosting fixing in position and applying a priming coat of red lead paint. In beam and joints, channels, angles tees, flats, with connecting plates or Angle cleats as in main & cross beams, Hop and jack falters, pralines connected to common rafters and the like.**

**1.0. Materials**

The structured steel work shall conform to M-22. Red lead paint shall conform to I.S : 102-1962.

**2.0. Workmanship**

**2.1.** The steel sections as specified or required, shall be cut, square and to correct lengths, as per drawings and design. The .cut ends exposed to view shall be finished smooth. No two pieces shall be welded or otherwise jointed to make up the required length of member, except as indicated in the drawing or as directed. All straightening and shaping to form shall be done by application of pressure and not by hammering. Any bending or cutting shall be carried out in [suet] a manner as not to impair the strength of the metal. All operations shall be done in cold state unless otherwise directed/permittted.

**2.2.** Steel riveted or bolted in built up sections, frame work.

**2.2.1.** The steel structure as shown in the drawings or as per direction of the Engineer-in-charge shall be laid out on a level platform to full scale and to full size in parts. A steel tape shall be used for measurements to ensure maximum accuracy.

**2.2.2.** Wooden templates 12 mm. to 19 mm. thick or metal sheet template shall be made to correspond to each connecting gussets plate and rivet holes shall be accurately marked on them and drilled. The templates shall be laid on the steel members and holes of the steel members shall also be marked for curing. The base of steel column and the .position of Anchor bolts shall be carefully set out

**2.2.3.** All stiffeners shall be formed by pressure and where practicable the metal shall not to be cut and welded in making these. In major work', or where so specified, shop drawings giving complete details and information for the fabrication of the component parts of the structure including location, type, size, (origin and details or rivets, bolts or weld shall be prepared in advance of the actual fabrication and as distinctly marked or stenciled with paint with the identification mark as given in the stop drawings. The bars shall be thickened at the ends, so as to provide for screwed threads and gradually tapered off to meet their normal section.

Great accuracy shall be observed in fabrication of various member, so that these can be assembled without being unduly packed, stained, or forced into position and when build up, shall be true and free from twists, brinks, buckles, or open joints.

Before making holes in individual members for fabrication the steel work intended to be riveted or belted together shall be as ambled or clamped properly and tightly so as to ensure close abutting or lapping or the surfaces of the different members. All softeners shall bear tightly both at top and bottom without being drawn or caulked. The abutting joints shall be cut or crossed true and straight and fitted close together. Web splice plates and tillers under stiffened shall be cut to fit within 3 mm. or flange Angles Web plates of Girders shall have no cover. Plates, shall have their ends flush with the top of angles forming the flanges unless otherwise required. The web plates when spiced ^ .hall have clearance of not more than 6 mm. The erection, clearance for created ends of members connecting steel shall preferably be not greater than i.5 mm. The erection clearance at the ends o' beams without web cleats shall not be more than 3 mm. at each end but where for a practical reason greater clearance is necessary, suitably designed seating shall be provided.

Pains and rollers shall be accurately tuned to gauge. These straight and smooth and free from flows. The roller bearing shall be provided with adequate arraignments fur holding the girders or truss resting on it. In columns caps and bases, the ends of shifts together with the attached gussets Angles, channels etc after riveting together shah be accurately mechanized so that the parts connected butt against each other over the entire surfaces of contact connecting angles or channels shall he fabricated and placed in position with greater accuracy so that they are nut unduly reduced in thickness by machining. The ends of bearing stiffeners shall be mechanized or ground to tit tightly both at the top and bottom, Alt holes shall generally be drilled to the required size and at required, position. Sub punching shall be permittted provided it is done 3 mm. or less in diameter and reamer thereafter to the require size. The holes for rivets and bolts shall be larger by 0.4. to 6 mm. than the nominal diameter of rivets or black bolts depending upon me diameter of rivets.

Holes shall have their axis perpendicular to the surface bored through. The drilling or remarrying shall be free from burrs, and the holes should be clean and accurate holes for counter sunk bolts shall be made in such a mariner that their heads fit flush with the surface after fixing.

The fabrication work shall be completed in workshop as far as it is practicable to do so. Site joints shall be done with rivets and fitted bolts or black bolts, as shown in the drawings or as directed. Generally the following principles shall govern the use of reverts turned and fitted bolts, and black bolts.

- (i) Rivets and turned and fitted bolts shall be used where the connections is such that slip under load has to be avoided.
- (ii) Black bolts may be used very sparingly where a force is carried through a connection without impact, vibration or reversal or stresses.

#### 2.2.4. Riveting:

The parts assembled for riveting shall be in close contact with each other and the bearing stiffeners shall bear tightly both at top and bottom without being drawn or caulked. Members to be riveted shall be properly pinned or bolted and rigidly held to gather while riveting. Drifting of holes shall not be permitted. Except to draw the parts together and the drifting tools so used shall have maximum diameter not exceeding, the nominal diameter of rivets or bolts. Drifting done during assembling shall not distort the metal or enlarge the holes.

The shanks of rivets shall project beyond the plate-surface sufficiently so as to fill hole thoroughly and form the required head after riveting.

The riveting shall be done by hydraulic or pneumatic process. However, where such facilities are not available, hand riveting may be permitted. The rivet shall be heated red hot, care being taken to control the temperature of heating so as not to burn the steel. Rivets of diameter less than 10 mm. may be fitted cold. Rivets shall be of heat finish with heads full and of equal size. All loose, burnt or badly formed rivets with concentric or deficient heads shall be cut out and replaced. The heads of rivets shall be central to shanks and shall grip the assembled member firmly. In cutting out rivets, care shall be taken so as not to injure assembled members, caulking or reequipping shall not be permitted.

For testing rivets, a hammer weighing approximately 0.25 kg shall be used. Both heads of the rivets shall be tapped, slack rivets will give a hollow sound and a jar.

All rivet heads shall be painted with red lead paint within a week of their fixing.

#### 2.2.5. All bolt heads and nuts shall be hexagonal and of equal size unless specified otherwise. The screwed heads shall conform to I.S. 1363-1960 and the threaded surface shall not be tapered. The bolts shall be of such length so as to project two clear threads beyond the nuts when fixed in position and these shall sit in the holes without any shakes. The nut shall be fit in the threaded ends of bolts properly.

Where turned and fitted bolts are required to be used in place of rivets shall be provided with washers not less than 6 mm. thick so that the nut when tightened shall not bear on the unthreaded body of the bolt. Tapered washers shall be provided for all heads and nuts bearing on leveled surfaces. The threaded portion of the bolt shall not be within the thickness of the parts bolted together, the faces of the bolt heads and nuts abutting against steel members shall be machine finished. Where there is a risk of the nut being removed or becoming loose due to vibrations or reversal of stresses, these shall be secured from slackening by the use of locknuts, spring washers, cross-cutting or hammering down of threads as directed.

Bolts, nuts, and washers shall be thoroughly cleaned and dipped in double boiled linseed oil before use. The whole steel work shall be painted with a coat of priming coat of red lead, as per relevant specification of painting.

### 3.0 Mode of measurements & payment

#### 3.1. The steel work shall be measured in general as under:

- (a) All work shall be measured on the basis of finished dimensions as fixed at site and measured net unless specified otherwise.
- (b) The weight of steel sections, steel rods, and steel strips in finished work shall be calculated on the same basis on which steel is supplied to Contractor by department or those given in relevant I.S. : if steel is arranged by the contractor.
- (c) The weight of steel plates and strips shall be taken from relevant I.S. based on 7.35 kg./ sq. meter for every millimeter sheet thickness if steel is supplied to the contractor by department.
- (d) Unless otherwise specified, weight of cleats, brackets, packing pieces, bolts, nuts, washer, distance pieces, separators, diaphragm gusset (taking overall square dimensions) fish plates etc. shall be added to the weight of respective items.
- (e) In riveted work allowance is to be made for weight of rivet heads. No deductions shall be made for rivet or bolts holes excluding holes for anchor or holding down bolts.
- (f) For forged steel and steel castings, weight shall be calculated on the basis of 7850 kg./cum.
- (g) Unless otherwise specified, no allowance shall be made for the weld metal in case of welded steel structure.
- (h) Dimensions other than cross sections and thickness of plates shall be measured to nearest 0.001m
- (i) Mill tolerance shall be ignored when weight is determined by calculation.

#### 3.2. The rate includes cost of all material, labour, erection, hoisting scaffolding, protective measure, required for proper completion of the item of work. This shall also include conveyance and delivery handling, loading, unloading and storing etc. required for completing the item described above including necessary wastage involved.

#### 3.3. The rate shall be for a unit of one quintal.

#### 11.2.(D) Steel work riveted in built up section, framed work including cutting, hoisting, fixing in position and applying a priming coat of red lead paint in trusses, and trussed, purlins, upto 25 m. span and 15 m. overall height.

##### 1.0. Materials & Workmanship

The relevant specifications of item No. 11.2 (A) shall be followed except that the work shall be for trusses and trussed purlins up to 25 m. span and 15 m. overall height.

##### 2.0. Mode of measurement & payment

2.1. The relevant specifications of item No. 11.2. (A) shall be followed.

2.2. The rate shall be for a unit of one quintal.

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

**1.0 Materials & Workmanship**

- 1.1. The relevant specification of item No. 11.2 (A) shall be followed except that the steel work shall be done by welding.
- 1.2. Welding shall generally be done by electric process. Gas welding shall be resorted to, using oxyacetylene flame with specific prior approval. Gas welding shall not be permitted for structural steel work.
- 1.3. The work shall be done as shown in the shop drawings which should clearly indicate various details of the joints to be welded, shop and site welded as well as type of electrodes to be used, symbol for welding on plans and shop drawings shall be according to I.S. 813-1961. As far as possible every effort shall be made to limit the welding that must be done after improper welding that is likely to be done due to heights and difficult positions on scaffoldings etc. The welding work shall conform to I.S. 816-1969.
- 1.4. Preparation of surfaces : Surfaces which are to be welded together shall be free from loose mill scale, rust, paint, grease or other foreign matter. A coating of boiled linseed oil shall be permitted.
- 1.5. Assembly for welding : Before welding is commenced, the plates shall first be brought together and firmly clamped or spot welded at specified distance. This temporary connection has to be strong enough to hold the plates accurately in place without displacement.
- 1.6. Precautions : All operations connected with welding and cutting equipment shall conform to safety requirement given in I.S. 818-1968.  
The following points shall be borne in mind during the process of welding:  
(b) Arc length voltage and amperage shall be suited to the thickness of material type of groove and other circumstances of the work.  
(c) The segments of welding shall be such that where possible the members which offer the greatest resistance to compression are welded first.
- 1.7. The defective welds which shall be considered harmful to the structural strength shall cut out and reworked.
- 1.8. Finished welds and adjacent parts shall be protected with clean boiled linseed oil and after all slag has been removed. Welds and adjacent parts shall not be painted after the same are approved.
- 1.9. All the members shall be thoroughly cleaned of rust-scales, dust etc. and given a priming coat of red lead paint before fixing them in position.  
Testing of welding to be added in the specification I.N. 12.2.2.12-(i) to (viii)

**2.0 Mode of measurements & payment**

- 2.1. The relevant, specification of item No. 11.2 (I) shall be followed.
- 2.2. The rate shall be for unit of one quintal.

**11.4.(D) Steel work welded in built up section framed work, cutting, hoisting, fixing in position and applying a priming coat a red lead paint in trusses and trusses purlins up to 25 m. span and 15 m. overall height.**

**1.0 Materials & Workmanship**

The relevant specification of item No. 11.4.(A) shall be followed except that the work shall be for trusses and trussed purlins up to 25 m. span and 15 m. overall height.

**2.0 Mode of measurement & payment**

- 2.1. The relevant specifications of item No. 11.4 (A) shall be followed.
- 2.2. The rate shall be for unit for one quintal.

**11.6. Providing and fixing in position collapsible steel shutters with vertical channels 20 x 10x2 mm. braced with flat iron diagonals 20 x 5 mm. size with top and bottom rails of T Iron 40 x 40 x 6 mm. with 38 mm. dia steel pulleys complete with bolts, nuts, locking arrangements, stoppers, handles, including applying a priming coat red lead paint.**

**1.0 Materials**

The collapsible steel gate shall conform to M-33.

**2.0 Workmanship**

J-rails shall be fixed to the floor and to the lintel at top by means of Anchor bolts, embedded in cement concrete-of floor and lintel. The anchor bolts shall be placed approximately at 45 mm. centers alternatively in groove shall be formed along the runner for the purpose. The collapsible gate shall fixed at the sites by fixing the double channels in the T-iron rail and also by hold fasts bolted to the end double channel and fixed in the masonry of the side walls or the otherwise.

In case where the collapsible gate is not required to the lintel beams or slop above, a toe iron suitably designed may be fixed at the top embedded in masonry and provided with necessary clamps and roller arrangement at the top. All the adjoining work damaged while fixing of gate shall be made good to match the existing work without any extra payment.

All the members of the collapsible gate including T-iron shall be thoroughly cleaned of rust, scales dust etc., and given a priming coat of red lead, before fixing them in position.

**3.0 Mode of measurement and payment**

- 3.1. The collapsible gate shall be measured in sq. meter. The height of the gate shall be measured as the length of double channels and breadth from outside to outside of the end fixed double channels in open position of the gate. The rate includes providing handles, arrangements stoppers etc.

- 3.2. The rate shall be for a unit of one sq. meter.
- 11.7. **Providing and fixing 1 mm. thick M.S. sheet sliding shutters both frame and diagonal braces of 40 x 40 x 6 mm. Angle iron 3.15. M.S.S. gusset plates at junctions and comers, 25 mm. dia. pulley 40 x 40 x 6 mm. angle and T-iron guide rail at top and bottom respectively with handles, stoppers and locking arrangements etc. including applying priming coat of red lead paint.**
- 1.0. **Materials**  
M.S. sliding shutters shall be fabricated of M.S. component as given in the description of item M.S. sheets 1 mm. thick shall be fixed to the frame with rivets or weld as approved. The shutters shall be provided with top and bottom guide rails of Angles or T-iron as specified and 25 mm. dia. steel pulleys at the bottom guide rail with steel pulleys at the top. The frame shall be riveted and /or welded and wherever riveting shall be done 3.15 mm. gusset plates shall be provided at the junctions.
- 2.0. **Workmanship**
- 2.1. The shutters shall be single or double leaf shutters as specified. The guide rails shall be sufficiently long and continued along the wall on the both ends so that the sliding shutters can rest against walls, leaving full opening when so required.
- 2.2. The guide rails shall be fixed to the floor by means of anchor bolts embed in the cement concrete floor. The steel section at the top shall be suitably supported from the walls. Two channel section shall suitably fixed vertically below the extreme clamps in the wall and floor to avoid the shutters from going out of the supports at the top and bottom. A suitable clamping arrangement will be provided at either end of the opening to avoid the shutters from rolling back into opening.
- 2.3. All the adjoining work damaged while fixing shall be made good to match the existing work.
- 2.4. All members of the sliding shutter including T-iron shall be thoroughly cleaned of rust scales dust etc. and given a priming coat of red lead before fixing them in position
- 3.0. **Mode of measurements & payment**
- 3.1. The sliding doors shall be measured on sq. meter. The height of the shutters shall be measured from outside to outside of the guide, rail and width outside of shutters including vertical channels in sides. The rate includes providing handles stoppers and locking arrangement etc. complete.
- 3.2. The rate shall be for a unit of one sq. meter.

## SECTION-12

### Labour for fixing fixtures & fastening

- 12.4. Fixing metallic tower bolts of sizes with necessary screws etc. complete (tower bolts and screws to be paid under separate items:)**
- 1.0. Workmanship**
- 1.1. This item provides for labour for fixing metallic tower bolts of any size with screws, mitts etc,  
1.2. The tower bolts shall be fixed in proper position as shown in the drawings or as directed. There shall be fixed truly vertical or horizontal as the case may be.  
1.3. The screws shall be driven home with screw driver. In no case the screws shall be hammered in.  
1.4. All recesses and seats shall be cut to the exact size for counter sinking etc. where so required.  
1.5. Care shall be taken to see that no gaps are left between the fitting and the surface meant to receive the fittings.  
1.6. The fittings shall be properly cleaned and left in original finish after fixing.
- 2.1. Mode of measurements & payment**
- (1) Cutting of holes, recesses, and seats involved in process of fixing.  
(2) Cost of filling and cushioning materials where so required for proper seating of new fittings.  
(3) Cost of nails etc. for temporary positioning of fitting.  
(4) Cost of cleaning materials like old washed dhoti stain remover etc.  
(5) Cost of making good the over cut recesses or holes if any.  
(6) Cost of making hole of required size on the wooden frame for housing the bolt for locking.
- 2.2. The rate includes cost of labour involved in all operations required for proper completion of the items including carriage, handling, fixing etc. complete.  
2.3. The rate shall be of unit of one number.
- 12.5. Fixing metallic flush bolts of size with necessary screws etc., complete (flush bolts and screws shall be paid under separate items):**
- 1.0. Workmanship**
- 1.1. The relevant specifications shall be followed as per item No. 12.4. except for fixing metallic flush bolts instead of tower bolts.  
2.0. **Mode of measurements and payment**  
2.1. The relevant specifications of item No. 12.4. shall be followed.  
2.2. The rate shall be for a unit of one number.
- 12.8. Fixing metallic or plastic door handles of sizes with necessary screws etc. complete (door handles and screws to be paid under separate items)**
- 1.0. Workmanship**
- 1.1. The relevant specifications of item No. 12.4. shall be followed except fixing door handles instead of tower bolts.  
2.0. **Mode of measurements and payment**  
2.1. The relevant specifications of item No. 12.4. shall be followed.  
2.2. The rate shall be for a unit of one number
- 12.10. Fixing metallic gate and shutter hooks and eyes of sizes (hooks and eyes to be paid under separate items)**
- 1.0. Workmanship**
- 1.1. The relevant specifications shall be followed as per item No. 12.4 except that fixing of eye and hooks instead of tower bolts.  
2.0. **Mode of measurements and payment**  
2.1. The relevant specifications of item No. 12.4 shall be followed.  
2.2. The rate shall be for a unit of one number (Hook & Eye)
- 12.11. Fixing metallic door latches of size with necessary screws (door latches and screws to be paid under separate items) :**
- 1.0. Workmanship**
- 1.1. The relevant specifications of item No. 12.4 shall be followed except that fixing metallic door latches instead of tower bolts.  
2.0. **Mode of measurements & payment**  
2.1. The relevant specifications of item No. 12.4 shall be followed.  
2.2. The rate shall be for a unit of one Number.
- 12.12. Fixing metallic mortise night latches with necessary screws including making necessary crews holes in wooden door shutters etc., complete (mortise night latches and screws to be paid under separate items):**
- 1.0. Workmanship**
- 1.1. The relevant specifications of item No. 12.4 above shall be followed except that the fixing of mortise night latches instead of tower bolts.  
2.0. **Mode of measurements & payment**  
2.1. The relevant specifications of item No. 12.4 shall be followed.  
2.2. The rate shall be for a unit of one number.
- 12.18. Fixing metallic ball catchers 100 mm. dia. (Ball catches to be paid under separate item):**

- 1.0. Workmanship**  
**1.1.** The relevant specifications of item No. 12.4 shall be followed same except fixing of ball catchers 100 mm dia.
- 2.0. Mode of measurements and payment**  
**2.1.** The relevant specification of item No. 12.4 shall be followed.  
**2.2.** The rate shall be for a unit of one number.
- 12.20. Fixing metallic casement window fasteners with necessary etc. complete. (Casement window fasteners and screws to be paid under separate items):**
- 1.0. Workmanship**  
**1.1.** The relevant specifications of item No. 12.4. shall be followed except fixing metallic casement windows fasteners.  
**2.0. Mode of measurements & payment**  
**2.1.** The relevant specifications of item No. 12.4 shall be followed.  
**2.2:** The rate shall be for a unit of one number.
- 12.21. Fixing metallic casement stays of sizes with necessary screws etc., complete. (Casement stays and screws to be paid under separate items)**
- 1.0. Workmanship**  
**1.1.** The relevant specifications of item No. 12.4 shall be followed except fixing of metallic casement stays.  
**2.0. Mode of measurements & payment**  
**2.1.** The relevant specifications of item No. 12.4 shall be followed.  
**2.2.** The shall be for unit of one number.
- 12.24. Fixing metallic cupboard of ward robe locks of sizes with necessary screws etc. complete (Locks and screws to be paid separately) :**
- 1.0. Workmanship**  
**1.1.** The relevant specifications of item No. 12.4 shall be followed except that fixing metallic cupboard or ward robe locks of size with necessary screws etc. complete.  
**2.0. Mode of measurements & payment**  
**2.1** The relevant specifications of item No. 12.4 shall be followed.  
**2.2.** The shall be for a unit of one number
- 12,25. Fixing metallic or plastic cupboard or ward robe knobs of size with necessary screws/bolts etc., (knobs and screws/bolts to be paid separately) :**
- 1.0. Workmanship**  
**1.1.** The relevant specifications of item No. 12.4 shall be followed except that fixing metallic or plastic cupboard or ward robe knobs of sizes with necessary screws/bolts etc. complete.  
**2.0. Mode of measurements & payment**  
**2.1.** The relevant specifications of item No. 12.4 shall be followed.  
**2.2.** The shall be for a unit of one number.
- 12.26. Fixing metallic floor stoppers of sizes with rubber cushion, screws etc., to suit shutter thickness complete, (floor door stopper with rubber cushion and screws to be paid under separate items) :**
- 1.0. Workmanship**  
**1.1.** The relevant specifications of item No. 12.4 shall be followed except that fixing metallic floor stoppers.  
**2.0. Mode of measurements & payment**  
**2.1.** The relevant specifications of item No. 12.4 shall be followed.  
**2.2.** The shall be for a unit of one number.
- 12.28. Fixing metallic door handles or knobs for mortise jocks with necessary screws etc. complete (doors, handles/knobs and screws to be paid separately) :**
- 1.0. Workmanship**  
The relevant specifications of item No. 12.4 shall be followed except that fixing metallic door handles or knobs for mortise with necessary screws etc. complete.  
**2.0. Mode of measurements & payment**  
**2.1.** The relevant specifications of item No. 12.4 shall be followed.  
**2.2.** The rate shall be for a unit of one number.

## SECTION-13

### Glazing

#### **13.1.(I) Providing and fixing sheet glass, selected quality (type-C) bedded in putty and fixed with wooden beading including cost of wooden beading of first class teak wood and necessary cutting of glass 5 mm. thick.**

##### **1.0. Materials**

The glass shall conform to M-38. The wood beading shall conform to M-29, Putty shall conform to I.S. 419-1967.

##### **2.0. Workmanship**

The glass shall be sheet glass of selected quality of 5 mm. thick.

**2.1.** The size of glass for glazing shall allow a clearance of 2.5 mm. between the edges of glass and the wood or metal surrounds. The clearance may be increased, provided the depth of the rebate of groove is sufficient to provide not less than 1.5 m. cover to the glass. The detailed process of glazing shall be as specified in I.S. 3548-1966.

**2.2.** All stains from the surface of glass shall be removed and cleaned with thinner or spirit without any extra payment.

##### **2.3. Wooden beading :**

**2.3.1.** The size of the wood beads for glass panes shall be 1.5 cms. x 3 cms unless otherwise specified. Beads shall be secured to wooden frames with either panels pins or screws and to metal frames in the way provided for in the frame.

**2.3.2.** Sufficient putty compound shall be applied to the rebate so that when the glass has been pressed into the rebate, a bed of compound not less than 1.5 mm. thick will remain between the glass and the rebate. There should also be surplus of compound squeezed out above the rebate which should be stripped at an angle not under cut to prevent water accumulating. Beads should be bedded with compound against the glass and wood beads should also be bedded against the rebate. Care should be taken to see that no voids are left between the glass and the bead.

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

**3.1.** All measurements of cutting shall, unless otherwise stated, be held to include the consequent waste.

**3.2.** Each pane' of glass shall be measured to the nearest 0.5 cms. both in width and height/length.

**3.3.** Irregular shaped or circular panes shall be measured as the smallest rectangular area from which the irregular or circular pane can be cut.

**3.4.** The rate includes cost of materials, labour required for completion of the item including hoisting, carriage, temporary erections like scaffolding etc.

**3.5.** The rate also includes :

(i) The wastages and breakage involved in the process.

(ii) Straight cutting on glass and glazing sheets.

(iii) Cost of subsidiary materials required for proper fixing and functioning of glass i.e. nails, spirit, putty, teak wood beading glass, pins, etc. complete.

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

#### **13.1.(M) Providing and fixing sheet glass selected quality (Type-C) bedded in putty and fixed with wooden beading including cost of wooden beddings of first class teak wood, and necessary cutting of glass 6 mm. thick.**

##### **1.0. Materials and workmanship**

**1.1.** The relevant specifications of item No. 13.1 (I) shall be followed except that the sheet glass of selected quality shall be 6 mm. thick.

##### **2.0. Mode of measurements and payment**

**2.1.** The relevant specifications of item No. 13.1.(I) shall be followed.

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

#### **13.3.(C) Providing and fixing rough cast wired glass 6 mm. thick bedded in putty and fixed with wooden beading including the cost of wooden beddings of Indian teak wood and necessary cutting of glass wired figures glass.**

##### **1.0. Materials :**

Wire figure glass shall conform to M-38. Wooden beading shall conform to M-29, Putty shall conform to I.S. 419-1967.

##### **2.0. Workmanship**

The relevant specification of item No. 13.1(1) shall be followed except that the wired figured glass of 6 mm. thick shall be used.

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

**3.1.** The relevant specifications of item No. 13.1(1) shall be followed.

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

#### **3.5.(3) Providing and fixing sheet glass ordinary quality bedded in putty and fixed with wooden beading including the cost of wooden beddings of first class teak wood and necessary cutting of glass 3 mm. thick.**

- 1.0. Materials**  
Glass shall conform to M-38. Wooden beading shall conform to M-29. Putty shall conform to I.S. 419-1967. **2.0 Workmanship**  
The relevant specification of item No. 13.1 (I) shall be followed except that the wired figured glass of 6 mm. thick shall be used.
- 3.0. Mode of measurements and payment**  
**3.1.** The relevant specifications of item No. 13.1 (I) shall be followed.  
**3.2.** The rate shall be for a unit of one sq. mt.
- 13.5.(3) Providing and fixing sheet glass ordinary quality bedded in putty and fixed with wooden beading including the cost of wooden beadings of first class teak wood and necessary cutting of glass 3 mm. thick.**
- 1.0. Materials**  
Glass shall conform to M-38. Wooden beading shall conform to M-29. Putty shall conform to I.S. 419-1967.
- 2.0. Workmanship**  
**2.1.** The specification of this item shall be followed as per item No. 13.1(1) except that the sheet glass of ordinary quality shall be used and thickness of sheet glass shall be 3 mm. thick.
- 3.0. Mode of measurements and payment**  
**3.1.** The relevant specifications of item No. 13.1(1) shall be followed.  
**3.2.** The rate shall be for a unit of one sq. meter.
- 13.5.(4) Providing and fixing sheet glass ordinary quality, bedded in putty and fixed with wooden beadings including the cost of wooden beadings of first class teak wood and necessary cutting of glass 4 mm. thick.**
- 1.0. Materials and Workmanship**  
The relevant specifications of item No. 135 (3) shall be followed, except that the thickness of ordinary sheet glass shall be 4 mm.
- 2.0. Mode of measurements and payment**  
**2.1.** The relevant specification of item No. 13.1(1) shall be followed.  
**2.2.** The rate shall be for a unit of one sq. meter,  
**13.7. Extra for using ground glass (Frosted or obscured on one side) instead of plain glass.**
- 1.0. Materials**  
Glass shall conform to M-38. Wooden beading shall conform to M-29. Putty shall conform to I.S. 419-1967.
- 2.0. Workmanship**  
The specifications of this item shall be followed as per item No. 13.1 except that ground glass (Frosted or obscured on one side) shall be used.
- 3.0. Mode of measurements and payment**  
**3.1.** The payment shall be made on sq. mt. basis extra over and above the payment for plain glass for using ground glass [Routed or obscured).  
**3.2.** The relevant specifications of item No. 13.5 (III) shall be followed.  
**3.3.** The rate shall be for a unit of one sq. meter.
- 13.11.(A) Difference in cost of material and labour involved in method of glazings if changed in item No. 13.1 to front and back puttied and sprigged or fixed with glazing pins :**
- 1.0. Materials and Workmanship**  
**1.1.** The relevant specification of item No. 13.1 shall be followed except that the glazing is to be done by front and back puttied and sprigged or fixed with glazing pins.
- 2.0. Mode of measurements and payment**  
**2.1.** The relevant specifications of item No. 13.1 (I) and 13.1 (II) shall be followed.  
**2.2.** The extra rate for extra cost involved shall be paid over and above item No. 13.1(1) & 13.1 (II).  
**2.3.** The rate shall be for a unit of one sq. meter.
- 13.12. Grinding, polishing and round of edges or glazing sheets.**
- 1.0. Materials**  
The glass shall conform to M-38.
- 2.0. Workmanship**  
The edges of glass or glazing sheets shall be grained, polished and rounded of such that it renders uniform look throughout the length and shall be neatly finished. The work shall be carried out in best workman's like manner.
- 3.0. Mode of measurements & payment**  
**3.1.** The edges of glass round, polished and rounded off shall be measured in meter.  
**3.2.** The rate shall be for a unit of one running meter.



**SECTION-14**  
**Paving & Floor Finishing**

**14.2.(A) 40 mm. thick marble chips flooring rubbed and polished (i.e. Terrazzo) to granolithic-finish with under layer 30 mm. thick cement concrete (1:2:4:) (1 cement :2 coarse sand : 4 graded stone aggregate 10 mm. and down gauge) and top layer, 10 mm. thick with white, black or white and black marble chips of required sizes from 1 mm. to 4 mm. nominal size laid in cement marble powder mix 3 : 1 (3 cement : 1 marble powder by weight, in proportion of 4: 7 ( 4 cement marble powder mix : 7 marble chips by volume): Dark shade pigment with ordinary cement (in top layer only).**

**1.0. Materials**

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-G. Stone grit shall conform to M-8.

The pigment incorporated in terrazzo shall be of permanent colour and shall conform to requirement mentioned in Appendix-A in IS: 2114-1962. Marble chips shall conform to M-46. The marble powder shall pass through I.S. Sieve Terrazzo-30.

**2.0. Workmanship**

2.1. Terrazzo finish shall be laid over a layer of base concrete in case of ground floor. When the terrazzo floor is laid over R.C.C. slabs a cushioning layer consisting of 75 mm. thick lime concrete shall be provided below the terrazzo floor. The terrazzo flooring shall consist of an under layer of cement concrete and layer of terrazzo which shall be paid monolithically.

**2.2. Under Layer :**

2.2.1. The under layer shall be of cement concrete mix 1:2:4. The maximum size of aggregate used shall not exceed 10 mm. Specification for cement concrete shall be followed as per item No. 5.4.1.

**2.3. Terrazzo Topping :**

2.3.1. The topping shall have mix of ordinary cement, and marble powder in proportion 3:1 (3 cement : 1 marble powder by weight) and marble aggregate shall be mixed in proportion 4:7 (4 cement marble powder : 7 marble chips by volume). The thickness of concrete and cushioning layer shall not be less than 10 cms. and 7.5 cms. respectively. The minimum thickness of under layer and topping shall be 40 mm.

**2.4. Panels :**

2.4.1. The floor both while laying the under layer and topping shall be divided into panels not exceeding 2 sq. m. in area so as to reduce the risk of cracking due to differential shrinkage or expansion of terrazzo and sub-floor. The joints be so located that the layer dimensions of any panel do not exceed 2 M. The panels shall preferably be separately. However where the butt joint are provided, the bays shall be laid alternatively allowing for an interval of at least 24 hours between the laying of adjacent bays.

**2.5. Mixing of materials :**

2.5.1. With a view to avoid variation in colour, mixing shall be done in trough or tub, and the complete quantities of cement and pigment required for one unit shall be mixed at the beginning of the work. Colour cement or cement and pigment mix shall be dry mixed with marble powder. The mix thus obtained shall be mixed with aggregate. Care shall be taken not to get the materials into a heap as this would result in coarser aggregates moving on the sides and cement to the centre. To the dry mix thus prepared, water shall be added in small quantities while materials are being worked to get a mix of proper consistency. The mixture shall be plastic but not so wet as to flow. The wet mix shall be used within half an hour mix of addition of wafer during preparation laying.

**2.6. Laying :**

2.6.1. The base shall be divided into panels with the help of dividing strips including the strips required for decorative design up to the finished surface level of the floor. Screeds strips shall be used where the dividing strips are not used. The base shall be cleaned of all dust, dirt laitance and any loose materials. It shall be then wetted with water mopped and smeared\*with cement slurry at 2.75 kg./sq.mt. Under layer shall be then be spread and leveled with a screening board. The top surface shall be left rough to provide a good bond to the terrazzo.

2.6.2. The terrazzo topping shall be laid while the under layer is still plastic but has hardened enough to prevent cement from rising to the surface. This is normally achieved between 18 to 24 hours after laying of under layer. A cement slurry preferably of the same colour as the topping shall be brushed on the surface immediately before laying the topping. The terrazzo mix shall be laid to a uniform thickness on the screed bed and be completed thoroughly by taping or rolling and trowel led smooth. Excessive troweling or rolling in early stages shall be avoided as it results in working up cement to the surface which will produce a surface liable to cracking and will require more grinding to expose marble chips. The terrazzo surface shall be tamped, trowel led, and brought true to required level by a straight edge and steel floats in such a manner that the maximum amount of marble chips come up and are spread uniform over the surface and no part of the surface is left without chips.

**2.7. Curing :**

2.7.1. The surface shall be left dry for air curing for a period of 12 to 18 hours. Thereafter water shall be allowed to stand overnight in pools for period of minimum of four days. The floor shall be prevented from being subjected to extreme temperature.

**2.8. Grinding and finishing :**

2.8.1. Grinding and finishing shall be done either by hand or by machine. In case of manual grinding, the process of grinding shall begin after two days, while in case of machine grinding, the process shall be striated after seven days, after completion of laying.

2.8.2. First grinding shall be done by carborundum stones of 60-grit size. The surface shall then be washed clean and grouted with a grout of cement or /and coloring matter in the same mix and proportion as the topping in order to fill any pin holes that appear. It shall be allowed to dry for 24 hours and wet cured for four days in the same manner as mentioned in Para 2.7 above.

2.8.3. The second grinding shall be done with carborundum stone of 80 grit size. The surface shall then be prepared as after first grinding. The third grinding shall be done with carborundum stone of 120 to 150 grit size. The surface shall then be washed again and allowed to dry for 12 hours, and wet cured for four days as before. The fourth grinding shall be done with carborundum stone of 320 to 400 grit size. The surface shall again be washed clean and rubbed hard with felt and slightly moistened Oxalic acid powder @ 5 gms. per sq. meter of floor surface. After the finishing work is over, the surface shall be washed with dilute oxalic acid solution and dried for floor polishing, machine fitted with felt or Hessian bobs shall then be run over it until floor shines. In case wax-polished surface is required, wax-polished shall be applied on the surface with the help of soft linen over a clean and dry surface. The polishing machine fitted with bobs shall be run over it, clean saw dust shall be spread over the floor surface and polishing machine again operated which will remove excess wax and leave glossy surface. Floor shall not be left slippery.

**3.0. Mode of measurements and payment**

3.1. Terrazzo flooring shall be measured as laid in sq. meters. Length and breadth shall be measured for visible area of work done. No deduction shall be made for nor extra for any opening in floor or area up to 0.10 sq. meter The rate shall cover laying the floor at different levels in the same room or court-yard and nothing extra shall be paid on that account.

3.2. The rate includes the cost of all materials and labour involved in all operations described above. The rate shall also not include diving strip.

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

**14.2.(B) 40 mm. thick marble chips, flooring rubbed and polished (i.e. Terrazzo) to granolithic finish with under layer 30 mm. thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 10 mm. and down gauge) and top layer 10 mm. thick with white, black or white and black marble chips of required sizes form 1 mm. 4 mm. nominal size laid in cement marble powder mix 3 :1 (3 cement : 1 marble powder by weight) in proportion of 4: 7 (4 cement : marble powder mix : 7 marble chips by volume) light shade pigment with white cement (in top layer only).**

**1.0. Materials & Workmanship**

1.1. The relevant specifications of item No. 14.2 (A) shall be followed except that light shade pigment with white cement shall be used in top layer

**2.0. Mode of measurements & payment**

2.1. The relevant specifications of item No. 14.2 (A) shall be followed.

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

**14.2.(C) 40 mm. thick marble chips, flooring rubbed and polished (i.e. Terrazzo) to granolithic finish with under layer 30 mm. thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 10 mm. and down gauge) and top layer 10 mm. thick with white, black or white and black marble chips of required sizes from 1 mm. to 4 mm. nominal size laid in cement marble powder mix 3:1 (3 cement : 1 marble power by weight) in proportion of 4:7 (4 cement : marble powder mix : 7 marble chips by volume). Medium shade pigment with approx, 50% white cement and 50% ordinary cement (In top layer only).**

**1.0. Materials & Workmanship**

1.1. The relevant specifications of item No. 14.2. (A) shall be followed except that medium shade pigment with approximately 50% white cement and 50% ordinary cement in top layer only shall be used.

**2.0. Mode of measurements & payment**

2.1. The relevant specifications of item No. 14.2. (A) shall be followed.

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

**14.2.(D) 40 mm. thick marble chips, flooring rubbed and polished (i.e. Terrazzo) to granolithic finish with under layer 30 mm. thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 10 mm. and down gauge) and top layer 10 mm, thick with white, black or white and black marble chips of required sizes from 1 mm. to 4 mm. nominal size laid in cement marble powder mix 3:1 (3 cement : 1 marble power by weight) in proportion of 4:7 (4 cement : marble powder mix : 7 marble chips by volume). White cement without any pigment (in top layer only).**

**1.0. Materials & Workmanship**

1.1. The relevant specifications of item No. 14.2.(A) shall be followed except that white cement without any pigment in top layer only shall be used.

**2.0. Mode of measurements & payment**

2.1. The relevant specifications of item No. 14.2.(A) shall be followed.

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

- 14.2.(E)** 40 mm. thick marble chips, flooring rubbed and polished (i.e. Terrazzo) to granolithic finish with under layer 30 mm. thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 10 mm. and down gauge) and top layer 10 mm. thick with white, black or white and black marble chips of required sizes from 1 mm. to 4 mm. nominal size laid in cement marble powder mix 3:1 (3 cement : 1 marble power by weight) in proportion of 4:7 (4 cement : marble powder mix : 7 marble chips by volume), light < de pigment with ordinary cement (in top layer only).
- 1.0. Materials & Workmanship**
- 1.1. The relevant specifications of item No. 14.2(A) shall be followed except that the light shade pigment with ordinary cement (in top layer only) shall be used.
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 14.2 (A) shall be followed.
- 2.2. The rate shall be for a unit of one sq. meter.
- 14.4.(A) Marble chips skirting (Terrazzo) or dodo rubbed and polished to granolithic finish top layer 6 mm. thick with white black or white and black marble chips of sizes from smallest to 4 mm. nominal size laid in cement marble powder mix 3:1 (3 cement : 1 marble by weight) in proportion of 4:7 (4 cement : 7 marble chips by volume) 20 mm. thick with under layer 14 mm. thick in cement plaster 1:3 (1 cement : 3 coarse sand) : Dark shade pigment with ordinary cement (in top layer only).**
- 1.0. Materials**
- 1.1. The relevant specifications of item No. 14.2 (A) shall be followed.
- 2.0. Workmanship**
- 2.1. Under layer: The under layer for terrazzo on vertical surfaces like skirting and dedos shall be of stiff cement mortar 1:3 (1 cement : 3 coarse sand) finished rough so as to give a good bond to the topping.
- 2.2. Terrazzo topping shall not be less than 6 mm. thick and the combined thickness of under layer and topping shall be less than 20 mm. The other details shall be followed same as per specifications of item No. C 24 except that the light shade pigment with white cement in top layers shall be used.
- 3.0. Mode of measurements & payment**
- 3.1. The skirting and dedo shall be measured in square meters correct to two places of decimals. The height shall be measured from the finished level of floor.
- 3.2. The rate shall be for a unit of one sq. meter.
- 14.4.(B) Marble chips skirting (Terrazzo) or dedo rubbed and polished to granolithic finish top layer 6 mm. thick with white black or white and black marble chips of sizes from smallest to 4 mm. nominal size laid in cement marble powder mix 3:1 (3 cement : 1 marble by weight) in proportion of 4:7 (4 cement : 7 marble chips by volume) 20 mm. thick with under layer 14 mm. thick in cement plaster 1:3 (1 cement : 3 coarse sand) : light shade pigment with white cement (In top layer only).**
- 1.0. Materials & Workmanship**
- 1.1. The relevant specifications of item No. 14.4 (A) shall be followed except that the light shade pigment with white cement in top layers only shall be used.
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 14.4(A) shall be followed.
- 2.2. The rate shall be for a unit of one sq. meter.
- 14.4.(C) Marble chips skirting (Terrazzo) or dedo rubbed and polished to granolithic finish top layer 6 mm. thick with white black or white and black marble chips of sizes from smallest to 4 mm. nominal size laid in cement marble powder mix 3:1 (3 cement : 1 marble by weight) in proportion of 4:7 (4 cement : marble powder mix 7 marble chips by volume) 20 mm. thick with under layer 14 mm. thick in cement plaster 1:3 (1 cement : 3 coarse sand) : medium shade pigment with approximate 50% white cement and 50% ordinary cement (In top layer only).**
- 1.0. Materials and workmanship**
- 1.1. The relevant specifications of item No. 14.4(A) shall be followed except that the medium shade pigment with approximate 50% white cement and 50% ordinary cement in top layers only shall be used.
- 2.0. Mode of measurement & payment**
- 2.1. The relevant specifications of item No. 14.4 (A) shall be followed.
- 2.2. The rate shall be for a unit for one sq. meter.
- 14.4.(D) Marble chips skirting (Terrazzo) or dodo rubbed and polished to granolithic finish top layer 6 mm. thick with white black or white and black marble chips of sizes from smallest to 4 mm. nominal size laid in cement marble powder mix 3:1 (3 cement : 1 marble by weight) in proportion of 4:7 (4 cement : marble powder mix 7 marble chips by volume) 20 mm. thick with under layer 14 mm. thick in cement plaster 1:3 (1 cement : 3 coarse sand) : White cement without any pigment (In top layer only).**
- 1.0. Materials & Workmanship**
- 1.1. The relevant specifications of item No. 14.4 (A) shall be followed except that the white cement without any pigment in top layers shall be used.
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 14.4 (A) shall be followed.
- 2.2. The rate shall be for a unit of one sq. meter.

- 14.4.(E) Marble chips skirting (Terrazzo) or dedo rubbed and polished to granolithic finish top layer 6 mm. thick with white black or white and black marble chips of sizes from smallest to 4 mm. nominal size laid in cement marble powder mix 3:1 (3 cement : 1 marble by weight) in proportion of 4:7 (4 cement : marble powder mix 7 marble chips by volume) 20 mm. thick with under layer 14 mm. thick in cement plaster 1:3 (1 cement : 3 coarse sand) : light shade pigment with ordinary cement (In top layer only).**
- 1.0. Materials & workmanship**
- 1.1. The relevant specifications of item No. 14.4 (A) shall be followed and except that the light shade pigment with ordinary cement in top layers only shall be used.
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 14.4 (A) shall be followed and except that the light shade pigment with ordinary cement in top layers only shall be used.
- 2.2. The rate shall be for a unit of one sq. meter.
- 4.16 Providing and laying cushioning layer on R.C.C. slab consisting of 75 mm. thick lime concrete using brick aggregate of 20 mm. nominal size 50% mortar comprising of 1 lime : 2 fine sand.**
- 1.0. Materials**
- 1.1. Water shall conform to M-1. Lime mortar or proportion 1:2 shall conform to M-10. Brick aggregate 20 mm. nominal size shall conform to M-14.
- 2.0. Workmanship**
- 2.1. The relevant specifications of item No. 1.8 shall be followed except that the proportion of mix shall be 50% mortar comprising of 1 lime : 2 coarse sand and the size of brick aggregate shall be 20 mm. nominal size. The lime concrete work shall be carried out in 7.5 Cms. average thickness as a cushioning layer on R.C.C. slab.
- 3.0. Mode of measurements and payment**
- 3.1. The lime concrete work shall be measured for visible area of work done.
- 3.2. The rate shall be for a unit of one sq. meter.
- 14.19.(A) Precast terrazzo (Mosaic) tiles 20 mm. thick with white, black or white and black marble chips of sizes up to 6 mm. laid in floors, treads of steps and landings on a bed of 25 mm. average thickness of lime mortar 1:1.5 (1 lime putty : 1.5 fine sand) or C.M. 1:6 jointed with neat cement slurry mixed with pigment to match the shade of the tiles including rubbing and polishing complete with precast files of light shades, using white cement.**
- 1.0. Materials**
- 1.1. Water shall conform to M-1. Cement shall conform to M-3. Lime Mortar shall conform to M-10 cement mortar shall conform to M-1. The precast terrazzo tiles of 20 mm. thick shall be light shade using white cement and conform to M-47.
- 2.0. Workmanship**
- 2.1. The work shall be carried out as per I.S. 1443-1972.
- 2.2. Bedding :**
- 2.2.1. Before spreading the mortar, the sub-base of the floor shall be cleaned of all dirt, scum and loose materials and then well wetted without forming any pools of water on the surface.
- 2.2.2. In case; of R.C.C. floors, the top shall be left a little rough, all points of level for the finished surface shall be marked out. The lime mortar of proportion 1:1.5 (1 lime putty : 15 fine sand) or cement mortar of proportion C.M. 1 : as directed shall be then evenly and smoothly spread over the base. Bedding layer of mortar shall be not less than 10 mm. and average thickness of bedding shall be 25 mm.
- 2.3. Laying :**
- 2.3.1. Before laying the terrazzo (Marble/Mosaic) tiles, the tiles shall be thoroughly wetted with water. Neat cement grout of required-consistency at 4.4. Kg. cement/sq. mt. shall be spread on the mortar bed. The tiles shall be laid on the neat cement float and shall be evenly and firmly bedded to the required level and slope, There shall be no hollows left. The joints shall be uniform thickness and in straight line as per the pattern.
- 2.3.2. The surface of flooring shall be checked frequently with a straight edge at least two meters long so as to obtain a true surface with required slope.
- 2.3.3. The tiles which are fixed in the floor adjoining the wall shall go about 10 mm. under plaster. Skirting or dedo shall be left unfinished for about 50 mm. above finished floor level and unfinished strip then left earlier shall be finished.
- 2.3.4. In places where full tiles cannot be fixed, the tiles shall be cut to the size and smoothed at edges to give straight and true joints.
- 2.3.5. After the tiles have been laid, the surplus cement slurry and the joints shall be cleaned and washed fairly deep before cement hardens.
- 2.3.6. The day after tiles have been laid, the joints shall be cleaned or gray cement grout with a wire brush to a depth of about 5 mm. and then grouted with white cement with or without pigment to match the shade of the topping of tiles. The same cement slurry shall then be spread over the whole surface in a thin coat to protect the surface from abrasive damage and to fill pin holes that may exist on the surface.
- 2.4. Curing :**
- 2.4.1. The flooring shall be kept wet with damp sand or water for seven days. It shall be kept undisturbed at least for 14 days. The grinding shall normally be commenced after 14 days.

**2.5. Polishing :**

2.5.1. After the tiles are properly cured, first grinding shall be done with carborundum stone of 48 to 60 grade grit fitted in machine. Water shall be properly used during grinding. When the chips show up and the floor has been uniformly rubbed, it shall be cleaned with water, baring all pin holes. It shall then be covered with a thin coat of white cement mixed with or without pigments to match the colour of the topping of the tiles. Pin holes if any shall thus be filled. This grout shall be kept moist for a week. Thereafter second grinding shall be done when other works are finished. The machine shall be fitted with carborundum of grit 220 to 350 using water in abundance. The floor shall then be washed clean with water. Oxalic acid powder shall then be dusted at 33 grams per square meter on the surface and the surface rubbed with machine fitted with Hessian bobs or rubbed hard with pad of woolen rags. The floor shall then be washed clean and dried with a soft cloth or linen. The finished floor shall not sound hollow when tapped with mallet.

2.5.2. If any tile is disturbed or damaged it shall be refitted or replaced properly jointed and polished.

2.5.3. Testing of the tiles shall be carried out by the contractor at his own cost as per I.S. requirement for required test.

**3.0. Mode of measurements & payment**

3.1. The terrazzo tiles flooring shall be measured in sq. meters for visible area of work done.

3.2. No deductions shall be made nor extra paid for any opening in the floor area up to 0.1 sq. mt. Nothing extra shall be paid for use of cut tiles or for laying the floors at different levels in the same room or court yard. Mosaic tiles laid in floor boarders and bands etc.-shall be measured in the same item and nothing extra shall be payable on account of these or similar bonds formed of half or multiples of half size, standard tiles or other uncut tiles.

3.3. The treads of stairs and steps paved with tiles without nosing shall also be measured under this item.

3.4. Extra rate shall however be paid for such area where width of treads does not exceed 30 cms.

3.5. The rate shall include the cost of all materials, labour involved in all the operations as described above.

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

**14.19.(B) Precast Terrazzo (Marble/Mosaic) tiles 20 mm. thick with white, black or white and black marble chips of size up to 6 mm. laid in floors treads of steps and landing on a bed of 25 mm. average thickness of lime mortar 1:1.5 (1 lime putty :1.5 fine sand) or C.M. 1:6 jointed with neat cement slurry mixed with pigment to match the shade of the tiles, including rubbing and polishing complete with precast tiles of medium shades using approximately 50% white cement and 50% ordinary cement.**

**1.0. Materials & Workmanship**

1.1. The relevant specifications of item No. 14.19(A) shall be followed except that the precast terrazzo (marble mosaic) tiles shall be of medium shades using approximately 50% white cement and 50% ordinary cement.

**2.0. Mode of measurement and payment**

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

**14.19.(B) Precast Terrazzo (Marble/Mosaic) tiles 20 mm. thick with white, black or white and black marble chips of size up to 6 mm. laid in floors treads of steps and landing on a bed of 25 mm. average thickness of lime mortar 1:1.5 (1 lime putty :1.5 fine sand) or C.M. 1:6 jointed with neat cement slurry mixed with neat cement slurry mixed with pigment to match the shade of tiles including rubbing and polishing complete with precast tiles of dark shade using ordinary cement.**

**1.0. Materials and Workmanship**

1.1. The relevant specifications of item No. 14,19 (A) shall be followed except that the precast tiles shall be of Dark shade using ordinary Portland cement.

**2.0. Mode of measurements & payment**

2.1. The mode of measurement and payment shall be same as item No. 14.19 (A)

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

**14.21.(A) Precast terrazzo (Marble Mosaic) tiles 20 mm. thick with marble chips of sizes up to 6 mm. in skirting and risers of steps not exceeding 30 cms. in height on 10 mm. thick cement plaster 1:3 C1 cement :3 coarse sand) jointed with neat cement slurry rubbing and polishing complete with tiles of light shades using white cement.**

**1.0. Materials**

Water shall conform to M-1. Cement Mortar shall conform to M-11. The precast terrazzo (Marble/Mosaic) tiles of light shades using white cement tiles 20 mm. thick shall conform to M-47.

**2.0. Workmanship**

**2.1. Laying :**

The work shall be carried out for skirting or dedo. Before fixing precast Terrazzo (Mosaic marble) tiles of shade and size as specified, the surface shall be prepared by heavy scraping, making joints etc, to the required line, level and plumb. The surface shall be thoroughly wetted before commencing the laying work. Thereafter about 10 mm. thick backing of cement mortar in specified proportion shall be applied on the surface in true line and level generally as per specifications of plaster item.

**2.2. Fixing :**

The back of each tile to be fixed shall be smeared with cement paste of matching colour and the mosaic tiles shall then be gently tapped against the surface, with a wooden mallet. The skirting shall be done only after the flooring is completed. Any pipes coming out of the wall through the dedo or skirting shall only be at the intersection of the horizontal and vertical joints. The tiles shall not have staggered joints. The joints shall be true to entire line both ways and vertical joints shall be in line with joints or flooring. Tiles shall be fixed as close as possible to the

adjoining tiles and any difference in the thickness of the mosaic tiles shall be evened out in the cement paste so that all the tiles faces are set in conformity with one another. The skirting shall project uniformly and not more than 6 mm, thickness beyond the finished surface above. Top of skirting or dedo shall be truly horizontal. The risers of steps, skirting or dedo shall rest on top of treads of flooring. Wherever required the tiles shall be cut (sawn) and thin edges smoothed before use.

**2.3. Curing :**

Curing shall be done for 7 days continuously.

**2.4. Finishing:**

Skirting and dedo shall be hand polished to have an even smooth and shining surface. In case of skirting only 10 mm. x 10 mm. groove shall be provided at the junction of cement plaster and cement tiles.

**3.0. Mode of measurements & payment**

3.1. The terrazzo tiles with light shade using white cement base shall be paid under this item. The length shall be measured along finished surface of the riser, skirting or dedo, correct to a centimeter height measured from finished level of treads, or floor to the top (under side of treads in case of steps).

3.2. The rate shall include all materials and labour required for all the operations involved and described above.

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

**14.21.(B) Precast terrazzo tiles 20 mm. thick with marble chips of sizes up to 6 mm. in skirting and risers of strips not exceeding 30 cms. in height on 10 mm. thick cement plaster C.M. 1:3 (1 cement :3 coarse sand) jointing with neat cement slurry including rubbing and polishing complete with tiles of : medium shades using approximately 50% white cement and 50% ordinary cement.**

**1.0. Materials and workmanship**

1.1. The relevant specifications of item No, 1\*1 21 (A) shall be followed except that the work is for using tiles of medium shades using approximately 50% white cement and 50% ordinary cement.

**2.0. Mode of measurements & payment**

2.1. The mode of measurements and payment shall be followed same as item No. 14.21 (A).

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

**14.21.(C) Precast terrazzo tiles 20 mm. thick with marble chips of sizes up to 6 mm. in skirting and risers of steps not exceeding 30 cms. in height on 10 mm. thick cement plaster in C.M. 1:3 (1 cement :3 coarse sand) jointing with neat cement slurry including and polishing complete, with tiles of Dark shade using ordinary cement.**

**1.0. Materials & Workmanship**

1.1. The relevant specifications of item No. 14.21 (A) shall be followed except that the tiles of dark shade using Portland cement shall be used.

**2.0. Mode of measurements and payment**

2.1. The mode of measurements and payment shall be followed as per item No. 14.21 (A).

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

**14.25.(A) Chequered terrazzo tiles 22 mm. thick with marble chips of size up to 6 mm. in floor on 25 mm. thick bed of lime mortar 1:1.5 (1 lime putty : 1.5 coarse sand) or C.M. 1:6 jointed with neat cement slurry mixed with pigment to match the shade of the tiles including rubbing and polishing etc. complete, light shade using white cement.**

**1.0. Materials**

Water shall conform to M-1. White cement shall conform to M-4. Lime mortar of proportion 1:1.5 shall conform to M-10. Cement mortar shall conform to M-11. Chequered tiles shall conform to M-47 D.

**2.0. Workmanship**

2.1. The relevant specifications of Item No. 14.21 (A) shall be followed except that chequered tiles of light shade using white cement shall be used.

**3.0. Mode of measurement & payment**

3.1. The relevant specifications of item No. 14.21 (A) shall be followed.

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

**14.25.(B) Chequered terrazzo tiles 22 mm. thick with marble chips of size up to 6 mm. in floor on 25 mm. thick bed of lime mortar 1:1.5 (1 lime putty : 1.5 coarse sand) or C.M. 1:6 painted with neat cement slurry mixed with pigment to match the shade of the tiles including rubbing and polishing etc. complete, medium shade using approximate 50% the cement and 50% ordinary cement.**

**1.0. Materials and workmanship**

1.1. The relevant specification of item No. 14.25 (A) shall be followed except that chequered tiles of medium shade approximate 50% white cement and 50% ordinary cement shall be used.

**2.0. Mode of measurements & payment**

2.1. The relevant specifications of item No. 14.25 (A) shall be followed.

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

- 14.25.(C) Chequered terrazzo tiles 25 mm. thick with marble chips of size up to 6 mm. in floor on 25 mm. thick bed of lime mortar 1:1.5 (1 lime putty : 1.5 coarse sand) or C.M. 1:6 jointed with neat cement slurry mixed with pigment to match the shade of the tiles including rubbing and polishing etc, complete, : Dark shade using ordinary cement.**
- 1.0. Materials and workmanship**
- 1.1. The relevant specification of item No. 14.25 (A) shall be followed except that chequered tiles of dark shade using ordinary cement shall be used.
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 14.25 (A) shall be followed.
- 2.2. The rate shall be for a unit of one sq. meter.
- 14.27.(A) Chequered terrazzo tiles 28 mm. thick with marble chips of size up to 6 mm. in treads of stairs and staircases in 12 mm. thick bed of lime mortar 1:5 coarse sand) to C.M. 1:6 jointed with neat cement slurry mixed with pigment to match the shade of the tiles including rubbing and polishing etc. complete, Dark shade using ordinary cement.**
- 1.0. Materials and workmanship**
- 1.1. The relevant specification of item No. 14.25 (A) shall be followed except that chequered tiles 28 mm. thick of light shade using white cement shall be used in trades, stair cases etc.
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 14.25 (A) shall be followed.
- 2.2. The rate shall be for a unit of one sq. meter.
- 14.27 (B) Chequered terrazzo tiles 22 mm. thick with marble chips of size up to 6 mm. in floor in on 25 mm. thick bed of lime mortar 1:1.5 (1 lime putty : 1.5 coarse sand) or C.M. 1:6 jointed with neat cement slurry mixed with pigment to match the shade of the tiles including rubbing and polishing etc. complete : Medium shade of using approximately 50% white cement and 50% ordinary cement.**
- 1.0. Materials and Workmanship**
- 1.1. The relevant specifications of item No. 14.25(A) shall be followed except that the chequered tiles 28 mm. thick of medium shade using approximately 50% white cement and 50% ordinary cement shall be used in treads of stair, staircases etc.
- 2.0. Mode of measurement and payment**
- 2.1. The relevant specifications of item No. 14.25 (A) shall be followed.
- 2.2. The rate shall be for a unit of one sq. meter.
- 14.27.(C) Chequered terrazzo tiles 28 mm. thick with marble chips of sizes up to 6 mm. in treads of stairs and staircases in 12 mm. thick bed of lime mortar 1:1.5 (1 Lime putty: 1.5 coarse sand) or c.m. 1:6 jointed with neat cement slurry mixed with pigment to match the shade of tiles including rubbing and polishing complete : Dark shade using ordinary cement.**
- 1.0. Materials and Workmanship**
- 1.1. The relevant specifications of item No. 14.25 (A) shall be followed except that chequered tiles 28 mm. thick of dark shade using ordinary cement shall be used in treads of stair, staircase etc.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 14.25 (A) shall be followed.
- 2.2. The rate shall be for a unit of one sq. meter,
- 14.29 White glazed tiles 6 mm. thick in flooring, treads of steps and landings laid on a bed of 12 mm. thick cement mortar 1:3 (1 cement : 3 coarse sand) finished with flush pointing in white cement.**
- 1.0. Materials**  
Water shall conform to M-1 Cement mortar shall conform to M-11 White glazed tiles shall conform to M-55
- 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 monsoon to place wooden planks across and squat on it.
- 2.1.2. The white glazed tiles shall be laid on cement mortar bedding of 12 mm. thick in C.M. 1:3. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of bedding. The base shall be cleared and well wetted. The mortar shall then be spread in thickness not less than 10 mm. at any place and average 12 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 tow 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.

**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.

**14.32. White glazed tiles 6 mm. thick in skirting, risers of steps and dedo on 10 mm. thick cement plaster 1:3 (1 cement :3 coarse sand) and jointed with white cement slurry.**

**1.0. Materials**

Water shall conform to M-1 Cement mortar shall conform to M-11 White glazed tiles shall conform to M-55

**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 15 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 mortar 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 smoothed.

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 lo 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.

**14.34. Providing and fixing 50 mm. internal or external -angles of white glazed tiles.**

**1.0. Materials**

Water shall conform to M-1. Cement mortar shall conform M-11. Glazed tiles shall conform to M-55.

**2.0. Workmanship**

2.1. The relevant specifications of item No. 14.32 shall be followed except that the internal or external angles of glazed tiles shall be of thickness not less than the tiles with which they are used. The fixing shall be done as per directions.

**3.0. Mode of measurements and payment**

3.1. Rate shall be including the cost of materials and labour involved in all the operation described above. Internal or external angles of glazed tiles shall be measured in running meters correct tip to a centimeter. length being measured on the exposed face of the special at its centre line. No extra payment shall be made for corner places at angles junctions of cover beads and cornices for using cut length of special.

3.2. The rate shall be for a unit on one running meter.

**14.36.(A) Providing and laying marble stone slab flooring over 20 mm. (Average) base of cement mortar 1:6 (1 cement : 6 coarse sand) or L. M. 1:1.5 laid and jointed with gray cement slurry including rubbing and polishing compete : Marbles slab 25 mm. thick.**

**1.0. Materials**

Water shall conform to M-1. Lime mortar shall conform to M-10. Cement mortar shall conform to M-1). Marble stone slab 25 mm. thick shall conform to M-51.

**2.0. Workmanship**

**2.1. Dressing of slabs :**

Every stone shall be cut to required size and fine chisel dressed to give a smooth and even surface on all sides to full depth. A straight edge laid along the sides of the stone shall be fully in contact with it Chisel dressing shall also be done on top surface to remove any waviness. The sides and top surface of marble



- slabs shall be machine rubbed or table rubbed with coarse sand before using. All angles and edges of slabs shall be true, square and free from chipping.
- 2.2 The thickness of stone shall be 25 mm. The allowable tolerance shall be 2 mm. allowable. The 'tolerance shall  $\pm$  5 mm. in length and breadth.
- 2.3. **Bedding:**  
Bedding of marble slabs shall either be lime mortar 1:1.5 (1 lime putty : 1.5 coarse sand) or cement mortar 1:6 (1 cement : 6 coarse sand) of average thickness 20 mm. thick as given in description of item. Minimum thickness at any place shall not be less than 10 mm.
- 2.4. **Laying**  
The surface of sub-grade shall be cleared, wetted and mopped. Mortar of specified mix and thickness shall then be spread on an area sufficient to receive one marble slab. The slab be washed clean before laying. It be laid on top pressed and tapped gently to bring it in level with other slabs. It shall then be lifted and laid aside. The top surface of the mortar shall then be corrected by adding fresh mortar at hollows, or depressions. The mortar shall then be allowed to harden it over this surface cement slurry or honey like consistency at 4.4 Kg. of cement per sq. meter. The edges of slabs already paved shall be buttered with gray cement. The slab shall then be gently placed in position and tapped with wooden mallet till it is properly bedded in level with and close to the adjoining slab. The joints shall be as fine as possible. Surplus cement on the surface of the slab shall be removed. The slab fixed in the floor adjoining the walls shall enter not less than 10 mm. under the plaster skirting or dedo. The junction between the walls and floors shall be finished neatly. The finished surface shall be true to level and slopes as directed.
- 2.5. **Curing :** The floor shall be cured for a minimum period of seven days.
- 2.6. **Polishing and finishing:**  
Unevenness at the meting edges of slab shall be removed by fine chiseling. Finishing etc. shall be done as per relevant specifications of item No. 14.21 (A) or terrazzo tiles flooring except that cement slurry with/or without pigments shall not be applied on the surface before each polishing.
- 3.0. **Mode of measurements and payment**
- 3.1. Marbles stone flooring with various kinds of marble shall be measured in sq. meter. The length and breadth shall be measured between-the finished face of skirting or dedo or wall plaster No deduction shall be made nor extra shall be paid for nay opening in the floor or area up to 0.05 sq. mt. Nothing extra shall be paid for laying stone at different levels in the same room. Treads and steps of stairs paved with marble stone slabs shall be also be measured under flooring.
- 3.2. The rate shall be for a unit of one sq. meter.
- 14 43.(A) **Kota stone slab (Polished, Green colour) flooring over 20 mm. (average) thick base of cement mortar 1:6 (1 cement : 6 coarse sand, or lime mortar 1:1.5 laid over and jointed with gray cement slurry including rubbing and polishing complete 25 mm. thick.**
- 1.0. **Materials**
- 1.1. Water shall conform to M-1. Lime mortar shall conform to M-10. Cement mortar shall conform to M-11 Polished kota stone shall conform to M-49,
- 2.0. **Workmanship**
- 2.1. Each slab shall be cut to the required size and shape and fine chisel dressed at all the edges. The sides shall be table rubbed with coarse sand before paving. All angles and edges of the slabs shall be true square and free from chippings and giving a plane surface. The thickness shall be 25 mm. (Average) as specified in the item but not less than 20 mm. at any place of the slab.
- 2.2. Bedding for the Kota stone slabs shall be of cement mortar 1:6 (1 cement : 6 coarse sand) or L.M. 1:1.5 of average thickness 20 mm given in the description of the item. Sub grade shall be cleaned, wetted and mopped Mortar of the specified mix and thickness shall then be spread on an area sufficient to receive one kota stone slab. The slab shall be washed clean before laying. It shall be laid on top, pressed, tapped gently to bring it in level with the other slabs. It shall then be lifted and laid aside. Top surface of the mortar shall then be corrected by adding fresh mortar at hollows or depressions. The mortar shall then be allowed to harden bit. Over this surface, cement slurry of honey-like consistency shall be applied. The slab shall then be gently placed in position and tapped with wooden mallet till it is properly padded in level with and close to the adjoining slab. The joint shall be as fine as possible. The slabs fixed in the floor adjoining, the walls shall enter not less than 10 mm. under the plaster, skirting or dedo. The junction between the wan and floor shall be finished neatly. The finished surface shall be true to levels and slopes as directed
- 2.3. The floor shall be kept wet for a minimum period of 7 days so that bedding and joints set properly
- 2.4. Polishing shall be normally commenced after 14 days of laying the stone slab. First polishing shall be done with carborundum stones of 120 grade grit fitted in the heavy machine and then second polishing shall be done with carborundum stone of 220 to 350 grade grit fitted in heavy machine. Water shall be properly used during polishing. The stone shall then be washed clean with water When directed by the Engineer-in-charge, wax polish of approved quality shall be applied on the surface with the help of soft cloth over a clean and dry surface. Then the polishing machine fitted with bobs shall be run over it.
- 2.5. The holes required for Nahni traps, pipes and any other fittings shall be made, without any extra cost.

**3.0. Measurement & payment**

**3.1.** The rate shall include the cost of all materials and labour involved in all the operations described above. The kota stone flooring shall be measured in square meters correct to two places decimal, length and breadth shall be measured correct to a centimeter and between the finished face of skirting dedo plaster and no deduction shall be made nor extra paid for any opening in floor of areas up to 0 1 sq

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

**14.43.(B) Kota stone slab flooring over 20 mm. (average) thick base of cement mortar 1:6 (1 cement :6 coarse sand) or L.M. 1:1.5 laid over and jointed with gray cement slurry including and polishing complete : 30 mm. thick.**

**1.0. Materials and workmanship**

**1.1.** The relevant specifications of item No 14 43 (A) shall be followed except that the thickness of stone shall be 30 mm.

**2.0. Mode of measurements & payment**

**2.1.** The relevant specifications of item No 14.43 (A) shall be followed.

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

**14.44. Kota stone slab 25 mm. thick in riser of steps dedo and pillars laid on 10 mm. thick cement mortar 1:3 (1 cement : 3 coarse sand) and jointed with gray cement slurry including rubbing and polishing etc. complete.**

**1.0. Materials**

Water shall conform to M-1. Cement mortar shall conform to M-11. Kota stone slab 25 mm thick shall conform to M-49.

**2.0. Workmanship**

**2.1.** The relevant specifications of item No. 14.43(A) shall be followed except that the kota stout-fixed for risers of steps, dedo or skirting in C.M. 1:3 and the polishing shall be done manually instead of machine polishing.

**3.0. Mode of measurements and payment**

**3.1.** The risers of steps, skirting or dedo shall be measured in sq. meter Length shall be measured along the finished faces of risers, skirting or dedo. Height shall be measured from finished level of treads of floor to top. Lining of pillars shall be measured under this item.

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

**14.46.(A) Rough chiseled dressed (Kota stone green) stone flooring over 20 mm. thick base of cement mortar 1:5 (1 cement :5 coarse sand), or L.M. 1:1.5 including pointing wit cement mortar 1:2 (1 cement : 2 stone dust) etc. complete 25 mm. thick.**

**1.0. Materials**

Water shall conform to M-1. Lime mortar shall conform to M-10. Cement mortar shall conform to M-11 Rough chisel dressed stone shall conform to M-48.

**2.0. Workmanship**

**2.1.** The relevant specifications of item No. 14.43 (A) shall be followed except that the rough chisel dressed stone of 25 mm. thickness of approved quality are to be fixed on cement mortal bedding in CM 1:5 or L.M. 1:1.5 of 25 mm. average thickness.

**2.2. Dressing of stone slab :**

Every stone slab shall be cut to the required size and shape and rough chisel- dressed on top, if required, so that the dressed surface shall not be more than 6 mm, from straight edge placed on it. The sides shall also he chisel-dressed to a minimum depth of 20 mm. so that the dressed edge shall at no place be more then 30 mm. from straight edge butted against it. Beyond this depth, the sides may be dressed slightly splayed so as to form an inverted V shaped joint with adjoining also. The surface shall be reasonable true and plane and all the angles and edges shall be square and free from chippings. Where the stone slabs are to be used for nosing, exposed edges shall be rough chisel-dressed to full depth and cut to the uniform thickness.

**2.3.** Thickness of the stone slab shall be 25 mm. with permissible tolerance of  $\pm 2$  nun.

**2.4. Laying :**

The surface of the sub-grade concrete shall be cleaned, wetted and mopped. The bedding of specified mortar mix shall he spread under each slab to the specified thickness. The slab shall be washed clean before laying. It shall be than laid on top. pressed and so that all hollows underneath filled surplus mortar works up through the joints. The top shall be tapped and brought level to the adjoining slab. The thickness of the joints shall not exceed 5 mm. Subsequent slabs shall be laid in the same manner

**2.5. Curing & Finishing :**

Any surplus mortar on the surface of the slab shall be cleaned off and joints-finished flush. The joints shall be raked out uniformly to a minimum depth of 12 mm. under the plaster, skirting or dedo. The junctions between wall plasters and floor shall .be finished neatly and without wavirless. The pointing shall be done with C.M. 1:2. The pointing shall be cured for a minimum period of seven days. The finished floor shall not sound hollow when tapped with wooden mallet and the finished surface shall be true to level and slopes as directed.

**3.0. Mode of measurements & payment**

**3.1.** The relevant-specifications of item No. 14.43 (A) shall be followed.

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

- 14.46.(B) Rough chisel dressed (Kota stone green) stone flooring over 20 mm. thick base of cement mortar 1:5 (1 cement : 5 coarse sand) or Lime Mortar 1:1.5 including pointing with cement 1:2 (1 cement : 2 stone dust) etc., complete-40 mm. thick.**
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specifications of item No. 14.46 (A) shall be followed except that the thickness of stone slabs shall be 40 mm. thick.
- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specifications of item No 14.46(A) shall be followed.
- 2.2.** The rates shall be for a unit of one sq. meter.
- 14.71.(A) Cement concrete flooring for I.P.S, 1:2:4 (for Indian Patent Stones) (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) laid in one layer finished with a floating coat of neat cement 40 mm. thick.**
- 1.0. Materials**
- Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Stone aggregate 20 mm. nominal size shall conform to M-12. Cement concrete of 1:2:4 proportion measured by volume shall conform to relevant specifications of ordinary grade 1:2:4 concrete.
- 2.0. Workmanship**
- 2.1.** The cement concrete flooring of 40 mm thick (Average) is to be laid as per the site condition. The concrete shall be mixed in a mechanical mixer at the work. Hand mixing may however be allowed for smaller quantities of work and in case of failure of machineries or as permitted by the Engineer-in-charge. It shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. However in such cases 10% more cement than otherwise required shall have to be used without any extra cost. The mechanical mixing shall be done for period of 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, Flooring or specified thickness shall be laid in accordance with approved pattern or as directed. Finishing operation shall depending upon the temperature and atmospheric conditions. The surface shall be left for some time till moisture disappears from it. Fresh quantity of cement shall be mixed with water to form a thick slurry and spread over the surface while the concrete is still green. Use of dry cement or cement and sand mixture sprinkled on this surface to stiffen the concrete or absorb excessive moisture shall not be permitted. The cement slurry shall then be properly pressed twice by means of iron floats, once when the slurry is applied and the second time when cement setting and finished floated smooth. The surface shall be marked with string or B.R.C. fabric jali to make the surface non-slippery as and when directed. The junction of floors with wall plaster, dedo or skirting shall be rounded off where so required up to 25 mm. radius. Flooring in lavatories and bath rooms shall be laid after fixing of water closet and squatting pans and floor traps which shall be plugged while laying the floors and opened after the floors are completed. Any damage done to water supply or sanitary fittings during execution of work shall be made good.
- 2.2.** After the final set, the concrete shall be kept continuously wet. if required by ponding for a period of not less than 7 days from the date of placement.
- 2.3.** The form work shall be provided if necessary as directed by Engineer-in-charge. Concreting shall be done as per alternate bay method with necessary centering either by mastic or cement mortar as directed
- 3.0. Mode of measurements & payment**
- 3.1.** The rate shall include the cost of all materials and labour involved in all the operations described above. No deduction shall be made or extra paid for any opening up to 0.1 sq. mt. In area in the floor, nothing extra shall be paid for laying the floor at different levels in the same room or the counter yard.
- 3.2.** ("he rate shall be for a unit of one sq. meter.
- 14.71.(B) Cement concrete flooring (Indian patent stone) 1:2:4 coarse sand 4: graded stone aggregate 20 mm. nominal size) laid in one layer finished with floating coat of neat cement : 50 mm. thick.**
- 1.0. Materials & Workmanship**
- 1.1.** The relevant specifications of item No. 14.71 (A) shall be followed except that the thickness of concrete flooring shall be 50 mm.
- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specifications of item No. 14.71. (A) shall be followed.
- 2.2.** The rate shall be for a unit of one sq. meter.
- 14.74. Cement concrete payment (25 mm. to 50 mm. thick) with 1:2:4 (1 cement : 2 coarse sand : 4 stone aggregate 20 mm. nominal size) including finishing with a floating coat of neat cement complete.**
- 1.0. Materials and workmanship**
- 1.1.** The relevant specifications of item No. 14.71 (A) shall be followed except that the thickness of concrete flooring vary from 25 mm. to 50 mm.
- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specifications of item No.14.71 (A) shall be followed except that thickness shall be measured correct up to 1 mm. flooring laid in borders, margins and treads of steps, shall be measured under item of flooring in respective of width.
- 2.2.** The rate shall be for a unit of one cubic meter.

**14.81.(C) 20 mm. thick precast concrete tile with aggregate of sizes up to 6 mm. laid in floors, treads of steps and landings on 20 mm. thick bed of cement mortar 1:6 (1 cement : 6 coarse sand) or L.M. 1:1.5 jointed with neat cement slurry with pigment to match the shade of the titles complete with precast tiles of Dark Shades ordinary cement.**

**1.0. Materials**

Water shall conform to M-1. Cement shall conform to M-2. Sand shall conform to M-6. Lime mortar 1:1.5 shall conform to M-10. Cement shall conform to M-11. Tiles shall conform to M-47 (A) cement concrete tiles shall conform to I.S. 1237-1959 and pigments to be admixed with mortar or for grouting shall conform to I.S. 2114-1962

**2.0. Workmanship**

2.1. The tiles shall be laid on the sub-grade of concrete of the R.C.C. slab. Bedding shall be in the mortar 1:1.5 or cement mortar (1:6). The amount of water added shall be minimum required for sufficient plasticity and workability C.M. or lime mortar where the ingredients shall be thoroughly mixed dry hard lumps removed and water added to give a good workability.

2.2. The base shall be cleaned of all dust, dirt and scum and properly wetted without allowing water pools. For a bedding of cement mortar shall be then spread evenly over the base of two rows of tiles and three to five meters in length. The top shall be kept rough so that cement slurry can be absorbed. The thickness of the bedding shall be not less than 10 mm. at any place. The laying of tiles shall be commenced with neat cement slurry of honey-like consistency and shall be spread over the mortar bed over an area sufficient to receive about 20 tiles. The tiles shall then be fixed in this grout one after the other, each tile being gently tapped and properly bedded in line and level with the adjoining tiles. The joints shall be as narrow as possible and normally shall not exceed 1.5 mm. After the day's work the excess cement slurry on top shall be cleaned as also the joints with a broom struck and washed before the slurry sets hard. Next day the joints shall be filled with the cement grout of the same shade as the matrix of the tiles. Tiles which are fixed in the floor adjoining the wall shall go a minimum of 10 mm. under the wall plaster, skirting or dado. For the purpose, plaster etc. may be left unfinished by about 50 mm. above the proposed finished level of the floor. The unfinished strip shall be plastered after laying the floor tiles. Where full tile cannot be used, tile shall be cut to the size to be used.

2.3. The flooring shall be cured for 7 days.

**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 above.

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

**14.86. Chequered precast cement concrete tiles 22 mm. thick with aggregate of sizes up to 6 mm. in floors, treads of steps and landings on 20 mm. thick bed of C.M. of 1:6 (1 cement : 6 sand) or lime mortar 1:1.5 (1 Lime putty : 1.5 coarse sand) jointed with cement slurry with pigment to match the shade of tiles.**

**1.0. Materials**

1.1. The relevant specifications of item No. 14.25 (A) shall be followed.

**2.0. Workmanship**

2.1. The relevant specifications of item No 14.21 (A) shall be followed except that chequered precast cement concrete tiles 22 mm. thick shall be used in floors, treads of steps and landings on average 20 mm. thick bed of C.M. 1:6 or L.M. 1:1.5.

**3.0. Mode of measurements and payment**

3.1. The relevant specifications of item No. 14.21 (A) shall be followed.

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

**14.87. Extra for polishing and polishing the precast cement concrete tiles in flooring, skirting or dado.**

**1.0. Workmanship**

1.1. Grinding and rubbing shall normally be commenced after 14 days of laying the tiles, except for skirting or small areas, machine shall be used for the purpose.

1.2. First grinding shall be done with carborundum stones of 48 to 60 grade grit fitted in machine. Water shall be properly used during grinding. When the chips show up and the floor has been uniformly rubbed, it shall be cleaned with water baring all pin holes It shall then be covered with a thin coat of gray or white cement mixed with or without pigments to match the colour of the topping of the tiles Pin holes if any shall thus be filled. This grout shall be kept moist for sufficient period as directed. Thereafter, second grinding shall be started with carborundum of 120 grit. Grouting and curing shall be followed again. Final grinding shall be done when other works are finished. The machine shall be fitted with carborundum of grit 220 to 350 using water in abundance. The floor shall then be washed clean with water Oxalic acid powder shall then be dusters as needed on the surface and the surface rubbed with machine fitted with Hessian bobs 01 rubbed hard with pad of woolen rags. The floor shall then be washed, cleaned and dried with a soft cloth of linen. The finished floor shall not sound hollow when tapped with a mallet.

1.3. If any tile is disturbed or damaged it shall be refitted or replaced properly jointed and polished. 1.4. For skirting, dado or small areas where it is not possible to do machine polishing all the above operations are to be done manually.

**2.0. Mode of measurements and payment**

2.1. The rate shall include the cost of all materials and labour involved to all the operations as described above.

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

- 14.90. Providing and laying brick on edge flooring laid dry, grouted with C.M. 1:6 (1 cement : 6 coarse sand) including finishing the joints flush, curing etc. complete.**
- 1.0. Materials**  
Water shall conform to M-1. Cement mortar shall conform to M-11. Burnt bricks shall conform to M-15.
- 2.0. Workmanship**
- 2.1.** The flooring shall be laid on concrete sub grade where so provided. The slope in the floor shall be provided in the sub-grade. Where sub-grade is not provided, the earth below shall be properly sloped, watered, rammed and consolidated. Before laying the flooring it shall be moisture. Plinth masonry off-eta shall be depressed so as to allow the sub grade concrete to rest on it.
- 2.2. Laying :**  
The brick shall be laid in plain, diagonal herring bond, or other pattern as directed. The bricks shall be dry laid properly and set home by gently tapping. On completion of the portion of flooring the vertical joints shall be grouted with C.M. 1:6 and all joints shall be finished flush. The joints shall be as fine as possible and not exceeding 5 mm. These points shall be filled with cement mortar 1:6.
- 2.3. Curing :**  
The brick paving shall be cured for 7 days.
- 3.0. Mode of measurements and payment**
- 3.1.** The length and breadth shall be measured correct to a centimeter between skirting dedo or wail plaster. No deductions shall be made nor extra paid for any opening up to 0.1 sq.mt. in area in the floor Nothing extra shall be paid for laying the floors at different levels in the same room or courtyard.
- 3.2.** The rate shall be for unit of one sq. meter.

**SECTION-15**  
**Roof Covering**

- 15.1. Providing corrugated G.I. sheets roofing fixed with galvanized iron 1J' or 1L' hook bolts and nuts 8 mm. dia. with bitumen and G.I. limpet washers filled with white lead complete excluding the cost of purline, rafters and trusses (1) 0.8 mm. thick sheet.**
- 1.0. Materials :**  
Corrugated G.I. sheets shall conform to M-23.
- 2.0. Workmanship**
- 2.1.** Spacing of purlines : One purline shall be provided at the ridge and one at the eaves. The spacing of other purlines for 0.8 mm. thick G.I. sheets shall not exceed 1.80 meters. The purline shall coincide with the centre line of the end lap. The ridge purlines shall be placed in such a way that the ridges can be fixed properly. The portion overhanging the wall support shall not be more than one fourth of the 'spacing of purlins.
- 2.2.** The top surfaces of the purlines shall be painted before the sheets are fixed over them. Embedded portions of purlins shall be finished with two coats of coal-tar.
- 2.3. Laying of sheets :**
- 2.3.1.** The sheets shall be laid in purlins to a true plane with the line of corrugations truly parallel or normal to the sides of area to be covered. The sheets shall not generally be built into gables and parapets. They shall be bent up along their side edges close to the wall, and the junction shall be protected by suitable flashing or by projecting drip course.
- 2.3.2.** The laps at end shall be provided 150 mm. minimum for roof slopes 1 in 2 (1 vertical : two horizontal) and steeper but 200 mm. shall be provided for flatter slopes than those above. The side lap shall be provided two ridges of corrugations at each side.
- 2.3.3.** The sheets shall be cut to the dimensions or the shape of the roof either along their lengths or their width or in slant across the line of corrugations at hips and valleys. The sheets shall be cut carefully with a straight edge and chisel to give straight finish. The sheets shall be laid such that the laps are turned away from the usual direction of local heavy rain.
- 2.3.4. Fixing of sheets :**
- 2.3.4.1.** Sheets shall be fixed to the purlins or other roof members such as hips or valley rafter etc. with 1J' or 1L' galvanized hook bolts, and galvanized nuts 8 mm. dia. with bitumen limpet washers and G.I. washers. Limpet washers with white lead shall be used. Length of hook bolt shall be varied to suit the site requirement. Bolts shall be sufficiently long so that after fixing the project above the top of their nuts by not less than 12 mm the grip of 1J' or 1L' hook bolts on the sides of purlins shall not be less than 25 mm. There shall be minimum of three hook bolts placed at the ridge of corrugations in each sheet in every purlin and their spacing shall not exceed 300 mm. Coach screw shall not be used for fixing the sheets to purlin, where the slopes of roof are not less than 2.1/2 degree (1 vertical and 2.1/2 horizontal). Sheets shall be jointed together at the side laps by galvanized iron bolts and nuts 25 mm. x 6 mm. size each bolt with a bitumen and G.I. limpet washer filled with white lead. Where the overlaps at the sides extend to two corrugations, these bolts shall be placed zigzag over lapping corrugations, so that the ends of the overlapping sheets are drawn tightly towards each other. The spacing of same bolts shall not exceed 600 mm. along each of the staggered rows.
- 2.3.5.** Holes for all bolts shall be drilled and not punched in the ridges of the corrugations from the under side, while the sheets are on the ground. The holes in the sheets shall be at least 50 mm. from the edge. ' Sheets drilled wrongly shall be rejected. The holes in the washers shall be of the exact diameter of the hook bolts or the beam bolts. The nuts shall be tightened from above to give a leak-proof roof
- 3.0. Mode of measurements and payment**
- 3.1.** The measurements of the C.G.L sheet roof shall be taken for finished work in superficial area in general plane (not girthed on the roof). The laps between the C.G.I. Sheets both at their ends and along the side edges shall not be measured. The overlaps of C.G.I, sheets over the valley piece and their under lap under the ridge, hip and flashing piece shall be included in the measurements.
- 3.2.** No deductions in measurements shall be made for openings for chimney stacks, sky light etc., of area up to 0.40 sq. mt. nor extra be paid for labour in cutting and for wastage etc. in forming such openings.
- 3.3.** The rate of roof shall include the cost of all materials and labour involved in all operations described above. The rate also includes the cost of provision, erection and removal of the scaffolding, benching, ladders, templates and tools required for the proper execution and erection of the work. The rate includes the cost of purlins, rafters and trusses.
- 3.4.** The rate shall be for a unit of one sq. meter.
- 15.7. Providing ridges of hips 600 mm. overall in plain G.I. sheets fixed with G.I. 'J' or 'L' hooks bolts and nuts 8 mm. dia. G.I. limpet and bitumen washer etc. complete. 0.80 mm. thick sheet.**
- 1.0. Material**  
The G.I. valley gutters and ridges shall conform M-23 A.
- 2.0. Workmanship**
- 2.1.** The relevant specification of item No. 15.1 shall be followed except that the work shall be carried out for ridges or hips. The overlaps for ridges and hips or either side over the C.G.I, sheets and end legs shall be minimum 225 width of the ridges and hips shall be as described in the item.

2.2. Ridges shall be fixed to the purlins with same 8 mm. dia. G.I. hook bolts and nuts and bitumen and G.I. limpet washers, which fix the sheets for the pureline. Hips shall be fixed to the roof members with the same 8 mm. dia G.I. hook bolts and nuts and bitumen and G.I. limpet washers which fixed the sheets. At least one of the fixing bolts shall pass through the end laps of the ridges and hips on other sides. If this is not possible, extra hook bolt shall be provided. End laps of ridges and lips shall be jointed together by galvanized iron seam bolts and G.I. Washers. There shall be at least two such bolts in each end lap.

2.3. Ridges and hips shall fit in squarely on the sheets.

**3.0. Mode of measurements and payment**

3.1. The measurements of ridges or hips shall be taken for finished work in length along their centre lines.

3.2. No laps shall be measured.

3.3. The payment for ridges and hips shall be made in a similar way as in case of C.G.I, sheet roofing.

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

**15.8. Providing valleys 900 mm. overall in plain 1.6 mm. thick G.I. Class-3 fixed with 'J' or 'L' hook bolts and nuts galvanized from 'J' or 'L' hook bolts and 8 mm. dia. G.I. limpet and bitumen washers complete.**

**1.0. Materials**

1.1. The G.I. valleys 900 mm. overall in galvanized plain sheet of 1.6 mm. thickness shall be of class-3. The valleys shall be 900 mm. wide overall and flashing shall be 380 mm. wide overall. There shall be bent to the required shape without damage to the sheets in the process of bending.

**2.0. Workmanship**

2.1. The relevant specifications of item NO. 15.1. shall be followed except that the work shall be carried out for G.I. valleys 900 mm. overall with G.I. sheets 1.6 mm. thickness.

2.2. Wherever the edge of a roof sheeting or valley gutter is turned up against a wall, the edge shall be weather proofed with a flashing. Flashing shall be bent to shape and fixed. Lap over the sheet shall be not less than 150 mm. over the roofing sheets. The end between the flashing sheets shall not less than 225 mm.

2.3. The flashing shall be inserted into brick work or masonry joints to a depth of 50 mm. These joints shall be filled with cement mortar (1:3). The flashing shall be well secured to the masonry. Whenever flashing has to be laid at a slope, it shall be stepped at each course of masonry, the step being out back at angle or not less than 30 degrees to the vertical.

2.4. Valleys shall be bent to shape and shall have end lap projection on either side under C.G.I, sheet not less than 225 mm. Valleys shall be fixed to the roof member below, with same 8 mm. dia. G.I. hook, bolts and nuts and bitumen and G.I. limpet washer which fix the sheets to these members. At least one of the fixing bolts shall pass through the end laps of the valley piece. If necessary extra bolts shall be provided for this purpose.

**3.0. Mode of measurements and payment**

3.1. The measurements for valley shall be taken for finished work in length along their centre lines.

3.2. No laps shall be measured.

3.3. The rate excludes the cost of boarding underneath which shall be paid separately.

3.4. The rate of flashing includes the cost of mortar for fixing in wall and other labour and materials required for it.

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

**15.10.(I) Providing and fixing 150 mm. wide 450 mm. overall semicircular plain, G.I. sheets clas-3 Gutter with iron brakes 40 mm. x 3 mm. size bolts nuts, washers etc. including making necessary connections with rain water pipes : 0.80 mm. thick.**

**1.0. Materials**

1.1. These shall be of plain galvanized sheets Class-3 of 0.80 mm. thickness. The gutter shall be designed to carry the maximum discharge from the roof without flowing over and shall be constructed wherever possible with sunk channel or gutter.

**2.0. Workmanship**

2.1. The longitudinal edges shall be turned back to the extent of 12 mm. and beaten to form a rounded edge. The ends of the sheets at junctions of pieces shall be hooked into each other and beaten flush to avoid leakages.

2.2. The size of gutters shall be as specified in the item.

2.3. The gutter shall be laid with a minimum fall in 120. Gutter shall be true to line and slope and shall be supported on fixed M.S. Flat iron brackets bent to shape or any other suitable bracket.

**3.0. Mode of measurements and payment**

3.1. The measurements of gutters shall be taken for finished work in length along their centre lines. No. laps shall be measured.

3.2. The rate gutter shall include the cost of all labour and materials specified above including all specials such as angles, junctions, drop ends or funnel shaped connecting pieces, stop ends etc. flat iron brackets and bolts and nuts required for fixing the latter to the roof members.

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

**15.20.(A)(I) Providing asbestos cement sheets, roofing fixed with G.I. plain and bitumen washers complete excluding cost of purlins, fakers and trusses : 7 mm. thick, corrugated sheet.**

**1.0. Materials :**

1.1. Asbestos cement sheets shall conform to M-24.

## **2.0. Workmanship**

**2.1.** The maximum spacing of purlins shall be 1.6 meters in case of 7 mm. thick A.C. sheets and 1.4 meters for 6 mm. thick A.C. sheets.

## **2.2. Laying & fixing of Sheets**

The sheets shall be laid on the purlins and other roof members as per cods practice. The top bearing surfaces of all purlins and other roof members shall be is one plane so that the sheets when being fixed shall not be required to be forced down to rest on the purlins. The finished roof shall present uniform slope and the line of corrugation shall be straight and true. The sheets shall be laid with smooth side upwards. Corrugated sheets shall be valid starting at the eaves either from left to right or right to left depending upon the direction of wind. Before actual laying of the sheets is started, the purlins spacing and the size of sheets shall be checked to ensure that the arrangements shall provide the laps required and the specified overhang at the eaves. In case the sheets are laid from right to left, the first sheet shall be laid uncut but the remaining sheets in the bottom row shall have the top left hand corners cut or mitered. The sheets in the second and other immediate rows shall have bottom right and corner of the first sheet cut. All other sheets except the last sheets shall have both bottom right hand corner of the first sheet cut. All other last sheet shall have only top left hand corner cut. The last of the top row sheets shall have the bottom right hand corner cut with exception of the last sheet which shall be left uncut. If the sheets are laid from left to right, the first sheet shall be laid and cut and the remaining procedure shall be reversed.

**2.3.** The free overhang of the sheets at the eaves shall not exceed 400 mm. in case of 7 mm. thick sheets and 300 mm. in case of 6 mm. thick sheets.

**2.4.** The meter described above is necessary to provide snug fit. Where 4 sheets meet at a lap the length of meter shall be 150 mm. and the width of miter shall be equal the width of the side lap. The cutting may be done with ordinary wood-saw at site.

## **2.5. Laps :**

The sheets shall be laid with an end lap of 150mm. minimum. In case of roof with a' pitch flatter than 1 vertical to 2.1/2 horizontal (Approx. 22) or in the case of very exposed situations appropriate larger Taps may be provided. The sheets shall be laid with side lap of half a corrugation.

**2.6.** Fixing Accessories : The sheets shall be secured to the purlins and other roof members by means of 8 mm. dia galvanized iron bolts (J) type hook bolts in case of angle iron purlins and 'L' type bolts in case of R.S. joints, precast concrete, or timber purelin, and nuts bearing on galvanized iron washers .and bitumen washers. The grip of 'J' or 'L' bolts on the side of purlins shall not be less than 25 mm, Each galvanised iron 'J' or 'L' hook bolts shall have bitumen washer and galvanised iron washer placed over the sheets before the nuts is screwed down from above. On each purelin there shall be one hook bolt on the crown adjacent to the side lap on either side bitumen washer shall be of approved quality. The G.I. flat washer shall be 25 mm. in diameter and 1.60 mm. thick and bitumen water shall be 35 mm. in dia. and 1.5 mm. thick with hole to suit the required size of fixing accessory. Each nut shall be screwed lightly at first. After a dozen or more sheets are laid, the nuts shall be tightened to ensure a leak proof joint and also nuts tightened only to extent so as to prevent damage 1o the sheets. The length of the 'J' bolts or crank bolts shall be 75 mm. more than the depth or purlins for single sheet fixing and 90 mm. more where two sheets overlap or where ridges or other accessories are to be fixed. The minimum length of coach screw for timber purlins shall be 110 mm.

## **2.7. Holes :**

The holes fo fixing the sheet shall be drilled in the centre of end lap to sheets to suit the purlins i.e. on the centre line of the purline, if these are of timber and square head coach screws are used, or as close as possible to the back of purlins if 'J' or 'J' bolts are used as with steel angles or precast concrete or timber purlins. Holes for hook bolts etc. shall be 2 mm. more than diameter of the fixing bolts. No holes shall be nearer than 40 mm. to any edge of sheet or accessory.

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

**3.1.** The relevant specifications of item 15.1 shall be followed, except that the over lap of the corrugated sheets over valley gutters, roof lights, caves, filler piece sand underlay of the corrugated sheets below ridges, hips north light curves, flashing pieces, roof light sheets and large board shall be included in the measurement. No deduction shall be made for holes cut for extractor or cowl type ventilators. Deductions shall be made for roof light sheets.

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

## **15.20.(A)(III) Providing asbestos cement sheets roofing fixed with G.I. plain and bitumen washers complete excluding the cost of purlins, rafters and trusses: 6 mm. thick corrugated sheets.**

### **1.0. Materials and Workmanship**

The relevant specifications of item No. 15.20 (A)(I) shall be followed except that the thickness of A.C. sheets shall be 6 mm.

### **2.0. Mode of measurements and payment**

**2.1.** The relevant specifications of item No. 15.20 (A)(I) shall be followed.

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

## **15.25.(D) Providing and fixing ridges and hips in asbestos cement sheets roofing with G.I. 'J' or 'L' hook, bolts and nuts 8 mm. dia. G.I. plain and bitumen washers complete. North tight adjustable ridges.**

### **1.0. Materials**

**1.1.** The ridges and hips of Asbestos cement sheets roofing shall conform to M-24.



**2.0. Workmanship**

- 2.1. The relevant specifications of item 15.20 (A) (I) shall be followed except that the work is to be carried out for ridges and hips in A.C. sheet roofing.
- 2.2. The ridges shall be laid as per manufacturer's instructions with rolls of the two wings in case of adjustable ridges, fitting closely and with a separation of serrated ridges registering correctly with the sheet underneath. The staggered lapping of two wings of adjustable ridge section and the lap between the adjustment pieces on the same wing of ridges shall be as per manufacturer's instructions. The end portion of the wing of the adjustable ridges which project beyond the verges of the roof shall be cut and trimmed off neatly.

**2.3. Hips :**

In laying hip pieces, serrations to suit the corrugations in the sheets below should be cut in them so that they shall be snug fit over the sheets. The wings of ridges shall be fixed to the sheet below with seam bolts and nuts 8 mm. dia. G.I. 'J' or 'L' hook bolts and bitumen and G.I. washers which fix the sheets to the purlins. In addition, in north light adjustable ridges, the roll of the two wings shall be jointed together at their crown, with 8 mm. dia G.I. seam bolts and nuts at the rate of two numbers per pair wings. Each seam bolt shall be provided with one bitumen and a pair of G.I. washers. Where the plain wing angular or plain C.C. (1.2:4) up to a full length of the overlaps. The exposed face shall be finished perpendicular to the sheeting. Wings of hips shall be fixed to the roof members below with the same 8 mm. dia. G.I. 'J' or 'L' bolts end nuts which fix the sheets to the member. In addition, they shall be secured to the sheet below with 8 mm. dia G.I. seam bolts, nuts and washers so that taken together with hook bolts, there shall be bolt on each wing at least at every fifth Corrugation of the sheets below in case of corrugated and at least every second corrugation of the sheet below in case of semi corrugated sheets. Each seam bolt shall be provided with one bitumen and pair of G.I. washers.

**3.0. Mode of measurements & payment**

- 3.1. Measurements of ridges, hips and other accessories shall be for finished work and the length shall be taken along the centre line. The lap shall not be measured. The under lap of ridges under expansion joint pieces shall be measured.
- 3.2. The rate of ridges and hips shall not include the cost of expansion joint pieces, closing of gap, between plain ridge and the sheet corrugation with concrete.
- 3.3. The rate shall be for a unit of one running meter.

**15.26. Filling cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 12.5 mm. nominal size) in gaps of A.C. sheet corrugation and wing of ridges.**

**1.0. Materials**

Water shall conform to M-1. Cement shall conform to M-3. Coarse sand shall conform to M-6. Stone grit shall conform to M-8.

**2.0. Workmanship**

- 2.1. The relevant specifications of item No. 5.4.1 of C.C. shall be followed except that the work shall be for filling gaps of A.C. sheet corrugation and wings of ridges.

**3.0. Mode of measurements & payment**

- 3.1. The measurements of filling gaps in ridges, hips of A.C. sheet corrugation and wings of ridges shall be for finished work. The length shall be measured along the centre line.
- 3.2. The rate shall be for a unit of one running meter.

**15.27 (III) Providing and fixing asbestos cement roofing accessories with galvanised iron 'J' or 'L' hook bolts and nuts, G.I. plain and bitumen washer etc. complete : North light and ventilator curves.**

**1.0. Materials and Workmanship**

- 1.1. The relevant specifications of item No. 15.10 (I) shall be followed except that the work is carried out for accessories for asbestos cement roofing north light and ventilator curves.
- 1.2. The accessories such as north light and ventilator curves shall be laid and secured with same G.I. hook bolt to secure the sheets to the roof, or with separate G.I. hook bolts to the roof members below and/ or with 8 mm. dia. G.I. bolts nuts and washers to the sheeting, generally as per manufacturer's written instructions.

**2.0. Mode of measurements & payment**

- 2.1. The relevant specifications of item No. 15.25 (D) shall be followed.
- 2.2. The rate shall be for a unit of one running meter.

**15.29.(I) Providing and fixing asbestos cement socketed half eaves gutter with bolts, nuts, bitumen washer etc. and flat iron brackets 40' mm. x 3 mm. size including asbestos rope and plastic roofing compound in joints complete : 150 mm. nominal size.**

**1.0. Materials & Workmanship**

- 1.1. The relevant specifications of item No. 15.10(f) shall be followed except that the asbestos cement socketed half round eaves gutter shall be provided. The size of gutter shall be 150 mm. nominal.
- 1.2. Gutters shall be laid with a minimum fall of 1 in 120 which should be increased where possible. Gutters shall be true to line and slope and shall be laid with requisite accessories such as drop ends, stop ends, nozzles, m angles and union slips, as directed. The size of outlet of drop ends and nozzles shall be the same as the size of rain water pipe into which they discharge water. Gutters and their accessories shall be supported by m.s. fiat/ iron bracket. Where these are required to be fixed to the side of rafter they shall be fixed with 40 mm. by 3 mm. section bent to shape and fixed rigidly to the sides of the rafter with 3 Nos. of 10 mm. dia. bolts, nuts and washers. The brackets shall overlap the rafter not less than 300 mm. sand connecting bolts be 115 mm. centers.

- 1.3. Where the brackets are to be fixed with purlins, these shall consist of 40 x 3 mm. M.S. flat iron bent to shape with one/and turned at a right angle and fixed to the purlins face with a 10 mm. dia bolt, nut and washer. The perpendicular overhang portion of 40 mm. x 3 mm. bracket shall be stiffened by another 40 x 3 mm. flat bent to right angle shape with its longer leg connected to the bracket with two numbers of 6 mm. dia. M.S. Bolts nuts and washers and its shorter legs fixed to the face of purlins with one number 10 mm. dia bolt nuts and washers. The overhang of the vertical portion of the flat iron bracket from the face of the purlin shall not exceed 225 mm.
- 1.4. Requisite slope in the gutter shall be given in the line of bracket. The brackets shall be placed at not more than 900 mm. centers.
- 1.5. The gutters shall be fixed to the brackets with 2 Nos. 8 mm. G.I. seam bolts and nuts, each bolt and nut being equipped with a pair of bitumen and G.I. washers. These connection bolts shall normally be above the water line of the gutter..
- 1.6. Spigot and socket end of gutters of socketed half round gutter and their accessories shall be connected together at their laps with one row of 8 mm. dia. G.I. bolts and nuts. Each of the bolts and nuts shall be provided with a pair of bitumen and a pair of G.I. washers. The gap between socket and spigot shall be packed with approved plastic roofing compound and flanked on the both sides with 6.35 mm. dia asbestos rope. The connecting G.I. Bolt shall be then tightened so that the lapped joint becomes leak-proof. The outer face of packed asbestos rope shall not be further than 6 mm. from the edges of the spigot and socketed ends. Where both ends of gutters and / or their accessories to be connected together are spigot ends, they shall be laid as butt jointed with 1.5 mm. gap in between over union clips. The union clips connected to the two butt ends of the gutter or other sections with two rows. The gap between union clips and ends of gutter sections or accessories shall be packed with plastic roofing compound flanked with edges of 6.35 mm. dia asbestos ropes as before. The whole joint shall be made leak-proof by tightening the bolts.

**2.0. Mode of measurements & payment**

- 2.1. The asbestos socketed half round eaves gutter shall be measured for finished work and the length shall be measured along the centre line. -
- 2.2. The rate of gutters shall include the cost of providing and fixing accessories such as drops ends, stop ends, nozzles, and fixing union clips together with bolts, nuts and washers.
- 2.3. The rate shall be for a unit of one running meter.

**15.29.(II) Providing and fixing Asbestos cement socketed half round eaves gutters with bolts, nuts, bitumen washers etc. and flat iron brackets 40 mm x 3 mm. size including Asbestos rope and plastic roofing compound in joint etc. complete. 300 mm. nominal size.**

**1.0. Materials & Workmanship**

- 1.1. The relevant specifications of item No. 15.29 (I) shall be followed except that the size of the Asbestos socketed eaves half round gutter shall be 300 mm. nominal size.

**2.0. Mode of measurements & payment**

- 2.1. The relevant specifications of item No. 15.29(1) shall be followed.
- 2.2. The rate shall be for a unit of one running meter.

**15.51. Tiled roofing with Mangalore pattern roof tiles including teak reefers of size 50 mm. x 25 mm.**

**1.0. Materials**

(1) Mangalore pattern roof tiles shall conform to M-25, (2) Teak wood batten shall conform to M-29.

**2.0. Workmanship**

**2.1. Laying**

The maximum distance between centre to centre of rafters shall be not more than 500 mm. Teak wood reapers 50 mm. x 25 mm. be nailed to each rafter at central distances suited to the size of the tiles by means of nails 50 mm. long. The reapers shall be of well seasoned teak wood and shall be straight pieces of uniform size and colour and not shorter than the length necessary to cover at least four rafter. The under face and sides of the reapers shall be planned before fitting up. Joints shall come over the rafter. The joints of two adjacent rows of reapers shall not come over the same rafter. At the eaves, there shall be two reapers of such thickness and shape that the uniformity of the top slope of the roof shall be preserved.

**2.2. The work of valleys shall be executed as under :**

Galvanized iron sheet 1200 mm. wide and 1.25 mm. thick shall be used for valleys. The sheet shall be extended by about 450 mm. under the tiles on either side in a depth of 100 mm. at centre. The sheet shall be carried 75 mm. into the wall and set with cement mortar unless flushing is specified. The laps, if any, on the slope shall be 300 mm. The sheets shall be laid over the reapers and nailed. Two reapers 50 mm x 25 mm. each shall be fixed over the galvanized iron sheet 150 mm. away from the centre line of the valley, on either side to keep the tiles and mortar from falling into the gutter of the valley.

**2.3. Laying :**

The tiles shall be laid from the eaves towards the fudges after fitting of the reapers, the rebate of the tiles resting fully against the reapers. The joints of the hips and ridges tiles and also those between them and the plain tiles shall be set in and well grouted with lime mortar and the mortar surface painted and finished off with a mixture of red paint and port land cement or preserve informality of colour. The finished slope of roof shall be uniform from ridges to eaves. The eaves line shall be perfectly straight, horizontal and parallel to each other. The end over gales shall be protected by lime borders and neatly finished.

- 2.4. At the side of valleys and for 230 mm. on either side of the roof at valleys cement plastering 12 mm. thick shall be done to prevent the rain water from the gutter leaking by the sides of valleys.
- 2.5. At the eaves, wide tie shall be placed over the ends of the last tiles and secured by means of galvanized iron washers and screws 25 mm. into the rafter to prevent tiles from being blow up. Care shall be taken to put the screws in the, ridges and not in the gutter or the tiles, Where full tiles are not necessary, half tiles manufactured for the purpose shall be used.
- 3.0. Mode of measurements and payment**
- 3.1. The measurement of the roof shall be taken for finished work for superficial area flat in the plane, of the roof and not girthed. Laps shall not be measured.
- 3.2. No deduction in measurements of roofed shall be made for openings of area up to 0.40 sq. mt. nor shall any extra be paid for labour and wastage in forming such openings.
- 3.3. The rate includes the cost of all materials and labour including ridges, hips, eaves and bottoms.
- 3.4. The rate shall be for a unit of one square meter.
- 15.75 Providing and fixing five courses water proofing treatment with bitumen felt consisting/ of second and fourth course of blown bitumen or/and residual bitumen applied hot 1.20 kg./sq. mt. of area for each course and first course with fiber base bitumen saturated underlay type and third course with fiber base self finished felt type 2 Grade-I, fifth and final course of stone grit 6 mm. and down size or pea sized gravel spreaded at 0.008 cum/sq.mt. including preparation of surface, excluding grading complete.**
- 1.0. Materials**  
The tar felt shall conform to M-76. The bitumen primer shall conform to I.S. 3388-1965. The bitumen shall conform to I.S. 702-1961. The grit or gravel shall conform to M-8.
- 2.0. Workmanship**
- 2.1. Preparation of surface :**
- 2.1.1. Well defined cracks other than hair cracks in the roof structure shall be cut to V section cleaned and filled up flush with cement sand slurry or with bitumen conforming to I.S. 702-1961. The surface to be treated shall have minimum slope of 1 in 120. The grading shall be carried out prior to the application of water proofing treatment by cement mortar or line surkhi mortar or as specified in description of item.
- 2.1.2. The surface or room, part of parapet and gutters, drain mouths etc. over which the water proofing treatment is to be applied shall be cleaned or all foreign matter such as funguses, moss and dust by wire brushing and dusting.
- 2.1.3. Drain outlet shall suitably placed with respect to the roof gradient to ensure rapid drainage and prevent local accumulation of water on the roof, surface, masonry drain mouth shall be widen sufficiently and rounded with cement mortar.
- 2.1.4. For cast iron drain outlets, a groove shall be cut all round to touch the treatment.
- 2.1.5. When a pipe passes through a roof on which water proofing treatment is to be laid a cement concrete angle fillet shall be built round it and the water proofing treatment taken over the fillet.
- 2.1.6. In case of parapet wall over 450 mm. in height for trucking in the water proofing treatment a horizontal groove 75 mm. wide and 65 mm. deep at minimum height of 150 mm. above roof level shall be left in the vertical face at the time of construction. The horizontal face of the groove shall be shaped with cement mortar 1:4.
- 2.1.7. In case of low parapet where the height does not exceed 450 mm. no groove shall be provided and the water proofing treatment shall be carried right over the top.
- 2.1.8. In case of existing R.C.C. and stone and vertical face of the parapet wall, a fillet 75 mm. in radius shall be constructed.
- 2.1.10. At the drain mouths the fillet shall be suitably cu back and rounded off for easy application of water proofing treatment and easy flow of water.
- 2.1.11. Outlet at every low dividing wall about less than 300 mm. in height cut open to full depth and the bottom and the sides shall be rounded smooth and corners rounded off for easy application of water proofing treatment.
- 2.2. Priming coat:**
- 2.2.1. Bitumen primer shall conform to I.S. 3335-1965. A priming coat consisting of bituminous solution of low viscosity shall be applied with brush on the roof and wall surface at specified weight per unit area to assist adhesion to bonding materials as specified in the description of the item.,.
- 2.2.2. Where a floating treatment to water proofing with self finished bitumen felt is required i.e. where water proofing treatment is required to be isolated from the roof structure, a layer of bitumen saturated felt (under lay) shall be spread over the roof surface and tucked into the flashing grooves. To keep the underlay free from the structure nonbonding materials shall be used below underlay. Overlapping to the adjoining strip of underlay shall be minimum of 75 mm. as sides and 10 mm. at ends, and shall be sealed with the same bonding materials, m as used for self finished felt treatment. The underlay shall be of type I saturated felt conforming to I.S. 1322-1970.
- 2.3. Laying of Felt :**
- 2.3.1. The self finished tar felt shall be cut to the required lengths, brushed clean to dusting materials, laid out flat on the roof to eliminate curls and subsequent sketching. The felt shall be laid in lengths running at right angles to the direction of run off gradient commencing at the lowest level and working up to crest, so that the lower laps of the adjacent felt layer offer minimum obstruction to the flow of water. The felt shall not be laid in a single piece of very long lengths as it is likely to shrink. 6 to 8 meters are suitable length. The roof shall be cleaned and dried before the felt treatment is begun. Each length shall be laid in position and rolled up for a distance of half its-lengths. The hot

bonding materials heated to correct working temperature as specified by manufacturer shall be poured on the roof across the full width of the felt as the letter is steadily unfolded and pressed down. The excess of bonding materials which squeezes out at the ends shall be removed as the laying proceeds. The pouring shall be so regulated that the correct weight of the bonding materials as per unit area is spread uniformly over the surface. When the first half of the tar felt has been bonded to the roof, the other half shall be rolled up and then unrolled on the hot bonding materials in the same way. Subsequent strips shall also be laid in the same manner. Each strip shall overlap the preceding one by at least 75 mm. at the longitudinal edges and 100 mm. at the ends. All overlaps shall be firmly bonded with hot bitumen. Streaks and trailing of bitumen near edges or laps shall be leveled by heating the overlaps with blow lamp and leveling down unevenness.

- 2.3.2. Third layer of bonding materials in four course treatment shall be carried out in similar out in manner after the flashing has been complete.
- 2.3.3. Water proofing treatment shall be carried out in the drain pipe or out-lets by at least 100 mm. The Water proofing treatment laid on the surface shall over-lap the upper edge of water proofing treatment in the drain outlets by latest 100 mm. Flashing felts shall be laid as flashing. Wherever junction of vertical horizontal surfaces occurs longitudinal laps shall be 100 mm. The lower layer of flashing felt shall overlap the roofing felt by 100 mm on vertical and sloping faces. Last course of flashing should not be of stone grit or pea sized gravel but it shall be replaced by providing two coats of bitumen solution of approved quality.
- 2.3.4. The lower edge of flashing shall overlap the flat portion for the roof and the upper edge of the flashing shall be trucked into the horizontal groove 75 mm. thick wide, 65 mm. deep provided at minimum height of 150 mm. from top of the roof surface. The flashing treatment shall be firmly held in place in the grooves with wooden wedges at intervals and the grooves shall be filled with cement mortar 1:4 (1 cement : 4 coarse sand) or cement concrete (1:2:4) (1 cement : 2 coarse sand : 4 graded stone aggregate 6 mm. nominal size) and surface finished smooth with the rest of wall. The cement work shall be cured of bituminous solution shall be applied on the vertical and sloping surface of flashing.
- 2.3.5. After the top flashing felt layer has been laid, the penultimate layer of bonding material shall be applied over the roofing felt and horizontal overlap, and vertical and sloping surfaces of flashing shall be spread uniformly over the hot bounding materials on the horizontal roof surface and pressed into it with wooden roller.
- 2.3.6. The material for surface finish shall be spread as described in the item over top layer.
- 2.3.7. If ballooning occurs the defects may be rectified as under.
- 2.3.8. Remove the gravel on the ballooned surface. The cut open and squeeze out the trap vapor by firm pressure applied by hand, seal the bitumen felt so lifted back on the surface by applying additional bitumen, finally seal the cut with piece of bitumen felt with bitumen application.

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

3.1. The measurements for this item shall be taken as under:

- (a) Water proofing of roof with bitumen shall be measured in sq. mt. length and breadth shall be measured correct to centimeter.
- (b) Measurement shall be taken for the superficial area of roofing and flashing treatment including flashing over the parapet wall, low dividing walls and expansion joints and at the pipe projection etc. Overlapping and tucking into flashing grooves shall not be measured.
- (c) Slopping and vertical surface of water proofing treatment shall be measured under the four or five course treatment as the case may be irrespective of the fact that the final course of grit or grave! is replaced by bitumen primer.
- (d) In measurements, no deductions shall be made for either openings or recesses for chimney stacks, roof lights etc. for areas up to 0.40 sq. mt. not anything extra shall be paid for extra labour and materials in forming such openings. For similar area exceeding 0.04 sq. mt. deduction shall be made in measurements for full opening but nothing extra shall be paid for extra labour and materials in forming such openings.
- (e) The grading (coba bedding) shall be paid separately but cleaning of surface and treatment shall not be measured or paid separately.

3.2. The rate includes cost of all materials and labour.

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

### 15.87(A) **Providing and fixing on wall face C.I rain water pipe including filling the joints with spun yarn soaked in neat cement slurry and cement mortar 1:2 (1 cement : 2 fine sand) 75 mm. dia.**

#### 1.0. **Materials**

Water shall conform to M-1. The C.I. rain water pipes and fittings shall conform to M-68. Cement mortar shall conform to M-11.

#### 2.0. **Workmanship**

2.1. C.I. rain water pipes shall be of the specified diameter and shall be in full lengths of 1.8 meters including socket ends of the pipes unless shorter lengths are required at junction with fittings.

#### 2.2. **Fixing :**

The pipe and fittings shall be fixed in vertical alignment unless otherwise specified and shall be secured to the walls at joints with M.S. clamps. The clamps shall be M.S. sheet 30 mm. bent to required shape and size so as to fit tightly on the socket of pipe when tightened with screw bolts. It shall be formed out of two semi-circular pieces, hinged with 6 mm. dia M.S. pin on one side and provided flanged ends on the other side with holes to fit in the screw bolt and nut 40 mm. long. The clamps shall be provided with hook made out of 275 mm. long, 10 mm. dia M.S. bar

- invested to the ring at the centre of one semicircular piece. The clamps shall be fixed to the walls. The clamps shall be kept above 25 mm. clear of finished face of wall so as to facilitate cleaning and painting the pipes.
- 2.3. The pipe shall be fixed vertically. The spigot of the upper pipe shall be properly fitted in the socket of the lower pipe such that there is uniform annular space filling with the jointing material. The annular space between the spigot and socket shall be filled with, a few turns of spun yarn soaked in cement slurry or with stiff cement mortar 2:1 (1 cement : 2 fine sand) well pressed with caulking tools and finished smooth at top at an angle of 45°, shopping up. The joint shall be kept wet at least for 7 days by tying four fold of gunny bag to pipe and keeping it moist constantly.
- 3.0. **Mode of measurements & payment**
- 3.1. The relevant specifications of item No. 15.93(B) of A.C. rain water pipes shall be followed except that the C.I. rain water pipe shall be fixed.
- 3.2. The rate shall be for a unit of one running meter.
- 15.88.(A) **Providing and fixing M.S. Holder bat clamps of approved design to C.I. or S.C.I, pipes embedded and including cement concrete blocks (108 mm. x 100 mm. size) in 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) and cost of cutting holes and making good the wall etc. complete : 75 mm. dia.**
- 1.0. **Materials of Workmanship**
- 1.1. The relevant specifications of item no. 15.94(6) shall be followed except that the M.S. holder bat clamps of approved design shall be C.I. rain water pipe-75 dia.
- 1.2. The bat clamps shall be fixed as directed with C.C. blocks of 100 mm. x 100 mm. The relevant specification of item No. 5.4.1 shall be followed for concrete work.
- 2.0. **Mode of measurements and payment**
- 2.1. The bat clamps of M.S. holder suitable for 75 mm. dia shall be measured for finished item.
- 2.2. The rate includes cost of all materials and labour etc. required for satisfactory completion of this item.
- 2.3. The rate shall be for a unit of one number.
- 15.90(A) **Providing and fixing and embedding sand C.I. rain water pipe in the masonry surrounded with 12 mm. thick cement mortar of the same mix as that of masonry : 75 mm. dia. pipe.**
- 1.0. **Materials**  
Water shall conform to M-1. Cement mortar shall conform to M-11. The C.I. pipe and fittings shall conform to M-68.
- 2.0. **Workmanship**
- 2.1. The relevant specifications of item No. 15.87 (A) shall be followed except that C.I. pipe 75 mm. dia shall be embedded in masonry surrounded with 12 mm. thick cement mortar.
- 2.2. The pipes shall be fixed in the masonry work as it proceeds. The pipe shall be kept vertical or to the line as directed. The pipe shall have minimum surroundings of 12 mm. thick cement mortar at every portion of external surface. The length shall be caulked with spun yarn and cement mortar as soon as the next length of pipe is placed in position. The socket end of the pipe shall be kept closed till the next length of pipe is fitted and jointed to prevent any brick-bats or concrete or pieces of wood falling in and cocking the pipes.
- 3.0. **Mode of measurements and payment**
- 3.1. The relevant specifications of item No. 15.87 (A) shall be followed.
- 3.2. The rate shall be for a unit of one running meter.
- 15.93(6) **Providing and fixing on wall face asbestos cement rain water pipe including jointing with spun yarn soaked in bitumen and cement mortar 1:2 (1 cement : 2 coarse sand) complete : 80 mm. dia.**
- 1.0. **Materials**
- 1.1. Asbestos cement pipes of 80 mm. dia shall conform to I.S. 1626-1960 for pipes fixed on wall face. AC. pipe shall conform to M-74.
- 2.0. **Workmanship**
- 2.1. Asbestos cement rain water pipes and fittings shall be of the diameter, size and type specified in the item. The pipe shall be full lengths of 2 meter as far as possible. All the pipes shall be fixed on wall face at locations indicated on drawings or as ordered by the Engineer-in-charge. Pipe shall be secured to face of wall below all joints by M.S. clamps with wooden gut ties.
- 2.2. The spigot of the upper pipe shall be properly fitted into the socket of the lower pipe such that there is uniform annular space for fitting with the jointing materials. One third depth of annular space between the item. The pipe shall be full lengths of 2 meter as far as possible. All the pipes shall be fixed on wall face at locations indicated on drawings or as ordered by the Engineer-in-charge. Pipe shall be secured to face of wall below all joints by M.S. clamps with wooden gut ties.
- 2.2. The spigot of the upper pipe shall be properly fitted into the socket of the lower pipe such that there is uniform annular space for fitting with the jointing materials. One third depth of annular space between the socket and the spigot shall be filled with spun-yarn soaked in bitumatic jointing compound and shall be pressed home by means of caulking tool. The remaining 2/3 depth of the joints shall be filled in with stiff cement mortar 1:2 and shall be pressed with caulking tool and finished smooth at top at an angle of 45° sloping up.
- 3.0. **Mode of measurements and payment**
- 3.1. The pipe shall be measured including all fittings along its length in running meter. No allowance shall be made for the portion of pipe length entering the sockets of the adjacent pipe or fittings.
- 3.2. The rate includes the cost of all materials and labour involved in all the operations including jointing.
- 3.3. The rate shall be for a unit of one running meter.

- 15.93.(C) Providing and fixing on wall face asbestos cement rain water pipe including jointing with spun yarn soaked in bitumen and cement mortar 1:2 (1 cement : 2 coarse sand) complete : 100 mm. dia.**
- 1.0. Materials and Workmanship**
- 1.1. The relevant specifications of item No. 15.93 (B) shall be followed except that the diameter of pipes shall be 100 mm.
- 2.0. Mode of measurements & payment**
- 2.1. The pipe shall be measured including all fittings along its length in running meter. No allowance shall be made for the portion of pipe length entered into the sockets of the adjacent pipe or fittings.
- 2.2. The rate includes the cost of all materials and labour involved in all the operations including jointing.
- 2.3. The rate shall be for a unit of one running meter.
- 15.94.(B) Providing and fixing for A.C. pipe on wall plugs and standard holder bat clamps comprising of two semi circular halves of flat iron and cast iron base screwed on wooden plugs : 80 mm. dia.**
- 1.0. Materials and workmanship**
- 1.1. The bat clamps shall consist of a iron base with a projecting 1 shaped lay, teeth web of which the semicircular halves of the flat iron clamps are bolted. The base on the holder bat clamp shall be screwed on a pair of wooden plugs fixed in the wall with screw slotted driven through the holes in the base. The ' screws shall be not less than 75 mm. long-for 80 mm. diameter pipes and 100 mm. diameter pipes. The plugs shall be fixed in the wall to a depth of 150 mm. in cement mortar, 1:2 centrally to the holes in the base of the bat clamps and with their front face projecting to such a length' from the brick face that when the bat clamps is fixed, the outer base of its base shall be flush with the plaster face of the wall. The plugs shall be 110 mm. x 50 mm. wide at face increasing to 160 mm. x 70 mm. width at rear and shall be 70 mm. deep through out.
- 2.0. Mode of measurement & payment**
- 2.1. The work shall be measured on number basis of clamps prescribed with accessories including cost of all materials and labour involved in all the operation including jointing etc. complete fixing in position etc. complete.
- 2.2. The rate shall be for a unit of one number.
- 15.94 (C) Providing and fixing for A.C. pipe on wall plugs and standard holder bat clamps comprising of two semi circular halves of flat iron and cast iron base screwed on wooden plugs : 100 mm. dia.**
- 1.0. Materials and workmanship**
- 1.1. The relevant specifications of item No. 15.94 (B) shall be followed except that the standard holder bat damp shall be for A.C. pipe of 100 mm. dia.
- 2.0. Mode of measurements and payment**
- 2.1. The work shall be measured on number basis of clamps including cost of all materials and labour involved in all the operation including jointing, fixing in position etc. complete.
- 2.2. The rate shall be for a unit of One Number.
- 15.95.(A) Providing and fixing on wall face asbestos cement fittings for rain water pipe including jointing with spun yarn socked in bitumen and cement mortar 1:2 {1 cement : 2 coarse sand). Bend of required degree. 80 mm. dia without door. 100 mm. dia. without door.**
- 1.0. Materials**
- 1.1. The bend of required degree and size as specified in item shall be of best quality and made as approved by the Engineer-in-charge. The fittings shall conform to I.S, 1626-1960.
- 2.0. Workmanship**
- 2.1. The fitting (bend of required degree) shall be fixed as per relevant specifications of item No. 15.93 (B), except that the A.C. bends of required degree shall be provided instead of pipe.
- 3.0. Mode of measurements and payment.**
- 3.1. The rate shall be for a unit of One Number.
- 15.95.(B) Providing and fixing on wall face asbestos cement fittings for rain water pipe including jointing with spun yarn soaked in bitumen and cement mortar 1:2 (1 cement: 2 coarse sand) off set 50 mm. (2) 80 mm. dia. (3) 100 mm. dia.**
- 1.0. Materials & Workmanship**
- 1.1. The relevant specification of item No. 15.95 (A) shall be followed except the off set 50 mm. of specified size of A.C. pipe shall be used instead of bends.
- 2.0. Mode of measurements & payment**
- 2.1. The rate shall be for a unit of One Number
- 15.95.(C) Providing and fixing on wall face asbestos cement fittings for rain water pipe including jointing with spun yarn soaked in bitumen and cement mortar 1:2 (1 cement : 2 coarse sand) off set 75 mm. (2) 80 mm. dia (3) 100 mm. dia.**
- 1.0. Materials & Workmanship**
- 1.1. The relevant specifications of item No. 15.95 (A) shall be followed except that off-set 75 mm. of specified size of A.C. Pipe shall be provided instead of bends.
- 2.0. Mode of measurements & payment**
- 2.1. The rate shall be for a unit of One Number.
- 15.95.(J) Providing and fixing on wall face Asbestos cement fittings for rain water pipe including jointing with spun yarn soaked in bitumen and cement mortar 1:2 ( 1 cement : 2 coarse sand) junction equal angle. (3) 80 mm. dia without door (5) 100 mm. dia. without-door.**

**1.0. Materials and workmanship**

The relevant specifications of item 15.95 (A) shall be followed that junction of equal of angle of specified size of A.C. pipe shall be provided instead of bends.

**2.0. Mode of measurements & payment**

2.1. The rate shall be for a unit of One Number.

**15.95.(K) Providing and fixing on wall face Asbestos cement fittings for rain water pipe including jointing with spun yarn soaked in bitumen and cement mortar 1:2 (1 cement : 2 coarse sand) : junction of equal double angle. (3) 80 mm. dia. without door (5) 100 mm. dia. without door.**

**1.0. Materials and workmanship**

1.1. The relevant specification of item 15.95 (A) shall be followed except that junction of equal double angles of A.C. rain water pipe of specified size shall be provided instead of A.C. Bend.

**2.0. Mode of measurement & payment**

2.1. The rate shall be for a unit of One Number.

**15.95.(L) Providing and fixing on wall face Asbestos cement fittings for rain water pipe including jointing with spun yarn soaked in bitumen and cement mortar 1:2 (1 cement : 2 coarse sand) : Standard shoe. (2) 80 mm. dia. (3) 100 mm. dia.**

**1.0. Materials and workmanship**

1.1. The relevant specification of item No. 15.95 (A) shall be followed except that the standard shoe of A.C. pipe of specified size shall be provided instead of bend.

**2.0. Mode of measurement & payment**

2.1. The rate shall be for a unit of One number.

## SECTION-16

### Ceiling Lining

#### 16.3.(A) Providing and fixing wooden planks ceiling with long Laid and grooved jointing and Wood screws (Frame work and cover fillets to be measured and paid separately) : Indian Teak Wood (i) 12 mm. thick (ii) 20 mm. thick (iii) 25 mm. thick.

##### 1.0. Materials

1.1. The Indian Teak wood shall conform to M-29.

##### 2.0. Workmanship

###### 2.1. General

The planks shall be clean sawn in the direction of the grain, cut square and straight. Each plank shall have tongued and grooved jointing. On exposed faces, it shall be planed for full face.

2.2. The frame for supporting the ceiling may be wooden or metal and the size and the other details of frame work shall be as directed, Suspenders of M.S. angles or other sections may be used for suspending the frame. Use of wooden suspenders shall be permitted. The bottom surface of the frame shall be checked and corrected to true surface and slope.

###### 2.3. Fixing :

Planks of a specified timber and thickness shall be used. The width of the planks shall not be more than 100 mm. up to 20 mm. thick planks and 150 mm. for planks above 20 mm. thick and length shall not exceed 3 meters. The planks shall be of uniform width except in the first and last lines of planks adjacent to the two walls where remaining additional odd width shall be adjusted equally on both sides. The minimum, length of planks in finished work shall be such that it will span at least two spacing of the supporting frame work except where shorten lengths are unavoidable. The planks shall be planed true on the exposed sides.

2.4. The longitudinal edges of the planks shall be jointed with tongued and grooved type joints as described in the item.

2.5. The outer lines of planks shall be accurately fixed parallel and close to be wall. Each subsequent plank shall be carefully jointed up. The plank shall be fixed to the frame above with two screws at each and joints of frame and one at every intermediate joint. (The screws shall not be thinner than designations 8 and of a length not less than twice the thickness of the boards). The screws shall be counter sunk and the screw holes filled with putty or-sloping out way. The unexposed face of planks shall be treated with wood preservative before the board is fixed.

##### 3.0. Mode of measurement & payment

3.1. The supporting frame, cover fillets, and suspenders shall not be included in rate of ceiling.

3.2. No deductions in measurements shall be made for opening not exceeding 0.46 sq. m. and no extra payment shall be made for forming such openings.

3.3. Each type of work in ceiling shall be measured separately.

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

#### 16.4. Providing and fixing Fiber insulation board lining with butt jointing and nails (Frame work and cover fillets to be measured and paid separately) (i) 12 mm. thick (ii) 18 mm. thick (iii) 25 mm. thick.

##### 1.0. Materials

1.1. The fiber insulation board of specified thickness shall conform to I.S. 3348-1965.

##### 2.1. Fixing :

The work shall be carried out as per detailed drawings for panel arrangements.

2.2. All boards are subject to slight movements due to moisture and temperature changes, and this shall be allowed for in fixing. Preferably the board shall be stored up for at least 24 hours before use in the same environment as the one in which they are to be fixed.

##### 2.3. Frame work :

The studs and grounds for fixing the boards shall be spaced at 300 mm. to 450 mm. centers both ways the .actual spacing selected depending on the width of the cut board in the panel arrangements. All edges of the boards shall be supported. Intermediate supports shall be provided at dado heights for picture rails and cornices etc.

2.4. Planked battens 40 mm. x 20 mm. shall be used for grounds on solid walls. The batten shall be plugged to wall as described-under. The batten shall be fixed on tapering plugs with 50 mm. long wood screws. The tapering plug shall be trapezoidal in shape having base 50 x 50 mm. at bottom 38 x 38 mm. at top with depth of 50 mm. Plugs shall be embedded in C.M. 1 : 3 and shall be placed at 450 x 500 mm. centers. The plugs shall be treated with coal tar and battens shall be treated with wood preservative before use. On uneven wall faces the battens shall be plugged and fitted with packing pieces at the back where necessary. The frame shall be treated with wood preservative before boards are nailed on.

Nailing shall be done by nails having a shank diameter of 2.5 mm. and head diameter of about 8 mm. Nails shall have length as per requirements. The nails shall be placed at supports at 100 mm. to 150 mm centre to centre and at edges 75 mm. centers. Minimum clearance for nails from edges shall be 10 mm. The nails shall be rustles where the nail heads are exposed. Where the joints are to be covered with beading, felt headed (clout) nails shall be used instead of lost head nails.

##### 3.0. Mode of measurements and payment

3.1. The relevant specifications of item No. 16.3.(A) shall be followed.

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



measured and paid for separately) 6 mm. thick ply.

**1.0. Materials :**  
6 mm. thick plywood shall conform to M-37.

**2.0. Workmanship**  
The relevant specifications of item 16.4 shall be followed except that 6 mm. thick plywood shall be fixed in lining.

**3.0. Mode of measurements and payment**

**3.1.** The relevant specifications of item 16.4 shall be followed.

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

**16.13(11) Providing and fixing plywood lining with butt jointing and nails (frame work and cover fillets to be measured and paid for separately) 9 mm. thick ply.**

**1.0. Materials & Workmanship**

**1.1.** The relevant specifications of item No. 16.13 (I) shall be followed except that the thickness of plywood to be fixed shall be 9 mm.

**2.0. Mode of measurements & payment**

**2.1.** The relevant specifications of item No. 16.4 (I) shall be followed.

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

**16.21(1) Providing and fixing plain asbestos sheet lining with butt jointing and wood screws (frame work and cover fillets to be paid for separately), Class-A-6.5 mm. thick.**

**1.0. Materials**

**1.1.** Plain A.C. Sheets 6.5. mm. thick shall be conform to M-24.

**2.0. Workmanship**

**2.1.** The relevant specifications of item No. 16.4. shall be. followed except that the plain A.C. sheets class A of 6.5 mm. thickness shall be fixed in lining.

**2.2.** In fixing asbestos cement sheets, care shall be taken to avoid rigid fixing as this may cause cracking if the supporting structure expands or shrinks. The sheet shall be fixed with wood screws to wooden ground and the screw holes shall be drilled slightly longer than the screws. Asbestos sheet may also be advantageously fixed on to walls with cement plaster backing. The screws shall be fixed at 150 mm. to 200 mm. at supports. The boards shall be fitted either with wooden cover fillets or asbestos strips as described in item.

**3.0. Mode of measurement and payment**

**3.1.** The relevant specifications of item No. 16.4 shall be followed.

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

**18.21 (II) Providing and fixing plain asbestos sheet lining with butt jointing to wood screws (frame work and cover fillets to be paid for separately), Class-B-5 mm. thick.**

**1.0. Materials & Workmanship**

**1.1.** The relevant specifications of item No. 16.21 (I) shall be followed except that the plain A.C. sheet of Class-B 5 mm. thick shall be fixing in lining.

**2.0. Mode of measurements & payment**

**2.1.** The relevant specifications of item No. 16.21 (I) shall be followed.

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

**SECTION-17**  
**Plastering and Paints**

**17.58 (I) 10 mm. thick cement plaster in single coat on fair side of brick concrete walls for interior plastering up to floor two level and finished even and smooth in (i) C. M. 1:3.**

**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. 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 peasting 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 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 on the outside of the plaster and keeping them wet.

**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 rate shall be for a unit of One sq. meter.
- 17.58 (II) 10 mm. cement plaster in single coat on fair side of brick/concrete walls for interior plastering up to floor two level and finished even and smooth in C.M. 1:4.**
- 1.0. Materials & workmanship**
  - 1.1. The relevant specifications of item No. 17.58 (I) shall be followed except that the proportion of mortar is C.M. 1 :4 instead of C.M. 1:3.
  - 2.0. Mode of measurements & payment**
  - 2.1. The mode of measurements and payment shall be the same as for item No. 17.58 (I)
  - 2.2. The rate shall be for a unit of One sq. meter.
- 17.58 (III) 10 mm. cement plaster in single coat on fair side of brick/concrete walls for interior plastering' up to floor two level and finished even and smooth in C.M. 1:6.**
- 1.0. Materials & Workmanship**
  - 1.1. The relevant specifications of item No. 17.58 (I) shall be followed except that the proportion of mortar is cement mortar 1:6.
  - 2.0. Mode of measurements & payment**
  - 2.1. The mode of measurement and payment shall be followed same as item No. 17.58(1)
  - 2.2. The rate shall be for a unit of one square meter.
- 17.61.(I) 20 mm. thick cement plaster in single coat on rough side of single or half brick wall for interior plastering up to floor two level, finished even and smooth in cement mortar 1:3 (1 cement : 3 sand).**
- 1.0. Materials & workmanship**
  - 1.1. The relevant specifications of item No. 17.59 (I) shall be followed except that the thickness of cement plaster shall be 20 mm. 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.
  - 2.0. Mode of measurements & payment**
  - 2.1. The relevant specifications of item No. 17.59(1) shall be followed.
  - 2.2. The rate shall be for a unit of One sq. meter.
- 17.61.(II) 20 mm. thick cement plaster in single coat on rough side of single or half brick wall for interior plastering up to floor two level, finished even and smooth in cement mortar 1:4 (1 cement : 4 sand).**
- 1.0. Materials & Workmanship**
  - 1.1. The relevant specifications of item No. 17.59. (II) shall be followed except that the thickness of plastering shall be 20 mm. in C.M 1:4.
  - 2.0. Mode of measurements & payment**
  - 2.1. The relevant specifications of item No. 17.59 (I) shall be followed.
  - 2.2. The rate shall be for a unit of one sq. meter
- 17.61 (III) 20 mm. thick cement plaster in single coat on rough side of single or half brick wall for interior plastering up to floor two level, finished even and smooth in C.M. 1:6 (1 cement : 6 sand).**
- 1.0. Materials & Workmanship**
  - 1.1. The relevant specifications of item No. 17.59 (III) shall be followed except that thickness of plaster shall be 20 mm. C.M 1:6.
  - 2.0. Mode of measurements & payment**
  - 2.1. The relevant specifications of item No. 17.59 (I) shall be followed.
  - 2.2. The rate shall be for a unit of One sq. meter.
- 17.69 Extra over items 51 to 65 for finishing with a floating coat of neat cement slurry.**
- 1.0. Materials & workmanship**
  - 1.1. The relevant specification of item No. 17.58 and 1761 shall be followed for materials and workmanship except that this work is only providing smooth cement finish with floating coat of neat cement slurry

- 1.2. The coat of cement and fine sand mortar of proportion V1 (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.
- 1.3. In any continuous face of wall the finishing treatment should be carried out continuously and day to day breaks made to coincide with architectural breaks in order to avoid unsightly junctions
- 1.4. Curing : All the plaster work shall be kept damp continuously for a period 7 days
- 2.0. Mode of measurements and payment**
- 2.1. 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.
- 2.2. The relevant specifications of item of base coat shall be followed for measurements and payment.
- 2.3. The rate shall be for a unit of One sq. meter.
- 17.70. Extra over item 17.58 to 17.61 for providing and mixing water proofing materials in cement mortar in proportion recommended by the manufacturers.**
- 1.0. Materials and Workmanship**
- The relevant specification of item No 17.58 to 1761 shall be followed except that the water proofing materials of approved make shall be added to the cement at the rate specified or as directed by The Engineer-in-charge. The proportion proofing materials of water to be mixed with 50 kg bags shall be as recommended by the manufacturers of the water proofing material
- 2.0. Mode of measurements & payment**
- 2.1. The payment shall be made extra for this work over and above the plaster work
- 2.2. The rate shall be for a unit of 1 Kg of water proofing materials used in 1 bag of weighing 50 Kg cement used extra over the rate of plastering work
- 17.91. Extra over item No. 17.59 to 17.61 for plastering on ceiling and soffits of stair up to floor two level instead of plastering on walls.**
- 1.0. Materials and Workmanship**
- 1.1. The relevant specifications of item No 17.59 (1) shall be followed except that this work is for ceiling, soffits of stairs up to two floor
- 1.2. The smooth concrete surface shall be suitably roughened to provide bond before plastering.
- 2.0. Mode of measurement and payment**
- 2.1. The payment shall be made for a unit of One sq meter of work done extra over and above the payment of plaster work on wall surfaces.
- 2.2. The rate shall be for a unit of one sq. meter.
- 17.94(I) Extra over item No. 1 to 69, 71 to 87 and 90 for interior plastering above floor two level for every additional storey height (i) Single coat plaster.**
- 1.0. Materials and Workmanship**
- 1.1. The relevant specification of Item No. 17.59 (1) shall be followed except that the whole work is to be carried out above floor two level.
- 2.0. Mode of measurements and payment**
- 1.2. The mode of measurement and payment shall be same as item No. 17.59(1).
- 2.2. The extra payment shall be made over and above the floor two level rate for every additional floor height.
- 17.94 (II) Extra over item 1 to 69, 71 to 87 and 90 for interior plastering above floor two level for every additional storey height. Two coat plaster.**
- 1.0. Materials & workmanship**
- 1.1. The relevant specifications of item No. 17.94 (I) shall be followed except that extra payment for work shall be for a two coat plaster.
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 17.94(1) shall be followed.
- 2.2. The rate shall be for a unit of one sq. meter.
- 17.94(111) Extra over item 1 to 69, 71 to 87 and 90 for interior plastering above floor two level for every additional storey height. Floating coat of neat cement.**
- 1.0. Materials & Workmanship**
- 1.1. The relevant specifications of item No. 17.94 (I) shall be followed except that the extra payment shall be made for work of floating coat of neat cement slurry.
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 17.59 (I) shall be followed.
- 2.2. The rate shall be for a unit of One sq. meter.
- 17.95. 20 mm. thick sand face cement plaster on walls up to height of 10 mm. and above ground level consisting of 12 mm. thick backing coating of C.M. 1:3 (1 cement : 3 sand) and 8 mm. thick finishing coat in C.M. 1:1 ( 1 cement : 1 sand) 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 shall be carried out in the coats. The backing coat (base coat) shall be 12 mm. thick in C.M. 1:3. The relevant specifications of item No. 17.58(I) shall be followed except that the thickness of back coat shall be 12 mm. average. Before the first coat hardens its surface shall be beaten up by edges of wooden tapers and close dents shall be made on the surface. The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5

- days, depending upon the weather conditions. The surface shall not be allowed to dry during this period.
- 2.2. 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.
- 2.3. **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.
- 3.0. **Mode of measurement & payment**
- 3.1. The relevant specifications of item No. 17.58 shall be followed except that the sand face plaster on outside up to 10 m. above ground level shall be measured under this item.
- 3.2. The rate shall be for a unit of One sq. meter.
- 17.116(A) Pointing on brick work with cement mortar 1:3 ( 1 cement : 3 coarse sand) flush pointing.**
- 1.0. **Materials**
- 1.1. Water shall conform to M-1. Cement mortar shall conform to M-11.
- 2.0. **Workmanship**
- 2.1. The flush pointing work shall be carried out with cement mortar of proportion 1:3(1 part of cement and 3 part of coarse sand) by volume.
- 2.2. Preparation of surface.
- 2.2.1. The joints shall be raked to such a depth that the average of new mortar measured from either the sunk surface to finished pointing or from the -edge of the brick shall be average 10 mm.
- 2.3. **Application of Mortar and Finishing :**
- 2.3.1. The mortar shall, be pressed in to the raked out joints with a pointing trowel according to the types of pointing specified in item. The mortar shall not spread over the corner edges or surface of the masonry. The pointing shall then be finished with the pointed tools.
- 2.4. **Curing :**
- 2.4.1. The pointing shall be kept wet for 7 days. During this period, it shall be suitably protected from all damages.
- 3.0. **Mode of measurements & payment**
- 3.1. No deductions shall be made end of joints, beams and posts etc. and openings not exceeding 0.5 s. mt. each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings.
- 3.2. Deductions for openings exceeding 0.5 sq. mt. but not exceeding 3 sq. mt. each shall be paid as follows and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings : (i) When both faces of walls are pointed with same type of pointing, deduction shall be made for one face only, (ii) When two faces of walls are pointed with different type of pointing or if one face is plastered and the other is pointed, deduction shall be made in the plaster or pointing on the side of frame for door, windows etc. on which the width of reveals is less than that on the other side but no deduction shall be made from plaster or pointing on the other side.  
(iii) When only one face is treated and the other face is not rested, full deduction shall be made, if the width of the reveals on the treated side is less than on the untreated side, but if the width of the reveal is more then no deduction shall be made nor any addition shall be made for reveals/jambs, soffits, sills etc. **3.3.** In case of openings of area above 3 sq. mt each deduction shall be made for opening but jambs, sills, and soffits, shall be measured.
- 3.4. The rate shall be for a unit of One sq. meter.
- 17.116(8) Pointing on brick work with cement mortar 1:3 (1 cement : coarse sand) Ruled pointing.**
- 1.0. **Materials & Workmanship**
- 1.1. The relevant specifications of item No. 17.116 (A) shall be followed except that the pointing to be done ruled pointing as under:
- 1.2. The joints shall be initially formed as for flush pointing and then while the mortar is still green, a groove of specified shape shall be formed by running forming tool straight along the centre line of joints till a smooth and hard surface is obtained. The vertical joints shall also be finished in a similar way. The pointing lines shall be uniform in width and truly horizontal and parallel in case of floor and ceiling.
- 2.0. **Mode of measurements & payment**
- 2.1. The mode of measurements and payment shall be the same as per item No. 17.116(A).
- 2.2. The rate shall be for a unit of One sq. meter.
- 17.117(A) Pointing on brick work with cement mortar 1:4 (1 cement : 4 sand) Flush pointing.**
- 1.0. **Materials & Workmanship**
- 1.1. The relevant specifications of item No. 17.116 (A) shall be followed.
- 2.0. **Mode of measurements & payment**
- 2.1. The relevant specifications of item-No. 17.116 (A) shall be followed.
- 2.2. The rate shall be for a unit of One sq. meter.
- 17.117(6) Pointing on brick work with cement mortar 1:4 (1 cement : 4 sand) Ruled pointing.**
- 1.0. **Materials & Workmanship**
- 1.1. The relevant specifications of item No. 17.116(6) shall be followed except that the proportion of C.M. 1:4 shall used for ruled pointing.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 17.115 (A) shall be followed.

- 2.2. The rate shall be for a unit of One sq. meter.
- 17.140.(A) Pointing on coursed stone masonry with cement mortar 1:3 ( 1 cement : 3 sand) flush pointing.**
- 1.0. Materials and workmanship**
- 1.1. The relevant specifications of item No. 17.116 (A) shall be followed except that the pointing shall be done on coursed stone masonry with C:M. 1:3 and the mortar shall be simply struck off with a trowel and the work left showing the natural irregularities in line and the surface of the stones themselves.
- 2.0. Mode of measurement and payment**
- 2.1. The relevant specifications of item No.17.116 (A) shall be followed.
- 2.2. The rate shall be favor a unit of One sq. meter.
- 17.140(B) Pointing on course stone masonry with cement mortar 1:3 ( 1 cement ; 3 sand) Ruled pointing.**
- 1.0. Materials and Workmanship**
- 1.1. The relevant specifications of item No. 17.140 (A) and 17.116 (B) shall be followed.
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 17.116(A) shall be followed.
- 2.2. The rate shall be for a unit of One sq. meter.
- 17.44.(A) Pointing on uncoarsed stone masonry with cement mortar 1:3 (1 cement : 3 sand) Flushing pointing.**
- 1.0. Materials & Workmanship**
- 1.1. The relevant specifications of item No 17 116(A) shall be followed except that the flush pointing shall fie done on uncoarsed rubble masonry work if C.M 1 3 and the mortar shall De simply Struck off with a trowel and the work left showing the natural irregularities in line and the surface of the stone themselves.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 17.116(A) shall be followed.
- 2.2. The rate shall be for a unit of One sq. meter.
- 17.144.(B) Pointing on uncoarsed stone masonry with cement mortar 1:3 (1 cement : sand) Ruled pointing.**
- 1.0. Materials & Workmanship**
- 1.1. The relevant specification of item No 17 116 (Aj and 17 144 (A) shall be followed except that the ruled pointing work -shall be carried out on uncoarsed rubble masonry work in CM 1.3.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 17.116(A) shall be followed.
- 2.2. The rate .shall be for a unit of One sq. meter
- 17.0.0.1 Providing cement vata (10 cms x 10 cms) 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 he finished in quarter round shape. The work shall be earned out in the nest 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.

**SECTION-18**  
**White Washing & Distemping**

- 18.11. White washing with lime on undecorated wall surfaces (two coats) to give an even shade including thoroughly brooming the surface to remove all dirt, dust, mortar drops and other foreign matter.**
- 1.1. Materials**
- 1.1. The clear Cole shall be made from glue and boiling water by mixing 1 Kg. mixture shall be suitably tinted where required for use under coloured distemper it directed. Glue shall conform to I.S. 352-1959 (Specifications for animal glue)
- 1.2. Lime used shall be Freshly burnt class 'C' Lime (fat lime) and white in colour conforming to I.S. 712-1973. Water shall conform to M-1. Best quality of gum shall be used in (he preparations of white wash. Ultramarine blue or Indigo : This shall conform to I.S. 55-1970 for points, and shall be used for preparation of white was, Pigments. Mineral colours, not affected by lime shall be used in preparing colour wash.
- 2.0. Workmanship**
- 2.1. Preparation of white wash solution Surface already white or colour. The fat lime shall be slaked as site and shall be mixed and stirred with about five liters of water for 1 kg. of unslaked lime to made a trim cream This shall be allowed to stand for d period of 24 hours and then shall be screened through a clean coarse cloth, 4 Kg. of gum dissolves in hot water shall be added to each cubic meter of lime cream Small quantity of ultramarine blue (Up to 3 gins, per kg. of lime) shall also-be added to the last two coats of white wash solution and the whole solution shall be stirred thoroughly before use.
- 2.2. Preparation of surface:**
- 2.2.1. The surface shall be thoroughly cleaned of all dust, dirt, mortar cropping and other foreign matter before white wash is to be applied.
- 2.2.2. The surface spoiled by smoke soot shall be scrapped with steel wire brushes or steel scrapers 01 shall be rubbed with over-burnt surkhi or brick bats. The surface shall be then broomed to remove all dust dirt and shall he washed with clean water.
- 2.2.3. Oil or grease spots shall be removed by suitable chemical and smooth surface shall be rubber with wire Crushes.
- 2.2.4. All unsound portion of the surface plaster shall be removed to full depth of plaster in rectangular patches and plastered again after raking the masonry joints properly. Such portion shall he wetted and allowed to dry. They shall then be given one coat of white wash
- 2.2.5. All unnecessary nails shall be removed the holes, cracks, patches etc. shall be made good with material similar in composition to the surface to be prepared
- 2.3. Scaffolding :**
- Wherever scaffolding is necessary it shall be erected in such a way that 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.
- 2.4. Application of white wash :**
- 2.4.1. On the surface so prepared the white wash shall be applied with 'Moon' brush. The first stroke of the brush shall be from top downwards, another from bottom upwards over the first stroke and similarly one stoke from the right another from the left, over the first stroke brush before it dries. This will form one coat each coat shall be allowed to dry before and uniform finish free from brush marks and it should not come oft easily when rubbed with finger
- 2.4.2. Splashing and dropping if any on the doors and windows, ventilators etc shall be removed and the surface cleaned.
- 2.4.3. Priming and Alkali resistant treatments, scraping of surface washing etc. surface spoiled by smoke soot removed of oil and grease spots, treatment for infection with efflorescence moulds moos, fungi, algae and lichen and patch repairs to plaster wherever done shall not be paid extra.
- 3.0. Mode of measurement & 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) Naintial 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 The rate shall include the cost of ail materials, labour, scaffolding, protective measures etc. involved in all the operations described above.
- 3.9 The rate shall be for a unit of One sq. meter.
- 18.12. **White washing with lime on decorated wall surface (One coat) to give an even shade including thoroughly brooming in the surface to remove dust, mortar, drops and loose scales of lime wash and other foreign matter.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specifications of item No. 18.11 shall be followed except that the white washing work shall be carried out on decorated wall surface single coat.
- 2.0. **Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 18.11 shall be followed.
- 2.2. The rate shall be for a unit of One sq. meter
- 18.13 **Extra over items 18.11 and 18.12 for every subsequent coat of white washing with lime on wall surfaces.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specifications of item No. 18.11 shall be followed except that this work is for extra coat over and above two coats on wall surface.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 18.11 shall be followed except that the payment of subsequent coat snail be made extra over and above the item No, 18.11 for every subsequent coat applied.
- 2.2. The rate shall be for a unit of One sq. meter.
- 18.14. **Extra over item 18.11 for white washing with the lime on ceiling and / or sloping roof.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specifications of item No. 18.11 above shall be followed except that this work is for ceiling and / or sloping roof.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 18.11 shall be followed except that extra payment for white washing on ceiling and/or sloping roof shall be made over and above the payment of item No. 18.11
- 2.2. The rate shall be for a unit of One sq. meter.
- 18.15 **Extra over 18.12 for white washing with lime on decorated dealings and sloping roofs.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specifications of item No. 18.12 shall be followed except that the white washing work shall be carried out on decorated ceilings and/or sloping roofs.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 18.52 shall be followed except that extra payment for white washing on ceiling and/or sloping roof shall be made over and above the payment of item No. 18.12.
- 2.2. The rate shall be for a unit of one sq. meter.
- 18.16. **Extra over the item No. 18.13 for every subsequent coat of white washing with lime on ceiling and /or sloping roofs.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specifications of item No. 18.11 and 18.13 shall be followed except that this work is for extra coat over and above two coats of ceiling and / or sloping roofs.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 18.11 and 18. 13 shall be followed except that the extra payment for white washing shall be made for sloping roof or/and ceiling for every subsequent coat applied over and above item 18.11 and 18.13.
- 2.2. The rate shall be for a unit of one sq. meter.



**18.17. Colour washing with lime on undecorated wall surfaces (Two coats) over and including priming coat of white washing to give even shade including thoroughly brooming the surface to remove all dirt, dust, mortar drops and other foreign matter. The relevant specifications for the materials and workmanship 18.11 shall be followed except that it shall be for colour wash.**

**1.0. Materials**

**1.1.** Clear-Cole : This shall be made from glue and boiling water by mixing 1 kg. of glue to every 15 liters of water. The mixing shall be suitably tinted to match with colour of colour washing as directed. Glue shall conform to I.S. 852-1969.

**1.2.** Lime : Lime used shall be freshly burnt class 'C' lime (Fat lime) and white in colour conforming to I.S. 712-1973.

**1.3.** Water : Water shall conform to M-1.

**1.4.** Gum ; Best quality of gum shall be used in the preparation of white or colour wash. The colour pigment of required tint and shade shall be mixed in lime cream. The mineral colour not affected by lime shall be used in preparing the colour wash.

**2.0. Workmanship**

**2.1.** Sufficient quantity of colour wash enough for the complete job shall be prepared in one operation to avoid any difference in shade. The basic white wash solution shall be prepared in accordance with item 18.11 Mineral colours not affected by lime shall be added to the white wash solution. No colour wash shall be done until a sample of the colour has been approved. It shall be noted that small samples of colour appears lighter in shade than when the same shades are applied precisely to large surface. The colour shall be of event, tint, over the colour shall be of event tint, over the whole surface. If it is patchy or otherwise badly applied, it shall be rejected. Preparation of the colour wash with pigment shall be as under:

(a) With Yellow and Red Ocher :

Solid lumps if any in the powder shall be crushed to powder and solution in water prepared and then added to white wash sieving it through a coarse cloth, mixed evenly and thoroughly to white wash in-small quantities till required shade is obtained.

(b) With Blue Vitriol :

Fresh crystals of hydrous copper sulfate (i.e. vitriol) shall be ground to fine power and dissolved in small quantity of water. Sufficient quantity of solution enough to produce the colour wash of required shade shall be strained through a clean cloth, the filtrate being mixed evenly and thoroughly to the white wash.

(c) Colour wash from other colouring pigment shall be prepared in accordance with the instructions of the manufacturer.

**2.2. Preparation of Surface :**

The surface shall be prepared by removing mortar dropping and foreign matter and thoroughly cleaned with wire of fiber brush or any other suitable means as directed by the Engineer-in-charge. All loose pieces and scales shall be scrapped off and holes filled with mortar.

**2.2.1.** For scaffoldings and application of colour wash, relevant specification of item No. 18.11. above shall be followed. The colour wash shall be applied as under:

The colour wash shall be applied in accordance with the procedure given in item No. 18.11. "Application of white wash for colour washing on undercoated surface after the surface has been prepared. The first primary coat shall be of white wash and subsequent coats (minimum two) shall be colour wash and the entire surface shall represent a smooth and uniform finish. To start with, patch of 0.1 sq. mt. on prepared surface shall be colour washed with first coat of white wash and subsequent coats of colour wash solution entire work of colour washing is taken up in hand, it shall be noted that small areas of colour wash will appear lighter than when the same shade is applied to the large surface.

**2.2.2.** For colour washing on decorated surfaces, after (the surface has been prepared, a coat of white wash shall be applied for the patches and repairs. Then one coat or more of colour wash shall be applied over the entire surface, such that the colour washed surface shall present a uniform colour shade. No primary coat is needed for a decorated surface bearing colour of same shade on surface required change of colour after the surface has been prepared as described above. Two coats of white wash shall be applied before application of specified number (minimum two) of coats of colour wash of the new shade.

**2.3. Protective measure :**

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.** The relevant specifications of item No. 18 11 shall be followed.

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

**18.18. Colour washing with lime on decorated wall surfaces (one coat) to give even shade including thoroughly brooming the surface to remove all dirt, dust, mortar drops and loose scales of lime wash and other foreign matter.**

**1.0. mortals and Workmanship**

The relevant specifications item No 18.17 shall be followed except that the colour washing shall be carried out on decorated wall surface in one coat

**2.0. Mode of measurements and payment**

**2.1.** The relevant specifications of item No 18.7 shall be followed.

- 2.2. The rate shall be for a unit of One sq. meter.
- 18.19. Extra over item No 13.17 and 18.18 for every subsequent coat of colour wash with lime on wall surfaces.**
- 1.0 Materials and Workmanship**
- 1.1 The relevant specifications item No. 18.17 shall be followed except that this work is for extra coat of colour wash over and above two coats on wall surface.
- 2.0. Mode of measurement and payment**
- 2.1. The relevant specifications of item No. 18.17 shall be followed except that the extra payment for every subsequent coat of white wash shall be made over and above the rate of item. 18.17 and 18.18.
- 2.2. The rate shall be for a unit of one sq. meter.
- 18.20. Extra over item 18.17 for colour washing on ceilings and /or sloping roofs.**
- 1.0. Materials and workmanship**
- 1.1. The relevant specifications of item No. 18.17 shall be followed except that this work is for colour washing on ceiling and/or sloping roofs.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 18.17 shall be followed except that the rate shall be paid extra over and above the rate of item No. 18.17 for providing colour washing on ceiling and /or sloping roof.
- 2.2. The rate shall be for a unit of One sq. meter.
- 18.29. Cement washing with port land cement slurry on undecorated wall surfaces, (one coat) to give a smooth finish including thoroughly brooming the surface to remove all dirt, dust, mortar drops and other foreign matter.**
- 1.0. Materials**
- 1.1. Water shall conform to M-1. Part land cement shall conform to M-3.
- 2.0. Workmanship**
- 2.1. The relevant specification of item No. 18.11 for preparation of surface, scaffolding, application of wash etc. shall be followed except that the cement wash shall be applied, instead of white wash. Cement applied with brushes to form a smooth bodied opaque surface.
- 3.0. Mode of measurements and payment**
- 3.1. The relevant specifications of item No. 18.11 shall be followed.
- 3.2. The rate shall be for a unit of one sq. meter.
- 18.30. Extra over item No. 18.29 for every subsequent coat of cement washing with port land cement slurry.**
- 1.0. Materials Workmanship**
- 1.1. The relevant specifications of item No. 18.29 shall be followed except that the work of cement slurry wash shall be provided for every subsequent coat above item No. 18.29 to be applied.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specification of item No. 18.29 shall be followed except that the extra rate shall be paid for every subsequent coat and above the rate of item No. 18.29.
- 2.2. The rate shall for a unit of One sq. meter.
- 18.33. Removing dry or oil bound distemper by washing scraping and sand papering the wall surface smooth including necessary repairs to scratches complete.**
- 1.0. Materials and Workmanship**
- 1.1. All loose places and scaled shall be removed by sand papering and surface shall be cleared of all greasycay, dust, dirt, etc. on decorated wall surfaces. Where heavy scaling has taken place, the entire surface shall be scrapped by means of steel scrappers so as to remove all accumulated distemper, leaving clean surfaces. Necessary repairs to the scratches shall be made as directed.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 18.11. shall be followed.
- 2.2. The rate shall be for a unit of One sq. meter,
- 13.34. Extra over item No. 18.33. for removing dry oil bound distemper on ceiling and sloping and roofs.**
- 1.0. Workmanship**
- 1.1. The relevant specifications of item No. 18.33 shall be followed except that removing dry/oil bound distemper from sloping roof/ceiling is to be carried out.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 18.33 shall be followed except that the payment shall be made for removing dry/oil bound distemper from ceiling/sloping roof over and above the rate of item No. 18.33.
- 2.2. The rate shall be for unit of one Sq. meter.
- 18.38. Distemping with dry (water bound) Distemper of approved brand and manufacture (two coats) and of required shade on undecorated wall surfaces to give an even shade, over and including a priming coat of white washing after thoroughly brooming the surface free from mortar droppings and other foreign matters.**
- 1.0. Materials**
- 1.1. The dry distemper and primer shall be of approved brand and manufacture. The dry distemper shall be of required colour and shade and the same shall conform to I.S. 427-1965. Writing shall conform to I.S. 63-1964.

## **2.0. Workmanship**

**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 (Joolas) may be used for distempereing. 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 distempereing 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 free from dust, dirt, grease, mortar, droppings and other foreign matter and sand papered smooth. New plaster surface shall be allowed to dry at least 2 months before application of distemper.

**2.2.2.** All unnecessary nails shall be removed. Pitting in plaster shall be made good with plaster of Paris mixed with dry distemper of the colour to be used. The surface shall then be rubbed down again with a fine grades and paper and made smooth. The surface affected by moulds, moss, fang, algae lichens, efflorescence etc. shall be treated in accordance with I.S. 2395 (Part-I) 1966 before applying distemper. Any unevenness shall be made good by applying putty made of plaster of Paris mixed with water on entire surface including filling up the undulations and then sand papering the same after it is dry.

## **2.3. Priming coat :**

**2.3.1.** A priming coat of whitening shall be applied as per item No. 18.11 over the prepared surface in case of new work on undecorated surface. No coat of white washing with lime shall be used as a priming coat for distemper.

**2.3.2.** Application of plaster 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 stokes 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 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.** Distemper is not recommended to be applied within six months of the completion of wall plaster.

**2.4. Proportion of Distemper :** The distemper shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturers only. Sufficient quantity of distemper required for one day's 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 surfaces shall be lightly sand papered to make them smooth for receiving the distemper, taking care not to rub out the 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 on room at a time. The application of a coat in each room snail 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 bristle distemper brush shall be used. After the day's work, brushes shall be thoroughly washed in hot water with soap solution and hang down to dry. Old brushes which are dirty and caked with distemper shall not be used on the work.

**2.6. Protective Measures :** The surfaces of doors, windows, floors, articles of furniture etc. and such other parts of the building as are not to be distempered shall be a plashed form being splashed upon. Such surfaces shall be cleaned of distemper a plashes if any.

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

**3.1.** Pruning coal of distemper primer, scraping of surface spoiled by smoke soot, removal of oil and grease spots, treatment for infraction of effloresces, mould moss, fungi, algae and lichens and patch repairs to plaster shall be included in this item for which nothing extra shall be paid.

**3.2.** AH the work shall be measured net in the decimal system as in places 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 measured in sq. meter. No deductions shall be made for ends of joints, beams, posts, etc. of these openings nor for finish around the ends of joints, beams, posts etc.

**3.3.** Deductions of openings exceeding 0.5 sq.m. but not exceeding 3 sq. m. each shall be made as follows and no addition shall be made for reveal, jambs, soffits etc. of these openings:

(a) When both the faces of wails are provided with the same finish decutions shall be made for one face only.

(b) Wren each face of wail is provided with different finish, deduction shall be made for that of frame for door, windows etc. on which width of reveal is less than that of the other side but no deductions 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 reveals is equal or more than that of untreated side neither deductions nor additions to be made for reveals, jambs, sills and soffits shall be measured
- 3.4. In case of openings 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 casing, conduits, pipes, electric wiring and the like.
- 3.6. Item includes removing nails, making good holes, cracks, patches with materials similar in composition to the distemper.
- 3.7. The rate includes cost of all materials, labour, scaffolding, protective measures etc. involved in all the operations described above This shall also include conveyance, delivery, bundling, unloading storing etc.
- 3.8. The rate shall be for a unit of One sq. meter.
- 18.39. **Distemping with dry (wafer bound) distemper of approved brand and manufacture (one coat) and of required shade, on decorative wall surface to give an even shade after thoroughly brushing the surface clean of all grease dirt, loose pieces of scales including preparing the surfaces and even sand papered smooth.**
- 1.0. **Materials and workmanship**  
The relevant specifications of Kern No. 18,38 shall be followed except that the dry distemper shall applied on decorative wall surface in on coat.
- 2.0. **Mode of measurements and payment**
- 2.2. The rate shall be for a unit of One sq. meter.
- 18.40. **Extra over item 38 and 39 for every subsequent coat of distemper with dry distemper of approved brand and manufacture.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specifications of item No. 18.38 shall be followed except that the extra work for applying subsequent coat of dry distemper is to be carried out over and above the work of item No. 18.38 and 18.39.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 18.38 shall be followed except that extra rate shall be paid for every subsequent coat applied over and above the rate of item No. 18.38 and 18.39.
- 2.2. The rate shall be for a unit of One sq. meter.
- 18.41. **Extra over item 38 for distemping with dry distemper on ceiling and sloping roofs.**
- 1.0. **Materials and workmanship**
- 1.1. The relevant specifications of item No. 18.38 shall be followed except that the dry distemping shall carried out on ceiling and sloping roofs of undercoats surface.
- 2.0. **Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 18.38 shall be followed except that extra rate shall be paid for carrying outwork on ceiling/sloping roof on undecorated surface over and above the rate of item 18.38.
- 2.2. The rate shall be for a unit of One sq. meter.
- 18.42. **Extra over item 39 and 40 for distemping with dry distemper on ceiling/sloping roofs.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specifications of item No. 18.39 shall be followed except that the work shall be carried out on ceiling/sloping roofs on decorated surfaces.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 18.39 shall be followed except that the extra rate shall be paid for the distemping work carried out by dry distemped on ceiling/sloping roofs with decorated surfaces over and above the raw of item N. 18.39.
- 2.2. The rate shall be for a unit of One sq. meter.
- 18.44. **Distemping (two coats) with oil bound distemper of approved brand and manufacture and of required shade on undecorated wall surfaces to give an even shade, over and including a priming coat with distemper primer of approved brand and manufacture after thoroughly brushing the surface free from mortar droppings and 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.
- 2.0. **Workmanship**
- 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 distemped. A properly secured and well tied suspended platform (Joola) may be used for distemping. 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 distemping 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.

## **2.3. 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 preceding 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 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 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 rate includes cost of all materials, labours, scaffolding, protective measures etc. involved in all the operations described above. This shall also include conveyance, delivery, handing, unloading, storing work etc
- 2.8. The rate shall be for a unit of one sq. meter
- 18.45. **Distemping (two coats) with oil bound washable distemper of approved brand and manufacture and of shade required on undecorated wall surfaces to give an even shade, over and including a priming coat with alkali resistance primer of approved brand and manufacture after thoroughly brushing the surface free from mortar droppings and other foreign matter and also including preparing the surface even and sand papered smooth.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specifications of item No. 13.44 shall be followed except that the primer of alkali resistance primer of approved brand and manufacture shall be used instead of distemper primer.
- 2.0. **Mode of measurements and payment**
- 2.1. The mode of measurements and payment shall be the same as for item No. 18.44 above.
- 2.2. The rate shall be for a unit of One sq. meter.
- 18.46. **Distemping (one coat) with oil bound washable distemper of approved brand of required shade on decorated wall surfaces to give an even shade after thoroughly brushing the surfaces clean of all grease, dirt, loose pieces of scales and also including distemping with oil bound washable distemper of preparing the surface even and smooth.**
- 1.0. **Materials and Workmanship**
- The relevant specifications of item No. 18.44 shall be followed except that the distemping with oil bound washable distemper shall be carried out on decorated wall surfaces in on coat.
- 2.0. **Mode of measurement and payment**
- 2.1. The relevant specification of item No. 18.44 shall he followed.
- 2.2. The rate shall be for a unit of one sq meter.
- 18.47. **Extra over item 18.44 to 18.46 for every subsequent coat of distemping with oil bound washable distemper of approved brand and manufacture.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specifications of item No. 18 44 shall be followed except that this work is for providing extra coat of oil bound distemping over and above two coats of distemping.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specification of item No, IS K shall be followed except that the extra rate shall be paid over and above the rate for every subsequent coats over two coats of item 18.44 and 18.46.
- 2.2. The rate shall be for a unit of one sq. meter.
- 18.48. **Extra over item 18.44. and 18.45 for distemping with oil bound washable distemper on ceiling and sloping roofs.**
- 1.0. **Materials and Workmanship**
- The relevant specifications of item No. 18.44 shall be followed except that the distemping shall be carried out on ceiling/sloping roofs.
- 2.0. **Mode of measurements and payment**
- 2.1.1. The relevant specifications of item No. 18.44 shall be followed except that the extra rate shall be paid for carrying our distemping work on ceiling/sloping roofs over and above the rate of item No. 18.44 and 18.45.
- 2.2. The rate shall be for a unit of one sq. meter.
- 18.49. **Extra over item 18.46 and 18.47 for every subsequent coat of distemping on ceiling and sloping roofs.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specifications of item No. 18.44 shall be followed except that the distemping work shall be carried out for subsequent coats over item No. 18.46 and 18.47.
- 2.0. **Mode of measurements and payments**
- 2.1. The relevant specifications of item No. 18.46 shall be followed except that the extra rate shall be paid for every subsequent coat of distemper applied over and above the rate of item No. 18.46 and 18.47.
- 18.51. **Finishing wall with water proofing cement paint of an undecorated wall surfaces (two coats) to give an approved brand and manufacture and of required shape, even shade after thoroughly brushing the surface to remove.**
- 1.0. **Materials**
- 1.1. The water shall conform to M-1. Cement water proofing paint shall conform to I.S. 5410-1969.
- 2.0. **Workmanship**
- 2.1. **Scaffolding** : The relevant, specifications of item No. 18.11 shall be followed.
- 2.2. **Preparation of surface** :  
The relevant specifications of item No. 18.11 shall be followed except that the word white wash colour wash shall be substituted with water proofing cement paint. The surface shall be thoroughly wetted with clean water before cement water proofing paint is applied.

- 2.3. Preparation of paint:** Portland cement paint shall be prepared by adding paint powder to water and stirring to obtain a thick paste, which shall then be diluted to a brush able consistency. Generally, equal volumes of paint powder and water make a satisfactory paint. In all cases, The manufacture's instructions shall Site followed. The paint shall be mixed in such quantities as can used up within an hour of mixing as otherwise the mixture will set and thickness, affecting flowing and finish. The lids of cement paint drums shall be kept tightly when not in use.
- 2.4. Application of Paint:**
- 2.4.1.** No painting shall be done when the paint is-likely to be exposed to a temperature of below 7<sup>0</sup> c within 48 hours after application.
- 2.4.2.** When weather conditions are such as to cause be carried out in the shadow as far as possible. This helps the proper hardening of the paint film by keeping the surface moist for a longer period.
- 2.4.3.** To maintain the uniform mixture and to prevent segregation, the paint shall be stirred frequently in the bucket.
- 2.4.4.** For undecorated surfaces, the surface shall be treated with minimum two coats of water proof cement paint. Not less than 24 hours shall be allowed between two coats. Next coat shall not be started until the proceeding coat has become sufficiently hard to resist marking by the brush being used. In hot dry weather, the proceeding coat shall be slightly moistened before applying the subsequent coat.
- 2.4.5.** The finished surface shall be even and uniform in shade, without patches, brush masks, paint drops etc.
- 2.4.6.** The cement paint shall be applied with a brush with relatively short stiff hog or fiber bristles. The paint shall be brushed in uniform thickness and shall be free from excessively heavy brush marks. The lamps shall be brushed out.
- 2.4.7.** Water proof cement paint shall not be applied on surface already treated with white wash, colour wash, distemper dry or oil bound varnishes, paint etc. It shall not be applied on gypsum, wood and metal surfaces.
- 2.5.** Curing : Painted surfaces shall be sprinkled with water two or three times a day. This shall be done between coats and for at least two days following the final coat. The curing shall be started as soon as the point has hardened so as not be damaged by the sprinkling of water say about 12 hours after the application.
- 2.6.** Protection measures shall be taken as per item No. 18.11 Para 2.6.
- 3.0. Mode of measurements and payment**
- 3.1.** The relevant specifications of item No. 18.11. shall be followed.
- 3.2.** The rate shall be for a unit of One sq. meter.
- 18.53. Extra over item 18.51 for every subsequent coat of water proofing cement paint of approved brand and manufacture.**
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specifications of item No. 18.51 shall be followed except that the work is for applying subsequent coat of cement water proofing paint.
- 2.0. Mode of measurements and payment**
- 2.1.** The relevant specifications of item No. 18.51 shall be followed except that the extra rate shall be paid for applying every subsequent coat of cement water proofing paint over and above the rate of item No. 18.51.
- 2.2.** The rate shall be for a unit of One Sq. meter.
- 18.54. Extra over item 18.51 for finishing with cement paint on ceiling/sloping roofs.**
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specifications of item No. 18.51 shall be followed except that the cement water proofing paint shall applied on ceiling and sloping roofs.
- 2.0. Mode of measurements and payment**
- 2.1.** The relevant specifications of item No. 18.51 shall be followed except the extra shall be paid for applying cement water proofing paint on ceiling and sloping roofs, over and above the rate of item No. 18.51.
- 2.2.** The rate shall be for a unit of One sq. Meter.
- 18.56. Extra over 18.53 for every subsequent coat of finishing with cement paint on ceiling and sloping roofs.**
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specification of item No. 18.51 shall be followed except that the work shall be carried out for subsequent coat on ceiling and sloping roofs.
- 2.0. Mode of measurements and payment**
- 2.1.** The relevant specifications of item No. 18.53. shall be followed except that extra rate shall be paid for every subsequent coat applied with cement water proofing paint over and above the rate of item No. 18.53.
- 18.57. Wall painting (two coats) with plastic emulsion paint of approved brand of manufacture on undecorated wall surfaces to give an even shade including thoroughly brushing the surface free from mortar droppings and other foreign matter and sand paper smooth.**
- 1.0. Materials**  
Water shall be conform M-1. The plastic emulsion shall conform to I.S.: 5411-1969 (part-I).
- 2.0. Workmanship**
- 2.1. Scaffolding :** The relevant specifications of item-No. 18.11 Para 2.1 shall be followed.
- 2.2. Preparation of surface :** The relevant specification of item No. 18.44 Para 2.2 shall be followed.
- 2.3. Preparation of Mix :**  
This shall be done as per manufacture'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 payment :** The relevant specifications of item No. 18.11 shall be followed.
- 3.0. **Mode of measurements and payment**
- 3.1. The relevant specifications of item No. 18.11 shall be followed.
- 3.2. The rate shall be for a unit of One sq. meter.
- 18.59. **Extra over item No. 18.57 for every subsequent coat of wall painting with plastic emulsion paint of approved brand.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specifications of item No. 18.57 shall be followed except that the painting work shall be for subsequent coat of plastic emulsion paint.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 18.57 shall be followed except that the extra payment shall be done on ceiling and sloping roofs.
- 2.2. The rate shall be for a unit of One sq. meter.
- 18.60. **Extra over item 18.57 for painting with plastic emulsion paint of approved brand on ceiling and sloping roofs.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specifications of item No. 18.57 shall be followed except that the painting shall be done on ceiling and sloping roofs.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 18.57 shall be followed except that the extra payment shall be made for applying plastic emulsion paint on ceiling and sloping roofs over and the rate of item No. 18.57.
- 2.2. The rate shall be for a unit of One sq. meter.
- 18.62. **Extra over item 18.59 for paint ceiling and sloping roofs.**
- 1.0. **Materials and Workmanship**
- 1.1. The relevant specifications of item No. 18.57 shall be followed except that the work for subsequent coat of plastic emulsion paint shall be carried out on ceiling and sloping roofs.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 18.57 shall be followed except that the extra rate shall be paid for carrying out painting on sloping roofs and ceiling with plastic emulsion paint over and above the rate of item No. 18 59
- 2.2. The rate shall be a unit of One sq. meter.



**SECTION-19**  
**Paintings & Polishing**

**19.7. Painting two coats (excluding priming coat) on new steel and other metal surfaces with enamel paint, brushing, interior to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.**

**1.0. Materials**

The enamel pain 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 manufactures 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 of 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.

**19.15. Extra over item No. 19.7 and 19.11 for every subsequent coat of paint.**

**1.0. Materials and Workmanship**

**1.1.** The relevant specifications of item No. 19.7 shall be followed except that the work of painting shall be carried out for subsequent coat.

**2.0. Mode of measurements and payment**

**2.1.** The relevant specifications of item No. 19.7 shall be followed except that the extra rate shall be paid for every subsequent coat of paints applied over and above the rate of item No. 19.7 and 19.11.

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

**19.11. Painting one coats Excluding priming coat) on previously painted steel and other metal surface with enamel paint, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.**

**1.0. Materials and Workmanship'**

**1.1.** The relevant specification of item No 19.7 shall be followed except that painting shall be carried out in one coat with enamel paint on previously painted steel and metal surface.

**2.0. Mode of measurements and payment**

**2.1.** The relevant specifications of item No, 19.7 shall be followed.

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

**19.12. Applying priming coat over new steel and other metal surfaces after and including preparing the surface by thoroughly cleaning oil, grease, dirt and other foreign matter and secured with brushes, fine steel, wool scrapers and sand paper, with ready mixed priming paint, brushing red lead.**

**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 will 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 thicken 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 1 he 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.
- 19.19. Painting two coats (excluding priming coat) on new steel and other metal surfaces with synthetic enamel paints, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.**
- 1.0. Materials**  
Synthetic enamel paint shall conform to I.S. 1932-1964.
- 2.0. Workmanship**
- 2.1. The relevant specifications of item No. 19.7 shall be followed except that the painting shall be carried out with synthetic enamel paint.
- 3.0. Mode of measurements & payment**
- 3.1. The relevant specifications of item No. 19.7 shall be followed.
- 3.2. The rate shall be for a unit of One sq. meter.
- 19.21. Painting one coat (excluding priming coat) on previously painted steel and other metal surfaces 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 and Workmanship**
- 2.1. The relevant specifications of item No. 19.19 shall be followed except that the painting shall be carried out on previously painted steel and other metal surfaces using synthetic enamel paint in one coat.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 19.19 shall be followed.
- 2.2. The rate shall be for a unit of One sq. meter.
- 19.13. Extra over item No. 19.19 and 19.21 for every subsequent coat of paint.**
- 1.0. Materials and Workmanship**
- 1.1. The relevant specifications of item No. 19.19 shall be followed except that the extra rate shall be paid for out for subsequent coat of point.

- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specifications of item No. 19.19 shall be followed except that the work shall be paid for applying subsequent coat of oil paint over and above the item No. 19.19 and 19.21.
- 19.50.(B) Painting two coat (excluding priming coat) on external of new rain water, soil, waste and vent pipe and fittings with ready mixed bituminous paint, brushing, black anticorrosive to give an even shade including cleaning of all dirt, dust and other foreign matter (75 mm. dia.)**
- 1.0. Materials**
- 1.1.** Ready mixed bituminous pain shall conform to I.S. 158 : 1968.
- 2.0. Workmanship**
- 2.1.** The relevant specifications of item No. 19.7 shall be followed except that the painting work of external surfaces of 75 mm. dia rain water pipe, soil, waste, and vent pipe and fittings with ready mixed bituminous paint snail be earned out.
- 3.0. Mode of measurements and payment**
- 3.1.** The rate is excluding the cost o priming coat but including painting of all fittings coming in line.
- 3.2.** The rate shall be for a unit of one running meter,
- 19.50.(C) Painting two coats (excluding priming coat) on external of rain water, soil, waste and vent pipe and fittings with ready mixed bituminous paint brushing black anticorrosive to give an even shade including cleaning off all dirt, dust and other foreign matter : 100 mm. dia.**
- 1.0. Materials & Workmanship**
- 1.1.** The relevant specifications of item No. 19.50 (B) shall be followed except that the pipes to be painted on is 100 mm. dia. meter.
- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specifications of item No. 19.50(B) shall be followed. The rate is excluding the cost of priming coat but including cost of painting all fittings coming in line.
- 2.2.** The rate shall be for a unit of one running meter.
- 19.59.(B) Applying priming coat over wood and wood based surfaces after and including preparing the surface by thoroughly oil, grease, dirt and other foreign matter, sand papering and knotting : Ready mixed paint, brushing wood primer pink.**
- 1.0. Materials**
- 1.1.** The ready mixed paint, brushing, wood primer pink shall conform to I.S. 3536-1966
- 2.0. Workmanship**
- 2.1. Preparation of Surfaces :**
- 2.2.1.** AH wood work shall be dry and free from any foreign matter incidental to building operations. Nails shall be punched well below the surface to provide a film key for stopping. Moldings shall be carefully smoothed with abrasive paper and projecting fibers shall be removed. Flat portions shall be smoothed off with abrasive paper used across the grain prior to painting prior to painting and with the grain prior to staining or if the wood is to be left in its natural colour, wood work which is to be stained may be smoothed by scraping instead of by glass papering if so required.
- 2.2.2.** Any knots, resinous, streaks or bluefish sap wood that are not large enough to justify cutting out shall be treated with two coats of pure shellac knotting applied thinly and extended about 25 mm. beyond the actual area requiring treatment.
- 2.2. Application of primer :**
- 2.2.1.** The relevant specifications of item No. 19.12(A) shall be followed for application of primer.
- 3.0. Mode of measurements & payment**
- 3.1.** The relevant specifications of item No. 19.12 shall be followed except that work done on wood and wood based surfaces shall be paid under this item.
- 3.2.** The rate shall be for a unit of One sq. meter.
- 19.59.(D) Applying priming coat over new wood and wood based surface after and including preparing the surface by thoroughly cleaning oil, grease, dirt and other forging matter sand papering and knotting : Ready mixed paint brushing priming, for enamel.**
- 1.0. Materials**
- 1.1.** The ready mixed paint for brushing priming for enamels wood shall conform to I.S. 106-1962.
- 2.0. Workmanship**
- 2.1.** The relevant specifications of item No. 19.59 (B) shall be followed except that ready mixed paint brushing priming for enamel shall be used instead of ready mixed paint brushing wood primer pink.
- 3.0. Mode of measurements and payment**
- 3.1.** The relevant specifications of item No. 19.12 shall be followed.
- 3.2.** The rate shall be for a unit of One sq. meter.
- 19.62.(B) Extra over item 59.59 (B) for every subsequent coat of priming coat. Ready mix paint, brushing wood primer work.**
- 1.0. Materials and workmanship**
- 1.1.** The relevant specifications of item No. 19.59 (B) shall be followed except that the painting work shall be carried out with ready mix paint instead of wood primer pink for subsequent coat.

- 2.0. Mode of measurements and payment**
- 2.1.** The relevant specifications of item No. 19.59 (B) shall be followed except that the extra rate shall be paid for every subsequent coat applied with Ready mix paint, brushing wood primer pink over and above the rate of item No. 19.59 (B).
- 19.62.(D) Extra over item No. 19.59 for every subsequent coat of priming coat ready mix paint brushing priming for enamel.**
- 1.0. Materials & Workmanship**
- 1.1.** The relevant specifications of item No. 19.59(D) shall be followed except that the painting work shall be carried out with ready mix paint brushing priming for enamel.
- 2.0. Mode of measurements and payment**
- 2.1.** The relevant specifications of item No. 19.59(D) shall be followed except that the extra rate shall be paid for every subsequent coats of priming coat with ready mixed paint, brushing priming for enamel.
- 2.2.** The rate shall be for a unit of One sq. meter.
- 19.71. Painting two coats (excluding priming coat) on new wood and wood based surfaces with enamel paint interior to give an even shade including the surface off all dirt, dust and other foreign matter and papering and stopping.**
- 1.0. Materials**
- 1.1.** The enamel paint shall conform to I.S. 133-1975.
- 2.0. Workmanship**
- 2.1.** The relevant specifications of 19.7 shall be followed for general and application of paint, except that the enamel paint shall be used for painting on new wood/wood based surfaces.
- 2.2.** In painting doors and windows, the putty, round the glass panes also be painted but care shall be taken to see that no paint, stain etc. are left on the glass. Top of shutters and surfaces in similar hidden locations shall not be left out in painting.
- 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 payments. The rate excludes cost of priming coat.
- 3.2.** The rate shall be for a unit One sq. meter.
- 19.73. Painting one coat (excluding priming coat) on previously painted wood and wood based surfaces with enamel paint to give even shade including cleaning of all dirt, dust and other foreign matter.**
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specifications of item No. 19.71 shall be followed except that the painting work shall be carried out on previously painted wood and wood based surfaces with enamel paint to give even shade in one coat.
- 2.0. Mode of measurements and payment**
- 2.1.** The relevant specifications of item No. 19.7t shall be followed
- 2.2.** The rate shall be for a unit of One sq meter.
- 19.75. Extra over item 19.71 and 19.73 for every subsequent coat of paint.**
- 1.0. Materials and Workmanship**
- 1.1.** The relevant specifications of item 19.71 shall be followed except that painting work shall be for subsequent coat with paint.
- 2.0. Mode of measurements and payment**
- 2.1.** The relevant specifications of item No. 13.71 shall be followed except that the extra rate shall be paid.
- 2.2.** The rate shall be for a unit of One sq. meter.
- 19.77. Painting two coats (excluding priming coat) on new wood and wood based surfaces with ready mixed paint brushing, oil gloss, semi-gloss, to give an even shade including cleaning of all dust, dirt and other foreign matter sand papering and stopping.**
- 1.0. Materials**
- The ready mixed paint shall conform to M-44. The ready mixed paint brushing gloss, semi-gloss shall conform to KS. 129-1962 and I.S. 117-1364.
- 2.0. Workmanship**
- 2.1.** The relevant specification of item 19.71 shall be followed for general and application of paint, except that ready mixed paint brushing, oil gloss and semi-gloss shall be used of approved colour and shade instead of enamel paint.
- 3.0. Mode of measurements and payment**
- 3.1.** The relevant specifications of item 19.12 shall be followed for measurements and payment. The rate excludes cost of priming coat.
- 3.2.** The rate shall be for a unit of One sq. meter.
- 19.84. Varnishing two coats (excluding priming coat) on new wood and wood based surfaces undercoating with flattening varnish and finishing coat with varnish to give an even surface cleared of all dirt, dust and sand papering so as to produce a smooth dry surface.**
- 1.0. Materials**
- The varnish shall conform to I.S. 338-1962.
- 2.0. Mode of measurements & payment**
- 2.1.1.** The surface to be varnished shall be prepared to produce a smooth, dry neat surface. The previous coat of paint, if any shall be allowed to dry and rubbed down slightly whipped off and allowed to dry.

2.1.2. The operation of varnishing calls for careful attention to cleanliness. All dust and dirt shall be removed from the surface to be varnished and also from the neighborhood. If surfaces are dampened to avoid raising of dust, they shall be allowed to dry thoroughly before varnishing is commenced. Damp Exposure to extreme of heat or cold, or to a damp atmosphere will spoil the work.

2.1.3. In handling and applying varnish care should be taken to avoid forming forth or air bubbles. Brushes and containers shall be kept scrupulously clean.

## 2.2. Application

2.2.1. The varnish shall be applied liberally with a brush and spread evenly over a portion of the surface with a short light strokes to avoid froth in. It shall be allowed to flow out while the next section is being laid in. Excess varnish then be scrapped out of the brush and the first section be crossed, re crossed and the laid of lightly. Too much or too little varnish left on the surface will mar the appearance of the finish. The varnish, once it has begun to set, shall not be retouched. If a mistake is made, the varnish shall be removed and the work started afresh.

2.2.2. In case of two coats of varnish work, the first shall be hard drying, under coating or flattening varnish, this shall be allowed to dry hard and then be flattened down before applying the finishing coat. If two coats are applied, sufficient time shall be allowed between two coats.

2.2.3. When flat varnish is used for finishing a preparatory coat of hard drying under coating or flattening varnish shall be first applied and shall be allowed to harden thoroughly, it shall then be lightly rubbed down before the flat varnish is applied. Section of the work such as panels, shall be cut in clearly, so as to avoid any overlapping during applications, as this is likely to impart some measure, of gloss to partially dried area, worked up in lapping. On larger area the flat varnish shall be applied rapidly and the edges of each patch applied shall not be allowed to set but shall be followed up whilst in free working conditions-

## 3.0. Mode of measurements & payment

3.1. The relevant specifications of item 19.71 shall be followed.

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

**13.86. Extra over item No. 19.84 for every subsequent coat of varnish.**

### 1.0. Materials and Workmanship

1.1. The relevant specifications of item No.19.84 shall be followed except that the work shall be for subsequent coat of varnishing.

### 2.0. Mode of measurements & payment

2.1. The relevant specifications of item 19.84 shall be followed except that the extra rate shall be paid for every subsequent coat of varnishing done over and above the rate of item No. 19.84.

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

**19.87. Polishing with polish on new wood and wood based surface to give an even surface including cleaning the surface of all dirt, dust and sand papered smooth and including a coat of wood filler**

### 1.0. Materials

1.1. The French polish required tint and shade shall be prepared with the below mentioned ingredients and other necessary materials : (i) Chandra (ii) Shellac (ic) Pigment. The French polish so prepared shall conform to I.S. 348-1968.

### 2.0. Workmanship

#### 2.1. Preparation of surface :

2.1.1. All unevenness shall be rubbed down to smoothness with sand paper and the surface shall be well dusted. The proper in the wood shall be filled up with a filler made of a paste of whiting in water or methylated spirit (with a suitable pigment like burnt sienna or umber if required) : otherwise the French polish will get absorbed and a good gloss will be difficult to obtain.

#### 2.2. Application

2.2.1. A pad of wooden cloth covered by a fine cloth shall be used to apply the polish. The pad shall be moistened with polish and rubbed hard on the surface in a series of overlapping circles applying the polish sparingly but uniformly over the entire area to give an even surface. A trace of linseed oil on the face of the pad may be added which shall facilitate this operation. The surface shall be allowed to dry and the remaining coats applied in the same way. To finish off, the pad shall be covered with a fresh pieces of clean fine cloth, slightly damped with methylated spirit and rubbed lightly and quickly with circular motions. The finished surface shall present a uniform texture and high loose.

### 3.0. Mode of measurements and payment

3.1. The relevant specification of item 19.12 shall be followed for mode of measurements and payment.

3.2. The rate includes cost of wood filler etc. complete.

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

**19.88. Polishing with French polish on previously polished wood and wood based surface to give an even surface including cleaning the surface of all dirt, dust and sand papered smooth including a coat of wood filler.**

### 1.0. Materials & Workmanship

1.1. The relevant specifications of item No. 19.87 shall be followed that the French polish shall be applied on previously polished wood and wood based surface.

### 2.0. Mode of measurements and payment

2.1. The relevant specifications of item No. 19.87 shall be followed.

- 2.2. The rate shall be for a unit of One sq. meter.
- 19.91. **Applying wax polish on new Wood work and wood based surfaces with bees wax polish in proportion 2 : 1.5 : 1 : 0.5 (2 Bees Wax : 1.5 linseed oil: 1 Turpentine oil : 0.5 Varnish by weight) by give an surface including cleaning the surface of all dist, dust and sand papered smooth.**
- 1.0. **Materials**  
Bee's Wax shall conform to I.S. : 1504-1968. Linseed oil shall conform to I.S. : 75-1967. Turpentine shall conform to I.S. 83-1950. Varnish shall conform in I.S. 337-1952.
- 2.0. **Workmanship**
- 2.1. **Preparation of bees wax :**
- 2.1.1. In case of, bees wax it shall be prepared locally with following specification.
- 2.1.2. Pure bees wax free from paraffin on strain adulterants shall be used. The polish shall be prepared from mixture of bees wax, linseed oil, turpentine, and varnish in proportion 2:1:5:1:0.5 by weight. The bees wax and boiled linseed oil shall be heated of a slow fire, when the wax is completely dissolved the mixture shall be cooled till it is just warm and turpentine and varnish added to it in the required proportions and entire mixture shall be well stirred.
- 2.2. **Preparation of surfaces .**
- 2.2.1. The surface to be waxed shall he prepared to produce a smooth, dry, matt surface. Previous coat of paint of stain if any shall be allowed to dry and be rubbed down lightly wiped off and allowed to dry ail dust and dirt shall be removed from the surface to waxed and also from the neighborhood. Damp atmosphere and draughts shall be avoided, for waxing, normal dry day snail be chosen.
- 2.3. **Application :**
- 2.3.1. The polish shall be applied evenly with clean soft pad of cotton cloth in such a w«y that the surface is completely and fully covered. The surface shall then be rubbed continuously for half an hour After well rubbing in one coat of wax polish, the work shall be covered with dust proof sheet. (Cloth for preventing dust falling on the work). Subsequent coat shall be applied after the surface is quite dry arid shall be rubbed off with soft flannel until the surface has assumed a uniform gloss and in dry showing no sign of Stickiness.
- 2.3.2. The final polish depends on the amount of rubbing which shall be continuous and with uniform pressure with frequent changes in the direction.
- 3.0. **Mode of measurements & payment**
- 3.1. The relevant specifications of item No. 19.12 shall be followed.
- 3.2. The rate shall be for a unit of One sq. meter.
- 19.92. **Applying wax polish on previous wax polished wood and wood based surfaces with bees wax polish in proportion of 2:1.5:1:.0.5 (2 Bees wax 1.5 linseed oil : 1 Turpentine : 0.5 Varnish by weight) to give an even surface including cleaning the surface of all dirt, dust and sand papered smooth.**
- 1.0. **Materials and workmanship**
- 1.1. The relevant specifications of item No. 19.91 shall be followed except that the wax polishing shall be carried out on previously wax polished wood and owed based surfaces with bees wax polish.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 19.91 shall be followed.
- 2.2. The rate shall be for a unit of One sq. meter.
- 19.98. **Coat tarring two coats on new wood and wood based surfaces using 0.15 and 0.12 liters of coal tar per sq. m. in the first and second coat respectively to give an even shade including cleaning of all dirt, dust and other foreign matter ;**
- 1.0. **Material :** The coal tar shall conform to I.S. 290-1961.
- 2.0. **Workmanship**
- 2.1. 200 cms. of unslaked lime shall be added to every liter of coat tar and heated till it begins to boil. It shall then be taken off the fire and kerosene oil added to it slowly the rate of 1 part kerosene old and 6 parts or more parts of coal tar by volume and stirred thoroughly. The addition of lime is for preventing the tar from running.
- 2.2. **Preparation of Surface :**
- 2.2.1. The surface to be painted shall be allowed to dry sufficiently. Any existing fungus or mould growth shall be completely removed. All major cracks or defects in the plaster shall be cut out and made good. Before primer is applied holes and undulations shall be filled up with plaster of parish and rubbed smooth.
- 2.3. **Application of paint:**
- 2.3.1. The coat tar shall be applied as per relevant specifications of applying mixed paint item No. 19.7 except coat tarring is used instead of enamel paint.
- 3.0. **Mode of measurements & payment**
- 3.1. The relevant specifications of item No. 19.12 shall be followed.
- 3.2. The rate shall be for a unit of One sq. meter.
- 19.119.(I) **Writing letter of figures on any surface with black Japan paint (stops, comas, hyphens and the like not to be measured and paid for separately) : block (Letters/figures).**
- 1.0. **Materials**
- 1.1. Ready mixed the black Japan paint shall conform to I.S. 341-1952.
- 2.0. **Workmanship**
- 2.1. The letters and figures shall be to the heights and widths as per approved drawings or as directed. These shall be stenciled or drawn in pencil and got approved before painting. They shall be of uniform size and finished neatly. The

edges shall be straight or in pleasant smooth curves,

**3.0. Mode of measurements and payment**

**3.1.** Letters, figures and similar items etc. stops, commas, hyphens and the like shall be deemed to be included in the item. 9

**3.2.** The rate per cm. height of letter shall hold good irrespective of width of the letters of figures or the thickness of the lettering.

**3.3.** The rate shall be for a unit of per letter cm. height.

**19.119(II) Writing letter of figure? on any surface with black Japan pain (stops, commas, hypes and the like not to be measured and paid for separately ; Indian (Letters/figures).**

**1.0. Materials and Workmanship**

The relevant specifications of item No. 19.119 (I) shall be followed except the writing of letter shall be Indian letters/figures.

**2.0. Mode of measurements and payment**

**2.1.** The relevant specifications of item No. 19.119 (I) shall be followed.

**2.2.** The rate shall be for a unit of per letter per cm. height.

**19.126(1) Painting lines, dashes, arrows, letters etc. on roads, airfields and like in two coats with road marking paint, brushing including cleaning the surface of all dirt, dust and other foreign matter : Over 10 cms. in width.**

**1.0. Materials**

**1.1.** The road marking paint shall conform to. I.S. 164-1951.

**2.0. Workmanship**

**2.1.** The relevant specifications item No. 19.119(1) shall be followed except that the painting lines, dashes, arrows and letters on roads, air fields and like shall be carried out with road marking paint in two coats : over 10 cms. in width.

**3.0. Mode of measurements and payment**

**3.1.** The relevant specifications of item No. 19.119 (I) shall be followed.

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

**19.126.(II) Painting lines, dashes, arrows, letters etc. on roads, fields and like in two coats with road marking paint brushing including cleaning the surface of all dirt, dust and other foreign matter: Up to 10 cms. in width.**

**1.0. Materials and Workmanship**

**1.1.** The relevant specifications of item No. 19.126 (I) shall be followed except that painting work shall be up to 10 cms. width.

**2.0. Mode of measurements and payment**

**2.1.** The relevant specifications of item No. 19.119 (I) shall be followed.

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

**19.127.(A) Painting lines, dashes, arrows letters etc. on roads, airfields, and like in one coat with road marking paint, brushing including cleaning the surface of all dirt, dust and other foreign matter : over 10 cms. in width.**

**1.0. Materials and workmanship**

The relevant specifications of item No. 19.126(1) shall be followed except that the painting shall be done in one coat over 10 cms. in width.

**2.0. Mode of measurement and payment**

**2.1.** The relevant specifications of item No. 19.126 (I) shall be followed.

**2.2.** The rate shall be for a unit of One Sq. meter.

**19.127. (B) Painting lines, dashes, arrows, letters etc. on roads, air fields and like in one coat with road marking paint, brushing including cleaning the surface of all dirt, dust and other foreign matter : Up to 10 cms. in width.**

**1.0. Materials and Workmanship**

**1.1.** The relevant specifications of item No. 19.126 (I) shall be followed except that the painting shall be done in one coat upon 10 cms. in width.

**2.0. Mode of measurements and payment**

**2.1.** The relevant specifications of item No. 19.126 (I) shall be followed.

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

**SECTION-20**  
**Demolition & Dismantling**

**20.1.(i) Demolition and disposal of unserviceable materials with all leads and lifts : Lime Concrete.**

**1.0. Workmanship**

- 1.1. The demolition shall consist of demolition of one or more parts of the building as specified or shown in the drawings. Demolition implies taking up or down or breaking up. This shall consist of demolishing whole or part of work including all relevant items as specified or shown in the drawings.
- 1.2. The demolition shall always be planned before hand shall be done in reverse order to the one in which the structure was constructed. This scheme shall be got approved from the Engineer-in-charge before starting the work. This however will not absolve the contractor from the responsibility of proper and safe demolition.
- 1.3. Necessary propping, shoring and under pinning shall be provided for the safety of the adjoining work or property, which is to be left intact, before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining property.
- 1.4. Wherever required, temporary enclosures or partitions shall also be provided. Necessary precautions shall be taken to keep the dust nuisance down as and where necessary.
- 1.5. Dismantling shall be commenced in a systematic manner. All materials which are likely to be damaged by dropping from a height or demolishing roof, masonry etc. shall be carefully dismantled first. The dismantled articles shall be properly stacked as directed.
- 1.6. All materials obtained from demolition shall be the property of Government unless otherwise specified and shall be kept in safe custody until handed over to the Engineer-in-charge.
- 1.7. Any serviceable materials, obtained during dismantling or demolition shall be separated out and stacked properly as directed with all lead and lift. All unserviceable materials, rubbish etc., shall be stacked as directed' by the Engineer-in-charge.
- 1.8. On completion of work, the site shall be cleared of all debris rubbish and cleaned as directed.

**2.0. Mode of measurements and payment**

- 2.1. Measurements of all work except hidden work shall be taken before demolition or dismantling and no allowance for increase in bulk shall be allowed. The demolition of lime concrete shall be measured under this item. Specification for deduction for voids, openings etc. shall be on same basis as that employed for construction of work,
- 2.2. All work shall be measured in decimal system as fixed in its place subject to the following limits; unless otherwise stated hereinafter : (a) Dimensions shall be measured to the nearest 0.01 mt. (b) Area shall be worked out to the nearest 0.01 sq. mt.(c) Cubical contents shall be worked out to the nearest 0.01 Cu.m.
- 2.3. The rate shall include cost of all labour involved and tools used in demolishing and dismantling including scaffolding. The rate shall also include the charges for separating out and stacking the serviceable materials properly and disposing the unserviceable materials with all lead and lift. The rate also includes for temporary shoring for the safety of the portion not required to be pulled down or of adjoining property and providing temporary enclosures or portions where considered necessary.
- 2.4. The rate shall be for a unit of one cubic meter.

**20.1,(ii) Demolition and disposal of unserviceable materials with all leads and lifts : Un reinforced cement concrete.**

**1.0. Workmanship**

The relevant specifications of item 20.1.(i) shall be followed except that the un reinforced cement concrete work is to be demolished instead of lime concrete.

**2.0. Mode of measurements and payment**

- 2.1. The relevant specifications of item 20.1(i) shall be followed.
- 2.2. The rate shall be for a unit of one cubic meter.

**20.3. Demolition including of serviceable materials and disposal of unserviceable materials with all leads and lifts : R.C.C. work.**

**1.0. Workmanship**

- 1.1. The relevant specifications of item 20.1 (i) shall be followed except that demolition of R.C.C. work is to be done.

**2.0. Mode of measurements and payment**

- 2.1. The relevant specifications of item 20.(i) shall be followed except that the demolition of reinforced concrete structure is to be done. The unserviceable materials shall be disposed of at all leads and lifts. The rate excludes scraping straightening of reinforcement but includes cutting of reinforcement.
- 2.2. The rate shall be for a unit of one cubic meter.

**20.11 (ii) Demolition of brick work and stone masonry including stacking of serviceable materials and disposal of unserviceable materials with all leads and lift : in lime mortar.**

**1.0. Workmanship**

- 1.1. The relevant specifications of item No. 20.1.(i) shall be followed except that demolition of brick or stone masonry in lime mortar is to be done.

**2.0. Mode of measurements and payment**

- 2.1. The relevant specifications of item No. 20.1(i) shall be followed except that the wall and independent piers or columns of brick or stone masonry shall be measured in cubic meters. All copings, corbels, combs and other projections shall be included with the wall measurements.



- 2.2. In measuring thickness of plastered walls, the thickness of plaster shall be included. The unserviceable materials shall be disposed off with all lead and lift. Ashlars face stones dressed stone etc., if required to be taken down intact shall be dismantled and measured separately in cubic meters.
- 2.3. The rate is exclusive of cleaning of bricks or stones. Honey comb works or hollow block walling shall be measured as solid.
- 2.4. The rate shall be for a unit of one cubic meter.
- 20.11. (iii) Demolition of brick work and stone masonry including stacking of serviceable materials and disposal of unserviceable materials with all leads and lift : in cement mortar.**
- 1.0. Workmanship**
- 1.1. The relevant specifications of item 20.1.(i) shall be followed except demolition of brick or stone masonry in cement mortar is to be done.
- 2.0. Mode measurements and payment**
- 2.1. The relevant specifications of item 20.11 (ii) shall be followed. The unserviceable materials shall be stacked as directed by Engineer-in-charge with all leads and lifts.
- 20.22. Demolition in terrace including stacking or serviceable materials and disposal of unserviceable materials with all lead and lift : Brick tiles covering.**
- 1.0. Materials**
- 1.1. The relevant specifications of item No. 20.1 (i) shall be followed except that the demolition of terrace brick tiles is to be done.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of item No'. 20.1(i) shall be followed except that the brick tiles covering of terrace shall be measured in sq. mt. The unserviceable materials shall be stacked as directed at all leads and lifts.
- 2.2. The rate shall be for a unit of one sq. meter.
- 20.23. Dismantling tiled or stone floors laid in mortar including stacking of serviceable materials and disposal of unserviceable materials with all lead and lifts.**
- 1.0. Workmanship**
- 1.1. The relevant specification of item 20.1 (i) shall be followed except the dismantling of tiled or stone floors laid on mortar shall be done. Dismantling implies carefully taking up or down or removing without ^damage. The articles shall be passed by hand where necessary and lowered and where these are fixed by nail, screws, bolts etc., these shall be taken out with proper tools.
- 2.0. Mode of measurements and payment**
- 2.1. The supporting materials such as joints, beams if any etc. shall be measured separately. The relevant specifications of item No. 20.1 (i) shall be followed, The rate shall include staking the unserviceable materials as directed with all lead and lift.
- 2.2. The late shall be for a unit of one sq. meter.
- 20.25. Dismantling of wooden floors, including, stacking of serviceable materials and disposal of unserviceable materials with all lead and lifts.**
- 1.0. Materials**
- 1.1. The specifications of item 20.1(i) shall be followed except that wooden floors shall be dismantled.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of item 20.1 (i) same shall be followed. The supporting members such as joints, beams etc. shall be measured separately. The rate shall include disposal of unserviceable materials as directed for and with all lead and lift.
- 2.2. The rate shall be for a unit of one sq. meter.
- 20.27.(i) Dismantling of sheet including ridges, hips, valleys gutters etc. stacking of serviceable materials and disposal of unserviceable materials with leads with lifts : G.I. sheet roofing.**
- 1.0. Materials**
- 1.1. The relevant specifications of item 20.1.(i) shall be followed except that G.I. sheet roofing shall be dismantled instead of concrete work.
- 2.0. Mode of measurements and payment**
- 2.1. The area of G.I. sheets roofing shall be measured in sq. meter. Ridges, hips and valleys shall be girded and included with roof area. Corrugated and semi-corrugated surfaces shall be measured flat and not girthed.
- 2.2. Supporting members such as rafters, purlins, beams, joints, trusses etc. shall be measured separately.
- 2.3. The rate shall include disposal of unserviceable materials with all leads and lifts and stacking the serviceable materials as directed.
- 2.4. The rate shall be for a unit of one sq. meter.
- 20.27 (ii) Dismantling of sheet roofing including ridges, hips, valleys gutters etc. stacking of serviceable materials and disposal of unserviceable materials with all leads and lifts : A.C. Sheet roofing.**
- 1.0. Workmanship**
- 1.1. The relevant specifications of item 20.27 (i) shall be followed except that dismantling work of A.C. sheet roofing is to be done.
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of item 20.27 (i) shall be followed except that the A.C. sheets .roofing shall be measured in this item.

- 2.2. The rate shall be for a unit of one sq. meter.
- 20.28. Dismantling Manglore or country tile roofing with battens, boarding etc. including stacking of serviceable materials and disposal of unserviceable materials with all lead and lifts.**
- 1.0. Workmanship**
- 1.1. The relevant specifications of item 20.1 (i) shall be followed except that the country tile roof or Mangalore roof shall be dismantled.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of item 20.1 (1) shall be followed.
- 2.2. The supporting members shall be measured separate item.
- 2.3. The rate includes labour required for disposal of unserviceable item with all leads and lifts.
- 2.4. The rate shall be for a unit of one sq. meter.
- 20.30. Dismantling cement asbestos/hard board in ceiling or partition walls, wooden trellis work including frames, stacking of to serviceable material and disposal of unserviceable materials with all leads and lifts.**
- 1.0. Workmanship**
- 1.1. The relevant specifications of item 20.1 (i) shall be followed except that the cement asbestos hard board in ceiling or partition walls, wooden trellis, work etc. shall be dismantled.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of item 20.1 (i) shall be followed. The serviceable materials shall be stacked as and where directed and the unserviceable materials shall be disposed off with leads and lifts.
- 2.2. The rate shall be for a unit of one sq. meter.
- 20.35. Dismantling wood wrought, framed and fixed in frames, trusses including stacking the materials with all lead and lift.**
- 1.0. Workmanship**
- 1.1. The relevant specifications of item No. 20.1 (i) shall be followed except that the wood work, wrought framed and fixed in frames, trusses etc. shall be dismantled.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 20.1 (i) shall be followed.
- 2.2. The materials shall be stacked as and where directed with all leads and lifts.
- 2.3. The rate shall be for a unit of one cubic meter.
- 20.39. Dismantling expanded metal or I.R.C. fabric with necessary battens and beading including frame work and stacking the serviceable materials with all lead and lift.**
- 1.0. Workmanship**
- The relevant specifications of item No. 20.1 (i) shall be followed except that the dismantling of expanded metal or I.R.C. fabric shall be done
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of in item No. 20.1 (i) shall be followed.
- 2.2. The rate shall be for a unit of one sq. meter.
- 20.43. Dismantling steel work including dismembering and stacking the materials with air leads and lifts.**
- 1.0. Materials**
- 1.1. The relevant specifications of item No. 20.1 (i) shall be followed except that the dismantling of steel work shall be carried out.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 20.1 (i) shall be followed.
- 2.2. The weight of the member shall be computed from standard table unless the actual weight can be readily determined.
- 2.3. Riveted works where rivets are required to be cut. the same shall be carried out under this item and nothing extra shall be paid.
- 2.4. In framed still gate, the weight of any covering material or filling such as iron sheets and expanded metal shall be added to the weight of the main articles if such covering is not ordered to be taken out separately.
- 2.5. The rate includes stacking the materials as and where directed with all leads and lifts.
- 2.6. The rate shall be for a unit of one Kg.
- 20.49.(i) Dismantling doors, windows, ventilators etc. (wood or steel) shutters including chowkhats, Architraves, hold fasts and other attachments etc. complete and stacking them within all leads & lift. No exceeding 3 sq. meters in area.**
- 1.0. Workmanship**
- The relevant specifications of item No. 20.1 (i) shall be followed except that the door, windows, ventilators etc. (wood or steel) shutters including chowkhats, architraves, hold fasts and other attachments etc. are to be dismantled.
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 20.1 (i) shall be followed.
- 2.2. The doors, windows, ventilator etc. not exceeding 3 sq. mt. in area (each) including shutters and chowkhats. Architraves, hold fasts and other attachments to frames etc. will be dismantled and measured under this item.

- 2.3. The rate includes stacking the serviceable materials as and where directed with all leads and lifts.
- 2.4. The rate shall be for a unit of One number.
- 20.49.(II) Dismantling doors, windows, ventilators etc. (wood or steel) shutters including chowkhats. Architraves, hold fasts and other attachments etc. complete and stacking them within all leads and lift : Exceeding 3 sq. meters in area.**
- 1.0. Workmanship**  
The relevant specifications of item No. 20.49(I) shall be followed except that the area of doors, windows, ventilators, exceeding 3 sq. meters are to be dismantled under this item.
- 2.0. Mode of measurements of payment**
- 2.1. The relevant specifications of item No. 20.49 (I) above shall be followed.
- 2.2. The rate shall be for a unit of One number.
- 20.51. Dismantling barber wire fencing including making rolls and also including dismantling facing posts including all earth work, concrete in the base and making good the disturbed ground stacking useful materials as directed and disposing all the unserviceable materials with all leads and lifts.**
- 1.0. Workmanship**  
The relevant specifications of item No. 20.1 (i) shall be followed, except that the dismantling of barbed wire fencing shall be carried out.
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 20.1. (i) shall be followed.
- 2.2. The rate includes making rolls of dismantled wires and including dismantling fencing posts, concrete work, in base and making good the disturbed ground etc. complete.
- 2.3. The serviceable materials shall be stacked as and where directed and end unserviceable materials shall be disposed with all leads and lifts.
- 2.4. The rate shall be for a unit of One running meter.
- 20.56. Dismantling (C.I. Pipes, G.S.W. Pipes and A.C. rain water pipes with fittings and clamps, including stacking the materials with all lead and lift, (for any dia. of pipe).**
- 1.0. Workmanship**  
The relevant specifications of item No. 20.23 shall be followed except that the dismantling work of pipes lines of C.I., G.S.W. & A.C. Pipes with fitting shall be carried out.
- 2.0. Mode of measurements and payment**
- 2.1. The relevant specifications of No. 20.1 (i) shall be followed.
- 2.2. Water pipe lines, including rain water pipes, with clamps and specials, swear pipe lines, (Salt glazed ware or concrete) etc. shall be measured in running meter inclusive of joints. (The measurements shall be taken along the centre line of pipe and fittings).
- 2.3. The rate shall be for a unit of One running meter.
- 20.00.1. Dismantling sanitary fittings like wash basin, W.C. Pan, Indian & European Type flushing tank, etc. including stacking the materials with all lead lift.**
- 1.0. Workmanship**  
The relevant specifications of item No. 23.23 shall be followed except that the dismantling work of sanitary fittings such as wash basin, W.C. Pan (all type of pans), Flushing tanks etc. shall be carried out.
- 2.0. Mode of measurements & payment**
- 2.1. The relevant specifications of item No. 20.1 (i) shall be followed.
- 2.2. The rate shall be for a unit of one number.
- 20.00.2. Scraping oil paint steel and other metal surfaces and making the surface even (with hand scraping).**
- 1.0. Workmanship**  
The old paint from steel and other surface shall be scraped thoroughly with hand scraper followed by wire brushing (first with coarse and then with fine brushes) and finally sand papering with coarse and paper (No.3) steel wood (No.2) or emery paper (No.3) or with emery clothes. This shall then be wiped finally with mineral turpentine to remove grease and perspiration of hand marks etc. and allowed to dry. The surface shall be made even and smooth.
- 2.0. Mode of measurements and payment**
- 2.1. The work shall be measured in actual area of work done.
- 2.2. The rate shall be for a unit of one sq. meter.

## SECTION-21

### Repairs to Buildings

**21.8. Providing and fixing M.S. fan clamps of shape and size as specified in existing R.C.C. slab including cutting chase and making good.**

**1.0. Materials**

1.1. M.S. Bar shall conform to M-18.

**2.0. Workmanship**

2.1. The shape and size of fan clamp shall be directed!

2.2. The fixing M.S. fan clamp in existing R.C.C. slab a chase of size 150 mm. x 75 mm. shall be cut from the ceiling so as to expose the reinforcement and up to 25 mm. clear round the reinforcement bar. This shall be done without any damage to adjoining portion of ceiling. The two arms of the ends of the clamp shall be passed through the space over reinforcement bar from the bottom of the slab. Then the two arms shall be bent down about 15 mm. by means of crow bar. The clamp shall be held in position and the chase in ceiling filled with cement concrete 1:2:4 ( 1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size). The ceiling shall be then finished to match the existing surface and properly cured.

**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 as described above.

3.2. The rate shall be for a unit of One number.

**21.23. Cutting our cracks, of roof terrace to V. section, Cleaning out, wetting, grouting with cement and sand slurry 1:3 (1 cement : 3 sand)**

**1.0. Materials**

(1) Water shall conform to M-1. (2) Cement shall conform to M-3. (3) Sand shall conform to M-6.

**2.0. Workmanship**

2.1. The cracks shall be cleaned out and trimmed to V shaped cuts at least 6 mm wide on top. The cracks shall be cleaned off and then cracks shall be thoroughly flooded with water, water allowed to a soak in cracks, and then grouted with cement and sand slurry in proportion 1:3. The required cracks shall be cured at least 7 days.

**3.0. Mode of measurements and payment**

3.1. The rate shall includes cost of all materials and labour required for satisfactory completion of item as described above.

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

**21.24. Cutting out cracks of roof terrace to V-Section out, and filling solidly with a hot mixtures of bitumen and clean dry sand (1:1 weight).**

**1.0. Materials**

(1) Bitumen shall be 85/25 penetration (2) Sand shall conform to M-6.

**2.0. Workmanship**

2.1. The relevant specifications of item No. 21.23 shall be followed for opening cracks and cleaning.

2.2. The cracks shall be absolutely dried and cleaned and filled solidly with a hot mixtures of 85/25 penetration and sand in ratio of 1; 1 by weight. The filler shall be well filled into cracks with the edges of a trowel and left flush with surface of roof. Repaired cracks shall cause no ridges the direction of the slope of roof.

**3.0. Mode of measurements & payment**

3.1. The relevant specifications of item No. 21.23 shall be followed.

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

## SECTION-22

### Misc. Building Items

- 22.20. Providing and fixing 1.20 meter fencing with 2 meter long M.S. angle posts 40 mm. x 40 mm. x 6 mm. and oil painting 3 coats fixed at 2.5 M C/C with five horizontal lines, and two diagonals of galvanised steel barbed wire weighing 9.38 Kg. per 100 meter. (Min.) stained and fixed to posts with G.I. staples including fixing the posts in ground with 0.5 x 0.5 x 0.5 M block in C.C. 1:5:10 (cement : 5 sand : 10 graded brick aggregate 40 mm. nominal size) etc. complete.**
- 1.0. Materials**  
(1) Water shall conform to M-1. (2) Cement shall conform to M-3. (3) Sand shall conform to M-6. (4) Brick bats aggregate shall conform to M-14, (5) Oil paint shall conform to M-44. (6) Barbed wire shall conform to M-78.
- 2.0. Workmanship**
- 2.1.** The pits of the size 0.5 x 0.5 m. x 0.5 shall first be excavated, true to line and level to receive the post at 2.5 C/ C. The relevant specifications of item 4.00.1 shall be followed for excavation work.
- 2.2.** The pits shall be filled with a layer 0.15 m. thick with lean concrete 1:5:10 (1 cement: 5 sand : 10 graded brick bat aggregate 40 mm. nominal size). The M.S. angles 40 mm. x 40 mm. x 6 mm shall be filled in with lean concrete 1:5:10 and rammed properly so as to form total 0.5 m. x 0.5 m. x 0.5 m, concrete block. The concrete shall be cured for 7 days to allow it to set.
- 2.3.** The barbed wire shall be stretched and fixed in 5 horizontal rows and two diagonals. The bottom row shall be 140 mm. above ground and the rest at 125 mm. centre to centre. The diagonal shall be stretched between adjacent post from top wire of one post to the bottom wire of 2nd post. The wires shall be fixed to posts by means of staples. The M.S. Angle posts shall be painted with 3 coats of old paint of approved tint and shade.
- 3.0. Mode of measurements and payment**
- 3.1.** The work shall be measured for the finished work from centre to centre of the posts.
- 3.2.** The rate shall include the cost of labour and materials involved in the operations described above.
- 3.3.** The rate shall be for a unit of One running meter.
- 22.00.1. Construction of B.B. masonry paniara 23 cm x 75 mm wall including fixing pre cast R.C.C. marble Mosaic (Terrazzo) slab of 75 mm. thickness on top and smooth finishing to walls in cement plaster in C.M. 1:3 curing etc. complete including drainage out, waste water arrangements.**
- 1.0. Materials**  
(1) Water shall conform to M-1. (2) Cement shall conform to M-3. (3) Sand shall conform to M-6. (4) Burnt bricks shall conform to M-15. (5) Pre cast marble mosaic terrazzo paniara of 75 mm thickness shall be of best quality. The width of paniara shall be directed. .
- 2.0. Workmanship**
- 2.1.** The brick masonry shall be constructed for paniara for the size as directed in C.M. 1 :6. The thickness of wall shall be 23 cms. thick and height shall be 75 cms. The relevant specifications of B.B. masonry at item 6.13 (b) shall be followed for B.B. masonry work.
- 2.2.** The B.B. masonry shall be covered with pre cast marble terrazzo paniara at top, of width and length as specified or as directed. The terrazzo mosaic paniara shall be 15 mm, thickness.
- 2.3.** The whole masonry work shall be finished smooth with C.M. 1:3 on both sides the relevant specifications of item No. 1.7.59 (l) shall be followed.
- 2.4.** The drainage outlet and water arrangement shall be made as directed.
- 3.0. Mod& of measurements and payment**
- 3.1.** The work shall be measured for the finished work.
- 3.2.** The rate shall be include the cost of labour and materials involved in the operations described above.
- 3.3.** The rate shall be for a unit of One Running meter.
- 22.00.2. Constructing a chowkadi with C.Q. over 12 cm. thick B.B. masonry in front and dwarf wall 1 M high and 23 cms. thick cement plaster to masonry in C.M. (1:3) and cement concrete flooring in 1:2:4 with 5 cm. dia. A.C. Drain pipe etc. complete**
- 1.0. Materials**
- 1.1.** Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Burnt bricks shall conform to M-15. Stone aggregate 20 mm. nominal size shall conform to M-2. (a) A.C. Drain pipe of 5 cms. dia shall conform to M-74.
- 2.0. Workmanship**
- 2.1.** The chowkadi shall be constructed of specified size and as directed. The slab shall be cast on B.B. masonry wall 12 cms. thick and dwarf wall 1 M high and 23 cms, thick shall be constructed in proportion of C.M. 1:6. The relevant specifications of item 6.3. (l) shall be followed for masonry partition work and 5.4.1. (c) shall be followed for reinforced concrete work.
- 2.2.** The whole masonry work shall be finished with cement mortar 1:3 and finished smooth. The relevant specifications of item No. 17.59 (l) shall be followed for plastering work,.
- 2.3.** The A.C. pipe of 5 cms. dia shall be fixed as drainage pipe. The bottom shall be finished with C.C. 1:2:4 finished with cement slurry.

**3.0. Mode of measurements and payment**

3.1. The work shall be measured for finished work.

3.2. The rate includes cost of all materials, labour etc. required for carrying out satisfactory completion of work.

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

**22.00.3.(I) Constructing cooking platform 60 cm. width and 70 cm. height resting on B.B. Masonry wall 23 cms. thick in C.M. 1:6 with fixing of pre cast 1:2:4. R.C.C. 0.0 M. thick slab with marble mosaic chips set in G.M. (Terrazzo) with plastering on exposed faces to wall in C.M. 1:4 etc. complete.**

**1.0. Materials**

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Burnt brick shall conform to M-15. Marble Mosaic chips shall conform to M-46. Stone aggregate 20 mm. nominal size shall conform to M-12. (a) M.S. Bars shall conform to M-18.

**2.0. Workmanship**

2.1. The cooking platform of size as directed shall be constructed in 60 cms. width and 70 cms. height. The brick masonry wall, in C.M. 1 :6 shall be constructed in 23 cms. thickness up to full depth. The relevant specifications of item 6.13 (B) shall be followed for masonry work.

2.2. The R.C.C. slab of 8 cms. thickness and of adequate design and size shall be precast and the same shall be put up on the B.B. masonry work.

2.3. The top and exposed sides of the R.C.C. slab shall be finished with marble mosaic terrazzo 8 mm. thick with required colour pigment. The work of terrazzo shall be carried out as per relevant specifications of item 14.4 (E).

2.4. The whole masonry work shall be finished with cement mortar in C.M. 1 :4. The relevant specification of item 17.59 (II) shall be followed.

**3.0. Mode of measurements and payments**

3.1. The work of cooking platform shall be measured for finished work.

3.2. The rate includes cost of all labour and materials, etc. required for satisfactory completion of this item as described above.

3.3. The rate shall be for a unit of One running meter.

**22.00.3.(II) Constructing cooking platform of 60 cm. width and 70 cms. height resting on B.B. masonry walls 23 cm thick in C.M. 1:1 with fixing black kadapa stone surface laid on pre cast R.C.C. slab 1:2:4 with plastering on exposed faces to wall in C.M. 1:4 etc. complete.**

**1.0. Materials and Workmanship**

1.1. The relevant specification of item No. 22.00.3 (I) shall be followed except that the cooking platform shall be constructed by providing black kadapa stone of 25 mm. to 30 mm. thickness on pre cast R.C.C. 1:2:4 slab 8 cms. thick. The black stone shall be provided in single piece up to 1.8 M in length and specified width. All the exposed edges of stone shall be machine cut.

**2.0. Mode of measurement and payment**

2.1. The relevant specifications of item 22.00.3.(I) shall be followed.

2.2. The rate includes providing machine cut edges on exposed face of kadapa stone.

2.3. The rate shall be for a unit of One running meter.

**22.00.4. Providing and fixing Rajula stone 75 mm. thick 60 cm x 45 cms. size including fixing in cement mortar as directed.**

**1.0. Materials**

Water shall conform to M-1. Cement mortar shall conform to M-11. Rajula stone of specified, size shall be of best quality and free from any defects. The stone shall not be less than 75 mm in thickness.

**2.0. Workmanship**

2.1. The Rajula stone of size 60 x 45 cms. size shall be fixed as and where directed in cement mortar in 1:3. All the edges of the stone shall be fixed with cement mortar in C.M. 1:3 and sloped at 45° and finished smooth. The work shall be cured for 7 days after fixing.

**3.0. Mode of measurements and payment**

3.1. The work shall be measured for finished work.

3.2. The rate includes cost of all labour and materials required for satisfactory completion of this item.

3.3. The rate shall be for a unit of one number.

**22.00.5. Providing and laying Bilimora type brick facing in C.M. 1:1 laid over bedding of cement mortar 1:3 (13 mm. thickness) including cleaning, watering, scaffolding etc. complete.**

**1.0. Materials**

1.1. Water shall conform to M-1. Cement mortar of specified proportion shall conform to M-11. Bilimora type bricks shall be approved before collection the same on site.

**2.0. Workmanship**

2.1. The surface on which the Bilimora type bricks is to be provided shall be cleaned of all dust, dirt, etc. and finished with CM 1:3 in 13 mm, thickness. The relevant specifications of item 17.59 (I) shall be followed except that the thickness of finishing shall be 13 mm. The top surface shall be roughened by wire brushes to give proper grip to the tiles to be fixed.

2.2. The Bilimora type bricks shall be fixed with CM 1:1. The tiles shall be properly wetted before fixing. The horizontal and vertical joints shall be maintained in true line and level by providing 12 mm or 20 mm. sq. bars as directed. The tiles shall be tamped by trowel so that there shall not be any hollows left behind the tiles.

- 2.3. The tiles shall be cut to the required size on ends of at top bottom of beams in best workman like manner.
- 2.4. The whole work shall be cured for 7 days.
- 3.0. **Mode of measurements and payment**
- 3.1. The work shall be measured as per relevant specification of item No. 17.58(1)
- 3.2. The rate includes cost of all materials, wastage etc. occurring due to cutting of tiles and ends as top and bottom of beams etc. including base coat.
- 3.3. The rate shall be for unit of One sq. meter.

**22.00.6. Providing and fixing teakwood rail of 60 mm. x 20 mm. size and 50 cms. length incl. 3 coats of oil paint to wood work with set of 3 pegs.**

- 1.0. **Materials** : Teak wood battens of specified size shall conform to M-29. Oil paint shall conform to M-44. Wall pegs of aluminum 3 Nos. of approved quality and make shall be provided.
- 2.0. **Workmanship**
- 2.1. The teakwood battens of size 60 mm. x 20 mm. and 50 cms. long be planed on all sides. The anodized aluminum wall pegs of approved 'make shall be fixed on wooden batten prepared with screws as directed. The waif pegs unit shall be fixed on wall with wooden gut ties and screws as directed. The wooden battens shall be painted with 3 coats of ready mix paint of approved colour and shade.
- 3.0. **Mode of measurements and payment**
- 3.1. The work shall be measured for finished work.
- 3.2. The rate shall be for a unit of one number.

**22.00.7. Treating the bottom and sides (up to a height of 300 mm.) of the excavations made for the masonry foundations and basement with chemical emulsion at the rate of 5 liters per Sq. meter of the surface area.**

- 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	0.50% (by weight)
2.	Heptachlor	0.50% (by weight)
3.	Chlordane	1.00% (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. meter of the surface area. .
- 2.3. The chemical treatment shall be-carried out when the surfaces 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 are disturbed, immediate steps shall be taken to restore the continuing 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 defects within 14 days on receipt of notice from Engineer-in-charge. On contractor's failure to do so, the Engineer-in-charge may get the same rectified through any other agency at contractor's risk and cost, and decision of Engineer-in-charge as to the cost payable by contractor for the same shall be final and 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) hereby guarantee that work will remain unaffected and will not be any way 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 or damage that might be caused on account of termite and or other similar type of germs and hereby Guarantees to make good any loss of damages suffered by the Government 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 retained for the first one year after completion of the work and 10% shall be retained for the balance of guarantee period and shall be refunded only after the completion of the guarantee period.

### 3.0. Mode of measurements & 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 labour 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.

**22.00.8. Treating the backfill immediately in contact with foundation structure with chemical emulsion at the rate 7.5 liters per sq. mt. of vertical surface of the sub structure of each side (In case of R.C.C. columns, beams and R.C.C. basement walls, treating the sides of 50 cms. from ground level with chemical emulsion at the rate of 7.5 Liters/sq. meter).**

### 1.0. Materials

1.1. The specifications of the item 22.00.7. shall be followed.

### 2.0. Workmanship

2.1. After masonry foundations and retaining walls of basement come up , the backfill immediate in contact with foundation shall be treated with the chemical emulsion at the rate of 7.5 liters per sq. m. of the vertical surface of the sub structure for each side. The filling of earth is usually carried out in layers and the treatment shall be directed towards the concrete or masonry surfaces of the columns and walls so that the earth contact with these surfaces is well treated with chemical.

2.2. In case of R.C.C. framed structure with columns and plinth beams and R.C.C. basements the treatments shall start at the depth of 50 cms. below ground level from this depth backfill around the columns, beams, and R.C.C. basement walls shall be treated at 7.5 lit/sq. m. of vertical surface. The relevant specifications shall be followed same as item 22.00.7.

### 3.0. Mode of measurements and payment

3.1. The area of substructure in contact with backfill to be measured. The length and breadth shall be measured correct to a cm. dimension of sanctioned plans for the surfaces in contact with backfill.

3.2. No deduction shall be made nor extra paid for any opening for pipes, etc. up to 0.1 sq. m.

3.3. The rate includes cost of all labour, materials required for satisfactory completion of this item.

3.4. The rate shall be for a unit of One sq. meter.,

**22.00.9. Treating the top surface of the plinth filling with chemical emulsion at rate of 5 liters sq. meter, before the sand bed or sub grade is laid.**

1.0. **Materials** : The relevant specifications of item 22.00.7. shall be followed.

### 2.0. Workmanship

2.1. The relevant specifications of item 22.00.7 shall be followed that the top surface of the consolidated earth within the walls, shall be treated with the chemical emulsion at the rate of 5 liters/sq. metre of the surface before the sand bed or sub-grade is laid. If the filled earth has been well rammed and the surface does not allow the emulsion to seep through, holes up to 50 to 75 mm. deep at 150 mm. centers both ways may be made with 12 mm. dia. M.S. rod on the surface to facilitate absorption of the emulsion.

### 3.0. Mode of measurements & payment

3.1. The length and breadth shall be measured clean for the area actually treated.

3.2. No deduction shall be made nor extra paid for any opening for pipes, etc. up to 0.1 sq. m.

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

**22.00.10. Treating the junctions of wall and floor area with chemical emulsion at the rate of 7.5 liter/sq. mt. by making holes at junction of walls, and columns, with the floor before laying sub grade to a depth to 15 cms. by making holes.**

1.0. **Materials** : The relevant specifications of item 22.00.7 shall be followed,

### 2.0. Workmanship

2.1. The relevant specifications of item 22.00.7 shall be followed except that the junction of walls columns with floor shall be treated with the chemical emulsion at the rate 7.5 liters/sq. meter. Special care shall be taken to establish continuity of the vertical chemical barrier on inner wall surface from the ground level be taken to establish continuity^ of the vertical chemical berries on inner wall surfaces from the ground level up to the level of filled earth surface. To achieve this, a small channel 3x3 cm. shall be made at the junctions of the wall and columns with floor (before laying the sub 2 grade) and road holes made in the channels up to the ground level 15 cms. apart and the rod moved backs ward and forward to breakup the earth an chemical emulsion poured along the channel at



the rate of 7.5 liters per sq. m, of the vertical wall or column surfaces of sub-structures so as to soak the soil right to the bottom. The soil should be tamped back into place after this operation.

**3.0. Mode of measurements and payment**

3.1. The relevant specifications of the item 22,00.7. shall be followed.

3.2. The vertical area of sub-structure in contact with filled up earth above ground level to top filled up earth shall be measured for payment.

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

**22.00.11. Treating the earth along the external perimeter of the building by making holes 15 cms., apart up to a depth of 30 cms. with chemical emulsion at the rate of 7.5 liters per sq. meter along the wall.**

1.0. **Materials** : The relevant specification of item 22.00.7 shall be followed.

**2.0. Workmanship**

2.1. The relevant specifications of the item 22.00.7. shall be followed except that the external perimeter of the building shall be treated with chemical emulsions. After building is complete, the earth along the . external perimeter of the building should be treated at intervals of 15 cms. and to a depth of 30 cms. The rods shall be moved backward and forward parallel to the wall to breakup the earth and chemical emulsion poured along the wall at the rate of 7.5 liters per sq. meter of vertical surfaces. After the treatment the earth shall be tamped back into place the earth out side of the building should be graded on compaction of building, this treatment shall be carried out on the completion of such grading. In event of filling being more than 30 cms. the external perimeter and treatment shall be extended to the full depth of filling up to ground level so as to ensure continuity of the chemical barrier.

**3.0. Mode of measurements and payment**

3.1. The relevant specifications of item No. 22.00.7 shall be followed.

3.2. The vertical surfaces area so sub-structure 30 cms. in depth from finished ground level in external periphery only shall be measured and paid under this item. The depth of wall treated under back filled shall not be included in this item.

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

**22.0.12. Providing treatment along outside of foundation using chemical emulsion at 7.5 liters per sq. m. of vertical surface (for each side) of sub-structure.**

1.0. **Materials** : The chemical used for the soil treatment shall be any one of the following with concentration shown against each in aqueous emulsion :

	<b>Chemicals</b>	<b>Concentration</b>
1.	Aldrin	0.50% (by weight)
2.	Heptachlor	0.50% (by weight)
3.	Chlordane	1.00% (by weight)

**2.0. Workmanship**

2.1. The surface of consolidated earth around the existing building shall be treated with chemical emulsion at the rate 7.5 liters/sq. m. of vertical surface of sub-structure. The minimum height to substructure shall be considered 60 cms. for treatment. If the earth along the perimeter does not allow emulsion to seep through, holes up to 300 mm. deep at 150 mm. centers both ways be made by 12 mm. dia. mild steel rod on the surface to facilitate saturation of the soil with chemical emulsion.

2.2. The chemical barrier shall be complete and continuous under whole on the structure to be protected.

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

**3.0. Mode of measurements and payment**

3.1. The length shall be measured along the periphery of the sub-structure. The depth shall be taken 0.60 m.

3.2. No deduction shall be made not extra paid for any opening for pipes etc. up to 0.1 sq. m.

3.3. The rate includes cost of all labour and material required for the operations involved for satisfactory completion of this item.

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

**22.0.13. Providing treatment along external wall perimeter below concrete or masonry apron using chemical at 5. lit/linear including drilling and plugging etc.**

1.0. **Materials** : The relevant specifications of item No. 22.0.12 shall be followed.

**2.0. Workmanship**

2.1. The relevant specification of item No. 22.0.12 shall be followed except that the treatment shall be carried out along external wall perimeter below concrete or masonry apron, using chemical at rate of 5 lit/ running meter.

**3.0. Mode of measurements and payment**

3.1. The relevant specifications of item No. 22.0,12 shall be followed.

3.2. The rate including drilling and plugging holes in apron etc. complete.

3.3. The rate shall be for a unit of One running meter.

**22.0.14. Treatment of soil below existing floor using chemical at 1 liter per hole at 300 mm. a part including drilling plugging holes etc.**

1.0. **Materials** : The relevant specifications of item No. 22.0.12. shall be followed.

**2.0. Workmanship**

2.1. The relevant specifications of item No. 22.00.9. shall be followed except that the termite control treatment shall be carried out in soil below existing floors.

- 2.2. The holes of 12 mm. dia rod shall be drilled in floor up to 150 mm. depth at 300 mm. part both ways. The chemical shall be then injected with pressure at the rate of 1 liters/hole of the surface area.
- 3.0. Mode of measurements & payment**
- 3.1. The relevant specifications of item 22.0.9 shall be followed.
- 3.2. The rate shall include cost of drilling holes and plugging.
- 3.3. The rate shall be for a unit of One sq. meter.
- 22.0.15. Treatment of voids in masonry using chemical at 1 Lit/hole at 300 mm. apart including drilling holes and plugging.**
- 1.0. Materials :** The relevant specifications of item 22.0.12 shall be followed.
- 2.0. Workmanship**
- 2.1. The walls affected by termite shall be cleaned off all live forms binding inside and the holes of voids in masonry wall surface shall be treated by chemical emulsion at rat 1 Lit. hole. The holes in cracks in surface of wall shall be drilled at 300 mm. apart.
- 3.0. Mode of measurement & payment**
- 3.1. The rate shall be for a unit of One number of voids treated.
- 22.0.16. Treatment to wood work by chemical emulsion in oil or kerosene based including 6 mm. dia downward slanted holes 150 mm. C/C. and plugging the same with cement mortar.**
- 1.0. Materials :** The relevant specifications of item No. 22. 00.7 shall be followed.
- 2.0. Workmanship**
- 2.1. The wood work effected by Ants shall be cleaned of lives form hiding inside. The whole wood surface shall be then treated with oil or kerosene based chemical emulsion. The holes in 6 mm. dia. shall be drilled slanted downwards at 150 mm. centers to centers and chemical emulsion shall be poured into holes by means of funnels specifically prepared for the same and allowed to seep. After finales become emptily, another dose of chemicals shall be poured in them. This process shall be done repeatedly till the whole wood work is fully saturated with chemical.
- 2.2. The holes drilled in wood work shall be filled in with putty and other similar materials as directed and the whole wooden surface shall be made good as before.
- 3.0. Mode of measurements & payment**
- 3.1. The work shall be measured for the finished work in sq. meter, including frame.
- 3.2. The out of frame shall be measured as width ad form top of flooring to top of frame shall be as height. This area includes for treating frame and shutters both.
- 3.3. The rate includes cost of all labours and materials, required for satisfactory completion of this item.
- 3.4. The rate includes drilling holes plugging the same after treatment completed and making good as before.
- 3.5. The rate shall be for a unit One sq. meter.

## SECTION-23

### Water Supply, Plumbing and Sanitary Fittings

- 23.2. Providing and fixing to wall, ceiling and floor galvanised mild steel tube (Medium grade) of the following nominal bore, tube fittings and clamps including making good the wall ceiling and floor (A) 15 mm. dia (B) 20 mm. dia (C) 25 mm. (D) 32 mm. (E) 40mm. (F) 50 mm.**
- 1.0. Materials**
- 1.1. Galvanised mild steel tubes of specified dia nominal bore shall conform to I.S. 1239-1968.
- 1.2. The galvanised 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 become bent or damaged and shall not be used for turning of the threads so as to make them slack as the latter procedure may not result in the watertight 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 wrapped 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. Burr 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 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 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 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 e, 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 an carrying out the tests
- 3.7.** The rate includes galvanised steel tubing 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.
- 23.4.** **Providing and laying in trenches galvanised mild steel tubes (Medium grade) of the following nominal bore and tube fittings-earth work in trenches to be measured and paid for separately ; (A) 15 mm. dia. (B) 20 mm. (C) 25 mm. (D) 40 mm. (E) 60 mm. (F) 80 mm.**
- 1.0. Materials**
- 1.1.** Galvanised mild steel lube of specified dia. nominal bore and fittings shall conform to I.S. 1239-1968
- 2.0. Workmanship**
- 2.1.** The relevant specifications of Hem 23.2 (A) shall be followed for cutting laying an j jointing testing of joints except that the fixing of tube shall be done in trenches,
- 2.2.** The width and depth of the trenches for different diameters of tht, tubes shall he is under, For 15 to 80 mm. dia tube width of trenches shall be 30 cms. and depth of trenches 60 cms,
- 2.3.** All joints, the trench width, shall be widened where necessary. The work of excavation and refilling shall be done true to line, and gradient in accordance with general specifications of earth work in trenches
- 2.4.** The pipes shall *be* painted with two coats of anti-corrosive bitumastic paint of approved quality. The pipe shall be laid on a layer of 75 mm. sand filled upto 150 mm. above the pipe of so specified. The remaining portion of trench shall be then filled with excavated earth. The surplus shall be disposed off as directed.
- 2.5.** When the excavation is done in rock the bottom shall be cut deep enough to permit the pipe to be laid and cushion of sand 75 mm. in case of bigger diameter of tube where the pressure is very high thrust block of cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 grade stone aggregates of 20 mm nominal size) shall be constructed on all bends to transmit the hydraulic thrust without impairing the ground and spreading it over a sufficient area if so specified.
- 3.0. Mode of measurement**
- 3.1.** The relevant specifications of item No. 23.2 (A) shall be followed. The authorised quantities shall be
- 3.2.** For purpose of calculating cubic content cross section shall normally be taken at suitable intervals i.e. at manhole of wall chamber intervals except in abnormal cases like sudden change in strata or undulating ground etc., when they may be taken at closer intervals as approved by the Engineer-in charge whose decision shall be final, conclusive and binding.
- 3.3. Authorised width :**
- (a) Up to the meter depth, the width of the trenches for the purpose of measurements of excavation shall be arrived at by adding 40 cms. to the external diameter of the tube ( not the socket) where a pipe is laid on concrete bed/ Cushing layer, the authorised width shall be the external diameter of tube plus 40 cms. or the width of the concrete bed cushioning layer whichever is more.
- (b) For depths exceeding one meter an allowance of 5 cms. per meter of depth for each side of the trench shall be added to the authorised width (i.e. external diameter of pipe of plus 40 cms) This allowance shall apply to the entire depth of the trench. The authorised width in such cases shall therefore be, equal to the depth of trench, plus external diameter or tube plus 40 cms.
- (c) Where more then one tube is laid, the diameter shall be reckoned as the horizontal distance of outside to outside of the outermost pipes.
- (d) Where sheeting etc. has been provided the authorised width of the trenches at bottom shall be increased to accommodate for sheeting etc. so that the clear width available between faces of sheeting is as per previous ness of (a), (b) & (c) above.
- (e) If the sides of the trench are not vertical, the tones of side slopes shall end at the top of the pipe and vertical sided trench of authorised width as per (a), (b), (c) and (d) above shall be excavated from these down to the bed of trenches.
- 3.4.** Where the tubes are laid in trenches, the work of excavation and refilling and round tubes for which separate payment shall be made, the length shall be measured on running meter, basis.
- 3.5.** The rate shall be-for a unit of One running meter.
- 23.6. Marking connection of galvanised M/S. distribution branch with galvanised mild steel main 80 mm. nominal bore by providing and fixing tee including, cutting and threading the pipes etc. complete.**
- 1.0. Materials** The fittings required of specified dia. of pipe shall conform to I.S. 1237-1986.

## **2.0. Workmanship**

2.1. A pit of suitable dimensions shall be dug at the point where the connection is to be made with the main and earth removed up to 150 mm. below the main. The flow of water in water main shall also be disconnected by closing the sluice or wheel valves on the main. The main shall first be cut. Water if any, collected in the pit shall be bailed out and ends of the pipe threaded.

2.2. The connections of distribution pipe shall be made by fixing malleable galvanised mild steel tee of the required size and fitting such as jam nut, socket, connecting piece etc,

2.3. The testing of the joints shall be done as per relevant specifications of item No. 23.2 (A).

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

3.1. The rate includes cost of all labour, materials, tool and plant required for satisfactory completion of 'this item.

3.2. The rate shall be for a unit of One number.

23.8. **Providing and fixing to wall ceiling and floor 6 Kgs/Sq. Cm. working pressure polythene pipes of the following outside diameter, low density complete with special flag compression type fittings wall clips etc. including making good the wall/ceiling and floor. (A) 20 mm. dia. (B) 25 mm. dia (C) 32 mm. dia. (D) 40 mm. dia. (E) 50 mm. dia.**

## **1.0. Materials**

1.1. The low density polythene pipe of specified diameter with 6 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.D. 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 relevant specifications of item 23.2. (A) shall be followed except that the P.V.C. pipes of specified dia. shall be paid under this item.

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

23.111.(A)(I) **Providing and fixing water closet squatting pan (Indian type W.C. Pan) size 580 mm. (Earth work, bed concrete, foot-rests and trap to be measured and paid for separately). Vitreous china. Long pattern white colour.**

## **1.0. Materials**

1.1. Water closet squatting pan ( Indian type W.C. Pan) shall conform to M-62. Cement mortar shall conform to M-11

## **2.0. Workmanship**

2.1. The pan shall be sunk into the floor and embedded in a cushion of average 15 cm. cement concrete 1:5:10 (1 cement : 10 graded stone aggregate or brick aggregate 40 mm. nominal size) or and its bed concrete, the floor should be left 115 mm.-below the top level of the pan so as to allow for flooring and its bed concrete. The floor should be suitably stopped so that the .waste water is drained into the pan. The shall be provided with 100 mm. 'P' or 'S' trap as specified in the item No. 23.113 with approximately 50 mm seal-The joints between the pan and the trap shall be made leak-proof with cement mortar 1:1 (1 cement : 1 fine sand).

**3.0. Mode of measurements and payment**

- 3.1. The rate shall include the cost of all materials and labours involved in the operations described under workmanship.
- 3.2. The rate shall be for a unit of One number.
- 3.3. The 'P' or S<sup>1</sup> trap unit of One number.

**23.79. Providing and fixing cast spigot and sockets soil, waste, and ventilating pipes of the following normal size (B) 75 mm. dia. (C) 100 mm. dia.**

**1.0. Materials**

- 1.1. The specified dia. C.I. Spigot and socket soil or waste pipe shall conform M-68.

**2.0. Workmanship**

- 2.1. The fixing of C.f. spigot and sockets soil, waste and ventilating pipe shall be carried out as per relevant specifications of item 15.93 (B) except the C.I. spigot and socket shall be fixed. The joints shall be filled with cement mortar 1:2 (1 cement : 2 sand) span spun yarn. The joints shall be filled with cement mortar 1.2 (1 cement : 2 sand) and spurn yarn. The pipes without care shall be fixed to wall with M.S. clamps The pipes will earns shall be secured with 40 mm before steel or iron barrel distance pieces or boils and stout galvanised iron nails 10 cms long into hand wool plug fixed in walls. Access doors to fittings shall be provided with 3 mm. rubber insertion packing and secured without screws to made air and water tight
- 2.2. All soil pipes shall be earned up above the roof and shall have a wire ball on guarded or a cowl.
- 2.3. The ventilating pipe or shaft shall be carried out to a height of at least one meter above the outer covering of the roof of the building or in the case of windows in a gable wall or a dormer windows, it shall t carried up to a ridge of the roof or at least tow meters above the top of the windows. In case of flat roof to which access for use is provided, it shall be carried out up to a height of at least on meter above the parapet or two meters measured vertically from the top of any windows or opening which any exist up to a horizontal distance of five meters from the vent pipe into such building and in no case shall be carried out to a height less then three meters.
- 2.4. Where ventilating pipes are carried in pipe shafts, the shaft shall be of a minimum size of one meter. If !he shells are also used to give fight and air to rooms, the ventilating pipes must be carried out to a horizontal distance at root level not loss than five meter from the site of the shaft.
- 2.5. The sand cast iron pipes above parapet shall be fixed with M.S. clamps and stays. The clamps shall be made from 1.5 mm. thick MS flat or 3 mm. width band to the required shape and size to fit tightly one the sockets when tightened with screw bolts. It shall be formed of two semi circular pieces with flanged ends on both sides, with holes to fit in the screw bolts and nuts 40 mm. dia. M.S. Bars, One end of the stay shall be bent to form a hook to be fixed with clamps by means of bolts and the other end shall be bent for embedding in wall in cement concrete block of size 200 mm. x 100 mm. x 100 mm. in 1:2:4 mix. The concrete shall be finished to match the surrounding surfaces.
- 2.6. The connection between the main pipe and branch pipes shall be made by using branches and bends with access doors for cleaning
- 2.7. The waste from lavatories, kitchens basins, sinks, baths and other floor traps shall be separately connected to respective stacks of upper floor. The waste stack of lavatories shall be connected directly to main hole while the waste stack of other shall be separately discharged over gulley trap.

**3.0. Mode of measurements and payment**

- 3.1. The length of pipe shall be measured including all fittings along its length in running meters correct to a centimeter. No allowance shall be made for the portion of pipe length entered in the sockets of the adjacent pipe of fittings.
- 3.2. The rate includes all labour, and materials, tools and plant etc. required for satisfactory completion of this item.
- 3.3. The rate shall be for a unit of One running meter.

**23.87. Providing and fixing cast iron (spun) Nahni trap of the following nominal diameter of self cleaning design with C.I. Screwed down or hinged grating including cost of cutting and making good the waifs and floors : 100 mm. Inlet and 50 mm. outlet.**

**1.0. Materials**

- 1.1. The cast iron (spun) Nahni trap shall conform to M-69. The C.I. hinged or screwed down cover shall be of best quality

**2.0. Workmanship**

- 2.1. The Nahni trap with 100 mm. dia inlet and 50 mm. dia. outlet shall be fixed as per drawing or as directed.
- 2.2. The Nahni trap shall be jointed with C.I. Pipe, 75 mm. dia. with lead joints. The lead joints shall be done in conformation with I.S. 782.-1976.

**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.

**23.112.(A)(I) Providing and fixing wash down water closet (European type W.C. Pan) with integral 'P' or 'S' trap including jointing the trap with soil pipe in C.M. 1:1 ( 1 cement : < fine sand) (seat and cover to be measured and paid for separately) ; Vitreous china pattern : In white colour,.**

**1.0. Materials**

- Wash down water closet (European type W.C. Pan) shall conform to M-60. Cement mortar shah 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 ho 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 sent 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.
- 23.113.(A) Providing and fixing 100 mm. size 'P' or 'S' trap for water closet squatting pan including jointing the trap with the pan arid soil pipe in cement mortar 1:1 (1 cement : 1 fine sand) Vitreous China.**
- 1.0. **Materials** : The 100 mm. size 'P' or 'S' trap for water closet shall confirm to M-62. Cement mortar shall conform to M-11.
- 2.0. **Workmanship**
- 2.1. The 'P' or 'S' trap shall be fixed with pan 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.
- 23.114. Providing and fixing in C.M. 1:3 ( 1 cement : coarse sand) a pair of white vitreous china 250 mm. x 130 mm. 30 mm. foot rest for long pattern squatting pan water closet.**
- 1.0. **Materials**
- 1.1. The pair of white vitreous china foot-rests shall conform to M-62 Cement mortar shall conform to M-11.
- 2.0. **Workmanship**
- 2.1. After laying the floor, the floor shall be suitably sloped so that the waste water is drained into the pan A pair of foot-rests of size 250 mm. x 130 mm. x 30 mm. of white vitreous china shall be set in cement mortar 1:3 (1 cement ; 3 coarse sand). The foot-rests shall be fixed at a distance of 175 mm. from the inner edge of the back side of the pan and shall be fixed at convenient angle.
- 3.0. **Mode of measurements & payment**
- 3.1. The rate shall include the cost of all materials and labours involved in all the operations described under workmanship.
- 3.2. The rate shall be for a unit of One pair.
- 23.115.(A)(I) Providing and fixing 12.5 liters low level flushing cistern with a pair of C.I. or mild steel brackets complete with fittings such as lead valve less syphon, 15 mm. nominal size brass ball valve with polythene float, C.P. brass ball handle, unions and couplings for connections with inlet, outlet and overflow pipes, 40 mm. dia. porcelain enameled flush bend including cutting holes in walls and making good the same and connecting the flush bend with cistern and closet (overflow pipe to be measured and paid for separately) : Vitreous China. In white colour.**
- 1.0. **Materials**
- 1.1. The low level vitreous china (Enamel) flushing tank shall conform to M-65 except that the flushing cistern shall be 12.5 liters low level type as mentioned in the item.
- 2.0. **Workmanship**
- 2.1. The low level cistern shall be firmly fixed on two C.I. or mild steel, brackets which shall be firmly embedded in the wall in C.M. 1:4 ( 1 cement : 4 fine sand).
- 2.2. The height of the bottom of the cistern from the top of the pan shall be 30 cms of low level flushing cistern shall be connected to the closet by means of 40 mm. dia, white porcelain enameled flush bend using Indian rubber adapts joints. The flush pipe shall be securely connected to the cistern outlet by means of coupling nut made of any non-corrosive materials, non-ferrous metal or galvanised steel. The flush pipe from the cistern shall be connected to the closet by means of cement of red-lead.
- 3.0. **Mode of measurements & payment**
- 3.1. The rate shall include the cost of all materials fitting and labour involved in all the operations described under workmanship including testing.
- 3.2. The rate shall be for a unit of One number.
- 23.116. Providing and fixing 12.5 liters level C.I. flushing with a pair C.I. or mild steel brackets, complete with fittings such as syphonic arrangement, 15 mm. nominal size brass ball valve with polythene flat, lever. G.I. China (60 cms.) and pull unions and couplings for connections with inlet, outlet and overflow pipes etc. including cutting holes in walls and making good the same (overflow pipe to be measured and paid for separately).**
- 1.0. **Materials**
- 1.1. The high level C.i. flushing cistern shall conform to M-66, except that the flushing cistern shall be of 12.5 liters high level C.I. cistern as mentioned in the item.

- 2.0. Workmanship**
- 2.1.** The cistern shall be fixed on two C.I. or mild steel brackets which shall be firmly embedded in the wall in cement mortar 1:4 ( 1 cement : 4 fine sand).
- 2.2.** The height of the bottom of the cistern from the top of the pan shall be two meters.
- 2.3.** The W.C. Pan shall be connected to the cistern by galvanised steel flush pipes of 32 mm. nominal internal diameter. The flush pipe shall be fixed to wall by using clamps. The flush pipe from the cistern shall be connected to the closet by means of cement or red-lead. The flush pipe shall be securely connected to the cistern outlet by means of coupling nut made of any non-corrosive materials non-ferrous metal or galvanised steel.
- 2.4.** The chain and the pull union shall be fixed to the protruding level arm of the flushing cistern.
- 2.5.** The whole installation shall be tested for leak-proof joints and satisfactory functioning.
- 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.
- 23.117. Providing and fixing in position with clamps etc. 32 mm. nominal internal dia. galvanised steel tube flush pipe for high level flushing cistern including connecting the flush pipe with cistern and closet and making good the walls and floors.**
- 1.0. Materials**
- 1.1.** The 32 mm. nominal internal dia, galvanised steel tube flush pipe shall conform to M-56.
- 2.0. Workmanship**
- 2.1.** The W.C. pan shall be connected to the cistern by galvanised steel flush pipe of 32 mm nominal internal diameter. The flush pipe shall be fixed to wall by using clamps.
- 2.2.** The flush pipe from the cistern shall be connected to the closet by means of cement or red-lead.
- 2.3.** The flush pipe shall be securely connected to the cistern outlet by means of coupling nut made of any non-corrosive materials, non-ferrous metal or galvanised steel.
- 3.0. Mode of measurements and 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 running meter.
- 23.120. Providing and fixing 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.
- 23.127. Providing and fixing wash basin with single hole for pillar top white C.I. or M.S, brackets painted white including cutting holes, and making good the same but excluding fittings, vitreous china flat back wash basin 550 mm. x 400 mm. 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 wish 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.



- 23.130.(C) Providing and fixing kitchen sink with C.I. or M.S. brackets painted white including cutting holes in walls and making good the same of but excluding fittings. Vitreous china sink 600 mm. x 450 mm. x 150 mm. size.**
- 1.0. Materials**
- 1.1. White glazed vitreous china sink 600 mm. x 450 mm. x 150 mm. size shall conform to M-63.
- 2.0. Workmanship**
- 2.1. The kitchen sink shall be supported on a pair of M.S. or C.I. brackets fixed in cement mortar 1:3 (1 cement : 3 coarse sand). The M.S. or C.I. brackets shall conform to I.S. 775-1962. The wall plaster on the rear shall be cut to rest over the top edge of the sink. After fixing the sink, plaster shall be made good and the surface finished to match with the existing one.
- 2.2. The C.P. brass trap and union shall be connected to 40 mm. nominal bore galvanised mild steel waste pipe which shall be suitably bent towards the wall and which shall discharge into an open drain leading to gully-trap or direct into the gully-trap on the ground on 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 surface drain or a floor trap is placed directly under the sink and the waste is discharged to it vertically.
- 2.3. The height of front edge of the wash basin from the floor, level shall be 80 cms.
- 3.0. Mode of measurements & payment**
- 3.1. The rate includes cost of all labour, materials, tools and plant and other equipment required for satisfactory completion of this item as described in workmanship.
- 3.2. The rate shall be for a unit of One number.
- 23.135 (A) Providing and fixing 32 mm, dia. C.P. brass waste for wash basin or sink.**
- 1.0. Materials**
- 1.1. The C.P. brass trap and unions shall be of 32 mm. dia. and of best quality and make as approved by the Engineer-in-charge
- 2.0. Workmanship**
- 2.1. C.P. brass waste trap and union shall be connected to 32 mm dia waste pipe which shall be suitably bent towards the wall which shall discharge into drain through a floor trap The C.P brass waste trap shall be provided for wash basin or sink as the case may be.
- 3.0. Mode of measurement & payment**
- 3.1. The rate includes all labours and providing C.P. brass waste trap and union including waste couplings of 32 nun fin. The rate excludes the cost of waste pipe of 32 mm. dia.
- 3.2. The idle shall be for a unit of One number.
- 23.135.(B) Providing and fixing 40 mm dia. C.P. Brass waste for wash basin or sink.**
- 1.0. Materials & Workmanship**
- 1.1. The relevant specifications of item 23.135 (A) shall be followed except that the diameter of C.P. brass waste is 40 mm dia.
- 2.0. Mode of measurements & payment**
- 2.1. The rate shall be for a unit of One number.
- 23.136.(A) Providing and fixing 32 mm. dia. M.I. union for wash basin or sink.**
- 1.0. Materials**
- 1.1. The 32 mm dia M.I. Fisher union shall be of best quality and made as approved by the Engineer-in-charge.
- 2.0. Workmanship**
- 2.1. The 32mm dia M I. Fisher union shall be fixed to wash basin or sink in best workman like manner.
- 3.0. Mode of measurements and payment**
- 3.1. The rate includes all labours and materials, tools and plants etc. required for satisfactory completion of the item.
- 23.136.(B) Providing and fixing 40 mm, dia. M.I. fisher union for wash basin or sink.**
- 1.0. Materials and Workmanship**
- 1.1. The relevant specifications of item No. 23, 136 (A) shall be followed except that the diameter of M I fisher union shall be 40 mm. dia.
- 2.0. Mode of measurements of payment**
- 2.1. The rate shall be for a unit of One number
- 23.139. Providing and fixing 100 mm. dia, sand cast iron grating for gulley floor or Nahni tarp.**
- 1.0. Materials**
- 1.1. The- 100 mm. dia. sand cast iron gratings for gulley, floor or Nahni trap shall be of best quality and make as approved.
- 2.0. Workmanship**
- 2.1. The CAST IRON grating shall be provided to gulley trap floor or Nahni trap as the case may be in best workmen like manner.
- 3.0. Mode of measurements and payment**
- 3.1. The rate shall includes cost of all labour, materials, tools and plants, etc. required for satisfactory completion of this item.
- 3.2. The rate shall be for a unit of One number.
- 23 :141.(A) Providing and fixing 100 mm. dia, C.P, brass shower rose with 15 mm or 20 mm. inlet.**

- 1.0. Materials**
- 1.1.** 100 mm. dia C.P. brass shower rose shall conform to I.S. 2556-1972 part - XI and of best quality and makes as approved by engineer-in-charge. The inlet of shower rose shall be 15 mm dia. or 20 mm dia. as directed.
- 2.0. Workmanship**
- 2.1.** The C.P. brass shower rose shall be fixed as directed with 15 mm. dia. or 20 mm. dia. G.I. inlet pipe as the case may be.
- 3.0. Mode of measurements and payment**
- 3.1.** The rate includes all labours and materials, tools and plant etc. required for satisfactory completion of this item
- 3.2.** The rate shall be for a one number.
- 23.143. Providing and fixing 600 mm. x 450 mm. beveled edge mirror of superior glass mounted on 6 mm. thick A.C. Sheet or plywood sheet and fixed to wooden plugs with C.P. brass screws and washers,**
- 1.0. Materials**
- 1.1.** The 600 mm. x 450 mm. size mirror shall be of superior glass with edge rounded over 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 labour and materials, tools and plant etc. required for satisfactory completion of this item. The rate shall be for a .unit of One number.
- 23.144.(B) Providing and fixing 600 x 20 mm. C.P. brass towel rail complete with C.P. brass brackets fixed to wooden plugs with and C.P. brass screws.**
- 1.0. Materials**
- 1.1.** The C.P. brass towel rail shall be 600 x 20 mm. of best quality as approved by the Engineer-in-charge The brackets shall be of C.P. brass. The rail shall conform to I.S. 1068-1958.
- 2.0. Workmanship**
- 2.1.** The brackets of the towel rail shall be fixed by means of C.P. brass screws to wooden plugs firmly embedded in the wall with C.M. 1:3 (1 cement : 3 coarse sand). The towel rail shall be fixed as and where directed.
- 3.0. Mode of measurements and payment**
- 3.1.** The rate includes cost of all labour and materials, tools and plant etc. required for satisfactory completion of this item.
- 3.2.** The rate shall be for a unit of One number.
- 23.145. Providing and fixing 600 mm. x 120 mm. glass shelf with C.P. brass brackets and guard rail complete, fixed to wooden plugs with C.P. brass screws.**
- 1.0. Materials :** The glass shelf of 600 mm. x 120 mm. size shall be of 5 mm. thick plate glass. The edge of the glass shall be grounded. The C.P. over brass guard rail shall be best quality and make.
- 2.0. Workmanship**
- 2.1.** The C.P. brass brackets of the glass shelf shall be fixed with C.P. screws to wooden plug firmly embedded in the wall C.M. 1:3 (1 cement : 3 coarse sand). The C.P. guard rail shall be fixed to glass shelf as directed.
- 3.0. Mode of measurement and payment**
- 3.1.** The rate includes all labour and materials tools and plant etc. required for satisfactory completion of this item,
- 3.2.** The rate shall be for a unit of One number.
- 23.146.(A) Providing and fixing C.P. brass toilet paper holder.**
- 1.0. Materials :** The toilet paper holder shall be of best quality and make, chromium plating shall be of grade 'B' type conforming to I.S. 1068-2958.
- 2.0. Workmanship**
- 2.1.** The toilet paper holder shall be fixed in position by means of screws and wooden plugs embedded in wall with cement 1:3 (1 cement : 3 coarse sand).
- 3.0. Mode of measurements and payment**
- 3.1.** The rate includes cost of all labour and material, tools and plant etc. required for satisfactory completion of this item.
- 3.2.** The rate shall be for a unit of One number.
- 23.92.(A)(I) Providing and fixing brass screw down bib taps of following size. Polished bright : 14 mm. dia.**
- 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 labour, materials, tools and plant etc. required for satisfactory completion of this item.
- 3.2.** The rate shall be for a unit of One Number.
- 23.92.(A)(II) Providing and fixing brass screw down bib taps of following size : Polished bright: 20 mm. dia.**
- 1.0. Materials and Workmanship**  
The relevant specifications of item 23.92 (A) (i) shall be followed except that the bib taps of 20 mm. dia shall be fixed.
- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specifications of item 23.92 A(i) shall be followed.
- 2.2.** The rate shall be for a unit of One number.
- 23.92.(B)(I) Providing and fixing chromium plated brass screw down bib taps of the following size : 15 mm. dia.**
- 1.0. Materials and workmanship**  
The relevant specification of item No. 23.92 (A) (I) shall be followed except that the brass chromium plated screw down tap of 20 mm. dia. shall be fixed.
- 2.0. Mode of measurements & payment**
- 2.1.** The rate of shall be for a unit of One number.
- 23.92.(B)(II) Providing and laying chromium plated brass screw down bib taps of following size : 20 mm. dia.**
- 1.0. Materials and workmanship**  
The relevant specifications of item No. 23.92 (A) shall be followed except that the brass chromium plated screw down tap of 20 mm. dia. shall be fixed.
- 2.0. Mode of measurements & payment**
- 2.1.** The rate shall be for a unit of One number
- 23.92.(C)(I) Providing and fixing gun metal screw down bib taps of the following size : 15 mm. dia.**
- 1.0. Materials and workmanship**
- 1.1.** The relevant specification of item No. 23.9\*3 (A) (I) shall be followed except that the 15 mm. dia. gun metal screw down bib tap shall be fixed.
- 2.0. Mode of measurements & payment**
- 2.1.** The rate shall be for a unit of One number,
- 23.92.(C)(II) Providing and fixing gun metal screw down bib taps of following size : 20 mm. dia.**
- 1.0. Materials & Workmanship**
- 1.1.** The relevant specifications of item 23.92 (A) (i) shall be followed except that the 20 mm. dia. gun screw down bib tap shall be fixed.
- 2.0. Mode of measurements & payment**
- 2.1.** The rate shall be for a unit of One number.
- 23.95(A) Providing and fixing pillar tap capstan head screw down high pressure with screw shank and back nuts : (A) 14 mm. dia. (B) 20 mm. dia.**
- 1.0. Materials :** The capstan head pillar tap of specified dia. of C.R over brass shall be best quality and shall conform to I.S. : 1975 - 1961. The pillar taps shall be tested quality.
- 2.0. Workmanship**
- 2.1.** The capstan head pillar tap of specified dia. shall be fixed as directed with required washers of selected leather or rubber asbestos composition or of plastic as directed. The cock shall fixed with pipe line white Zink end spun yarn, to make joint water tight. The work shall be carried out in best workman like manner.
- 3.0. Mode of measurements and payment**
- 3.1.** The rate shall be for a unit of one number.
- 23.96(A) Providing and fixing brass screw down stop cock (A) 15 mm. dia. (B) 20 mm. dia. (C) 25 mm. dia.**
- 1.0. Materials :** The brass screw down stop cock of specified dia shall conform to IS. : 781 -1977 The stop cock shall be of tested quality.
- 2.0. Workmanship**  
The stop cock shall be fixed in position by means of Jam nut and socket. The stop cock shall be fixed near the inlet of the water meter or as directed. The joints shall be done with white zinc and spun yarn. The joint shall be tested for leak proofing.
- 3.0. Mode of measurements and payment**
- 3.1.** The rate includes cost of all labours, materials, tools and plant etc. required for satisfactory completion of this item.
- 23.99. Providing and fixing gunmetal check or non-return valve. (A) 15 mm. dia. (B) 20 mm. dia. (C) 25 mm. dia. (D) 32 mm. dia. (E) 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**.
- 23.00. Providing and fixing chromium plated brass half turn flush cock of approved quality including fixing in pipe line etc. complete (I) 20 mm. dia. (II) 25 mm. dia. (III) 32 mm. dia.**
- 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.
- 23.00.4. Providing and fixing chromium plated bottle trap with necessary coupling of approved quality for wash basin.**
- 1.0. **Materials** : The chromium plated bottle trap shall be approved make and of best quality. The bottle trap shall be provided with coupling.
- 2.0. **Workmanship**  
The bottle trap shall be fixed on wash hand basin with wooden gullies and screws as directed. The work shall be carried out in best workman like manner.
- 3.0. **Mode of measurements and payment**
- 3.1. The rate includes cost of all materials and labour involved for satisfactory completion of this item.
- 3.2. The rate shall be for a unit of One number.
- 23.122.(A) Providing and fixing urinal of approved quality including connecting the urinal with waste pipe trap etc. complete : white earthenware flat back or corner type size 430 mm. x 260 mm. x 350 mm.**
- 1.0. **Materials**: The white earthenware flat back or corner type urinal of size 430 mm. x 260 mm. x 350 mm. shall conform to M-64.
- 2.0. **Workmanship**
- 2.1. The urinals shall be fixed in position by using wooden plugs and screws and shall be at a height 65 cms. from the Moor level to the top of the lip of urinal, unless otherwise directed. The wooden plugs shall be of 50 mm. x 50 mm. at base tapering to 38 mm. x 38 mm. at top 50 mm. in length shall be fixed in wall in steel waste pipe which shall discharge in the channel or floor a tap. The connection between the urinal and flush or waste pipe shall be made by means of putty or white lead mixed with chopped hemp.
- 3.0. **Mode of measurements and payment**
- 3.1. The rate shall include cost all labours, materials, tools and plants etc. required for satisfactory completion of this item.
- 3.2. The rate shall be for a unit of One number.
- 23.124.(A) Providing and fixing urinal of approved quality including connection with trap and with integral longitudinal flush pipe squatting plate pattern white earthenware 550 mm. x 300 mm.**
- 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 of 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
- 23.134 Providing and fixing rubber plug for sink or wash basin.**
- 1.0. **Material**: The rubber plug for sink or wash hand, basin shall be best quality and make as approved by the Engineer-in-charge.
- 2.0. **Workmanship -**
- 2.1. The rubber plug with plain shall be fixed in wash basin or sink as directed.
- 3.0. **Mode of measurements and payment**
- 3.1. The rate shall be for a unit of One number.
- 23.00.5.(A) Providing and fixing ball cock of approved quality as directed {Copper metal} : (I) 25 mm. dia. (II) 50 mm. dia;**
- 1.0. **Materials** :  
The ball cock of specified diameter shall conform to M-75

- 2.0. Workmanship**  
The ball cock of specified diameter shall be fixed as directed. The fixing of ball cock shall be carried out as per relevant specification of item No. 23 (A) for joints etc.
- 3.0. Mode of measurement & payment**
- 3.1.** The rate includes-cost of all materials and labour involved for carrying out satisfactory work.
- 3.2.** The rate shall be for a unit of One number.
- 23.00.5.(B) Providing and fixing ball cock of approved quality as directed : Ebonite. (I) 25 mm. dia. (II) 50 mm. dia.)**
- 1.0. Materials & Workmanship :** The relevant specifications of item No. 23.00.5 (A) shall be followed except that the ball cock of specified dia of Ebonite shall be fixed.
- 2.0. Mode of measurements & payment**
- 2.1.** The relevant specifications of item NO. 23.00.5 (A) shall be followed.
- 2.2.** The rate shall be for a unit of One number.
- 23.00.6. Providing and fixing C.I. Manhole cover 0.60 C.M. x 0.45 C.M. size having weight not less than 35 kg.**
- 1.0. Materials**  
C. I. Manhole cover of 0.60 x 0.45 Cms. size shall be of best quality. The height of C.I. cover and frame shall be less than 35 Kg. The C.I. manhole cover shall be of light duty and conform relevant I.S.
- 2.0. Workmanship**
- 2.1.** The C.I. Manhole cover shall be fixed as per relevant specifications of item No. 24.44 except that the C.I. cover shall be fixed as and where directed.
- 3.0. Mode of measurements and payment**
- 3.1.** The rate includes cost of all labour and materials required for satisfactory completion of this item.
- 3.2.** The rate shall be for a unit of One number.
- 23.00.7. Providing and fixing G.I. water spout of 50 mm. dia. and 30 cms length.**
- 1.0. Materials :** G.I.M.S. type of 50 mm. dia. shall conform to M-56.
- 2.0. Workmanship**
- 2.1.** The G.I. pipe of 30 cms. fixed as rain water pipe as directed. The pipe shall be fixed about 1/4 dia. below the floor level so as to make approach of water easy. The inlet of pipe shall be rounded off for easy entry of rain water pipe. The pipe shall be fixed in C.M. 1:3.
- 3.0. Mode of measurements & payment**
- 3.1.** The rate includes of all labour and materials required for satisfactory completion of this item.
- 3.2.** The rate shall be for a unit of One number.
- 23.8. Providing and fixing to wall ceiling and floor 6 Kg/ Sq. cm, working pressure outside diameter, low density completion with special flange compression type fittings wall clips etc. including making good the wall, ceiling and floor. (A) 20 mm. dia. (B) 25 mm. dia. (C) 32 mm. dia. (D) 40 mm. dia. (E) 50 mm. dia.**
- 1.0. Materials :** The low density polythene pipe of specified diameter with 56 Kg/f. 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 allowances shall be made particularly in over-ground pipe line for any change in length of 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 undertaken after precautions are observed for their protection against dirt, sun rays and mechanical damage.
- 2.3.** The rigid P.V.C. pipes should not be kept exposed above ground when it passes through public places, railway lines, roads, road side and foot paths.
- 2.4.** P.V.C. pipe shall be supported at the following intervals ;  
-20 mm dia 500 mm.      -25 mm. dia. 750 mm.      -32 mm. dia. 900 mm.
- 2.5.** Close support spacing shall be provided if recommended by the manufacturer.
- 2.6.** The guide lines indicated by the manufacturer regarding handling, transportation, storing, laying and jointing of pipes shall be kept in view during execution.
- 2.7.** P.V.C. pipes shall be fixed on wall with wooden plugs suitable plastic clamps.
- 2.8. Jointing the pipes :**
- 2.8.1.** The pipes and socket s 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 shall be applied to the matching surface and pushed home and 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 off after jointing. Empty solvent cement tins, brushes, rags of 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 grained solid found to be free of presence of hard object such as large pebbles, 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 inducted stresses due to retraction. Any deviation required shall be obtained by using proper type of rubber ring joints.

**3.0. Mode of measurements & payment**

**3.1.** The relevant specifications of item No. 23.2. (A) shall be followed except that the P.V.C. pipes of specified dia. shall be paid under this item.

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

## SECTION-24

**24.1.(A) Providing any laying (two level or slopes) and jointing with stiff mixture of cement mortar in proportion 1:1 salt glazed stone-ware pipes, following nominal internal diameters including testing of pipes and joints complete : 100 mm. dia.**

**1.0. Materials**

(I) Water shall conform to M-1(2) Cement mortar of proportion 1:1 shall conform to M-11. (3) 100 mm. dia. glazed stoneware pipe shall conform to M-71.

**2.0. Workmanship**

**2.1.** The trenches for stoneware pipe drains shall be carried out as per relevant specifications of item No. 23.4 (A) except that the work is for stoneware pipes of 100 mm. dia.

**2.2. Laying:**

**2.2.1.** The pipes shall be laid accurately and perfectly true to line, levels and gradients, Great care shall be taken to prevent sand etc. from entering the pipes. The pipes between two manholes shall be laid truly in a straight line without vertical or horizontal undulation. All junctions and changes in direction and diameter shall be made inside manholes by means of curved tapered channels formed in Cement concrete finished smooth and benched on both sides. The body of the pipe shall rest for its entire length, on a even level bed grips being made or left on the bed to receive the sockets of the pipes.

**2.3. Jointing:**

**2.3.1.** Tarred gask in or yarn soaked in neat cement slurry shall first be placed around the spigot to each pipe and the spigot shall then be placed well home into the socket of the pipe previously laid. The pipe shall then be adjusted and fixed in the correct position and gaskin caulked home so as to fill not more than 1/4th of the total depth or (13 mm. in depth) of the socket.

**2.3.2.** The remainder of the sockets shall be filled with stiff mixture of cement mortar in proportion of one part of cement and one part of sharp sand. When the socket is fillet, a filled shall be formed round the joints with a trowel, forming an angle of 45° with the barrel of the pipe.

**2.3.3.** The mortar shall be mixed as necessary for immediate use.

**2.3.4.** After the joint is made, any extraneous materials shall be removed from the inside of the joints with a suitable scraper or "badger". The newly made joints shall be protected, until set, from the sun, dry winds, rain or frost, sacking or other suitable materials which shall be used for the purpose.

**2.3.5.** The mortar shall be cured for 10 days.

**2.4. Testing of Joints:**

**2.4.1.** If any leakage is visible the defective part of the work shall be made good at no extra cost. The pipe line shall be tested as directed.

**2.4.2.** A slight amount of sweating which is uniform may be overlooked, but excessive sweating from a particular pipe or joints shall be watched for and taken as indicating a defect to be made good.

**3.0. Mode of measurements and payment**

**3.1.** Pounding or buttering of the fit trenches bed to the lower part of the pipe and "Grips" dug to take socket, collars etc. are included in the rate of laying the pipes.

**3.2.** The measurements shall be net without any allowance for cutting, and waste. The length of bends, junctions, and other connections shall be included in the total length of the drain pipes. Nothing extra shall be paid for the same. The rate includes necessary excavation refilling trenches etc. complete,

**3.3.** The rate shall be for a unit of One running meter.

**24.1.(B) Providing and laying and jointing salt glazed stoneware pipes with lime concrete 1:2:4 (1 lime :2 fine sand : 4 graded brick aggregate 40 mm, nominal size)bedding with necessary form work and curing etc. complete : 150 mm. dia.**

**1.0. Materials & Workmanship :** The relevant specifications of item 24.1.(A) shall be followed except that the that diameter of pipe shall be 150 mm. dia.

**2.0. Mode of measurements and payment**

**2.1.** The relevant specifications of item No, 24.1. (A) shall be followed.

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

**24.2.(A) Providing and laying cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone : aggregate 40 mm. nominal size) bedding for stoneware pipe of following internal diameter with necessary form work and curing complete : 100 mm. dia. 300 mm. width (112 mm. average bed thickness).**

**1.0. Materials :** (1) Water .shall conform to M-1 (2) Cement shall conform to M-3. (3) Sand shall conform to M-6 (4) Stone aggregate 40 run nominal size shall conform to M-12.

**2.0. Workmanship**

**2.1.** The relevant specifications of item 5.3.4. shall be followed except that the concrete work shall be carried out in trenches as bedding for stoneware pipes. The width of concrete shall be 300 mm. and average thickness of bedding shall be 112 mm The concrete shall be brought up at least to the invert level of the pipe to form a cradle and to avoid line contact between the pipe and the bed.

**3.0. Mode of measurements & payment**

**3.1.** The rate includes cost of all labour and materials required for satisfactory completion of this item.

**3.2.** The rate includes cost of necessary form work required if any

- 3.3. The rate shall be for a unit of One running meter.
- 24.2.(B) Providing and laying cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate 40 mm. nominal size) bedding for stoneware pipe of following internal diameter with necessary form work and curing complete : 150 mm. dia. 450 mm. width (166 mm. average bed thickness),**
- 1.1. **Materials & Workmanship :** The relevant specifications of item 24.2 (A) shall be followed except that the cement concrete work shall be carried out for bedding of stoneware pipe of 150 mm. dia. The average thickness of bedding shall be- 166 mm. and width shall be 450 mm.
- 2.0. **Mode of measurements & payment**
- 2.1. The relevant specifications of item 24.2 (A) shall be followed.
- 2.2. The rate shall be for a unit of One running meter.
- 24.19(1) Providing and fixing S.W. gully trap with C.I. grating brick masonry chamber and watertight C.I. cover with frame of 300 mm. x 300 mm. size (Inside) with standard weight : (A) square mount taps 100 mm. x 100 mm. size P. type**
- 1.0. **Materials :** (1) Water shall conform to M-1. (2) Cement mortar of proportion 1:5 shall conform to M-11. (3) Burnt brick shall conform to M-15. (4) The S.W. Gully trap of 100 mm. x 100 mm. size shall conform to M-70.
- 2.0. **Workmanship**
- 2.1. Excavation for gully trap shall be done true to dimensions and levels as indicated on plans or as directed. The excavation work shall generally be done as per relevant specifications of item 4.0.0. of earth work.
- 2.2. **Fixing:**
- 2.2.1. The gully trap shall be fixed over cement concrete 1:5:10 (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 gully outlet to the branch drain shall be done similar to jointing of S.W. pipe as described in item No. 24.1 (A).
- 2.3. **Brick masonry chamber :** After fixing and testing gully and branch drain, a brick masonry 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 on gully trap from the top of bed concrete up to ground level. The space between the chamber walls and the trap shall be filled with cement concrete 1:5:10. The upper portion of the chamber i.e. above the top level of the trap shall be plastered inside with cement mortar 1:3 (1 cement: 3 sand) finished with floating coat of neat cement. The corners and bottom of the chamber shall be rounded off so as to slope towards the grating.
- 2.4. C.I. cover with frame 300 mm, x 300 mm. (inside) size shall then be fixed on the top of the brick masonry with C.c. 1:2:4 (1 cement : 2 coarse sand : 4 graded aggregate 20 mm. nominal size) 40 mm. thick and rendered smooth. The finished top of the cover shall be left about 40 mm. above the adjoining ground level so as to exclude the surface water from entering the gully trap.
- 3.0. **Mode of measurements & payment**
- 3.1. The rate includes cost of all labour, materials, tools and plant etc. required for satisfactory completion of this item as described above.
- 3.2. The rate shall be for a unit of one number basis.
- 24.22. Providing and laying (to level or slopes) and jointing reinforced concrete light duty non-pressure pipes I.S. class N.P. 2 of the following internal diameters with collars and butt ends prepared for collar joints including testing of joints etc. complete. (B) 150mm. (C) 250 mm. (D) 300 mm. (E) 450 mm. (F) 500 mm. (G) 600 mm. (H) 900 mm. (K) 1000mm. (M) 1200 mm.**
- 1.0. **Materials :** The reinforced concrete light duty non-pressure pipes of specified diameter shall conform to I.S. 458-1971.
- 2.0. **Workmanship**
- 2.1. The relevant specifications of item No. 24.1. A shall be followed for work of trenches except that the excavation in trenches shall be for reinforced concrete pipes of specified diameter.
- 2.2. **Laying**
- 2.2.1. The pipes shall be lowered into the trenches carefully. Mechanical appliances may be used. Where necessary pipe shall be laid in straight lines or with easy curves and true to line and gradient as specified. The laying of pipe shall proceed up grade of a slope. In the pipe spigot and socket joints, the socket ends shall face upstream. In case of pipes with joints to be made with loose collars, the collars shall be slipped on before the next pipe is laid.
- 2.2.2. In case where the foundation conditions are unusual such as the proximity of trees or holes, under existing or proposed all round in 150 mm. thick cement concrete 1:5; 10 (1 cement: 5 fine sand : 10 graded stone aggregate 40 mm. nominal size) or compacted sand or gravel:
- 2.2.3. In case where the natural foundation is inadequate the pipes shall be laid either in concrete cradle, supported on proper foundations or on any other suitably designed structure. If concrete bedding is used, the depth of concrete below bottom of the pipe shall be at least 1/4th of the internal diameter of the pipe subject to a minimum of 100 mm. and a maximum 300 mm. The concrete shall be extended up the sides of the pipe at least to a distance of 1/4th of the outside diameter for pipes 300 mm. and over in diameter.
- 2.2.4. The pipes shall be laid in the concrete bedding before the concrete has set. Pipes laid in trenches in earth shall be bedded evenly and firmly and as far as up to the haunches of the pipe as to safely transmit the load expected from the back fill through the pipe to the bed. This shall be done either by excavating the bottom of the trenches to fit the curve of the pipe or by compacting the earth under a round curve of the pipe to form an even bed, Necessary provision shall be made for joints wherever required.



## 2.3. Jointing

2.3.1. The joints shall be done by slipping the collar over and clear of the end of the pipe. The recess of the end of the pipe shall be filled with jute braiding in hot bitumen. The new pipe shall then be brought forward until the bitumen ring in recess of first pipe is set into the recess of the second pipe. The process shall be repeated for two or three pipes which shall then jacked up so as to thoroughly compress the bitumen. The quantity of jute and bitumen shall be just enough to fill the recess when pressed hard by jacking, care being taken that no offset of the jute braiding shall be visible either outside or inside of pipe. The collar shall then be set up over the joints covering equally both the pipe and leaving, an even caulking space all round. Cement and sand mortar: 1: 1.1/2 shall then be well punched or pressed home with a caulking tool within this caulking space. Care shall be taken that the underside of the joints is properly filled with mortar.

## 2.4. Curing

2.4.1. Every joints shall be kept wet for about 10 days for maturing. The section of the pipe line laid and jointed shall be covered immediately to protect from weather effects. Minimum bore of 100 mm. is considered adequate.

2.4.2. The joints shall be left exposed for observation.

## 2.5. Testing of Joints :

2.5.1. The testing of joints shall be done as per relevant specifications of item No. 24.1 (A) **except that** the testing of reinforced concrete pipes shall be done.

## 3.0. Mode of measurements & payment

3.1. The relevant specifications of item 24.1 (A) shall be followed except that the rate includes for laying to level or slope in trenches etc. (measured separately), making the joints a; Seated and testing to stand the water test.

3.2. The measurements shall be net without any allowance for cutting and waste. The length of bends, junctions and other connections (measured along the centre line) shall be included in the total length of the pipes, the connections being numbered afterwards and paid for extra over pipes.

3.3. The size of bend, junctions, etc, shall suit the size of pipe. The bore (internal diameter of pipe) shall be the criterion for payment.)

3.4. Nothing extra shall be paid separately for the use of mechanical appliances, where necessary, as described above.

3.5. The rate shall be for a unit of One running meter.

2.4.27. **Costing Manhole with R.C.C. Top slab in 1:2:4 mix (1 cement: 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) foundation concrete 1:3:6 (1 cement : 3 coarse sand : 6 bricks bats 40 to 50 mm. size) inside plastering 15 mm. thick with C.M. 1:5 (1 cement : 5 coarse sand) finished with floating coat of neat cement and making channels in C.C. 1:2:4 mix (1 cement : 2 coarse sand : 4 stone aggregate 20 mm. nominal size) finished smooth complete including curing and testing (I) inside size 900 mm. x 120 mm. and 1.5 mm. deep, including C1 cover with frame size 560 mm. diameter, total weight of cover and frame to be not less than 128 Kgs. (Wt. of cover 64 Kg. and Wt. of frame 64 Kg.) (A) With 230 mm. thick walls of brick masonry using bricks having crushing strength not less than 35 kg/sq. cm. in C.M. 1:5 (1 cement : 5 coarse sand)**

i.	A type depth	0.90 meter for	150 mm. sewer
ii.	B type depth	1.50 meter for	150 mm. sewer
iii.	C type depth	2.25 meter for	150 mm. sewer
iv.	D type depth	3.15 meter for	150 mm. sewer

1.0. **Materials :** Water shall conform to M-1. Cement shall conform to M-6. Burnt bricks shall conform to M-15. Brick bats of 40 to 50 mm. size shall conform to M-14. Stone coarse aggregate of 20 mm. nominal size shall conform to M-12. Grit shall conform to M-8. Cement mortar of specified proportion shall conform to M-11. The cast iron manhole cover of 560 mm. dia. with frame shall conform to I.S. 1726-1966.

## 2.0. Workmanship

2.1. The manholes of different types and sizes as specified shall be constructed in sewer line at such places and to such levels and dimension as shown in drawings of as directed.

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

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

## 2.3. Walls

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

## 2.4. Plaster

2.4.1. The inside of waits shall be plastered 15 mm. thick with C.M. 1:5 (1 cement : 5 coarse sand) and finished with floating coat of neat cement. All angles shall be rounded to 7.50 cms. radius and all rendered internal surfaces shall have hard impervious finish obtained by using a steel trowel. The external joints of masonry shall be finished smooth.

**2.5. Channels & Benching :**

- 2.5.1.** Channels shall be semicircular in the bottom half and of diameter equal to the sewer. Above the horizontal diameter, the sides shall be extended vertically to the same level as the crown of the out going pipe and the top edge shall be suitably rounded off. The branch channels shall also be similarly constructed with respect to the benching but at their junction with the main channel an appropriate fall suitably rounded off in the direction of flow the main channel shall be given.
- 2.5.2.** The channel and benching shall be done in C.C. 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) rising at a slope in line from edges of channel. The channels of the bottom of the chamber shall be plastered with C.M. 1:2 (1 cement : 2 coarse sand) and steel troweled smooth.

**2.6. Cover slab:**

- 2.6.1.** The cover slab of R.C.C. 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm. nominal size) 15 cms. thick reinforced with 10 mm. bars at 15 cms. C/C both ways, surface and edges finished fair. Full bearing equal to the width to the width of wall shall be given to the slab on all sides. The frame of manhole cover shall be embedded firmly in R.C.C. slab so that the top of the frame remains flush with the top of R.C.C. slab.

**2.7. Testing:**

- 2.7.1.** Manhole shall be tested by filling with water to a depth not exceeding 1.2 M. as directed.
- 2.7.2.** After completion of work, manhole cover shall be sealed by means of thick grease.

**3.0. Mode of measurements and payment**

- 3.1.** The depth of manholes shall be distance between the top of the manhole cover and the invert level of the main drain. The rate includes all labours, materials, tools, and plant etc. required for satisfactory completion of this item as directed above.
- 3.2.** The rate shall be for a unit of the One number.

**24.28.(I) Extra rate for constructing B.B. masonry for every additional depth of 0.1 M. or part thereof over item 24.27 (I) for depth from 0.90 to 1.5 M.**

**1.0. Materials and Workmanship**

The relevant specifications of item No. 24.27 (I) shall be followed for excavation same, except that the depth of manhole shall be done 0.1 M. or part thereof more than 0.90 meter up to 1.5 M. The extra payment shall be made for additional depth of 0.1 M. or part thereof manhole done over and above the depth 0.90 meter.

**2.0. Mode of measurements and payment**

- 2.1.** The relevant specifications of item No. 24.27 (I) shall be followed except that the extra rate shall be paid for every additional depth of 0.1 M. and part thereof shall be paid over and above the rate of item No. 24.27 (I)
- 2.2.** The rate shall be for a unit of One number.

**24.28.(II) Extra rate for constructing B.B. masonry for every additional depth of 0.1 M. and Part thereof over item 24.27 (II) for depth from 1.5 M. to 2.25 M.**

**1.0. Materials and Workmanship :**

The relevant specifications of item No. 24.27 (II) shall be followed except that the depth of manhole shall be done 0.1 M. or part thereof more than 1.5 M. up to 2.25 M. The extra payment shall be made for additional depth of 0.1 M. or part thereof manhole done over and above the depth 1.50 M. up to 2.25 M.

**2.0. Mode of measurements & payment**

- 2.1.** The relevant specifications of item No. 24.27 (II) shall be followed except that the extra rate shall be paid for 0.1 M. or part thereof additional depth of manhole provided over and above item 24.27 (II).
- 2.2.** The rate shall be for a unit of One number.

**24.28.(III) Extra rate for constructing B.B. masonry for every additional depth of 0.1 M. or part thereof over item 24.27 (III) for depth from 2.25 to 3.15 M.**

**1.0. Materials and Workmanship :**

The relevant specifications of item No. 24.27 (III) shall be followed except that the depth of manhole shall be done 0.1 M. or part thereof more than 2.25 M. up to 3.15 M. Extra payment shall be made for additional depth of 0.1 M. or part thereof manhole done over and above depth 2.25 M. up to 3.15 M.

**2.0. Mode of measurements & payment**

- 2.1.** The relevant specifications of item No. 24.27 (III) shall be followed except that the extra rate shall be paid for every additional 0.1 M. or part thereof depth provided over and above item 24.27 (III).
- 2.2.** The rate shall be for a unit of One number.

**24.28.(IV) Extra rate for constructing B.B. masonry for every additional depth of 0.1 M. or part thereof over item 24.27 (IV) for depth above 3.15 M.**

**1.0. Materials and Workmanship :**

The relevant specifications of item No. 24.27 (IV) shall be followed except that the depth of manhole shall be done 0.1 M. or part thereof more than 3.15 M above. 1.2. Extra payment shall be made for additional depth of manhole 0.1 M. or part thereof done above 3.15 M. and above depth.

**2.0. Mode of measurements and payment**

- 2.1.** The relevant specifications of item 24.27 (IV) shall be followed except that extra rate shall be paid for every additional 0.1 M. or part thereof depth provided for an above item 24.27 (IV).
- 2.2.** The rate shall be for a unit of One number.

**24.33. Providing and fixing C.I. steps of sizes 500 x 150 mm. 22.5 mm. and painting with two coats of anti-corrosive paint etc. complete.**

- 1.0. Materials :** The C.I. steps of size 500 x 150 x 22.5 mm. size shall conform J.S. 5455-1969. Paint shall conform to M-44.

**2.0. Workmanship**

**2.1.** The C.I. steps of size 500 x 150 x 22.5 mm. size shall be fixed in manhole as and where directed. The steps shall be staggered in vertical runs 380 mm. apart horizontally. The top step shall be 450 mm. below the manhole cover and lowest not more than 300 mm. above the benching. The steps shall be embedded in wall of manhole with C.C. : 1:3:6 up to 200 m. depth and the surface finished with cement plaster 15 mm. thick in C.M. 1:5. The steps shall be painted with two coats of anti-corrosive paint.

**3.0. Mode of measurements & payment**

**3.1.** The rate includes all labour, materials, tools and plants etc. required for satisfactory completion of this item.

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

**24.39. Providing and erecting at the site of work steel ventilating column of 150 mm. internal dia. and 12.20 M. high from G.L. to bottom of top grill, including C.I. grill and base plate, bolts and nuts etc. and excavation in foundation of size 120 x 120 x 165 cms. and filling the pit with 1st layer of cement concrete 1:3:6 mix (1 cement: 3 coarse sand : 6 graded stone aggregate 20 mm. nominal size) of size 120 x 120 x 90 cm. and remaining pit with B.B.C.C. 1:3:6 mix ( 1 cement : 3 coarse sand : 6 brick bats 40 to 50 mm. size) and providing filled in cement concrete : 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) at G.L. and 3 coats of silver paint etc. complete.**

**1.0. Materials :**

The steel ventilating column internal dia. 150 mm. 12.20 m. high shall be of standard many and best quality as approved. Stone aggregate of 20 mm. nominal size shall conform to M-12. Brick-bats-40 to 50 mm. nominal size shall conform to M-4. Cement shall conform to M-3. Water shall conform to M-1. Silver (Aluminum) paint shall conform to I.S. 2339-1963.

**2.0. Workmanship**

**2.1.** The vent shaft shall be provided at the starting point of main sewer and at such points where the flow of sewerage is disturbed i.e. at falls, siphons etc. As far as possible, the location shall be at such a place where it receive Sundays for the maximum period of the day.

**2.2.** A pit of 120 x 120 x 165 ms. size shall be dug The cement concrete of 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm. nominal size) shall be first laid in the pit to form 90 cms. thick concrete foundation which shall be allowed to set for 24 hours. The vent shaft shall then be erected at the centre of the pit truly in plumb by means of such as shear legs, pullies, backless and rope etc.

**2.3.** The connection with sewer man-hole shall be made using 150 mm. diameter cement concrete pipe. After the connection is completed, the pit shall be filled with cement concrete : 1:3:6 (1 cement: 3 coarse sand : 6 brick bats 40 to 50 mm. nominal size) round the vent shaft up to ground level except top 150 mm. which shall be filled with C.C. 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) and rendered smooth. The junction of vent shaft with cement concrete shall be grouted with cement mortar 1:1 (1 cement : 1 sand). The concrete work shall be cured for 7 days.

**2.4.** The steel shaft shall be painted with silver paint (aluminum paint) 3 coats. The relevant specifications of item of painting shall be followed for painting.

**3.0. Mode of measurements and payment**

**3.1.** The rate shall include the cost of all labours and materials, tools and plant etc. required for satisfactory completion of this item as directed above.

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

**24.00.1.(A) Providing and laying lime concrete 1:2:4 (1 Lime Putty : 2 fine sand : 4 graded brick aggregate 40 mm. nominal size) bedding for stoneware pipes of following internal diameters with necessary form work and curing complete : 100 mm. dia (112 mm. average, bed thickness).**

**1.0. Materials :** Water shall conform M-1. Lime mortar shall conform to M-10. Brick aggregate 40 mm. nominal size shall conform to M-14.

**2.0. Workmanship**

The relevant specifications of item No 5.1.8 shall be followed except that the proportion of mix shall be 1:2:4 (1 Lime Putty : 2 fine sand : 4 graded brick bats aggregate 40 mm. nominal size) and the concrete work shall be done in trenches for bedding of stoneware pipes of 100 mm. dia. The width of concrete shall be 300 mm. and the thickness of bedding shall be 112 mm. average.

**3.0. Mode of measurements and payment**

**3.1.** The relevant specifications of item 24.2 (A) shall be followed.

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

**24.00.1(B) Providing and laying lime concrete 1:2:4 (1 Lime Putty : 2 fine sand : 4 graded brick aggregate 40 mm. nominal size) bedding for stoneware pipes of following internal diameters with necessary form work and curing complete :150 mm. dia. (166 mm. average bed thickness).**

**1.0. Materials and workmanship :** The relevant specifications of 24.00.1 (A) shall be followed except that the concrete bedding shall be carried out for 150 mm. dia. stoneware pipe. The width of concrete bedding shall be 450 mm. and the average thickness shall be 166 mm.

**2.0. Mode of measurements and payment**

**2.1.** The relevant specifications of item No. 24.2 (A) shall be followed.

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

of following internal diameters : A-100 mm. dia. B-150 mm. dia.

**1.0. Materials & Workmanship**

The relevant specifications of item 24.1 (A) shall be followed that the salt glazed stoneware bends of any degree of specified diameter shall be provided.

**2.0. Mode of measurement & payment**

**2.1.** The relevant specifications of item No. 24.1 (A) shall be followed except that extra payment shall be made for providing salt glazed stoneware bend of specified diameter or required degree of any radius over above the of item No. 24.1.

**2.2.** The rate shall be for a unit of One number.

**24.17.(I)(A) Extra over item 24.1 for providing salt glazed stoneware fittings : Taper bend of required degree of following internal diameter. 100 mm. x 150 mm.**

**1.0. Materials & Workmanship :** The relevant specifications of item 24.1 (A) shall be followed except that the salt glazed stoneware taper bend of required degree of 100 mm. x 150 mm. shall be fixed.

**2.0. Mode of measurements & payment**

**2.1.** The relevant specifications of item No, 24.1 (A) shall be followed except that extra payment shall be made for providing salt stoneware taper bend of required degree of 100 mm. x 150 mm. size over and above the rate of item No. 24.1.

**2.2.** The rate shall be for a unit of One number.

**24.17.(III) Extra over item 24.1 for providing salt glazed stoneware fittings : Single junction of required angle of following internal diameter (A) 100 mm. dia. (B) 150 mm. dia.**

**1.0. Materials & Workmanship**

The relevant specification of item 24.1 (A) shall be followed except that the salt glazed stoneware single of junction required angle of specified diameter shall be fixed.

**2.0. Mode of measurements & payment**

**2.1.** The relevant specifications of item 24.1 (A) shall be followed except that the extra rate shall be paid for providing salt glazed stoneware single junction of required angle for specified diameters over and above the rate of item 24.1.

**2.2.** The rate shall be for a unit of One number.

**24.18. Providing and laying, jointing and jointing and pointing with stiff mixture of C.M. 1 : 1 (1 cement : 1 find sand) 150 mm. internal diameter salt glazed stoneware half round channels.**

**1.0. Materials and Workmanship :** The relevant specifications of item 24.1 shall be followed except that the half round channels of 150 mm. internal diameters shall be fixed in cement mortar 1:1.

**2.0. Mode of measurements and payment**

**2.1.** The relevant specifications of item 24.1 (A) shall be followed.

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

**24.35. Supplying and fixing C.I. cover 300 x 300 mm. without frame for gully trap (Standard pattern), weight of cover shall not be less than 4.53 Kg.**

**2.0. Workmanship**

The C.I. cover 300 x 300 mm. size without frame shall be fixed on top of the brick masonry with cement concrete : 1:2:4 (1 cement : 2 sand : 4 graded stone aggregate 20 mm. nominal size) 40 mm. thick and rendered smooth. The finished top of the cover shall be left about 40 mm. above the adjoining ground level so as to exclude the surface water from entering the gully trap.

**3.0. Mode of measurements and payment**

**3.1.** The relevant specifications of item No, 24.19 shall be followed.

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

**24.40. Constructing brick masonry road gully chamber 500 mm. x 450 mm. x 600 mm. including 500 mm. x 450 mm C.I. horizontal grating with frame complete.**

**1.0. Materials :** Water shall conform to M-1. Cement shall conform to M-3. Sand shall confirm to M-6. Brick shall conform to M-15. C.I. Grating of 500 x 450 mm. size of standard make shall be of approved quality. Stone aggregate 40 mm. nominal size shall conform to M-12. coal tar shall conform to relevant M-5.

**2.0. Workmanship**

**2.1.** The chamber shall be of size 500 mm. x 450 mm. internal clear dimensions between the masonry wall faces. The height of 500 mm. shall be measured from the top of the bed concrete to the top of the C.I. frame. The size of grating indicate the clear internal dimensions of the C.I. frame of the grating.

**2.2.** The excavation shall be done to true dimensions and levels.

**2.3.** The foundation concrete shall consist of 150 Cms x 100 Cms x 15 cms thick C.C. 1:5:10(1 cement : 5 sand : 10 graded stone aggregate 40 mm. nominal size).

**2.4.** The wall of the chamber shall be constructed in brick work C.M. 1:5 and 23 Cms. thick as per relevant specifications of item 6.12(8).

**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 gully grating cover shall be hinged to frame to facilitate its opening for cleaning and repairs. The frames of the gully 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.
- 24.41. **Constructing brick masonry road gully chamber 450 mm. x 450 mm. x 775 mm. with vertical grating complete.**
- 1.0. **Materials and Workmanship** : The relevant specifications of item 24.40 shall be followed except size of road gully chamber is 450 mm x 775 mm. with vertical grating complete.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specifications of item 24.40 shall be followed.
- 2.2. The rate shall be for a unit of one number.
- 24.42. **Constructing brick masonry road gully chamber 1100 mm. x 500 mm. x 775 mm. including 500 mm. x 450 mm. C.I. horizontal grating with frame and vertical grating complete.**
- 1.0. **Materials and Workmanship** : The relevant specifications of item 24.40 shall be followed except that the size of road gully chamber shall be 1100 mm. x 500 mm. x 775 mm. including 500 mm. x 450 mm. C.I. horizontal grating with frame and vertical grating complete.
- 2.0. **Mode of measurements and payment**
- 2.1. The relevant specifications of item No. 24.40 shall be followed.
- 2.2. The rate shall be for a unit of one sq. meter.
- 24.44(I) **Constructing brick masonry chamber for underground C.I. inspection chamber and bends with brick having crushing strength not less than 35 Kg/ Cm. 2 in C.M/ 1:5 C.I. cover with frame (light duty) 455 x 610 mm. internal dimensions, total weight of cover with frame to be not less than 38 Kg. (Wt of cover 23 Kg. and Wt of frame 15 Kg. ) R.C.C. top slab C.C. 1:2:4 mix (1 cement : 2 coarse sand : 4 graded aggregate 20 mm. size) foundation concrete 1:5:10, inside plaster 15 mm. thick with C.M. 1:3 finished smooth with a finishing coat of neat cement on walls and bed concrete etc. complete : Inside dimensions 455 mm. x 610 mm. and 450 mm. deep for single pipe-line.**
- 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 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.
- 24.44.(II) **Constructing brick masonry chamber for underground C.I. inspection chamber and bends with brick having crushing strength not less than 35 Kg/ Cm. 2 in C.M/ 1:5 C. cover with frame (light duty) 455 x 610 mm. internal dimensions, total weight of cover with frame to be not less than 38 Kg. (Wt of cover 23 Kg. and Wt of frame 15 Kg. ) R.C.C. top slab with 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm size) foundation concrete 1:5:10, inside plaster 15 mm. thick with C.M. 1:3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete : Inside dimensions 500 mm. x 700 mm. and 450 mm. deep for pipe the with one or two inlets.**
- 1.0. **Materials and Workmanship** : The relevant specifications of item 24.24 (I) shall be followed except that the inside dimension of brick masonry chamber shall be 500 mm. x 700 mm. and 450 mm. deep for pipe the with on two inlets.
- 2.0. **Mode of measurement and payment**
- 2.1. The relevant specifications of item 24.44 (I) shall be followed. 2.2 The rate shall be for a unit of one number.
- 24.44.(III) **Constructing brick masonry chamber for underground C.I. inspection chamber and bends with brick having crushing strength not less than 35 Kg/ Cm. 2 in C.M/ 1:5 C.I. cover with frame (light duty) 455 x 610 mm. internal dimensions, total weight of cover with frame to be not less than 38 Kg. (Wt of cover 23 Kg. and Wt of frame 15 Kg. ) R.C.C. top slab with 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. size) foundation concrete 1:5:10, inside plaster 15 mm. thick with C.M. 1:3 finished**

**smooth with a floating coat of neat cement on walls and bed concrete etc. complete : Inside dimensions 600 mm. x 850 mm. and 450 mm. deep for pipes line with three or more inlets.**

**1.0. Materials and workmanship :** The relevant specifications of item No. 24.44 (I) shall be followed except that the inside dimensions of chamber shall be 600 mm, x 850 mm. and depth 450 mm. for pipe lines with three or more inlets.

**2.0. Mode of measurements & payments**

**2.1.** The relevant specifications of item 24.44(1) shall be followed.

**2.2.** The rate shall be for a unit One number.

**24.46. Extra over item 24.44 for every additional depth of 1 M. or part thereof beyond 450 mm. depth for brick masonry chamber, (i) For 455 mm. x 610 mm. size (ii) For 500 mm. x 700 mm. size (iii) For 600 mm. x 850 mm. size.**

**1.0. Materials & Workmanship :** The relevant specifications of item 24.44 (i),(ii) (iii) shall be followed same except that extra depth of 0.1 M. or part thereof shall be constructed over and above the depth of respective items.

**2.0. Mode of measurements & payment**

**2.1.** The relevant specifications of item 24.44 (I) shall be followed except that the extra shall be paid for, providing additional depth of 0.1 M. or M. or part thereof over and above the item No 24.44. (I) 24.44 (II) 24.44 (III) as the case may be.

**2.2.** The rate shall be for a unit of One number.

**24.00.2.(A) Providing soak pit of 2 cum. volume including excavating and filling brick bats with dry masonry work at top for 450 cms. height including covering, the top with stone including providing Vatas in C.M. 1:3 with finishing curing etc. complete as directed.**

**1.0. Materials :** Water shall conform to M-1. Cement mortar con form to M-11. Burnt Bricks shall conform to M-15. Rough stone slab 40 x 50 mm. thick shall conform to M-48. Brick bat shall conform to M-14.

**2.0. Workmanship**

**2.1.** The excavation for soak pit shall be carried out as. per relevant specifications of item. 4.G0.1 (A) except that the size of soak pit such that the cleat volume 'Shall\* remain 2 cum. The diameter and depth shall be as directed.

**2.2.** The periphery of the sock pit shall be provided with dry masonry wall with burnt bricks in 23 cms. thick. The masonry wall shall be done with best workman like manner in true line and plumb.

**2.3.** The soak pit shall be filled in with brick bats of burn brick 40 mm. nominal size in 45 cms. height. The work of filling brick-bats shall be done in such a way that no dry masonry shall be damaged during filling of brick bats.

**2.4.** The top of the soak pit shall be covered with rough kotah stone slab 40 to 50 mm. thickness. The length of the stone shall be in single piece in length.

**2.5.** The cement mortar 1:3 shall be used to fill up the joints and preparing vata as directed.

**2.6.** The cement work shall be cured for 4 days.

**3.0. Mode of measurements and payment**

**3.1.** The rate includes costs of all labour and material required for satisfactory completion o this item as described above.

**24.00.2.(B) Providing soak-pit of 5 cum. Volume inc. excavating and filling brick bats with dry masonry work at top for 45 cms. height including covering the top with stone including providing vatas in C.M. 1:3 with finishing curing etc. complete as directed.**

**1.0. Materials and workmanship :** The relevant specifications of item 24.00.2 (A) shall be followed except that the volume of soak pit shall be 5 cum. clear.

**2.0. Mode of measurements and payment**

**2.1.** The relevant specifications of item 24.00.2 (A) shall be followed.

**2.2.** The rate shall be for a unit of One number.

**EQUIVALENT PLAIN AREAS OF UNEVEN SURFACES**  
(Vide specifications for items relating to : Painting & Polishing)

Sr. No.	Description of work	How measured	Multiplying Factor
1.	Paneled or framed and braced on ledged and battened or ledged and braced joinery.	Measured flat (not girthed) including chowkhat or frame edges, chocks clients etc. shall be deemed to be included in item.	1.30 (For each said)
2.	Flush joinery	Measured flat (not girthed) including chowkhat or frame. Edges, Chocks, cleats, etc. shall be deemed to be included in the item.	1.20 (For each side)
3.	Fully glazed or gauzed joinery	Measured flat (not girthed) including chowkhat or frame. Edges, Chocks, cleats, etc. shall be deemed to be included in the item.	0.80 (For each side)
4.	Partly paneled and partly glazed or gauzed joinery	Measured flat (not girthed) including chowkhat or frame. Edges, Chocks, cleats, etc. shall be deemed to be included in the item.	1.00 (For each side)
5.	Fully venetioned or louvered joinery.	Measured flat (not girthed) including chowkhat or frame. Edges, Chocks, cleats, etc. shall be deemed to be included in the item.	1.80 (For each side)
6.	Weather boarding	Measured flat (not girthed) supporting frame work shall not be measured separately.	1.20.(For each side)
7.	Wood single roofing	Measured flat (not girthed)	1.10(For each side)
8.	Boarding with cover fillets at match boarding	Measured flat (not girthed)	1.05 (For each side)
9.	Tile and Slate battening	Measured flat, overall, no deduction shall be made for open space over	0.80 (For painting all over)
10.	Trellis (or Jafri) work one way or two way	Measured flat, over all, no deduction shall be made for the open spaces supporting members shall not be measured separately)	1.00 (For painting all over)
11.	Guard, bars, balustrades, gates, graying, grills, expanded metal and railings.	Measured flat over all, No deduction shall be made for the open spaces, over) supporting members shall not be measured separately.	1.00 (For painting all over)
12.	Gates and open palisade fencing including standards	Measured flat over all No. deduction shall be made of open spaces : supporting members shall not be measured separately, (see note).	1.00 painting all over
13.	Curved or enriched work	Measured flat	2.0 (For each side)
14.	Steel roller shutter	Measured flat (size of opening) over all jamb, guides bottom rails and locking arrangement etc., shall be included in the item (top cover shall be measured separately).	1.10 (For each side)
15.	Plain sheet door and windows	Measured flat (not including) frame	1.10 (For each side)
16.	Full glazed or gauze steel door and windows	Measured flat (not girthed) including Frame edges etc.	0.50 (For each side)
17.	Partly paneled and partly glazed or gauzed steel doors	Measured flat (not girthed) including frame edges etc.	0.08 (For each side)

18. Collapsible gate Measured flat (size of opening) no separate 1.50 (For painting all measurements shall be taken for the top and over bottom guide rails, rollers, fittings, etc.

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**Note :** The height shall be taken from the bottom of the lowest of rail if the palisades do not go below it (or from the lower end of palisades, if they protect below the lower rail) up to the top of palisades, but not upto the top of standards if they are higher than the palisades.

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Sr. No.	Particulars of fixtures & fastenings	Size in mm	Da. S.1:B-900-T-38	Da. S.1:B-900-T-38	Da. S.1:B-900-T-38	Da. S.1:B-900-T-38	Da. S.2:B-900-T-38	Da. S.2:B-900-T-38	Da. S.2:B-900-T-38	Da. S.2:B-900-T-38
1.	Hold fast	300 x 40 x 3	6	6	6	6	6	6	6	6
2.	Hold Fasts	200 x 40 x 36	-	-	-	-	-	-	-	-
3.	Coach \screws ( Hexagonal Head )		-	-	-	-	-	-	-	-
4.	Butt Hinges	125	-	-	-	3	-	-	-	6
5.	Bun Hinges	100	3	3	3	-	6	6	6	-
6.	Butt Hinges	75	-	-	-	-	-	-	-	-
7.	Butt Hinges	75-A	-	-	-	-	-	-	-	-
8.	Butt Hinges	50	-	-	-	-	-	-	-	-
9.	Non projecting type Hinges (Box type)	22	-	-	-	-	-	-	-	-
10.	Tee & Strap Hinges	300	-	-	-	-	-	-	-	-
11.	Tee & Strap Hinges	200	-	-	-	-	-	-	-	-
12.	Sliding Door Bolts	250 x 16	1	1	1	1	1	1	1	1
13.	Tower Bolts (Barrel Type)	200 x 10	1	1	1	1	2	2	2	2
14.	Tower Bolts (Barrel Type)	150 x 10	-	-	-	-	-	-	-	-
15.	Tower Bolts (Barrel Type)	100 x 10	-	-	-	-	-	-	-	-
16.	Tower Bolts (Barrel Type)	75 x 10	-	-	-	-	-	-	-	-
17.	Tower Bolts (Barrel Type)	50 x 6	-	-	-	-	-	-	-	-
18.	Door Latch	200 x 16 x 5	1	1	1	1	1	1	1	1
19.	A Hooks and Eye	20 mm	-	-	-	-	-	-	-	-
20.	Bathroom Latches	60 x 12	-	-	-	-	-	-	-	-
21.	Casement window fasteners	-	-	-	-	-	-	-	-	-
22.	Casement Stays (Straight Peg Stay O	-	-	-	-	-	-	-	-	-
23.	Ventilator Catch Lug.	-	-	-	-	-	-	-	-	-
24.	Handles	100	2	2	2	2	2	2	2	2
25.	Handles	75	-	-	-	-	-	-	-	-
26.	Doorstopper	75	1	1	1	1	2	2	2	2
27.	Wooden Door Stop with Hinges	-	-	-	-	-	-	-	-	-
28.	Continuous Piano Hinges 30 width	30 width	-	-	-	-	-	-	-	-
29.	Haps and Staples (Safety types)	115 x 40	-	-	-	-	-	-	-	-
30.	Haps and Staples (Safety types)	90 x 40	-	-	-	-	-	-	-	-
31.	Cupboard Lock (6 Levers)	-	-	-	-	-	-	-	-	-
32.	Cupboard Knob	-	-	-	-	-	-	-	-	-

Sr. No.	Db : S:1	Dc : S.1 : 900	Dc : S.1 : B : 900	Dd : S.1 : B : 900	Dd : S.1 : B : 900	De : S.1 : B : 900	De : S.1 : B : 900	Wa : S.1 : H : 1200	Wa : S.1 : B : 1200	Wa : S.2 : H : 1200	Wa : S.2 : H : 1200	Va : Ind.	S.W.	Sv-Ind	Wardrobe-S.2	Showcase : CC : S.2	General : CB : S.2	Kitchen : CB : S.2	Platform : CB: S.2	Countersunk Wood Screw	Size of Screws in mm	and No. of Screws per	Unit of fixture fastenings
1.	6	6	6	-	6	6	6	4	6	4	6	-	-	-	-	-	-	-	-	2	-	-	-
2.	-	-	-	-	-	-	-	4	-	-	-	4	4	4	-	-	-	-	-	2	-	-	-
3.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	8	8	8	8	4	-	-	-
4.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-
5.	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-
6.	-	-	-	-	-	-	-	2	3	4	6	2	-	-	-	-	-	-	-	-	6	-	-
7.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	4	8	-	-	-	6	-
8.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	4	-
9.	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-
10.	-	-	3	-	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-
11.	-	3	-	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-
12.	-	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-
13.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-
14.	-	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-
15.	-	-	-	-	-	-	-	2	2	3	3	-	-	-	-	-	-	-	-	-	-	6	-
16.	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-
17.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	2	4	-	-	-	6
18.	-	-	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
19.	-	-	-	-	-	-	-	1	1	2	2	1	2	1	-	-	-	-	-	-	-	-	-
20.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6/4
21.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-
22.	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-
23.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
24.	2	2	2	2	2	2	2	-	-	-	-	-	-	-	2	-	-	2	-	-	-	4	-
25.	-	-	-	-	-	-	-	1	1	2	2	1	-	-	-	-	-	2	4	2	-	4	-
26.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-
27.	-	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-
28.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-	-	-	2
29.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	Per 75 mm. length
30.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	7
31.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
32.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-

**CODE OF PRACTICE C-13 (B)**  
**SCHEDULE OF FIXTURES AND**  
**FASTENINGS FOR DOORS, WINDOWS,**  
**VENTILATORS, WARDROBES AND**  
**CUPBOARDS**

**NOTATIONS**

Da.....	Teakwood doors fully paneled or fully glazed or partly paneled : and glazed
Db.....	Bathroom and W.C. door with single shutter
Dc.....	Doors plying planked
Dd.....	Doors battened framed and braced
Wa.....	Teakwood windows fully paneled or fully glazed or partly paneled and glazed
Va-Ind.....	Teakwood ventilator (independent)
S.W.....	Steel Windows
SV-Ind.....	Steel ventilators (independent)
CB.....	Cupboard
S.1.....	Single shutter
S.2.....	Double shutter
S.4.....	Four shutter
B.....	Breadth of door shutter
T.....	Thickness of door shutter
H.....	Height of window shutter.
900.....	900 mm & below
900.....	above 900 mm
1200.....	1200 mm & below
1200.....	above

**NOTE : PLEASE READ CAREFULLY :**

- (1) Where detailed specification of an item provides for specific size of any fixture or fastening that shall prevail over the provisions in this schedule.
- (2) Fixtures and fastenings (except hold fasts which shall be of M.S. plate only) shall be of Brass, copper, oxidised brass, chromium plated brass, Iron, copper oxidised iron, or chromium plated iron as specified in the item of the work or detailed specifications.
- (3) External door and door failing in staircase excepting the door in balcony shall have sliding door bolt of size 300 mm. x 18 mm. in place of 250 mm. x 16 mm- as shown in this schedule.
- (4) The length of tower old shown is for a door having shutter height up to 2100 mm. only. For door having shutter height more than 2100 mm. the length of tower bolts to be increased to the extent of increase of door shutter height beyond 2100 mm.
- (5) 150 mm. x 150 mm. size glass vision panel shall be provided in the doors of Officers chamber in addition to the scheduled provision if so directed by the Engineering in charge.
- (6) Diamond shape chromium plated brass peeping plate of approved quality shall be provided in one entrance door in residential building in addition to the scheduled provisions.
- (7) Drawer up a wardrobe shall be provided with one furniture handle and one drawer lock (4 levers) in addition to its scheduled provision.
- (8) For door and window with steel frame, 75 mm. size screws, shall be provided both in top bottom frame for fixity as shown below:
  - (a) For width up to 1200 mm.....2 Nos.
  - (b) For width above 1200 mm. and up to 1800 mm.....3 Nos.
  - (c) For every additional width of 500 mm. over and above 1800 mm.....1 No.
- (9) When the mortise lock (6 levers) and latch is specified to be provided to a door either in the item of work itself or by a separate amity, the requirement of providing sliding door bolt, door latch and handles as per his schedule shall be dispensed with.
- (10) For door/window with ventilator at top, fixtures and fastenings of door/window plus those of ventilator (excluding hold fasts) shall be used.
- (11) Where the item of the work, or its specification provides for anodised aluminum fixtures, all the fixtures except hinges and screws will be of anodised aluminum and chromium plated iron hinges and screws shall be used.
- (12) For door, window, or cupboard frame abutting concrete section, instead of hold fasts as shown in the schedule-, coach screws of size mentioned below shall be used:
  - (a) Teak wood frame..... 125 mm.
  - (b) Steel frame.....75 mm.
- (13) The locking etc. in the door latch shall be so positioned that the can be properly rocked even if part of the latch, when fully slided, remains in the frame or masonry.
- (14) Showcase cupboards having single shutter shall be provided with all catcher instead of tower bolt (barrel type) as per schedule.
- (15) The size of the handle shown in the schedule indicates grip length.
- (16) Door stopper shall be shown in the schedule indicates grip length.
- (17) Piano hinges shall be for the full height of the shutter.
- (18) Shutter with pivot arrangements shall be pivot arrangement shall be provided with two pivots of approved size instead of hinges as per the schedule.
- (19) For butt hinges, only lengths are indicated in the schedule. The width of each flap being 5 mm. less than the thickness of the shutter to which they are to be fixed and the thickness of the flap shall be as specified in the relevant I.S. for heavy, medium or light as specified in the detailed specifications of the item of work.

## Schedule for Testing of Materials

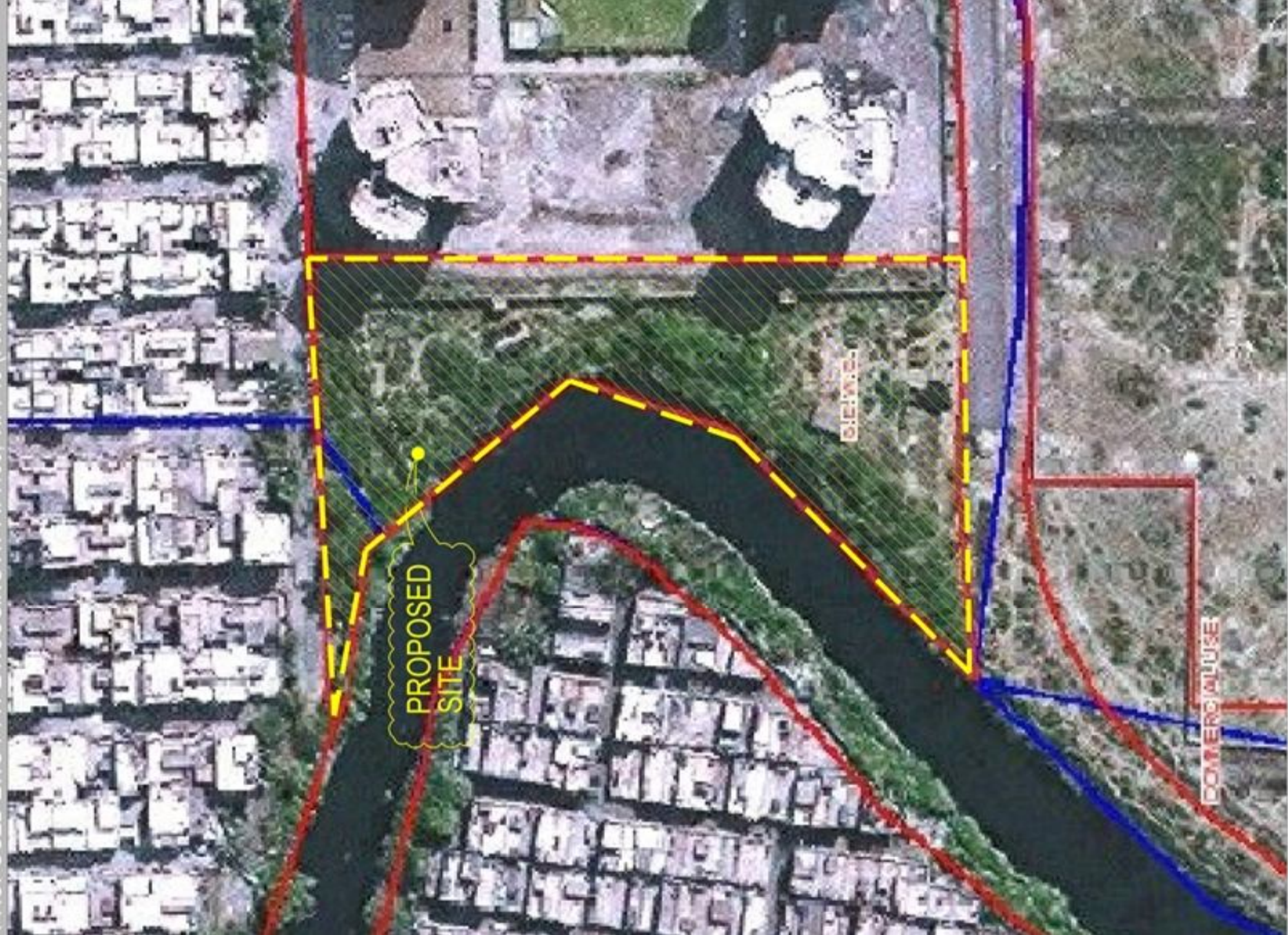
For ensuring quality control and workmanship, various test prescribed below corresponding to the material concerned shall be taken as periodic intervals as stipulated below..

The Material shall be got tested at GERI or Govt. recognized Laboratory or field Laboratory of GERI for which 1 % of the estimated amount put to tender shall be recovered from the contractor from the R.A. Bill and Final Bills as the testing charges shall be paid by the Govt. to the Laboratory. However if the charges increase over 1 % no excess recovery shall be made from the contractor as per resolution of B&C department dated 10th May 1985, vide TNC/1085 (4) S.

Item No. as per Sch. B	Brief Description of Materials to be tested	Qty. of Material	Prescription of test which shall be carried out	Frequency @ which test shall be carried out	Total No. of Test to be carried out
	Coarse Aggregate ( Metal, Kapchi, Gravel etc.)		- Gradation test - Impact Value - Flakiness Index - Water absorption - Stripping Value	1 to 100 Cum – 1 test 100 to 500 – 3 tests 500 to 1500 – 5 tests 1500 to 5000 – 7 tests	
	Grit		- Stripping Value	One test per work	
	Sand		- Gradation - Fineness Modulus - Specific gravity - Water absorption - Silt – Content	One test per 150 Cum or as per requirement of relevant specification	
	Tiles		- Dimension Test - Transverse strength - Water Absorption - Abrasion Test	One test per 2000 tiles	
	Teakwood		- Anatomy Test - Density Test - Moisture Content Test	One test per work	
	Bricks		- Dimension and tolerance - Water absorption - Effluence - Compressive Strength	1 Test @ 50,000 Bricks	
	Cement		- Consistency - Setting Time - Compressive Strength - Fineness - Chemical analysis - Soundness	Up to 50 MT      1 Test 50 – 100 MT      2 Test 100 – 200 MT      3 Test 200 – 300 MT      4 Test 300 – 500 MT      5 Test 500 – 800 MT      6 Test 800 – 1300 Mt      7 Test and 8 test for larger consignment	
	Steel		- Tensile Strength - Yield Stress - Elongation - Size	One test/40 tonnes/per category	
	C.C. Cube test 1:2:4		- Compressive Strength	1 to 5 Cum.      1 Test. 6 to 15 Cum.      2 Test. 16 to 20 Cum.      3 Test. 21 to 50 Cum.      4 Test 51 & Above Cum. 4 + 1 for each additional 50Cum or part thereof	
	Aluminum Sections		- Gauge, Section	One Test for each section	

**SIGN OF CONTRACTOR**

**EXECUTIVE ENGINEER**



PROPOSED  
SITE

COVERED

COVERED ALUSE

# PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

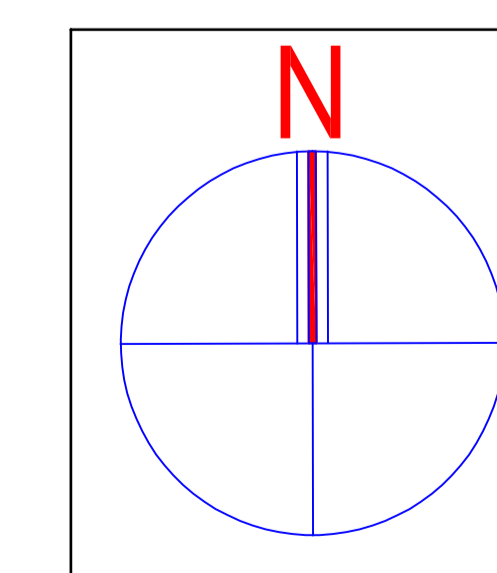
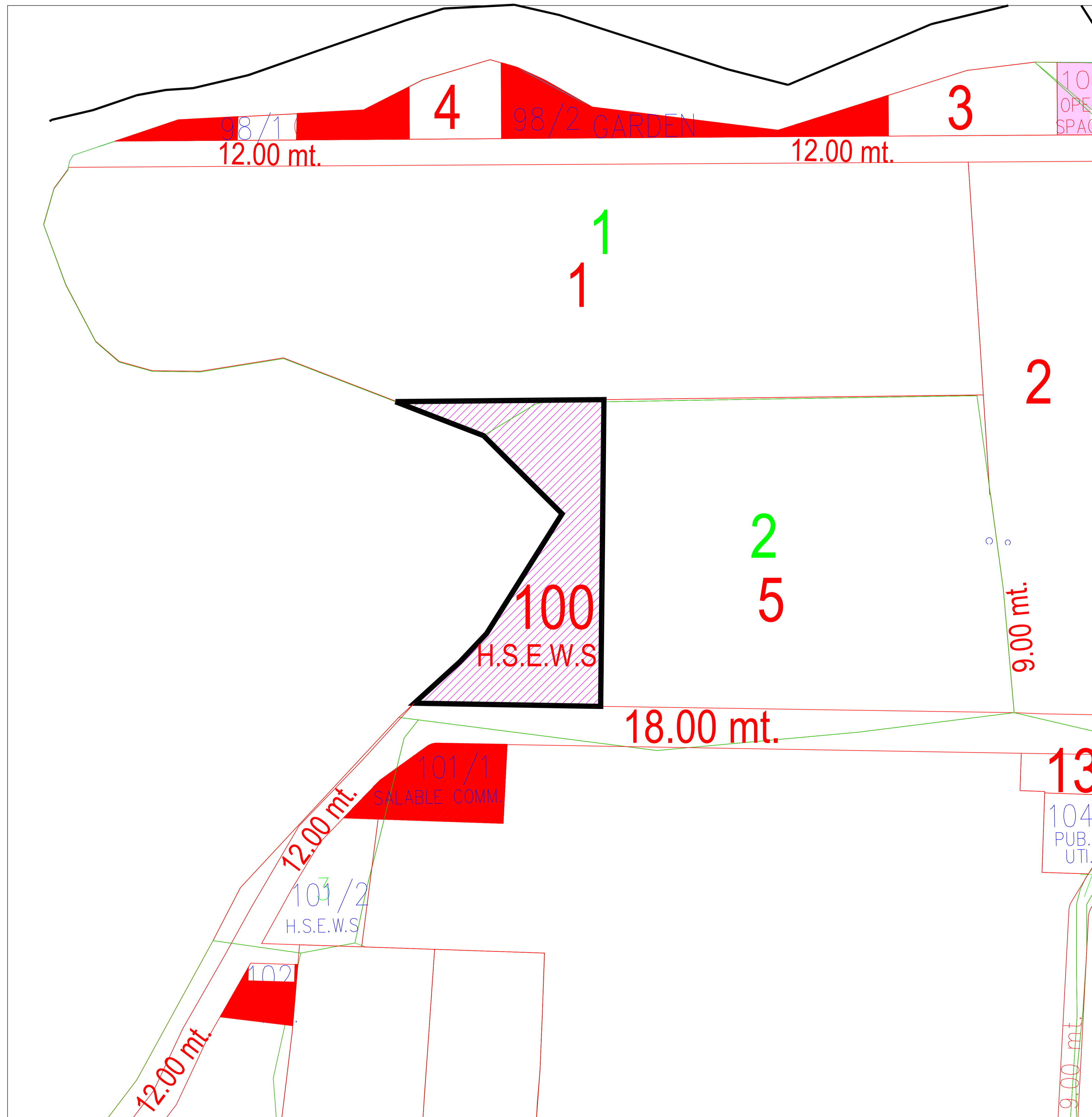
TENDER COPY FOR REFERENCE ONLY

CLIENT	CONTRACTOR	P.M.C.	T.P.I.
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ISSUE DATE -	SIGN -
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WORKING:-

## KEY PLAN



## KEY PLAN

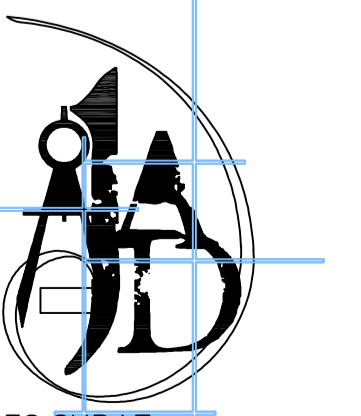
REVISION :	DATE :10-08-2016
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SCALE : N. T. S	
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KEY PLAN

PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

JAYESH A DALAL  
PROJECT MANAGEMENT  
CONSULTANT



"JALARAM SHAKTI", BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALINES,SURAT.

DRAWN BY B.S.PATEL		SHEET NO 01	14 Y 16
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PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

TOTAL PLOT AREA AS PER T.P. RECORD = 6565.00 SQ.MTS.  
 TOTAL PLOT AREA AS PER .....SITE..... = 6060.20 SQ.MTS.

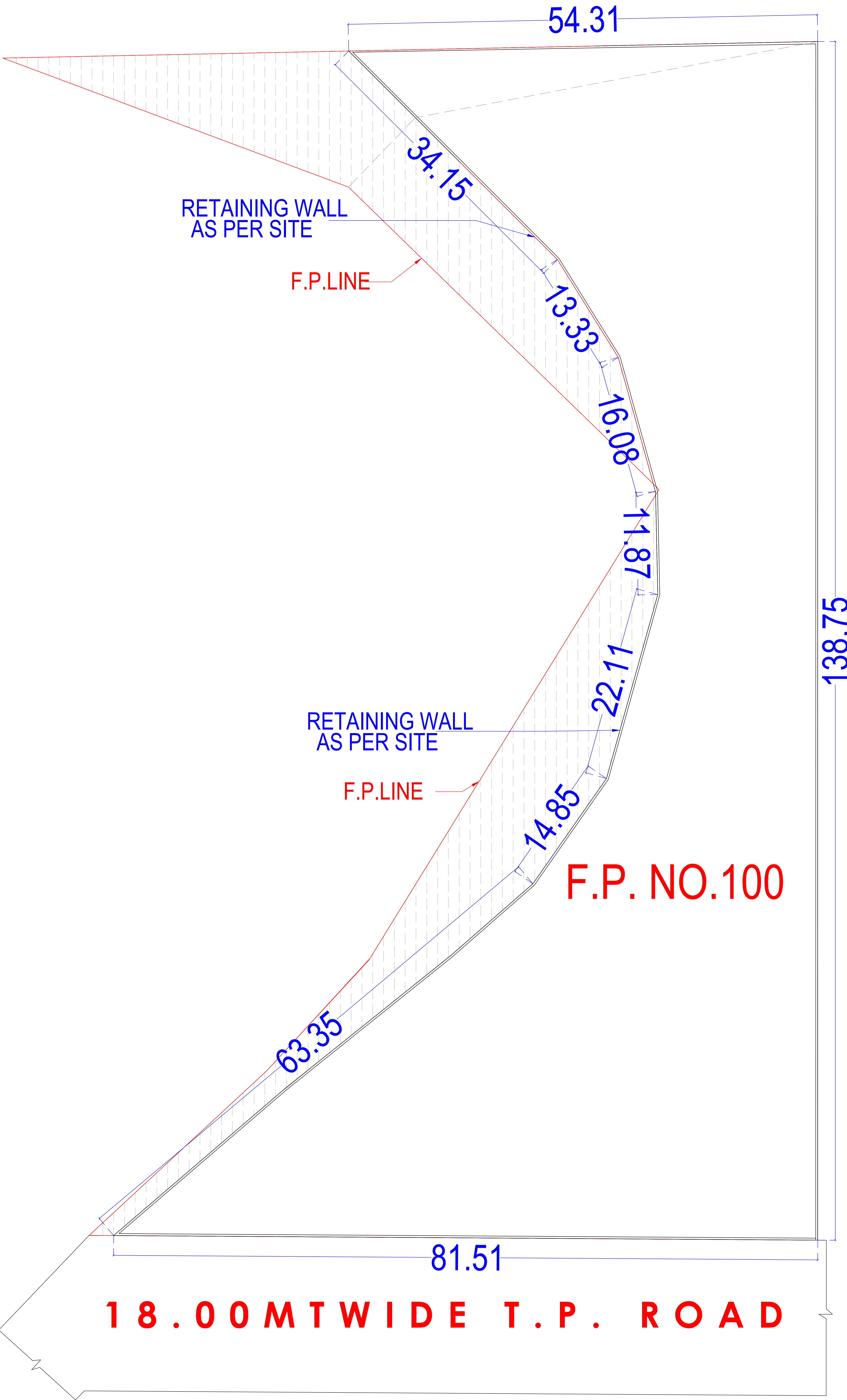
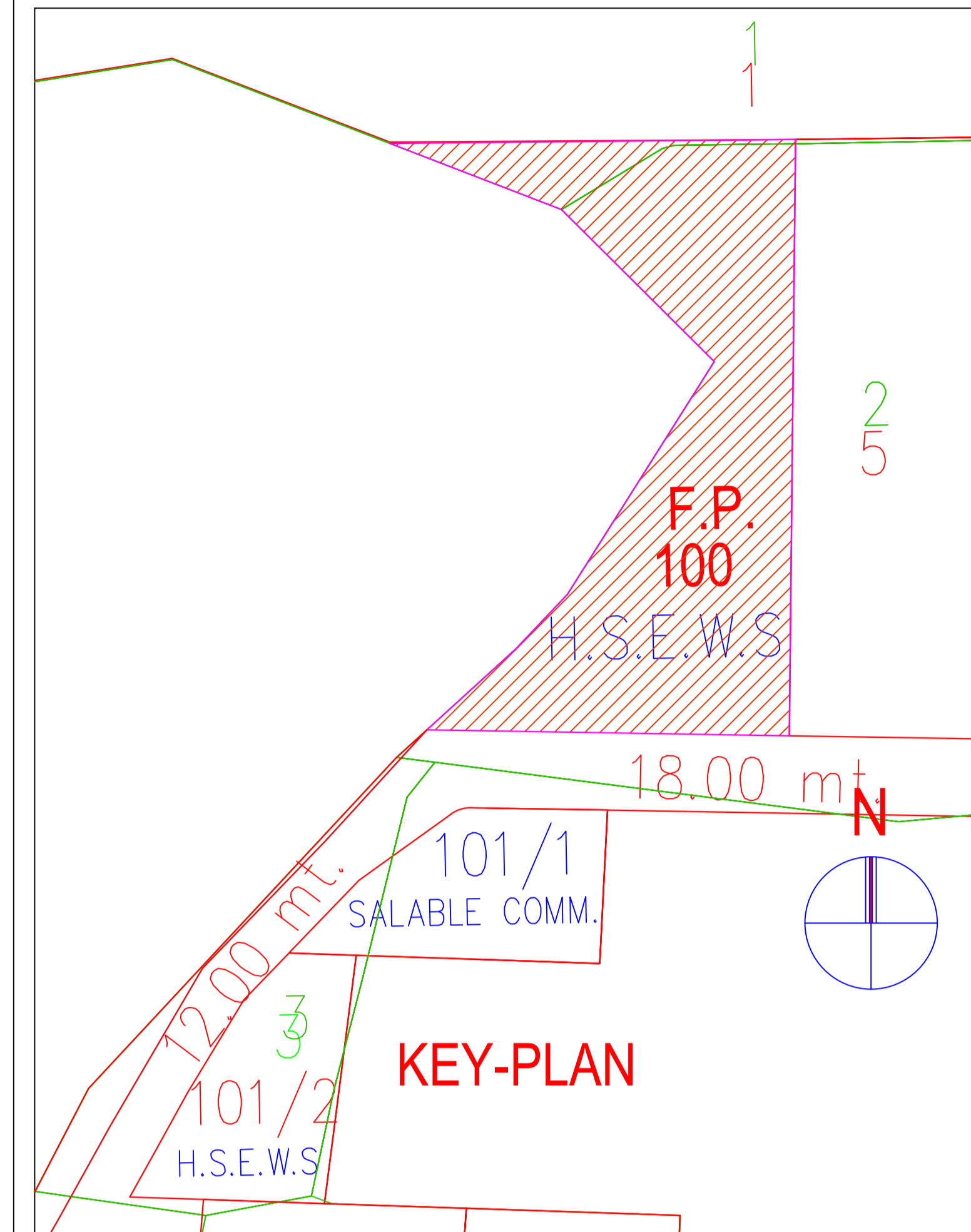
TENDER COPY FOR REFERENCE ONLY

CLIENT	CONTRACTOR	P.M.C.	T.P.I.

ISSUE DATE - SIGN -

WORKING:-

LAYOUT PLAN



LAYOUT PLAN

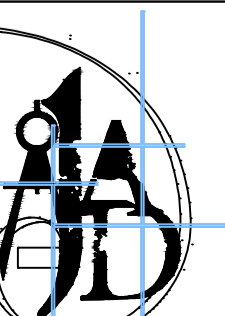
REVISION : DATE : 10-08-2016

SCALE : N. T. S

LAYOUT PLAN

PROJECT: PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

JAYESSH A DALAL  
 PROJECT MANAGEMENT  
 CONSULTANT



DRAWN BY  
 B.S.PATEL

CHECK BY

SHEET NO  
 A-02

14 Y 16

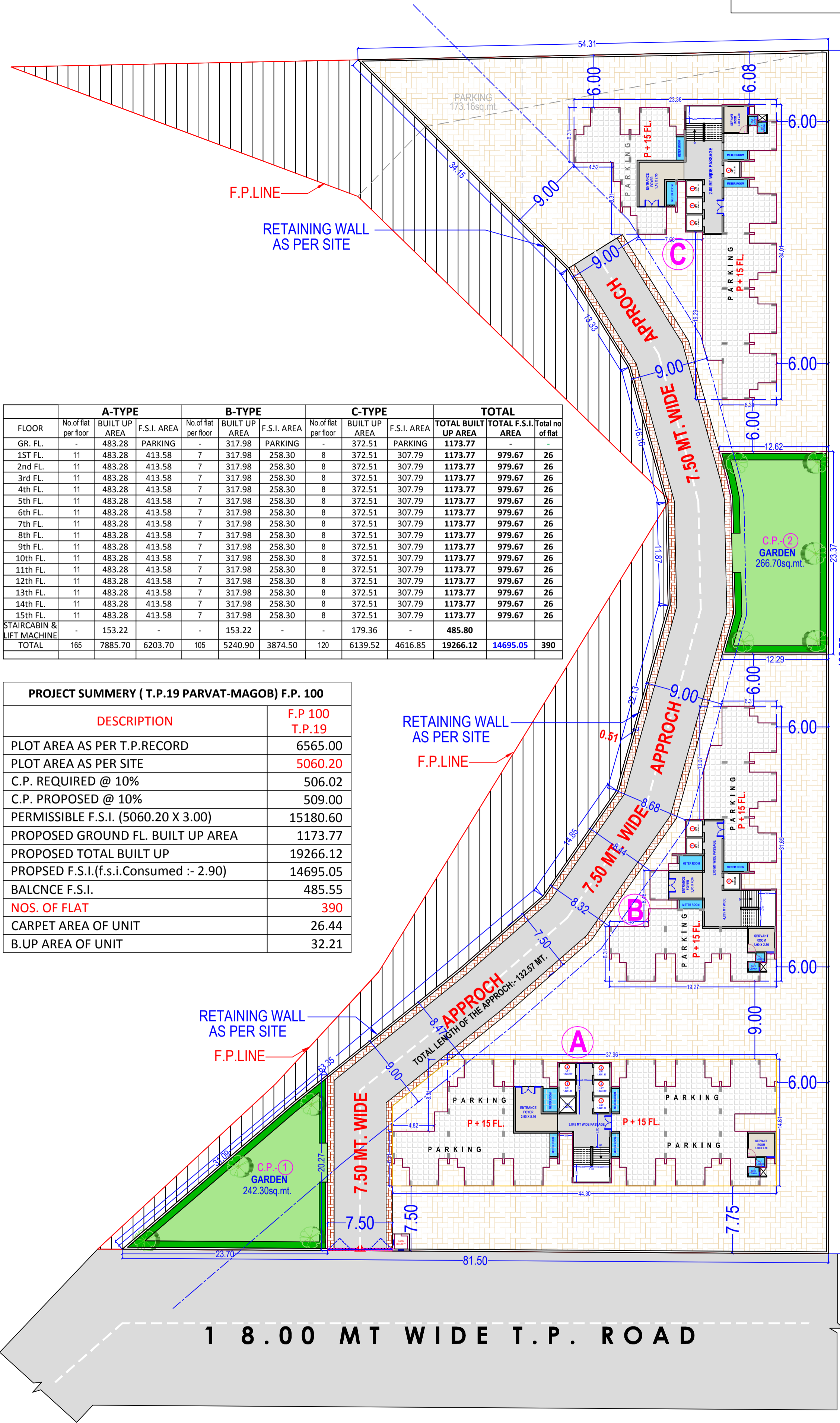
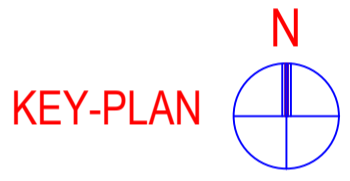
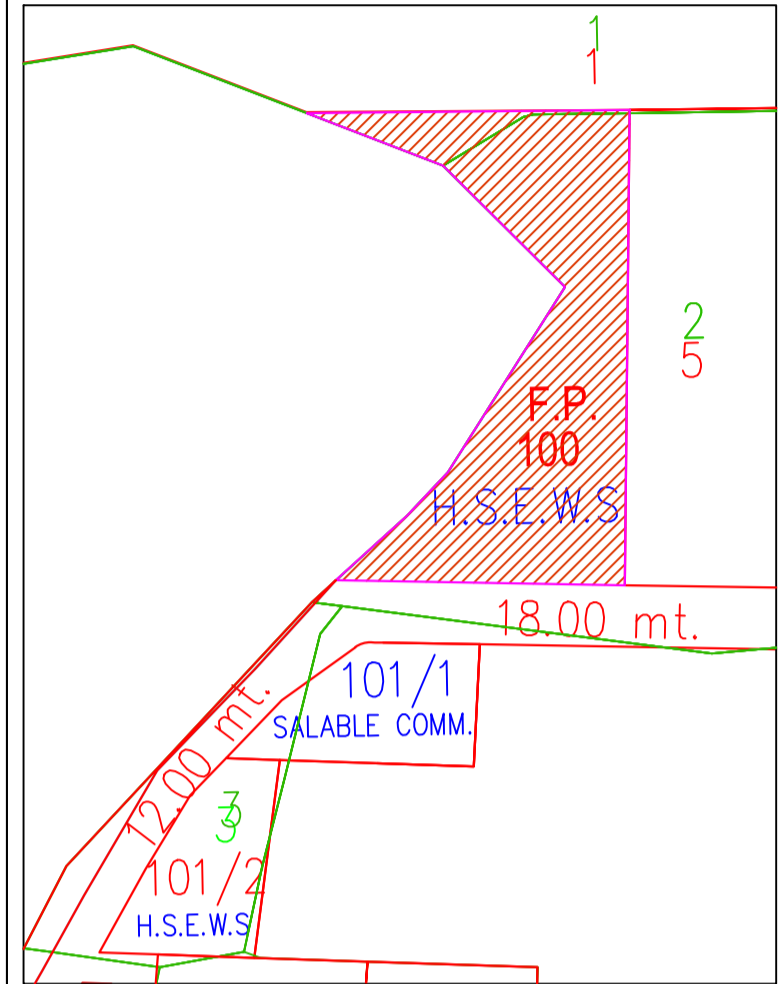


1. (A) BLDG. PARKING +15FL.
2. (B) BLDG. PARKING +15FL.
3. (C) BLDG. PARKING +15FL.

1. A - TYPE BLDG. =165 UNIT
  2. B - TYPE BLDG. =105 UNIT
  3. C - TYPE BLDG. =120 UNIT
- TOTAL =390 UNIT

CARPET AREA 26.44 SQ.MTS

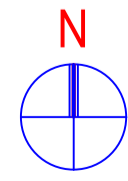
BUILT-UP AREA 32.21 SQ.MTS



FLOOR	No. of flat per floor	A-TYPE		B-TYPE		C-TYPE		TOTAL				
		BUILT UP AREA	F.S.I. AREA	BUILT UP AREA	F.S.I. AREA	BUILT UP AREA	F.S.I. AREA	TOTAL BUILT UP AREA	TOTAL F.S.I. AREA	Total no of flat		
GR. FL.	-	483.28	PARKING	-	317.98	PARKING	-	372.51	PARKING	1173.77	-	-
1ST FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
2nd FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
3rd FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
4th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
5th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
6th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
7th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
8th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
9th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
10th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
11th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
12th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
13th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
14th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
15th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67	26
STAIRCABIN & LIFT MACHINE	-	153.22	-	-	153.22	-	-	179.36	-	485.80	-	-
TOTAL	165	7885.70	6203.70	105	5240.90	3874.50	120	6139.52	4616.85	19266.12	14695.05	390

PROJECT SUMMERY ( T.P.19 PARVAT-MAGOB) F.P. 100	
DESCRIPTION	F.P 100 T.P.19
PLOT AREA AS PER T.P.RECORD	6565.00
PLOT AREA AS PER SITE	5060.20
C.P. REQUIRED @ 10%	506.02
C.P. PROPOSED @ 10%	509.00
PERMISSIBLE F.S.I. (5060.20 X 3.00)	15180.60
PROPOSED GROUND FL. BUILT UP AREA	1173.77
PROPOSED TOTAL BUILT UP	19266.12
PROPOSED F.S.I.(f.s.i.Consumed :- 2.90)	14695.05
BALCNCE F.S.I.	485.55
NOS. OF FLAT	390
CARPET AREA OF UNIT	26.44
B.UP AREA OF UNIT	32.21

GROUND FLOOR LAYOUT PLAN



NO.	DATE	REVISED DETAIL
1	04-10-2016	CHANGE LAYOUT PLAN AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.

REVISION : 04-10-2016 DATE : 28-09-2016

SCALE : N. T. S

PRESENTATION DWG.  
PROJECT: PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

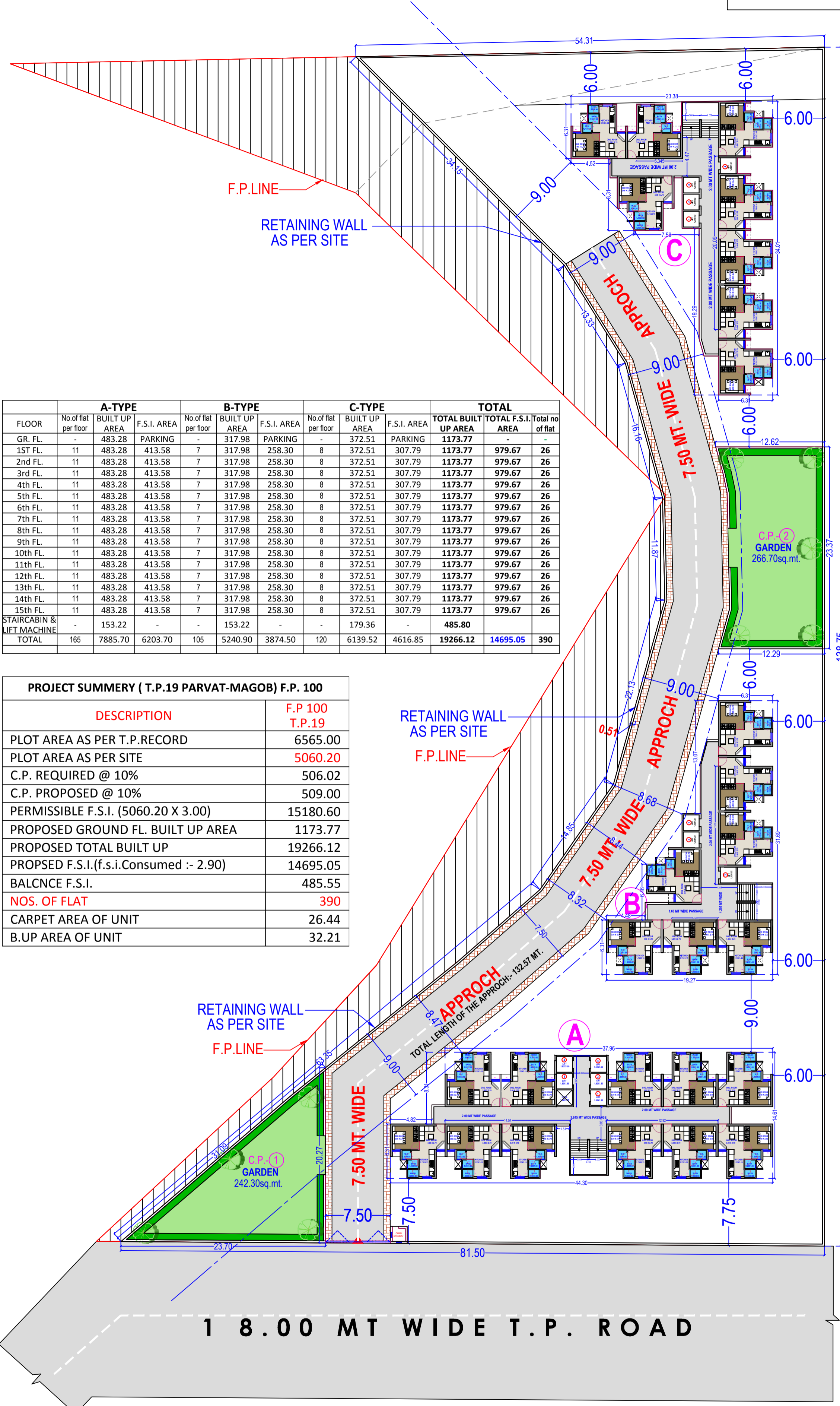
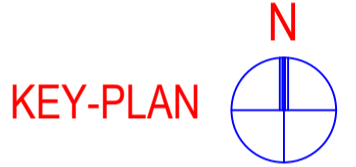
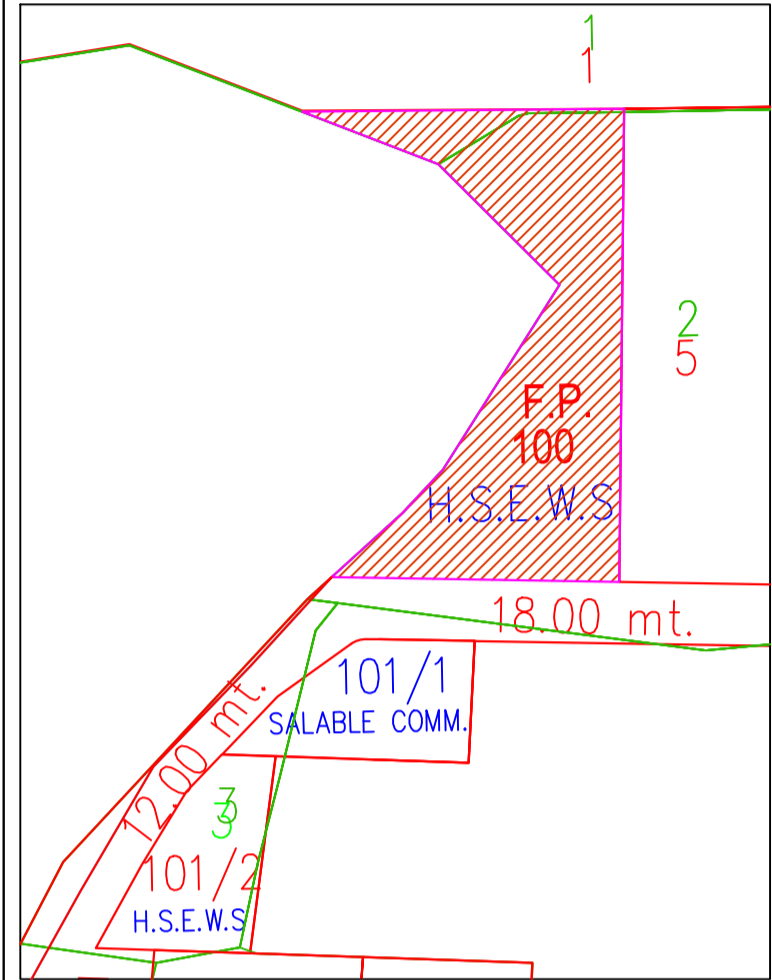
JAYESSH A DALAL  
PROJECT MANAGEMENT CONSULTANT

1. (A) BLDG. PARKING +15FL.
2. (B) BLDG. PARKING +15FL.
3. (C) BLDG. PARKING +15FL.

1. A - TYPE BLDG. =165 UNIT
  2. B - TYPE BLDG. =105 UNIT
  3. C - TYPE BLDG. =120 UNIT
- TOTAL =390 UNIT**

CARPET AREA 26.44 SQ.MTS

BUILT-UP AREA 32.21 SQ.MTS



TYPICAL FLOOR LAYOUT PLAN

FLOOR	A-TYPE			B-TYPE			C-TYPE			TOTAL	
	No of flat per floor	BUILT UP AREA	F.S.I. AREA	No of flat per floor	BUILT UP AREA	F.S.I. AREA	No of flat per floor	BUILT UP AREA	F.S.I. AREA	TOTAL BUILT UP AREA	Total F.S.I. AREA
GR. FL.	-	483.28	PARKING	-	317.98	PARKING	-	372.51	PARKING	1173.77	-
1ST FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
2nd FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
3rd FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
4th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
5th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
6th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
7th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
8th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
9th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
10th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
11th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
12th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
13th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
14th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
15th FL.	11	483.28	413.58	7	317.98	258.30	8	372.51	307.79	1173.77	979.67
STAIRCABIN & LIFT MACHINE	-	153.22	-	-	153.22	-	-	179.36	-	485.80	-
<b>TOTAL</b>	<b>165</b>	<b>7885.70</b>	<b>6203.70</b>	<b>105</b>	<b>5240.90</b>	<b>3874.50</b>	<b>120</b>	<b>6139.52</b>	<b>4616.85</b>	<b>19266.12</b>	<b>14695.05</b>

PROJECT SUMMARY ( T.P.19 PARVAT-MAGOB) F.P. 100	
DESCRIPTION	F.P 100 T.P.19
PLOT AREA AS PER T.P.RECORD	6565.00
PLOT AREA AS PER SITE	5060.20
C.P. REQUIRED @ 10%	506.02
C.P. PROPOSED @ 10%	509.00
PERMISSIBLE F.S.I. (5060.20 X 3.00)	15180.60
PROPOSED GROUND FL. BUILT UP AREA	1173.77
PROPOSED TOTAL BUILT UP	19266.12
PROPOSED F.S.I.(f.s.i.Consumed :- 2.90)	14695.05
BALCNCE F.S.I.	485.55
<b>NOS. OF FLAT</b>	<b>390</b>
CARPET AREA OF UNIT	26.44
B.UP AREA OF UNIT	32.21

NO.	DATE	REVISED DETAIL
1	04-10-2016	CHANGE LAYOUT PLAN AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.

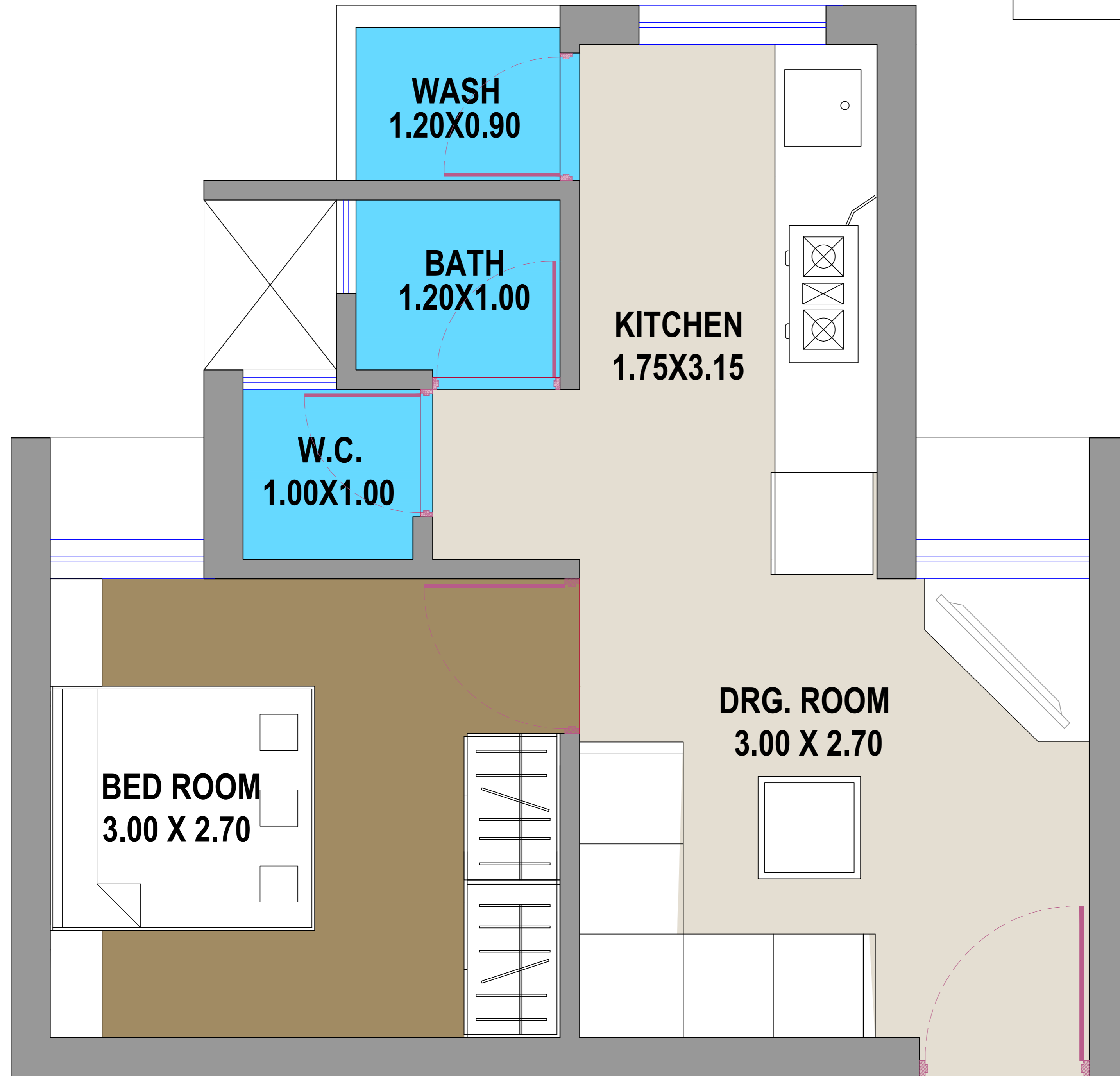
REVISION :	04-10-2016	DATE :	28-09-2016
SCALE :	N. T. S		

PRESENTATION DWG.  
PROJECT: PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

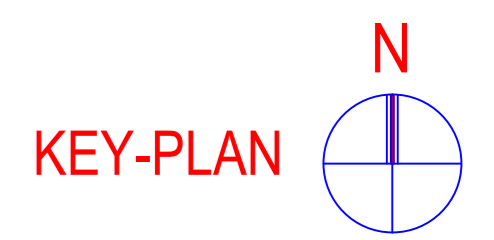
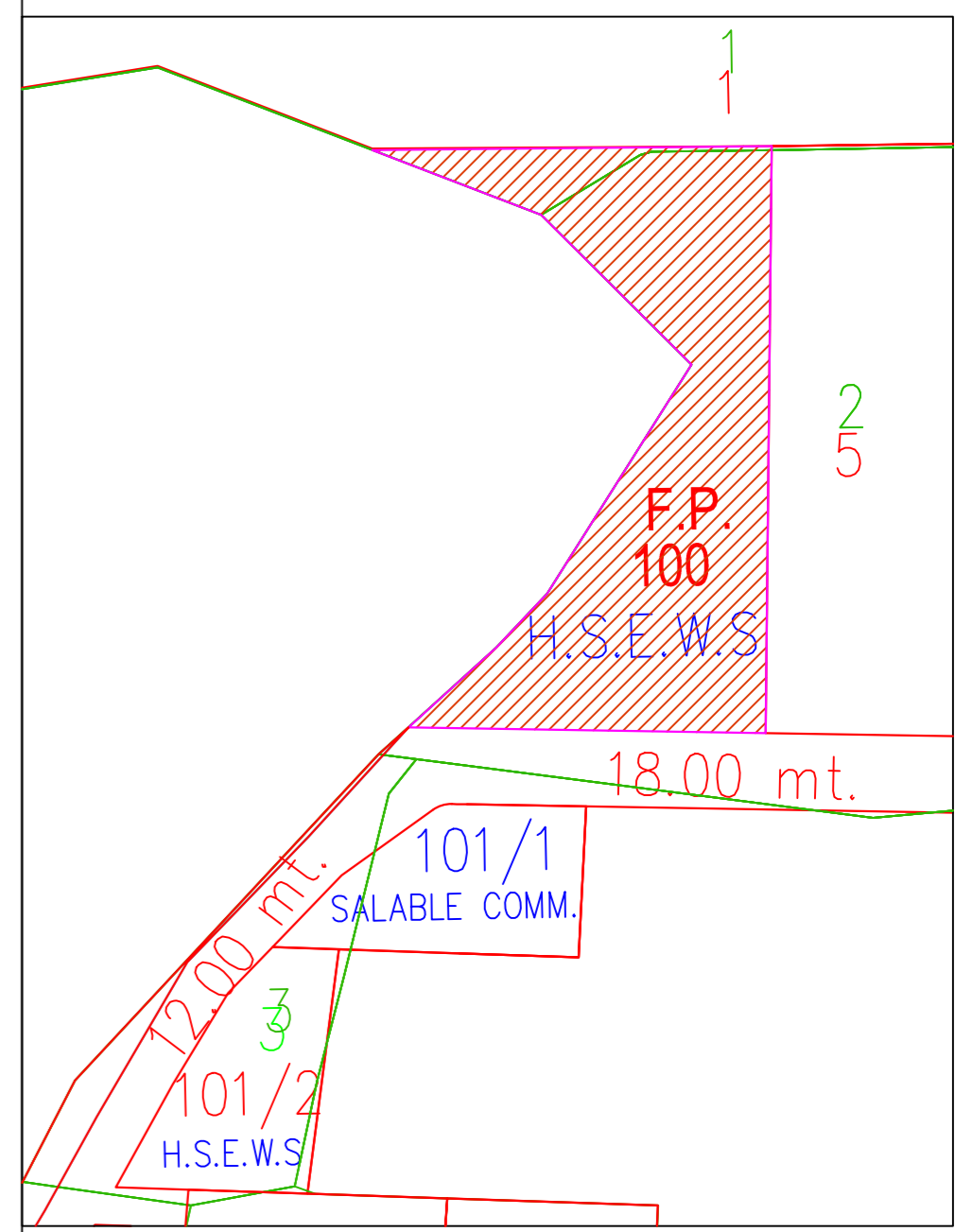
**JAYESSH A DALAL**  
PROJECT MANAGEMENT CONSULTANT

PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

**E.W.S - I**



PRESENTATION DWG.	
UNIT PLAN	
CARPET AREA = 26.44 SQ.MTS	
BUILT UP AREA = 32.21 SQ.MTS	



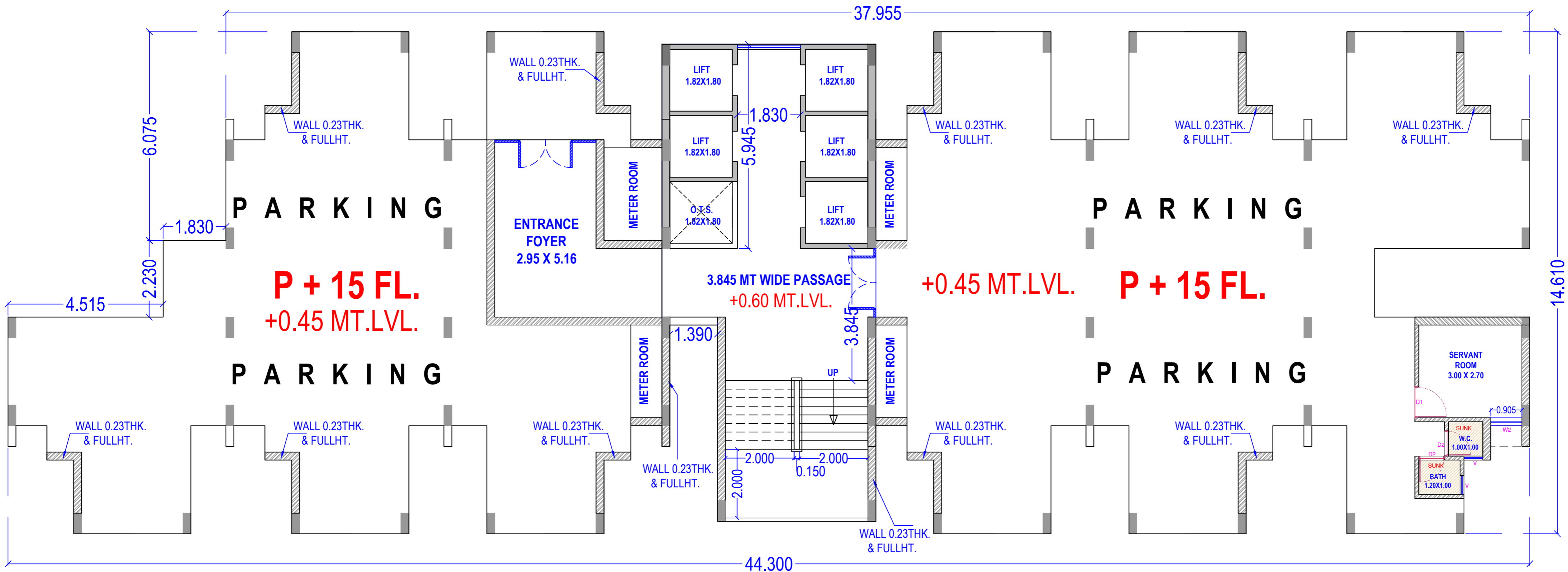
REVISION :	DATE : 28-09-2016
SCALE :	

PRESENTATION DWG.  
PROJECT : PROPOSED EWS-I TYPE HOUSING AT  
F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

**JAYESSH A DALAL**  
PROJECT MANAGEMENT  
CONSULTANT

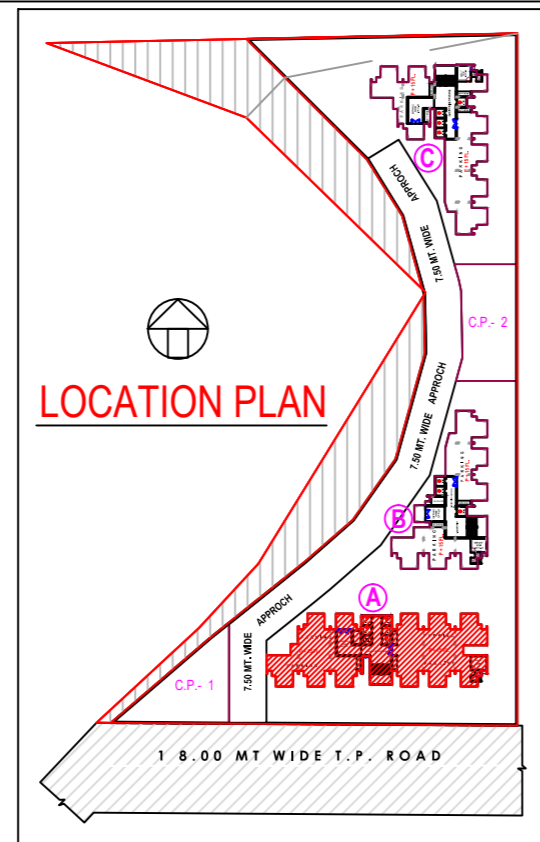
DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-00	14 Y 16
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# PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.



**GROUND(PARKING) FLOOR PLAN**

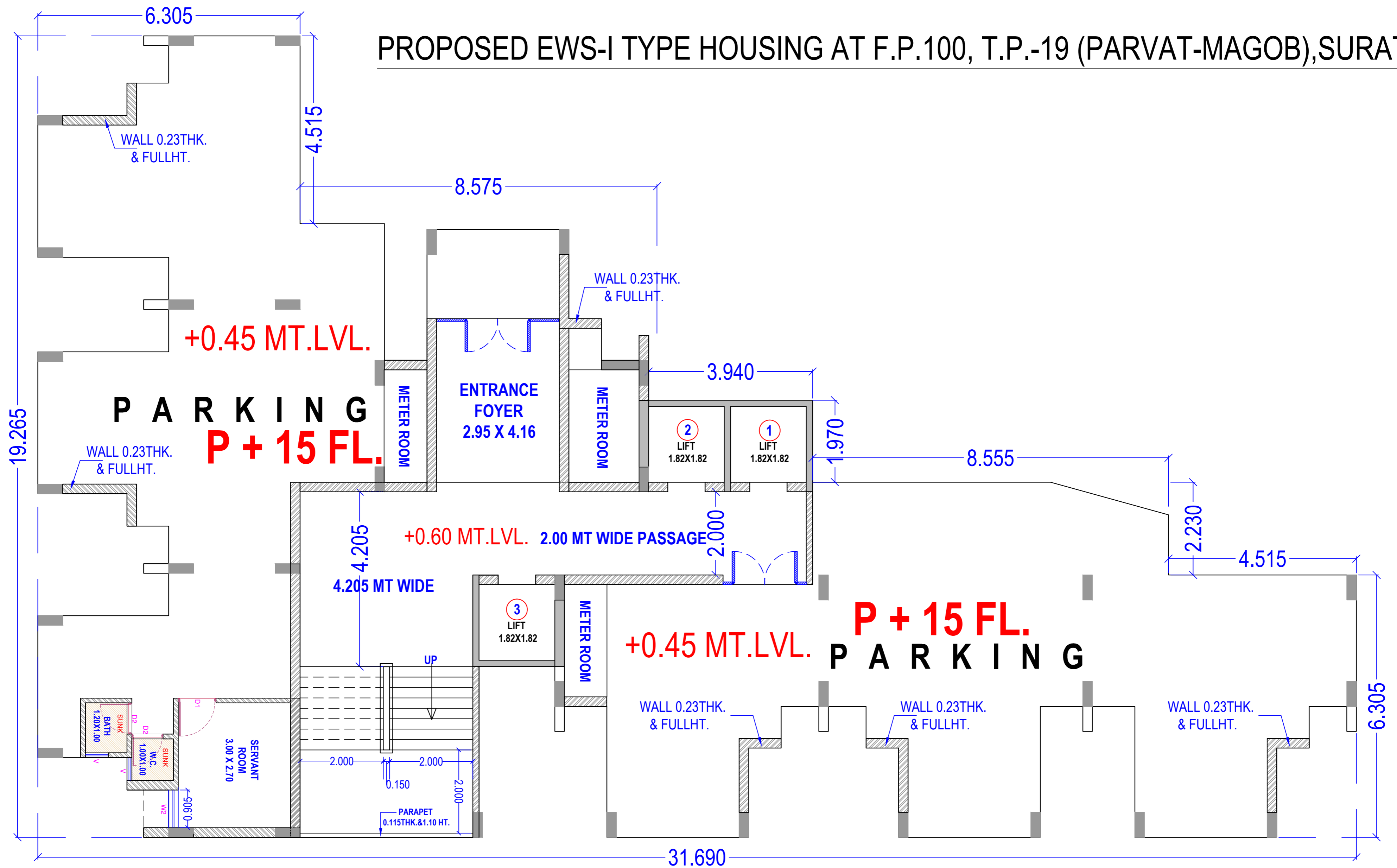
<b>TENDER COPY FOR REFERENCE ONLY</b>			
CLIENT	CONTRACTOR	P.M.C.	T.P.I.
BASIC WORKING DWG.			
ISSUE DATE -		SIGN -	
WORKING DWG.		A-TYPE (1-BLDG.) (P+ 15 FL.)	
<b>PARKING(GROUND) FLOOR PLAN</b>			



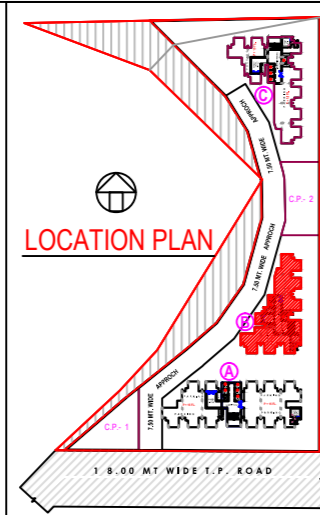
NO.	DATE	REVISED DETAIL
1	25-10-2016	CHANGE BLDG.PLAN (AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.)

REVISION :	25-10-2016	DATE :	28-06-2016
SCALE :			
<b>BASIC WORKING DWG.</b>			
PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.			
<b>JAYESSH A DALAL</b> PROJECT MANAGEMENT CONSULTANT			
*JALARAM SHAKTI, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALINES,SURAT.			
DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-03	14 Y 16

PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.



GROUND(PARKING) FLOOR PLAN



NO.	DATE	REVISED DETAIL
1	25-10-2016	CHANGE BLDG.PLAN (AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.)

REVISION : 25-10-2016 DATE : 28-06-2016

SCALE :

**BASIC WORKING DWG.**

PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

**JAYESSH A DALAL**  
PROJECT MANAGEMENT  
CONSULTANT



DRAWN BY B.S.PATEL CHECK BY SHEET NO A-05 14 Y 16

TENDER COPY FOR REFERENCE ONLY

CLIENT	CONTRACTOR	P.M.C.	T.P.I.

BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG. B-TYPE (1-BLDG.) (P+ 15 FL.)

**PARKING(GROUND) FLOOR PLAN**

PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

TENDER COPY FOR REFERENCE ONLY

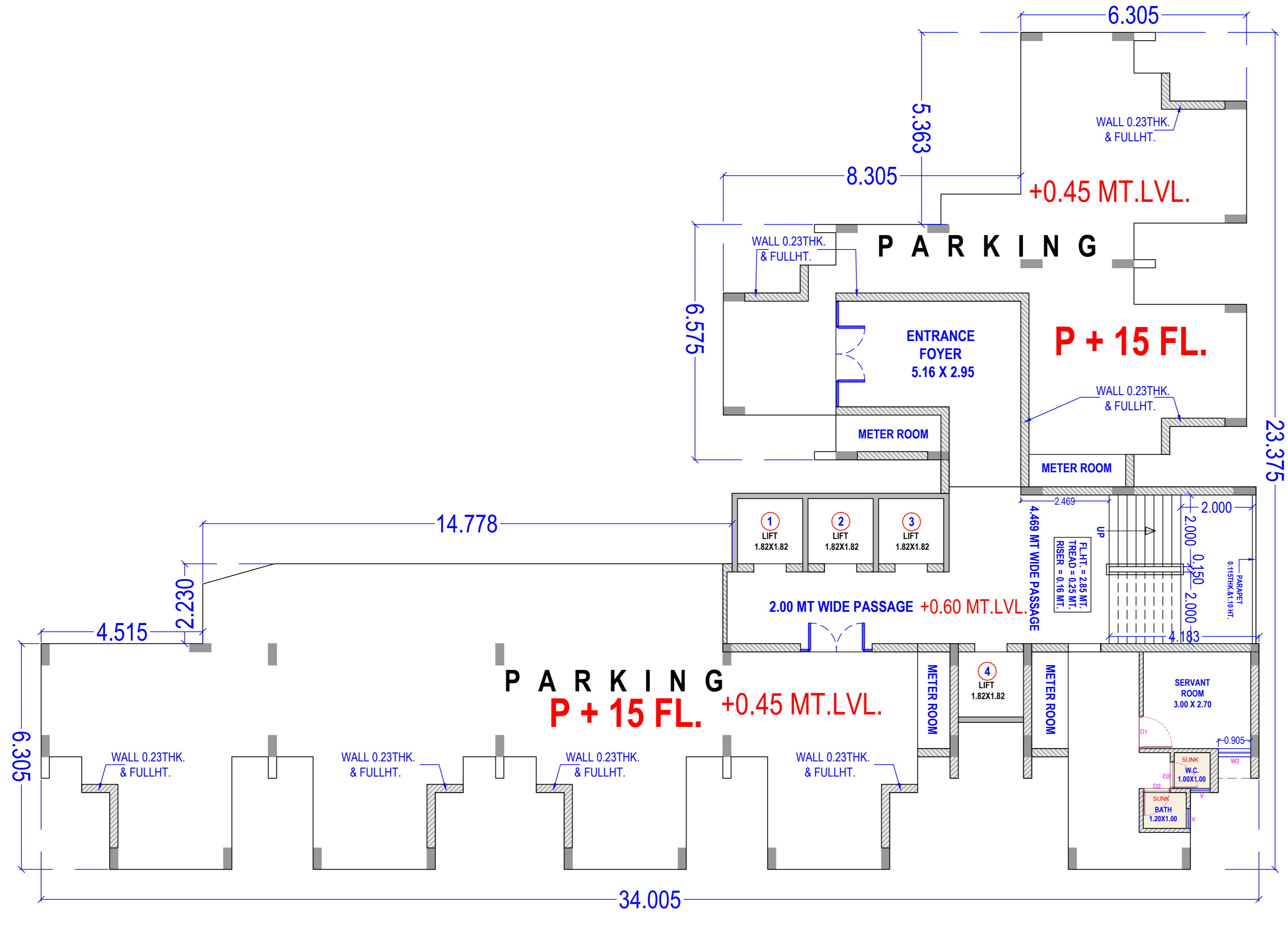
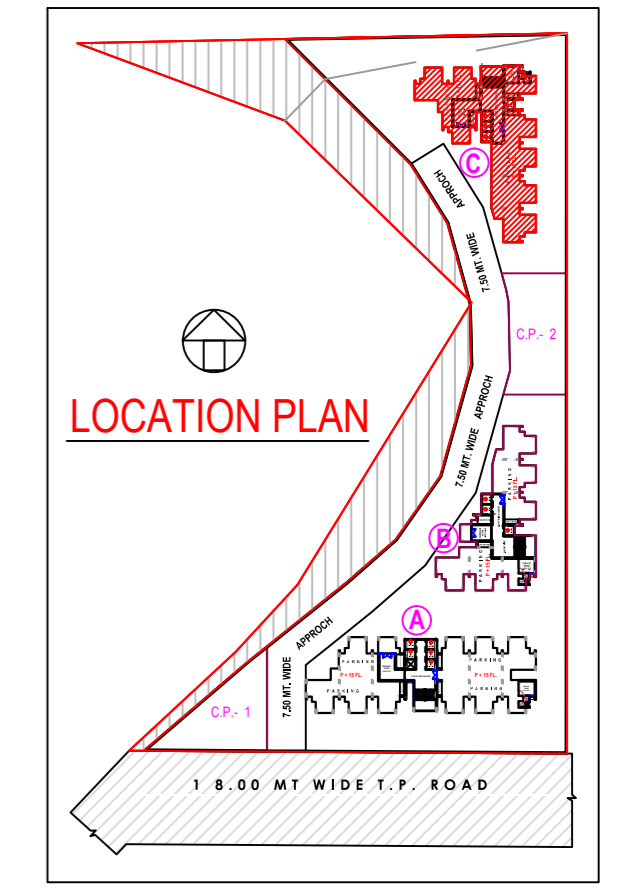
CLIENT	CONTRACTOR	P.M.C.	T.P.I.

BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG. C-TYPE (1-BLDG.) (P+ 15 FL.)

PARKING(GROUND) FLOOR PLAN



PARKING(GROUND) FLOOR PLAN

NO.	DATE	REVISED DETAIL
1	26-10-2016	CHANGE BLDG.PLAN (AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.)

REVISION : 26-10-2016 DATE : 28-06-2016

SCALE :

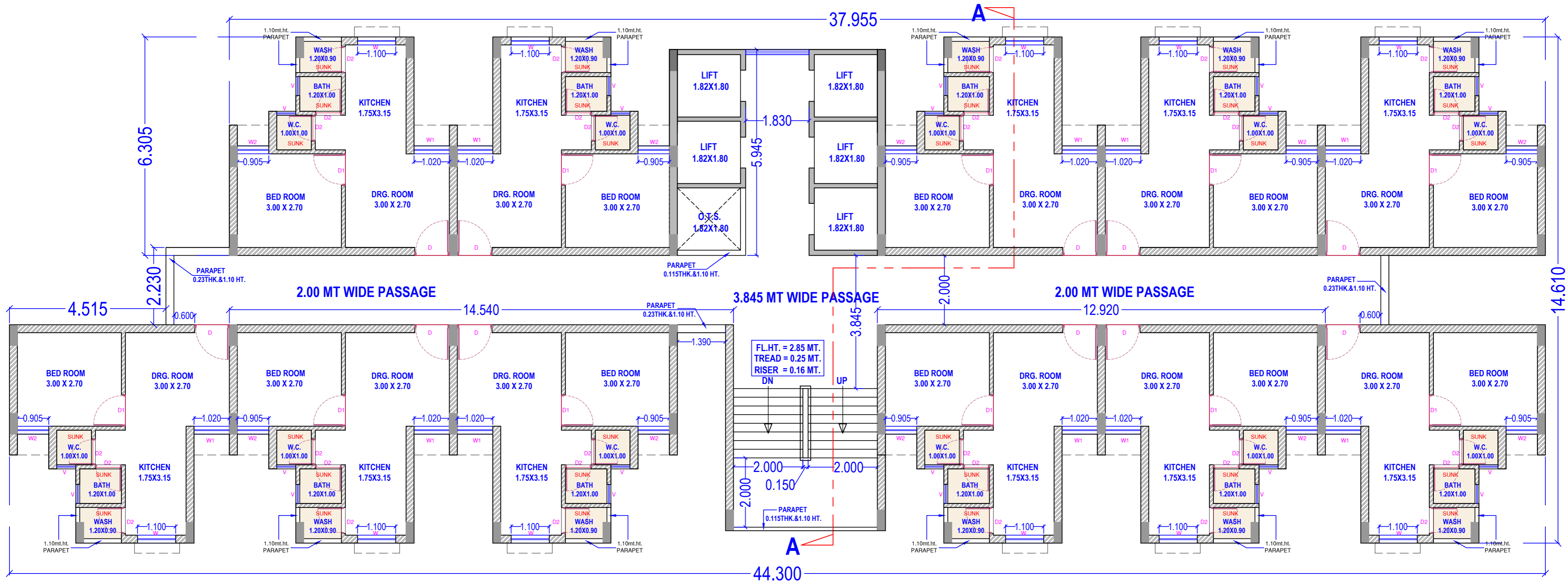
BASIC WORKING DWG.

PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

**JAYESSH A DALAL**  
PROJECT MANAGEMENT CONSULTANT

DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-07	14 Y 16
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# PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.



**TYPICAL FLOOR PLAN**  
(1ST. TO 15TH. FL.)

NO.	DATE	REVISED DETAIL
1	25-10-2016	CHANGE BLDG.PLAN (AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.)

**TENDER COPY FOR REFERENCE ONLY**

CLIENT	CONTRACTOR	P.M.C.	T.P.I.
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BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG. A-TYPE (1-BLDG.) (P+ 15 FL.)

**TYPICAL FLOOR PLAN**

**SCHEDULE OF DOORS FOR ONE BLDG.**

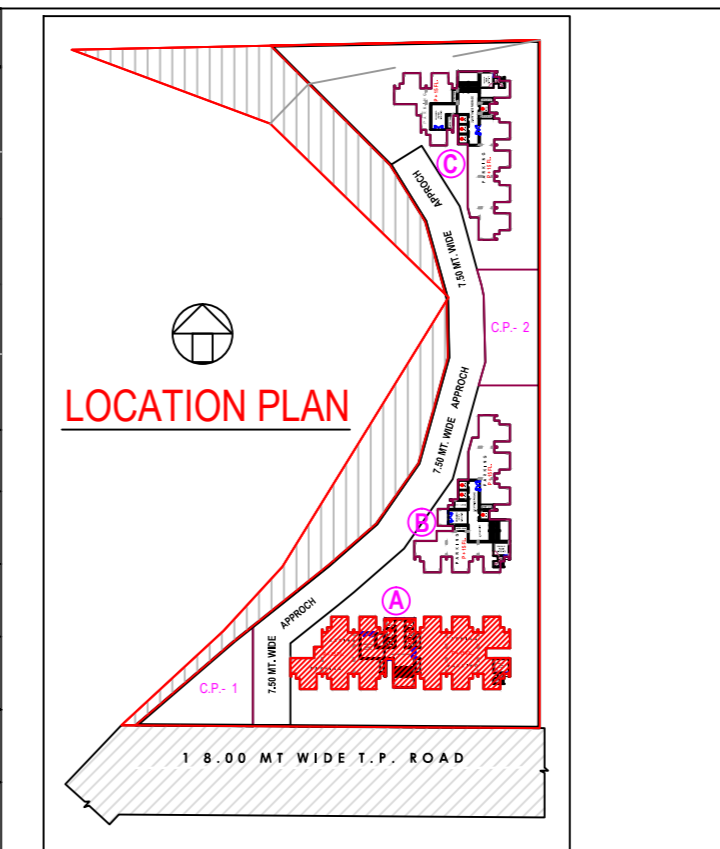
SR. NO.	NAME	SIZE (OPENING)	TY.	FL.	15th.FL.	TER.FL.	SILL	LINTEL	TOTAL
1.	D	1.00 X 2.10	1X11=11	11X15=165	03	-	2.10	2.10	168
2.	D1	0.91 X 2.10	1X11=11	11X15=165	-	-	2.10	2.10	165
3.	D2	0.75 X 2.10	1X11=11	11X15=165	-	-	2.10	2.10	165
4.	D3(FRP)	0.75 X 2.10	2X11=22	22X15=330	-	-	2.10	2.10	330

**SCHEDULE OF WINDOW**

1.	W	1.10 X 1.20	1X11=11	11X15=165	01	0.90	2.10	166
2.	W1	1.02 X 1.20	1X11=11	11X15=165	-	0.90	2.10	165
3.	W2	0.905 X 1.20	1X11=11	11X15=165	-	0.90	2.10	165

**SCHEDULE OF VENTILATION**

1.	V	0.55 X 0.60	2X11=22	22X15=330	02	1.50	2.10	332
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REVISION : 25-10-2016      DATE : 28-06-2016

SCALE :

**BASIC WORKING DWG.**

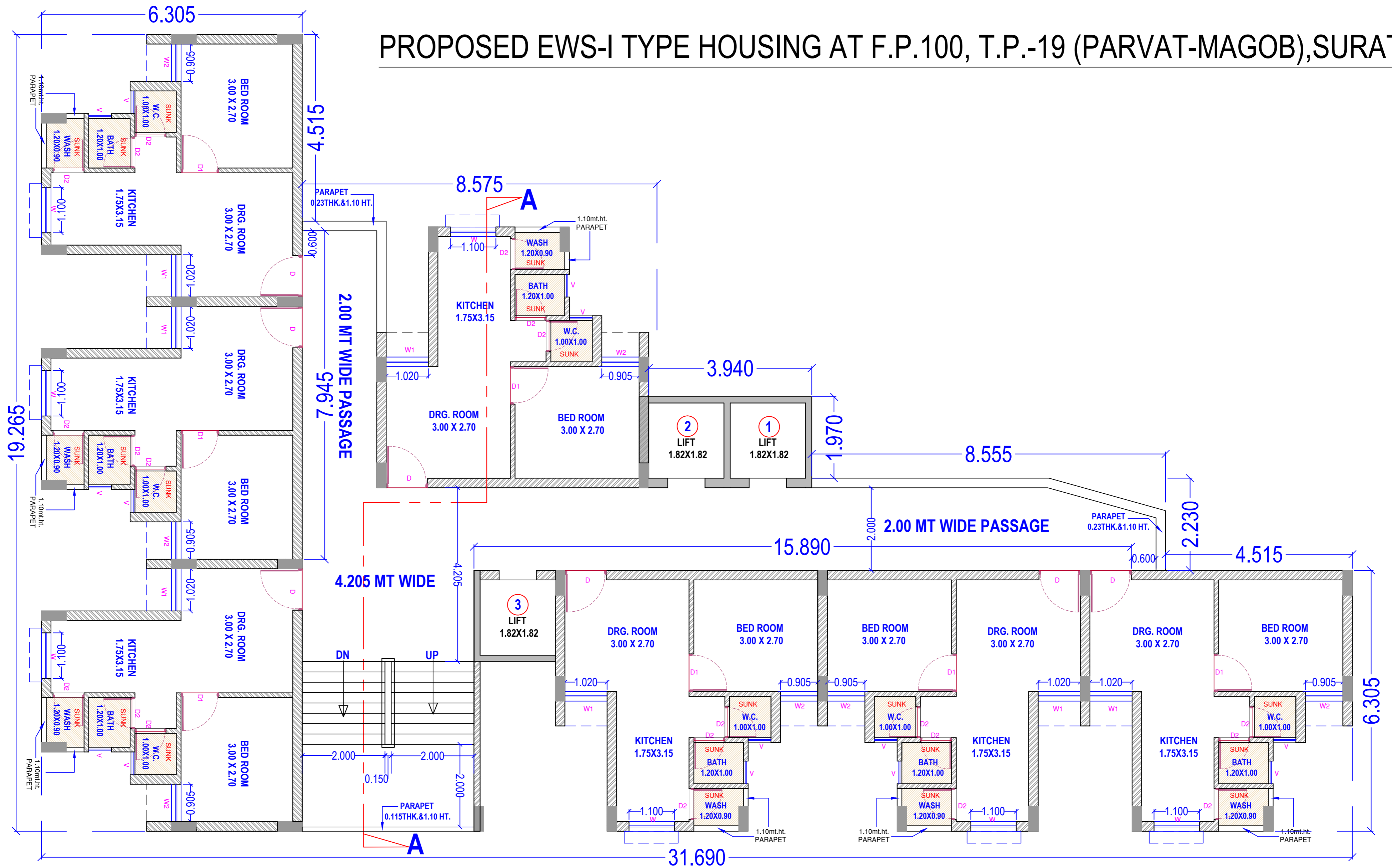
PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.

**JAYESSH A DALAL**  
PROJECT MANAGEMENT CONSULTANT

\*JALARAM SHAKTI\*, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALINES,SURAT.

DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-04	14 Y 16
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# PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.



**TENDER COPY FOR REFERENCE ONLY**

CLIENT	CONTRACTOR	P.M.C.	T.P.I.
BASIC WORKING DWG.			
ISSUE DATE -	SIGN -		
WORKING DWG.	B-TYPE (1-BLDG.) (P+ 15 FL.)		
TYPICAL FLOOR PLAN			

**SCHEDULE OF DOORS FOR ONE BLDG.**

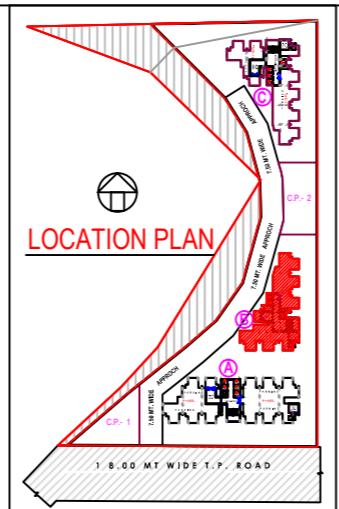
SR. NO.	NAME	SIZE (OPENING)	TY.FL.	15th.FL.	TER.FL.	SILL	LINTEL	TOTAL
1.	D	1.00 X 2.10	1X7=7	7X15=105	02	-	2.10	107
2.	D1	0.91 X 2.10	1X7=7	7X15=105	-	-	2.10	105
3.	D2	0.75 X 2.10	1X7=7	7X15=105	-	-	2.10	105
4.	D3(FRP)	0.75 X 2.10	2X7=14	14X15=210	-	-	2.10	210

**SCHEDULE OF WINDOW**

SR. NO.	NAME	SIZE	TY.FL.	15th.FL.	TER.FL.	SILL	LINTEL	TOTAL
1.	W	1.10 X 1.20	1X7=7	7X15=105	01	0.90	2.10	106
2.	W1	1.02 X 1.20	1X7=7	7X15=105	-	0.90	2.10	105
3.	W2	0.905 X 1.20	1X7=7	7X15=105	-	0.90	2.10	105

**SCHEDULE OF VENTILATION**

SR. NO.	NAME	SIZE	TY.FL.	15th.FL.	TER.FL.	SILL	LINTEL	TOTAL
1.	V	0.55 X 0.60	2X7=14	14X15=210	02	1.50	2.10	212



**TYPICAL FLOOR PLAN**  
(1ST. TO 15TH. FL.)

NO.	DATE	REVISED DETAIL
1	25-10-2016	CHANGE BLDG.PLAN (AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.)

REVISION : 25-10-2016	DATE : 28-06-2016
SCALE :	
<b>BASIC WORKING DWG.</b>	
PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.	
<b>JAYESSH A DALAL</b> PROJECT MANAGEMENT CONSULTANT	
DRAWN BY B.S.PATEL	CHECK BY
SHEET NO A-06	14 Y 16



# PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.

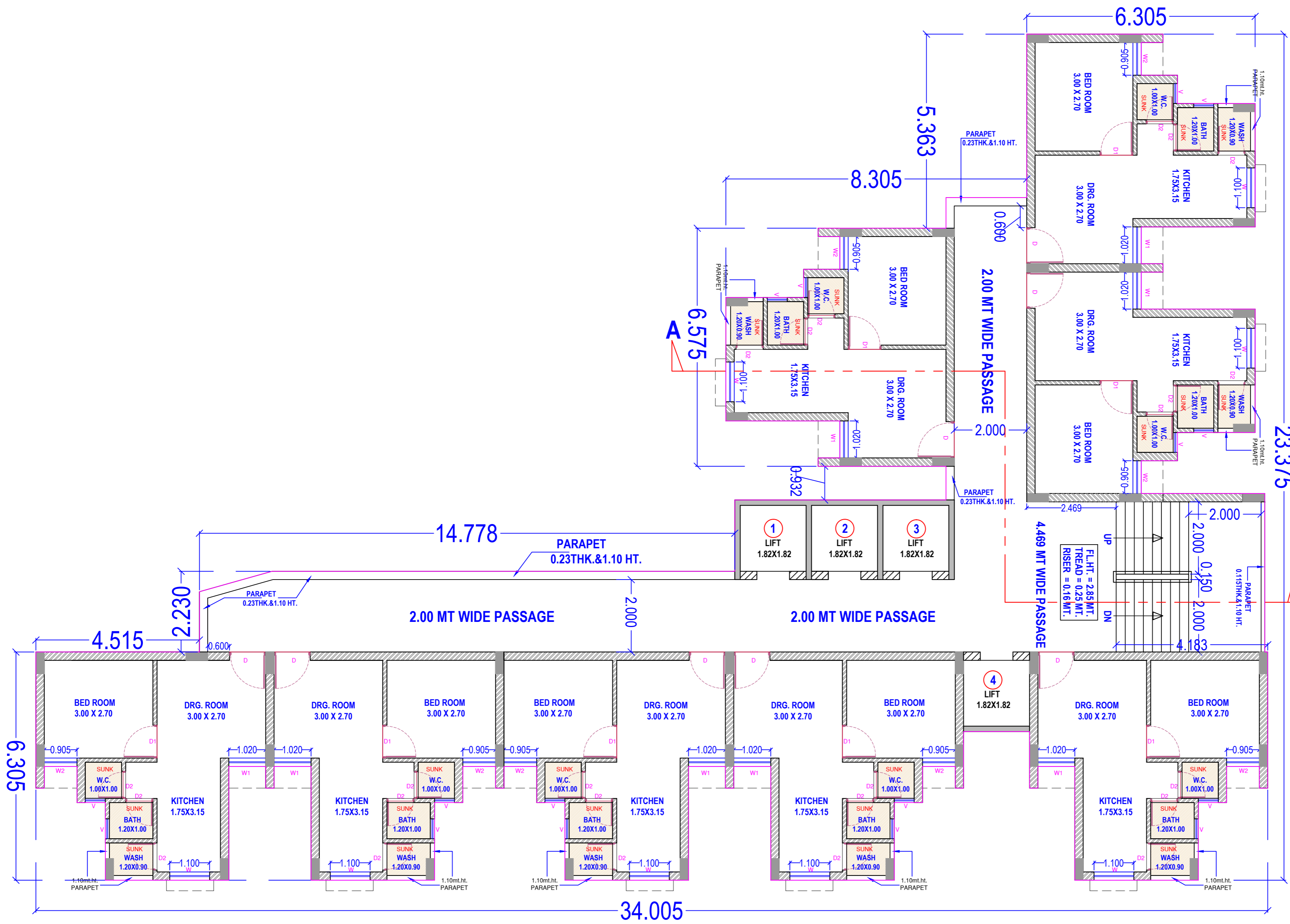
TENDER COPY FOR REFERENCE ONLY

CLIENT	CONTRACTOR	P.M.C.	T.P.I.

BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG. C-TYPE (1-BLDG.)  
(P+ 15 FL.)  
**TYPICAL FLOOR PLAN**



**SCHEDULE OF DOORS FOR ONE BLDG.**

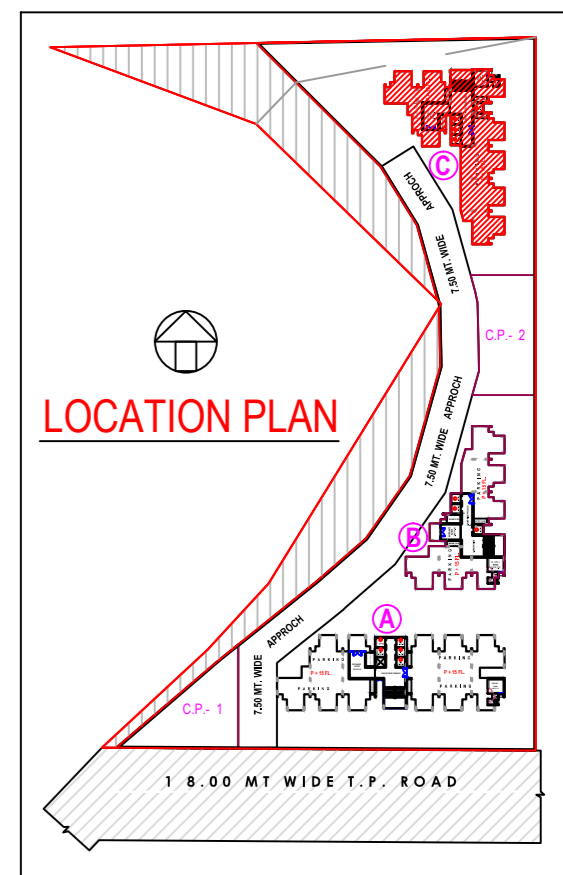
SR. NO.	NAME	SIZE (OPENING)	TY.FL.	15th.FL.	TER.FL.	SILL	LINTEL	TOTAL
1.	D	1.00 X 2.10	1X08=08	08X15=120	04	-	2.10	124
2.	D1	0.91 X 2.10	1X08=08	08X15=120	-	-	2.10	120
3.	D2	0.75 X 2.10	1X08=08	08X15=120	-	-	2.10	120
4.	D3(FRP)	0.75 X 2.10	2X08=16	16X15=240	-	-	2.10	240

**SCHEDULE OF WINDOW**

1.	W	1.10 X 1.20	1X08=08	08X15=120	01	0.90	2.10	121
2.	W1	1.02 X 1.20	1X08=08	08X15=120	-	0.90	2.10	120
3.	W2	0.905 X 1.20	1X08=08	08X15=120	-	0.90	2.10	120

**SCHEDULE OF VENTILATION**

1.	V	0.55 X 0.60	2X08=16	16X15=240	02	1.50	2.10	242
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NO.	DATE	REVISED DETAIL
1	26-10-2016	CHANGE BLDG.PLAN (AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.)

REVISION : 26-10-2016 DATE : 28-06-2016

SCALE :

**BASIC WORKING DWG.**

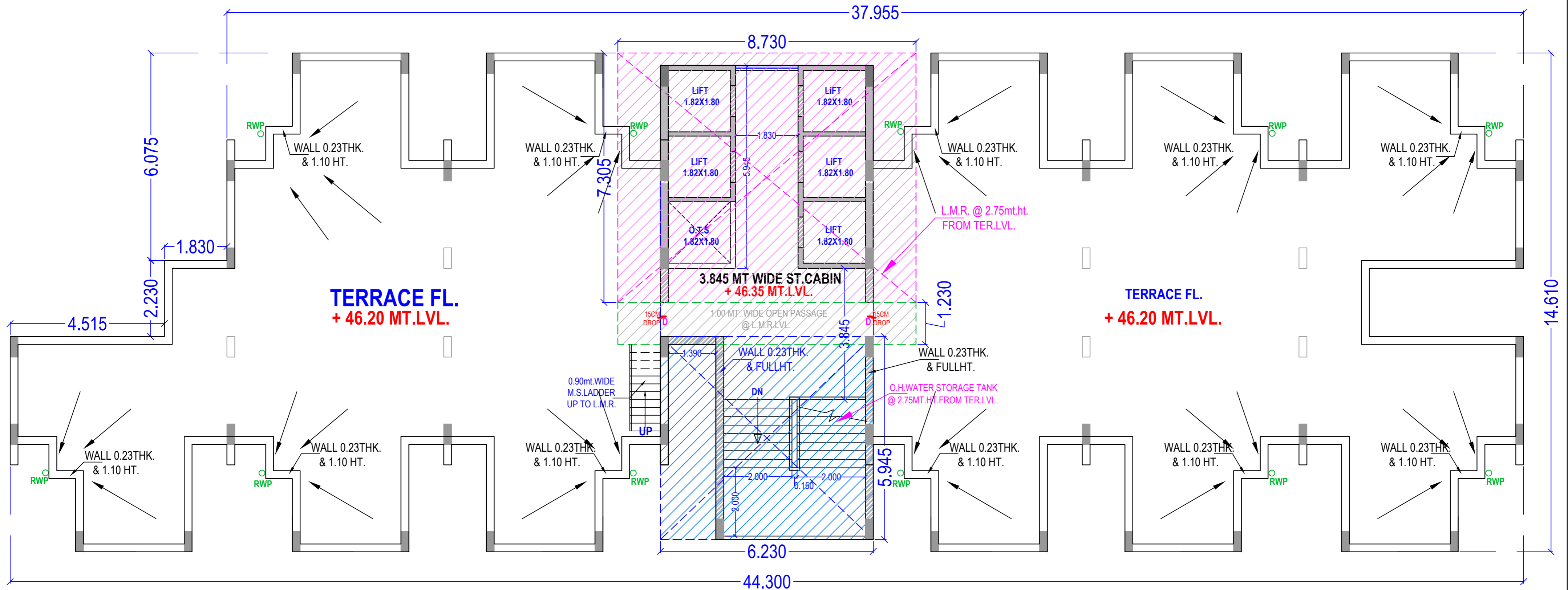
PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.

**JAYESSH A DALAL**  
PROJECT MANAGEMENT CONSULTANT

DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-08	14 Y 16
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**TYPICAL FLOOR PLAN**  
(1ST. TO 15TH. FL.)

# PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.



**TERRACE FLOOR PLAN**

TENDER COPY FOR REFERENCE ONLY

CLIENT	CONTRACTOR	P.M.C.	T.P.I.

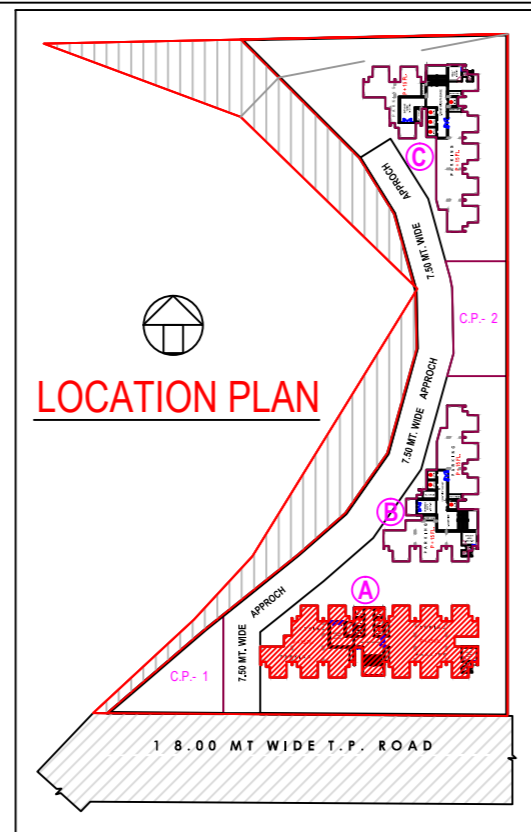
BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG.

A-TYPE (1-BLDG.)  
(P+ 15 FL.)

**TERRACE FLOOR PLAN**



NO.	DATE	REVISED DETAIL
1	25-10-2016	CHANGE BLDG.PLAN (AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.)

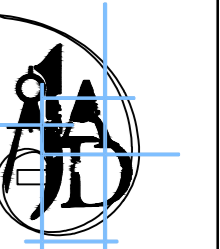
REVISION : 25-10-2016      DATE : 28-06-2016

SCALE :

**BASIC WORKING DWG.**

PROJECT : PROPOSED EWS-I TYPE HOUSING AT  
F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.

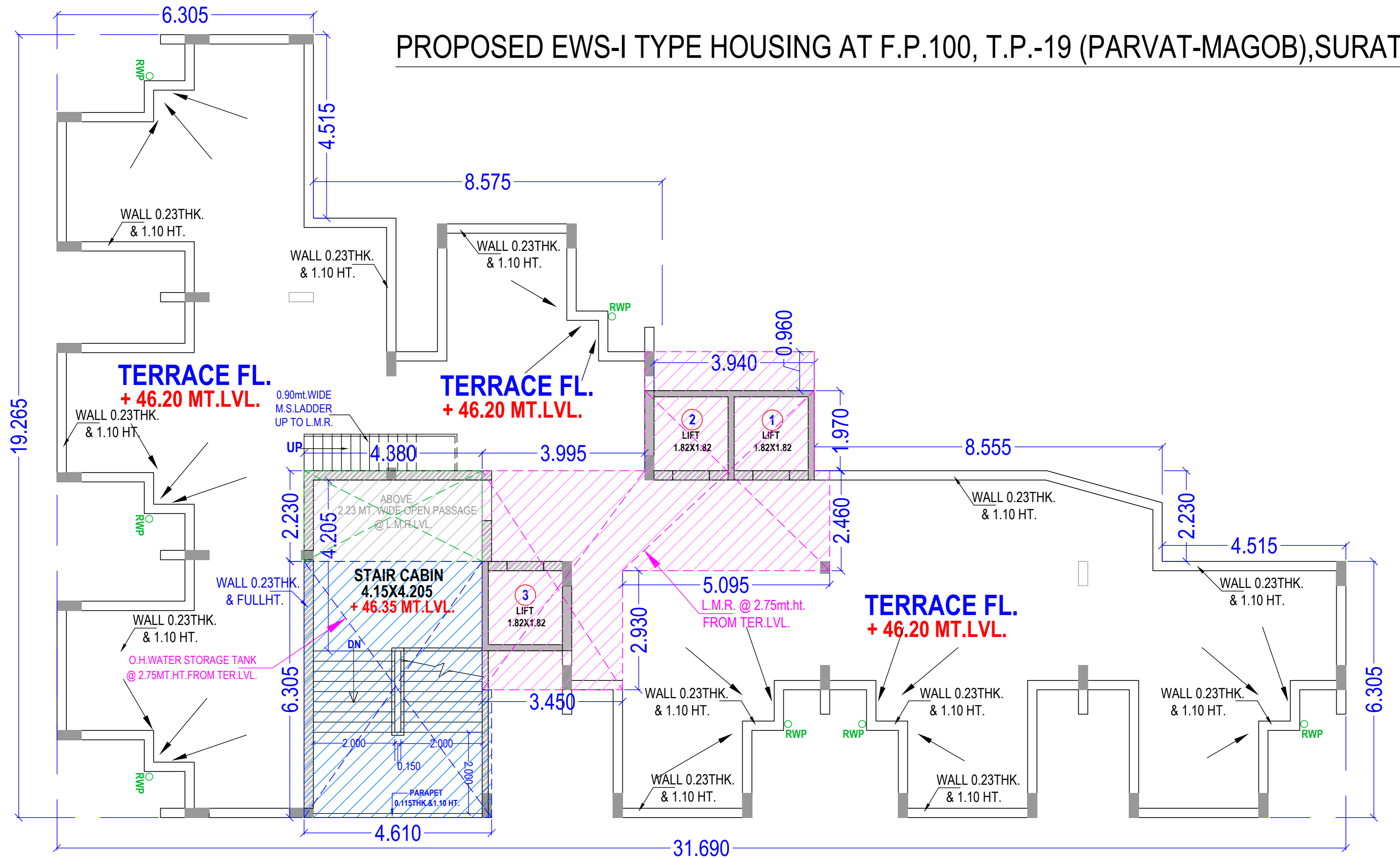
**JAYESSH A DALAL**  
**PROJECT MANAGEMENT**  
**CONSULTANT**



\*JALARAM SHAKTI\*, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALINES,SURAT.

DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-04a	14 Y 16
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# PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.



**TERRACE FLOOR PLAN**

NO.	DATE	REVISED DETAIL
1	25-10-2016	CHANGE BLDG.PLAN (AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.)

REVISION : 25-10-2016    DATE : 28-06-2016

SCALE :

**BASIC WORKING DWG.**

PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.

**JAYESSH A DALAL**  
PROJECT MANAGEMENT  
CONSULTANT



DRAWN BY : B.S.PATEL    CHECK BY :    SHEET NO : A-06a    14 Y 16

TENDER COPY FOR REFERENCE ONLY

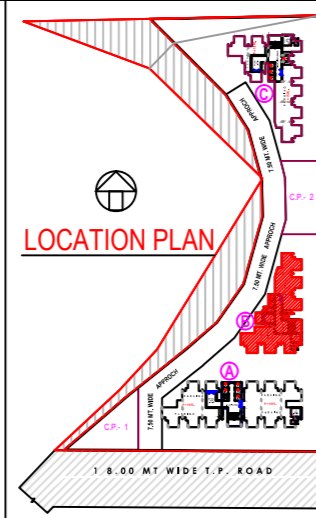
CLIENT	CONTRACTOR	P.M.C.	T.P.I.

BASIC WORKING DWG.

ISSUE DATE -    SIGN -

WORKING DWG.    B-TYPE (1-BLDG.)  
(P+ 15 FL.)

**TERRACE FLOOR PLAN**



# PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.

TENDER COPY FOR REFERENCE ONLY

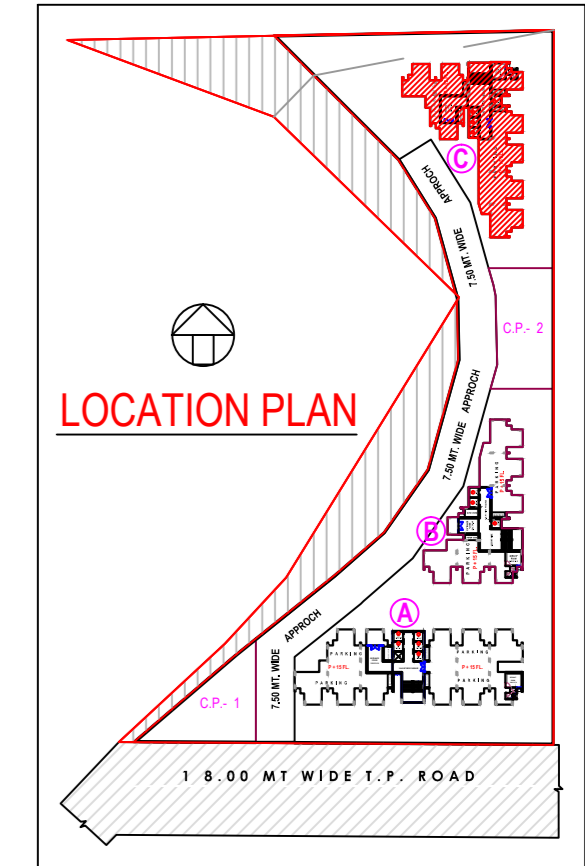
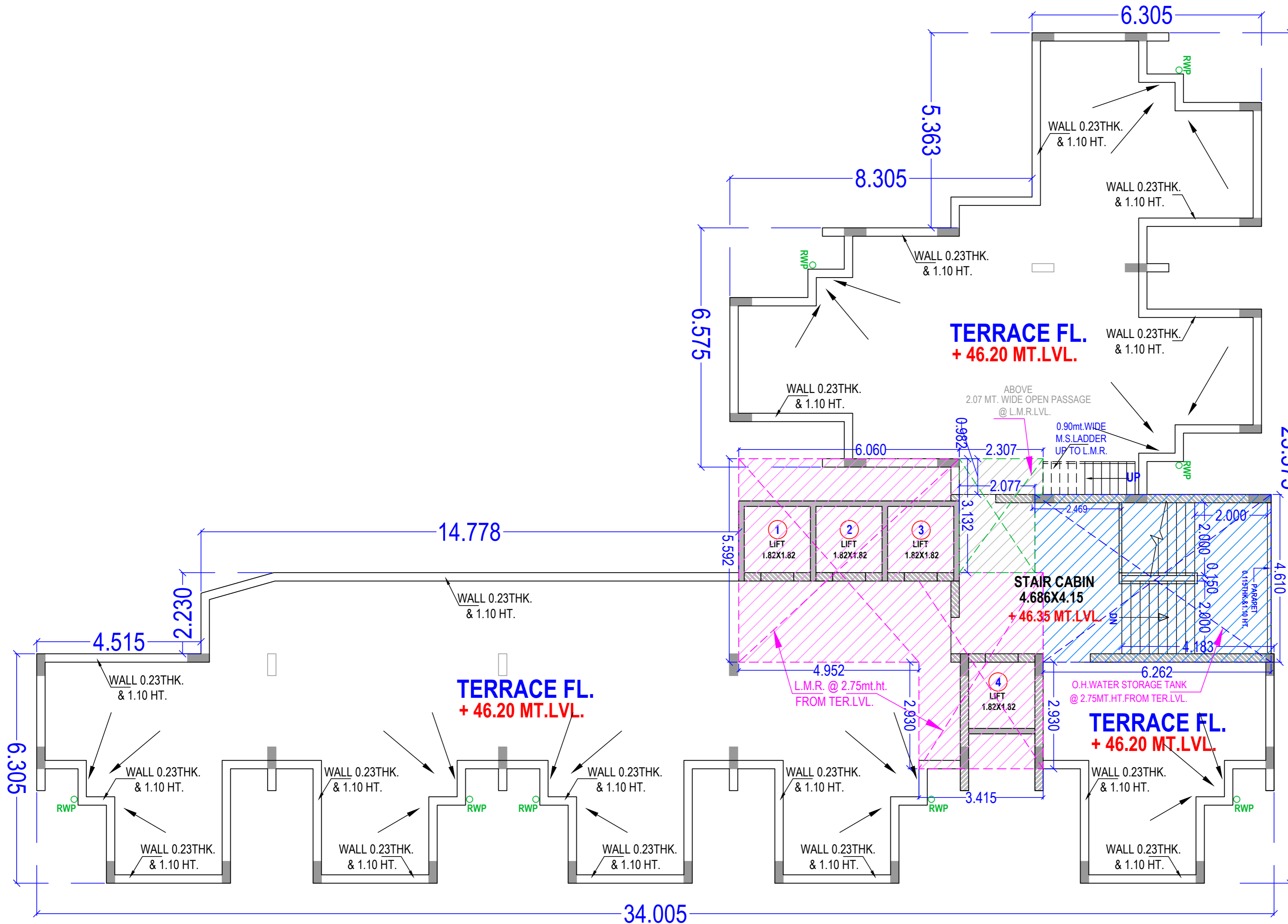
CLIENT	CONTRACTOR	P.M.C.	T.P.I.

BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG. C-TYPE (1-BLDG.)  
(P+ 15 FL.)

## TERRACE FLOOR PLAN



## TERRACE FLOOR PLAN

NO.	DATE	REVISED DETAIL
1	26-10-2016	CHANGE BLDG.PLAN (AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.)

REVISION : 26-10-2016 DATE : 28-06-2016  
SCALE :

**BASIC WORKING DWG.**  
PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.

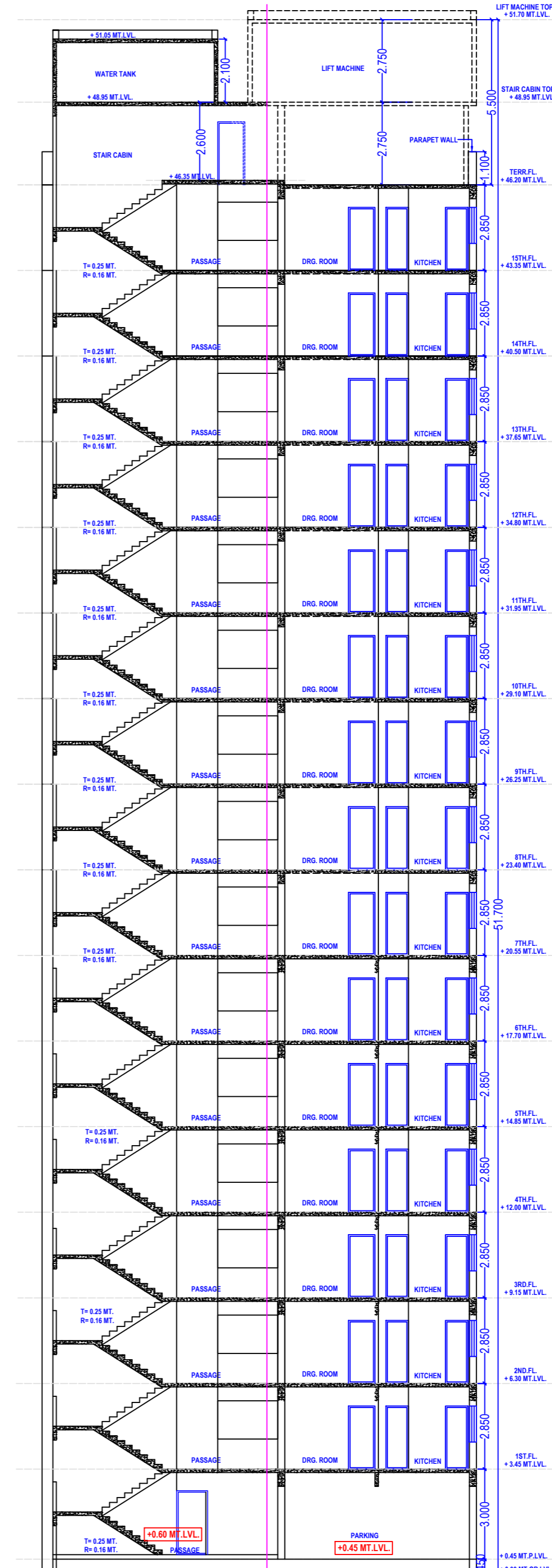
**JAYESSH A DALAL**  
PROJECT MANAGEMENT CONSULTANT  
\*JALARAM SHAKTI, BESIDE DHAWALGIRI APARTMENT, NR. LOURD'S CONVENT SCHOOL, ATHWALNES, SURAT.

DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-08a	14 Y 16
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PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.



FRONT ELEVATION



SECTION-A-A

TENDER COPY FOR REFERENCE ONLY

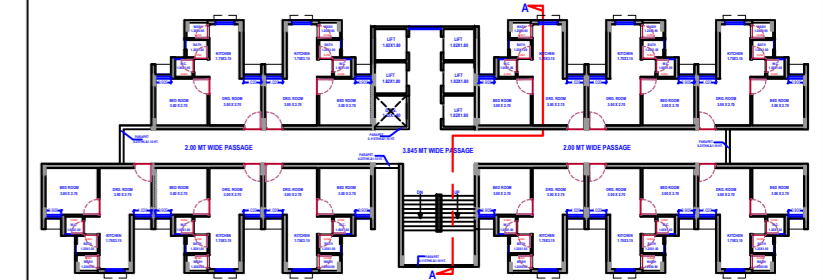
CLIENT	CONTRACTOR	P.M.C.	T.P.I.

BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG. A-TYPE (1-BLDG.) (P+ 15 FL.)

ELEVATION & SECTION



FRONT SIDE

NO.	DATE	REVISED DETAIL
1	25-10-2016	CHANGE BLDG.PLAN (AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.)

REVISION : 25-10-2016 DATE : 28-06-2016

SCALE :

BASIC WORKING DWG.

PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

JAYESSH A DALAL  
PROJECT MANAGEMENT  
CONSULTANT



\*JALARAM SHAKTI, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALNES,SURAT.

DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-09	14 Y 16
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PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.

TENDER COPY FOR REFERENCE ONLY

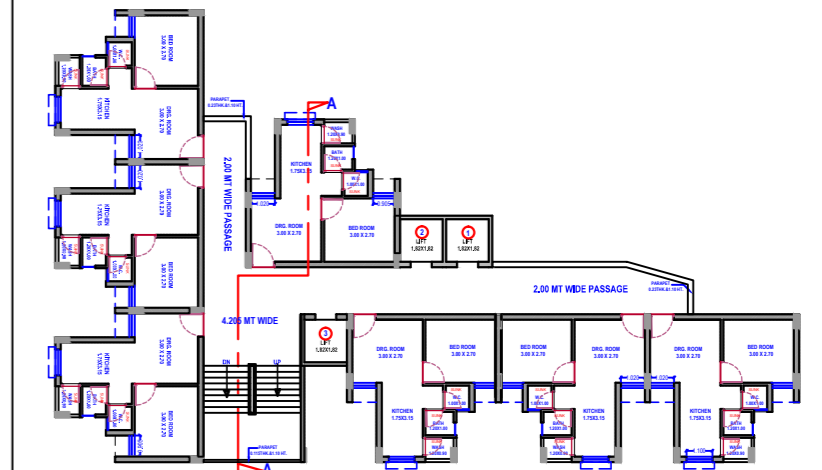
CLIENT	CONTRACTOR	P.M.C.	T.P.I.

BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG. B-TYPE (1-BLDG.)  
(P+ 15 FL.)

ELEVATION & SECTION



FRONT SIDE

NO.	DATE	REVISED DETAIL
1	25-10-2016	CHANGE BLDG.PLAN (AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.)

REVISION : 25-10-2016 DATE : 28-06-2016

SCALE :

BASIC WORKING DWG.

PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.

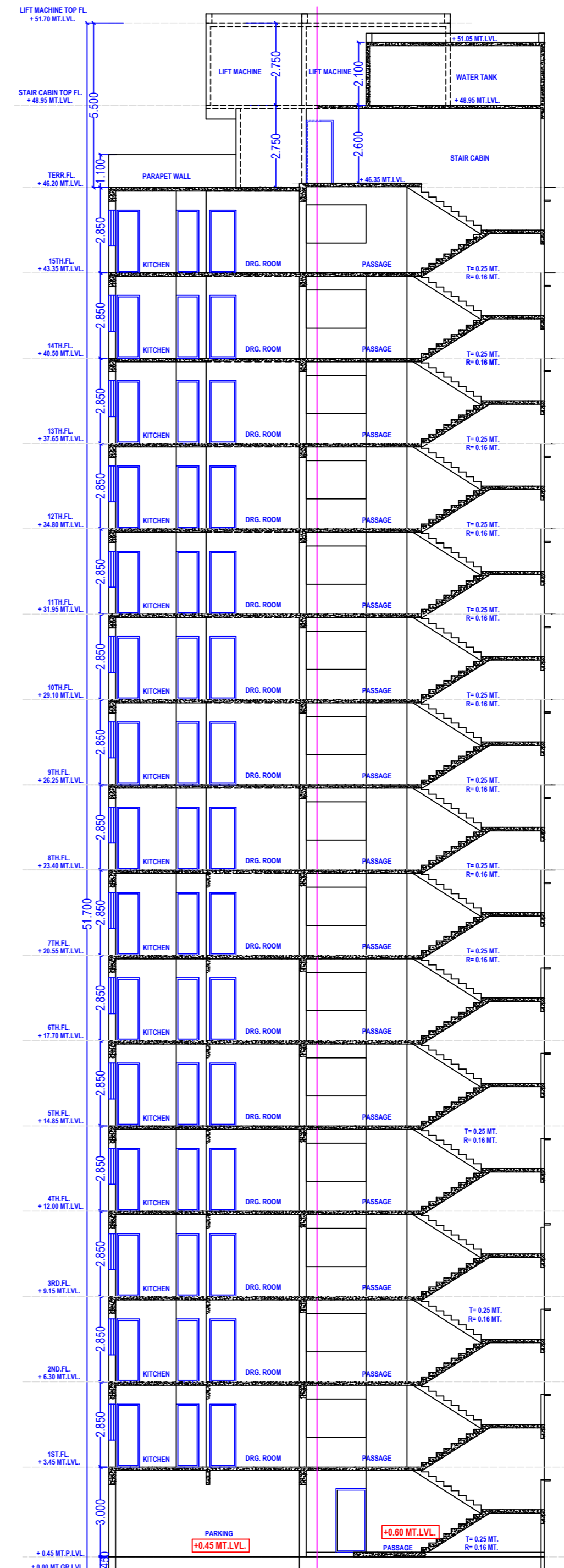
**JAYESSH A DALAL**  
PROJECT MANAGEMENT  
CONSULTANT



DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-10	14 Y 16
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FRONT ELEVATION



SECTION-A-A

PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

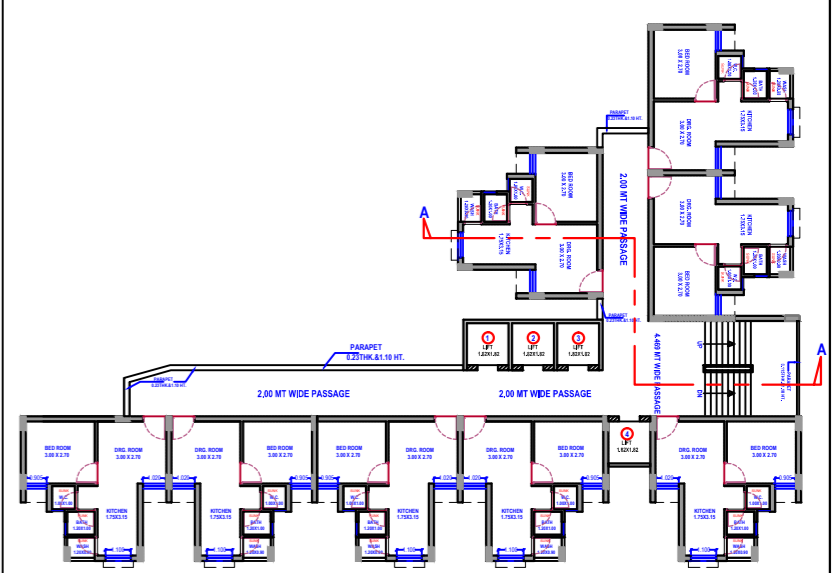
TENDER COPY FOR REFERENCE ONLY

CLIENT	CONTRACTOR	P.M.C.	T.P.I.

BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG. C-TYPE (1-BLDG.) (P+ 15 FL.)  
ELEVATION & SECTION



FRONT SIDE

NO.	DATE	REVISED DETAIL
1	26-10-2016	CHANGE BLDG.PLAN (AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.)

REVISION : 26-10-2016 DATE : 28-06-2016

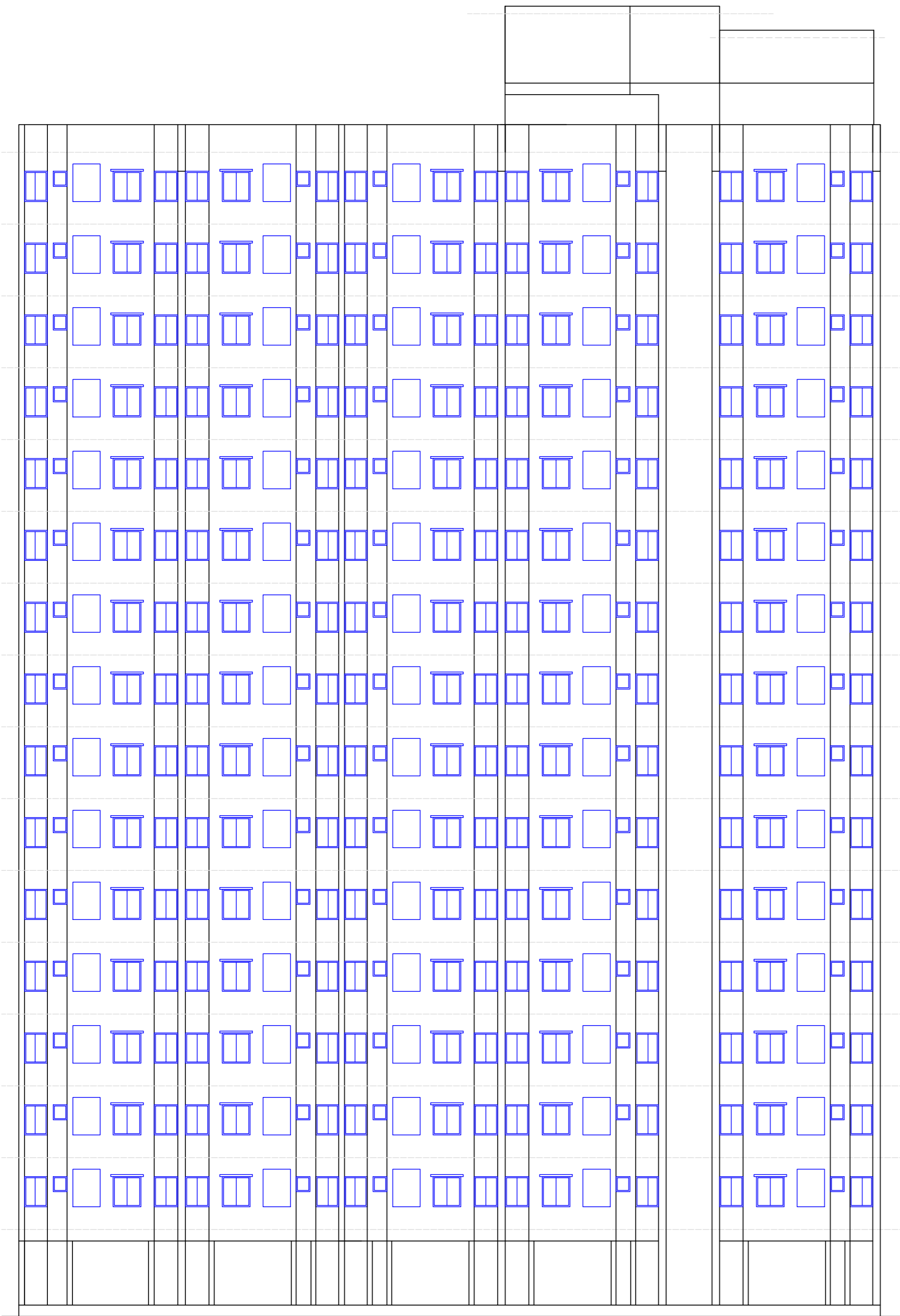
SCALE :

BASIC WORKING DWG.

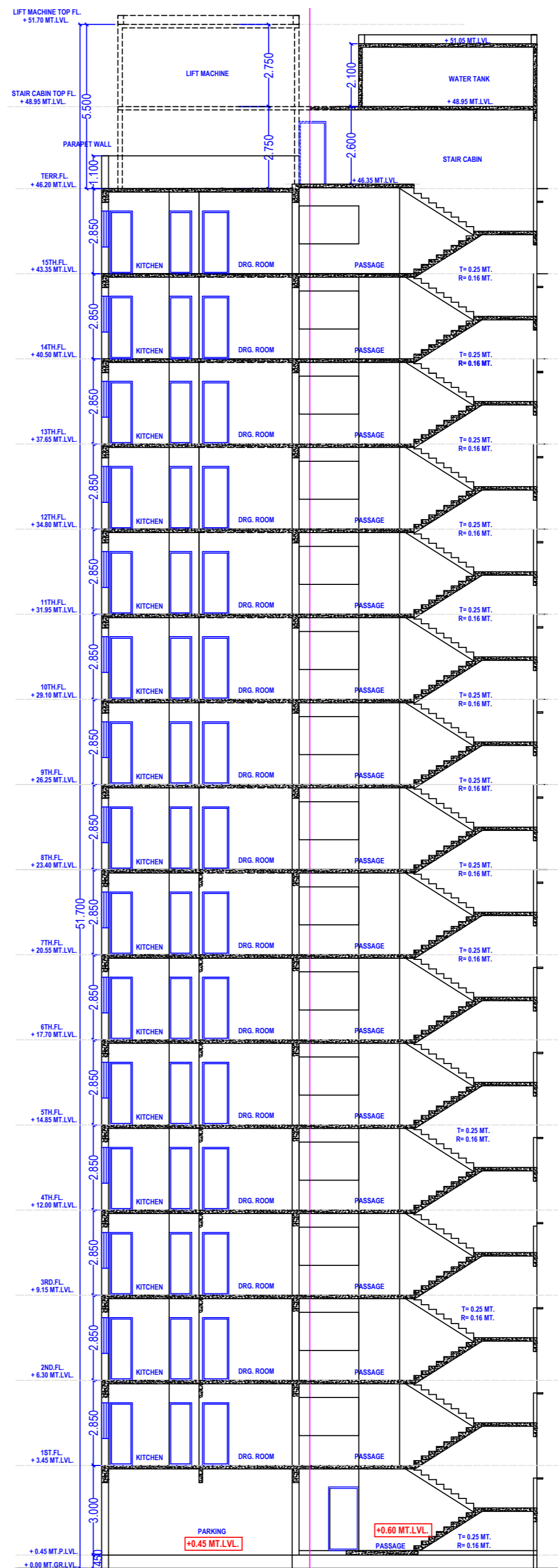
PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

**JAYESSH A DALAL**  
PROJECT MANAGEMENT CONSULTANT

DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-11	14 Y 16
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FRONT ELEVATION



SECTION-A-A

TENDER COPY FOR REFERENCE ONLY			
CLIENT	CONTRACTOR	P.M.C.	T.P.I.
<b>LAY OUT PLAN (GROUND FLOOR PLAN)</b>			
ISSUE DATE -		SIGN -	
BASIC WORKING DWG.			
<b>INFRASTRUCTURE LAYOUT PLAN</b>			
A B C BLDG. PARKING +15FL.			
TOTAL 165+105+120 =390 UNIT			

1 UNIT	CARPET AREA 26.44 SQ.MTS
	BUILT-UP AREA 32.21 SQ.MTS

LEGEND:-

01		DRAINAGE LINE 250 mm dia.
02		DRAINAGE LINE 150 mm dia.
03		DRAINAGE LINE 110 mm dia.
04		FLOW DIRECTION
05		SOIL WATER PIPE DOWN TAKE
06		WASTE WATER PIPE DOWNTAKE
07		RAIN WATER PIPE DOWNTAKE
08		DOMESTIC WATER PIPE RISER
09		GULLY TRAP (G.T.-300x300)
10		INSPECTION CHAMBER (IC-455x610)
11		A- TYPE MANHOLE
12		B- TYPE MANHOLE

LEGEND :

	2500 NP3. STORM WATER DRAIN
	JUNCTION CHAMBER(350X350) (CATCH PIT)
	PERCOLATION WELL (FILTER CHAMBER)

NOTE

	300 BORE WALL
	SUICE VALVE
	WATER SUPPLY LINE 150 mm dia.
	WATER SUPPLY LINE 100 mm dia.
	WATER SUPPLY LINE 80 mm dia.

ELECTRICAL LEGEND :

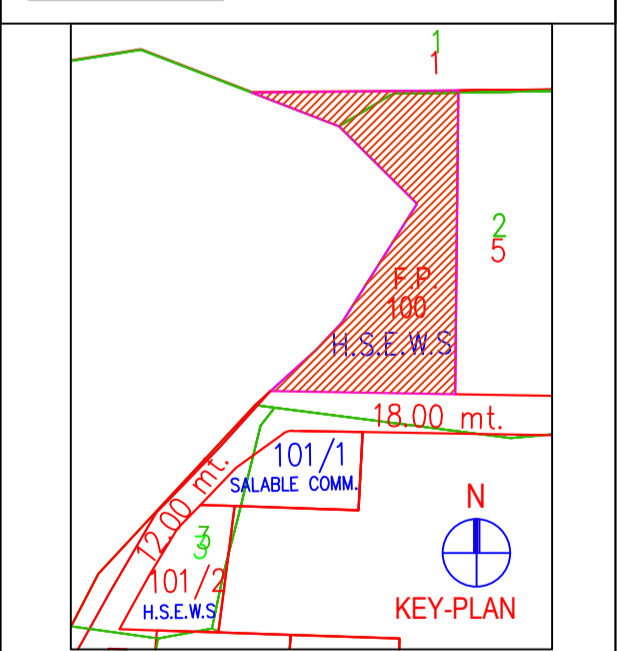
	EX.LIGHTING DISTRIBUTION BOARD
	STREET LIGHT
	STREET LIGHT CABLE
	250mm DIA. HUME PIPE @-750mm
	750mmX750mmX1000mm MANHOLE

LEGEND

	UNDER GROUND FIRE HYDRANT PIPE
	FLOW DIRECTION
	FIRE HYDRANT PIPE
	4 WAY FIRE BRIGADE INLET
	2 WAY FIRE BRIGADE INLET
	M.S. FABRICATED HOSE BOX
	HYDRANT VALVE
	BUTTERFLY VALVE
	NON RETURN VALVE
	AIR RELEASE VALVE
	FIRE HYVALVE & WASH PIPE
	HOSE REEL
	FOOT VALVE
	Y STRAINER
	ON/OFF SWITCH
	FIRE ALARM SWITCH
	FIRE ALARM CONTROL PANEL
	DIESEL PUMP 136.8 MS/MR (2280 LPM) & 70M HEAD
	MAIN PUMP 136.8 MS/MR (2280 LPM) & 70M HEAD
	JOCKEY PUMP 10.8 MS/MR (180 LPM) & 70M HEAD
	POWDER TYPE (FIRE EXTINGUISHER)
	CO2 TYPE (FIRE EXTINGUISHER)

LEGEND

	GARDEN
	PAVER BLOCK
	C.C.ROAD



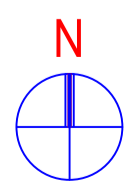
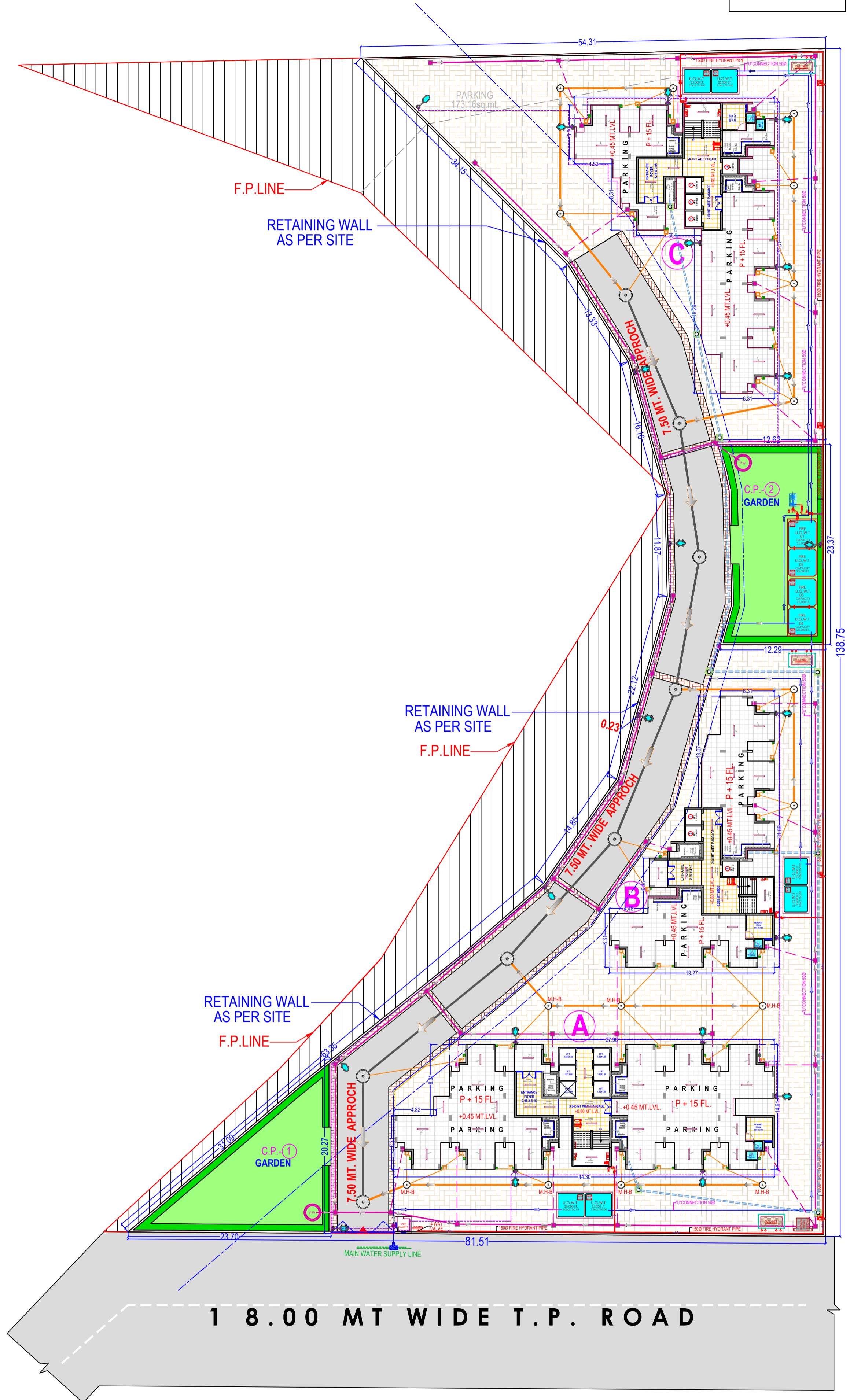
NO.	DATE	REVISED DETAIL
1	04-10-2016	CHANGE LAYOUT PLAN AS PER INCREASES OF 9.0 MT. WIDE MARGIN @ NEAR KHADI.

REVISION :	07-10-2016	DATE :	23-06-2016
SCALE : N. T. S			

INFRASTRUCTURE LAYOUT PLAN  
PROJECT: PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

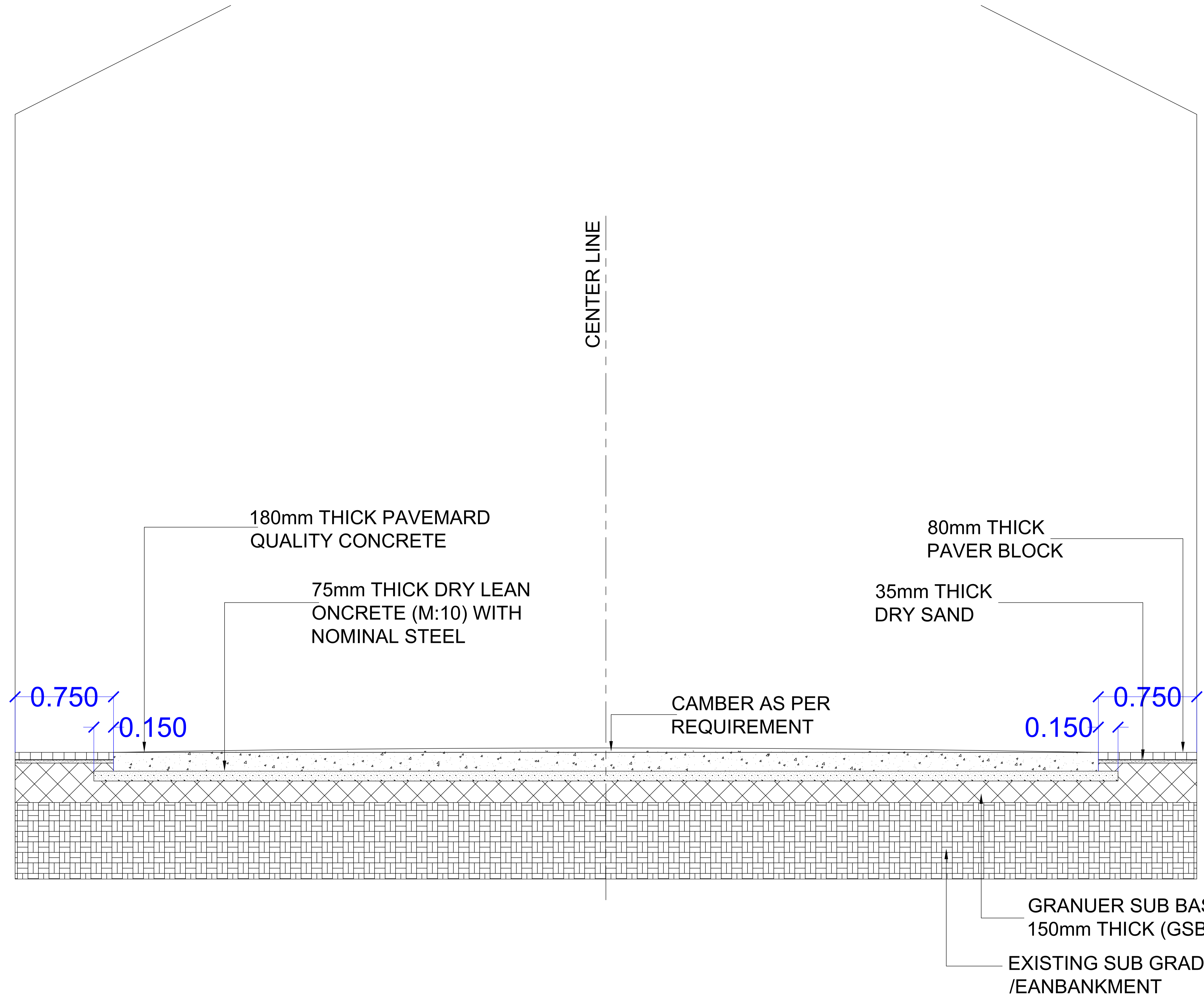
**JAYESSH A DALAL**  
PROJECT MANAGEMENT CONSULTANT

DRAWN BY	CHECK BY	SHEET NO	14 Y 16
SALMAN	B.S.PATEL	A-01	

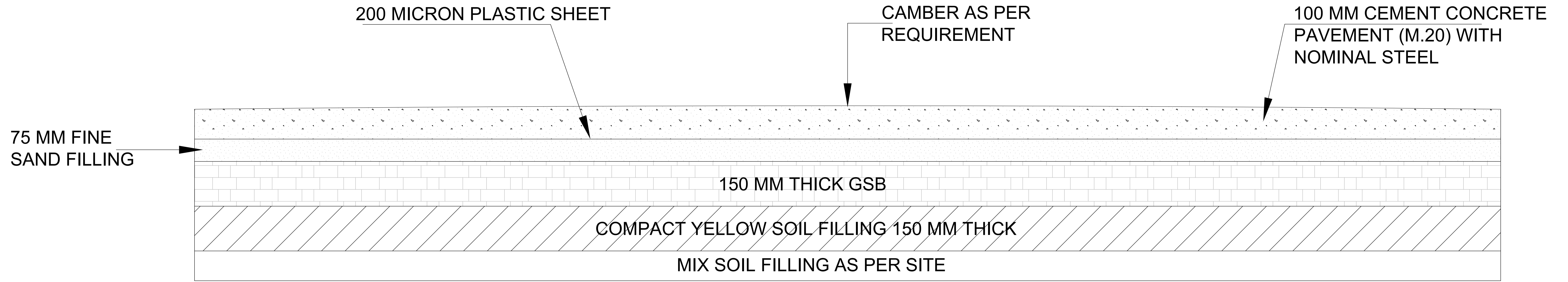




# SECTIONAL DETAIL FOR ROAD

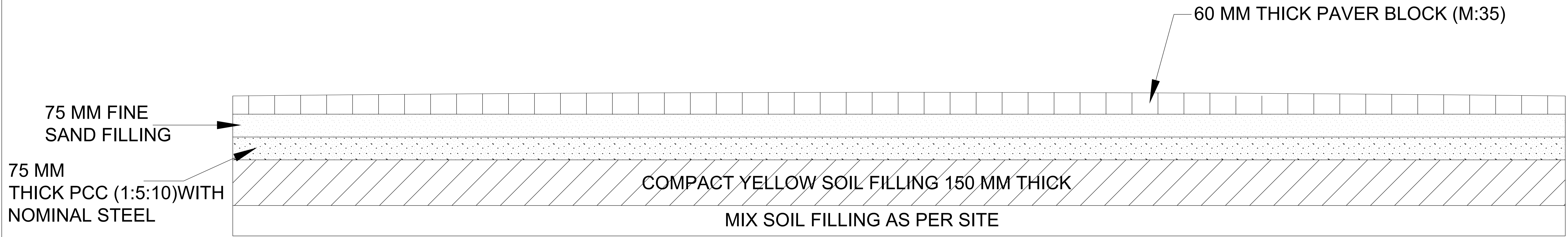


TENDER COPY FOR REFERENCE ONLY				<b>DRAWING TITLE:</b> <b>SECTIONAL DETAIL FOR ROAD</b>	REVISION :	DATE : 10-08-2016	
CLIENT	CONTRACTOR	P.M.C.	T.P.I.		SCALE : N. T. S		
					<b>SECTIONAL DETAIL FOR ROAD</b>		
ISSUE DATE -		SIGN -			PROJECT: PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.		
WORKING:-					JAYESSH A DALAL PROJECT MANAGEMENT CONSULTANT <small>*JALARAM SHAKTI*, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALINES,SURAT.</small>		
<b>SECTIONAL DETAIL FOR ROAD</b>				DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-08	14 Y 16



**NOTE:**  
At Every 4.00 Mt. place 25 mm Deep Grove

### Section Detail For V.D.S.

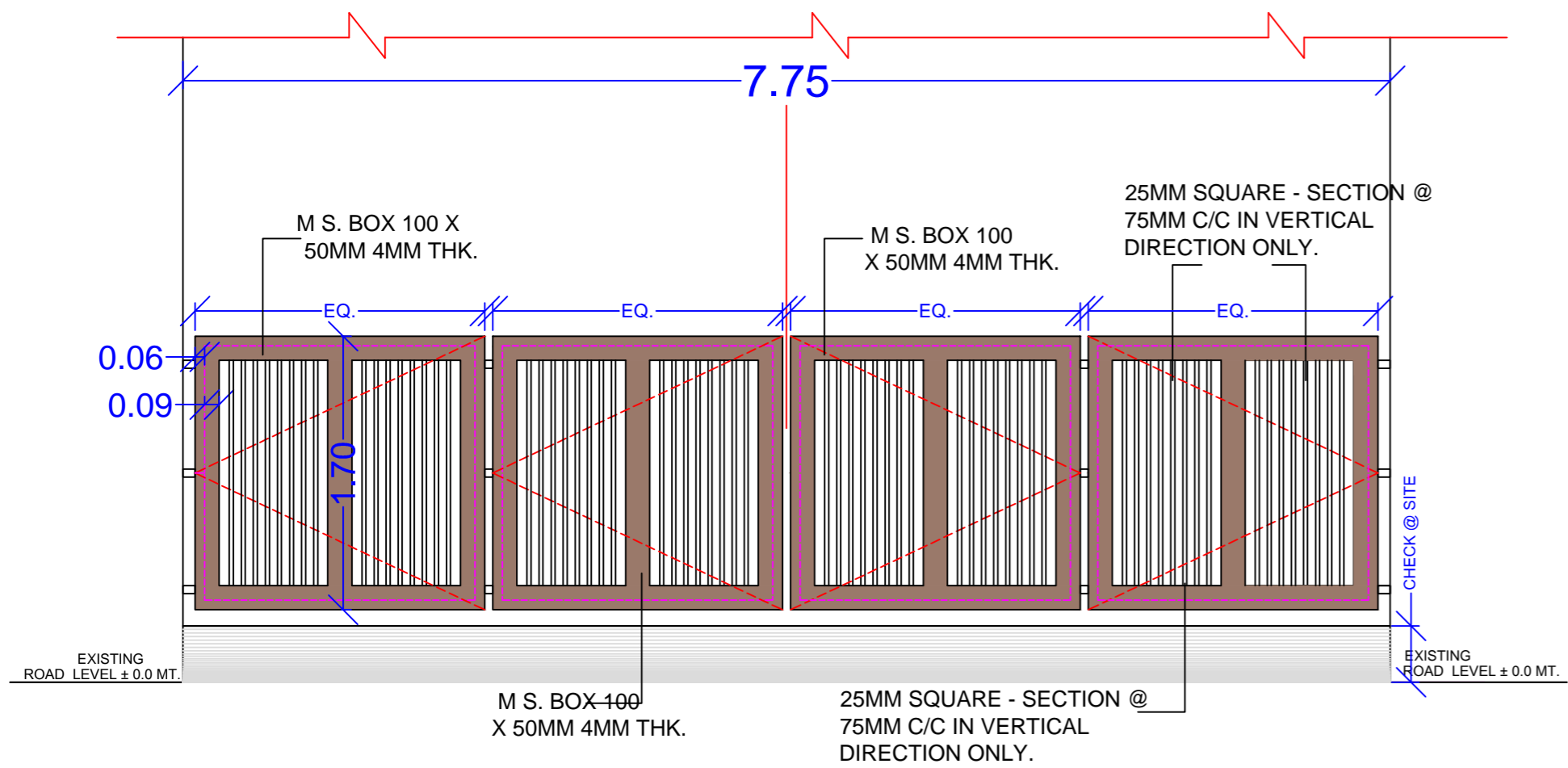


### Section Detail For Paver Block

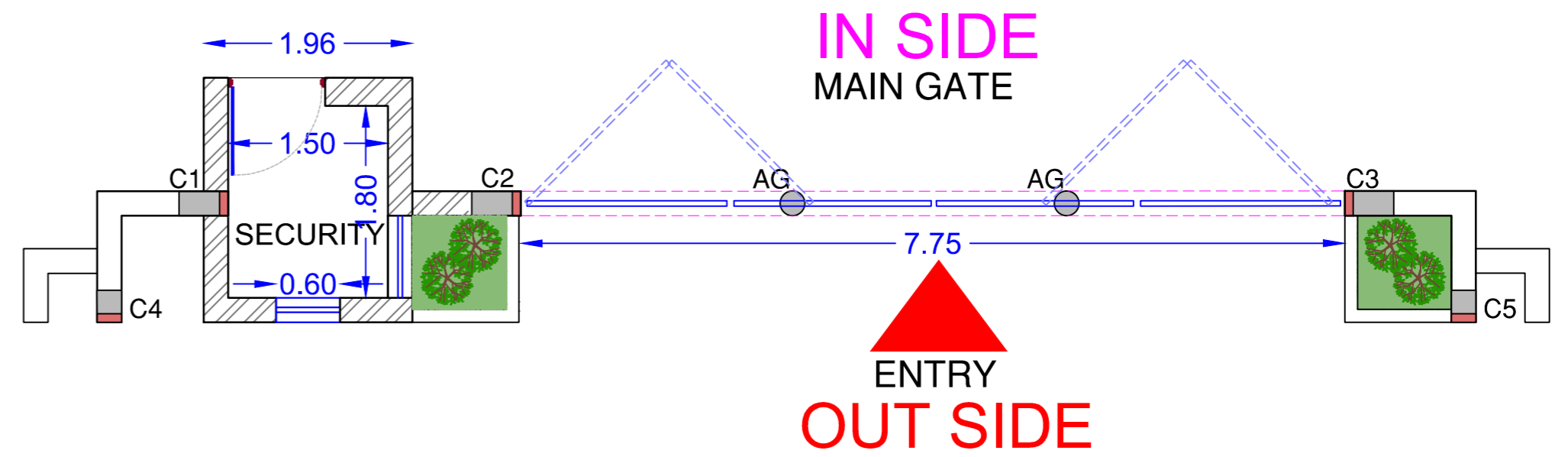
TENDER COPY FOR REFERENCE ONLY			
CLIENT	CONTRACTOR	P.M.C.	T.P.I.
ISSUE DATE -		SIGN -	
<b>WORKING:-</b> <b>SECTIONAL DETAIL FOR V.D.S. &amp; PAVER BLOCK</b>			

**DRAWING TITLE:**  
**SECTIONAL DETAIL FOR V.D.S. & PAVER BLOCK**

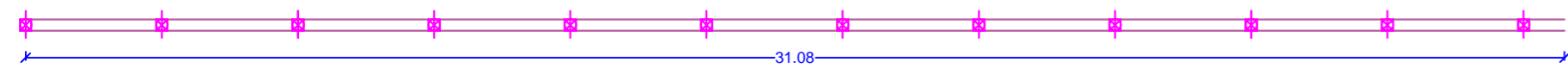
REVISION :	DATE : 10-08-2016
SCALE : N. T. S	
<b>V.D.S. &amp; PAVER SECTION DETAIL.</b>	
PROJECT: PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.	
<b>JAYESSH A DALAL</b> PROJECT MANAGEMENT CONSULTANT <small>*JALARAM SHAKTI*, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALINE,SURAT.</small>	
DRAWN BY B.S.PATEL	CHECK BY
SHEET NO A-09	14 Y 16



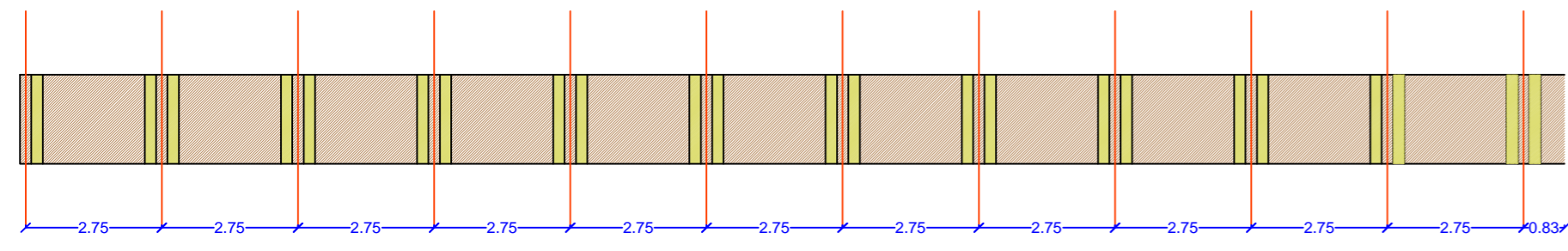
**M.S GATE DETAIL**



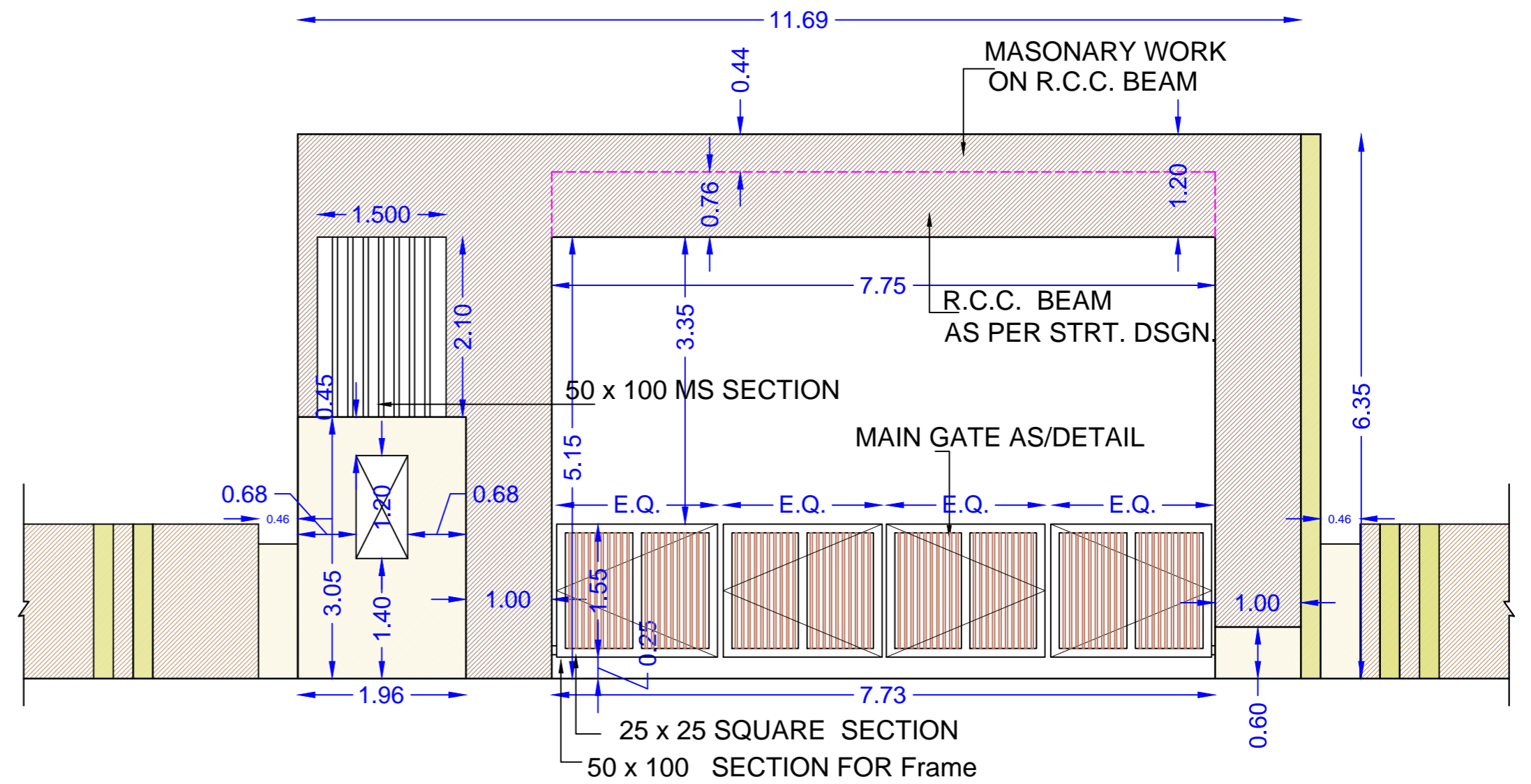
**PART PLAN @ FRONT SIDE**



**PART PLAN @ D SIDE**



**PART ELEVATION @ D SIDE**



**PART ELEVATION @ FRONT SIDE**

**COMPOUND WALL DETAIL.**

**DRG. TITLE:-**  
**COMPOUND WALL & MAIN GATE DETAIL.**

TENDER COPY FOR REFERENCE ONLY			
CLIENT	CONTRACTOR	P.M.C.	T.P.I.
ISSUE DATE -		SIGN -	
WORKING:-			
<b>COMPOUND WALL &amp; MAIN GATE DETAIL.</b>			

REVISION :	DATE : 10-08-2016
SCALE : N. T. S	
<b>COMPOUND WALL &amp; MAIN GATE DETAIL.</b>	
PROJECT: PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.	
<b>JAYESSH A DALAL</b> <b>PROJECT MANAGEMENT</b> <b>CONSULTANT</b>	
<small>*JALARAM SHAKTI, BESIDE DHAWALGIRI APARTMENT, NRI LOURD'S CONVENT SCHOOL,ATHWALNES,SURAT.</small>	
DRAWN BY B.S.PATEL	CHECK BY
SHEET NO A-08	14 Y 16

# PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

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CLIENT	CONTRACTOR	P.M.C.	T.P.I.
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ISSUE DATE -	SIGN -
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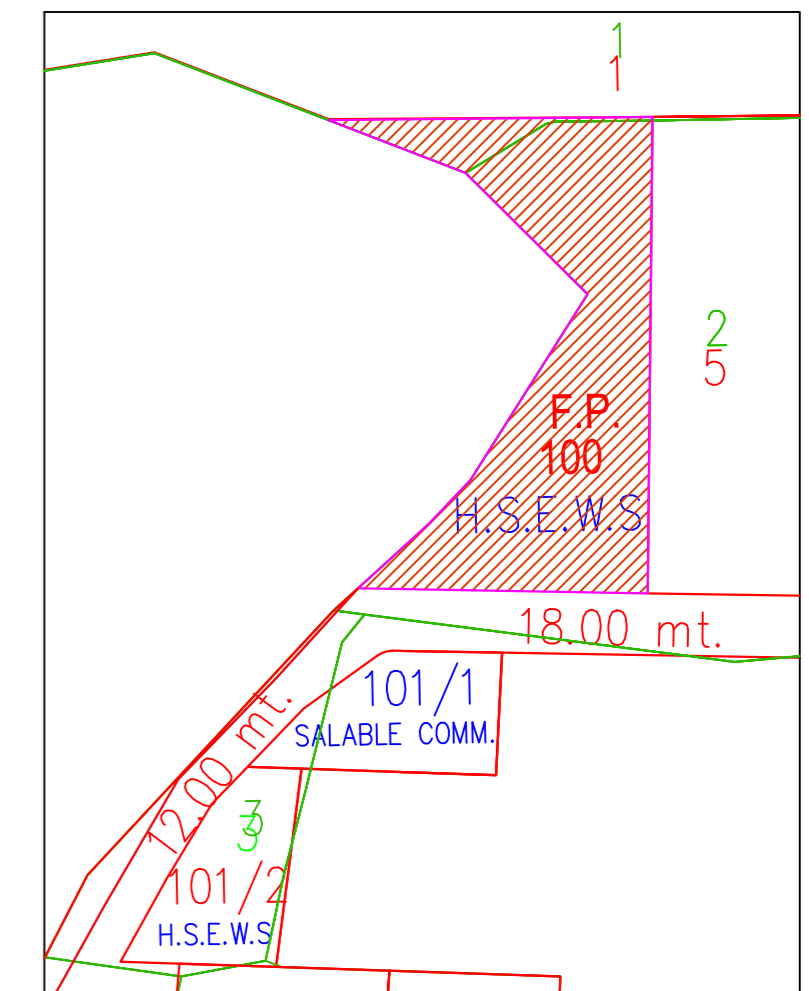
**WORKING:-**

**MANHOLE DETAIL DRG.**

FOR INFRASTRUCTURE  
LAY OUT PLAN

**MANHOLE**

- M.H-A MANHOLE - A TYPE
- M.H-B MANHOLE - B TYPE



**KEY-PLAN**

REVISION : DATE : 10-08-2016

SCALE : N. T. S

**MANHOLE DETAIL DRG.**

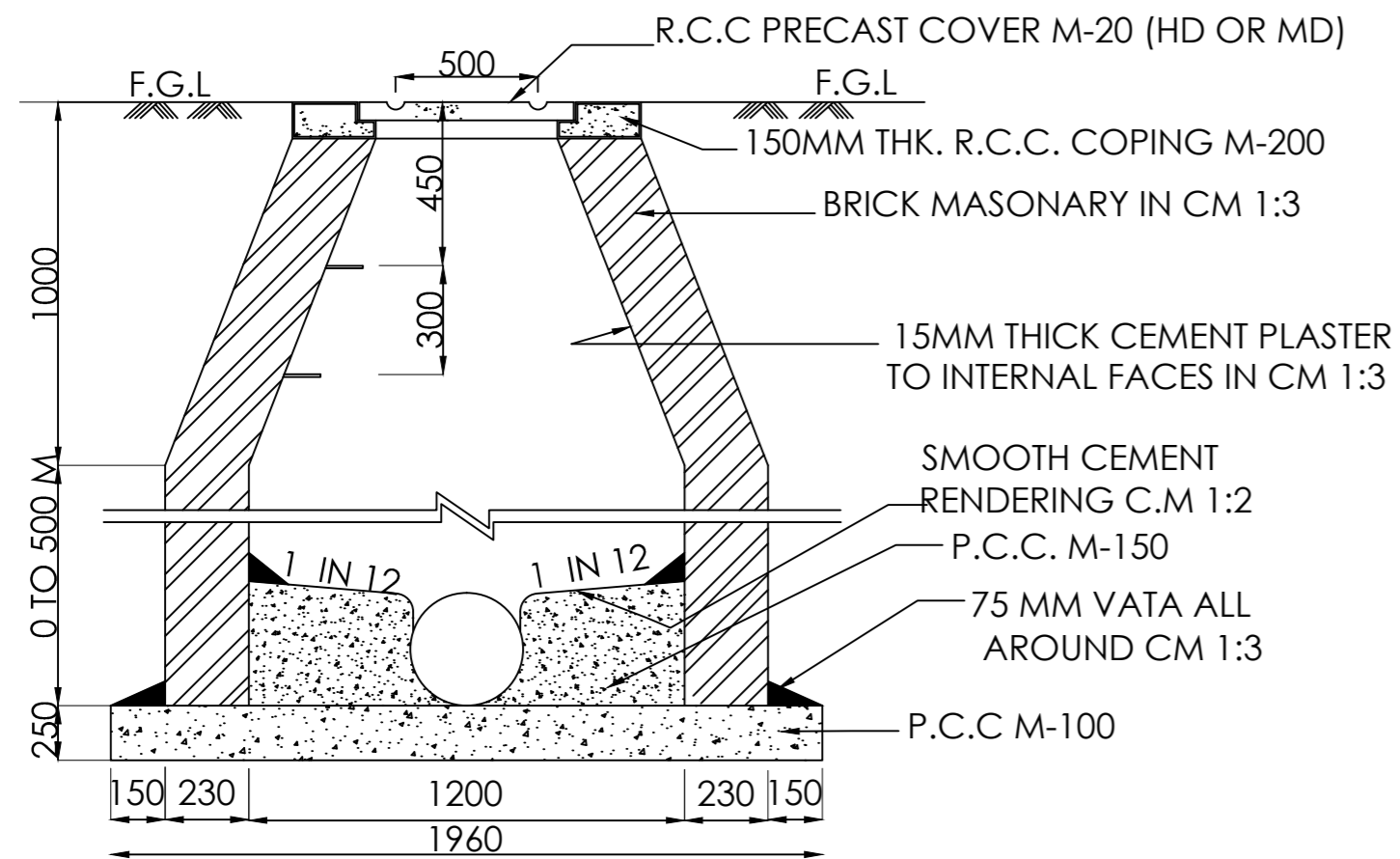
PROJECT : PROPOSED EWS-I TYPE HOUSING AT  
F.P.100, T.P.-19 (PARVAT-MAGOB),SURAT.

**JAYESSH A DALAL**  
PROJECT MANAGEMENT  
CONSULTANT

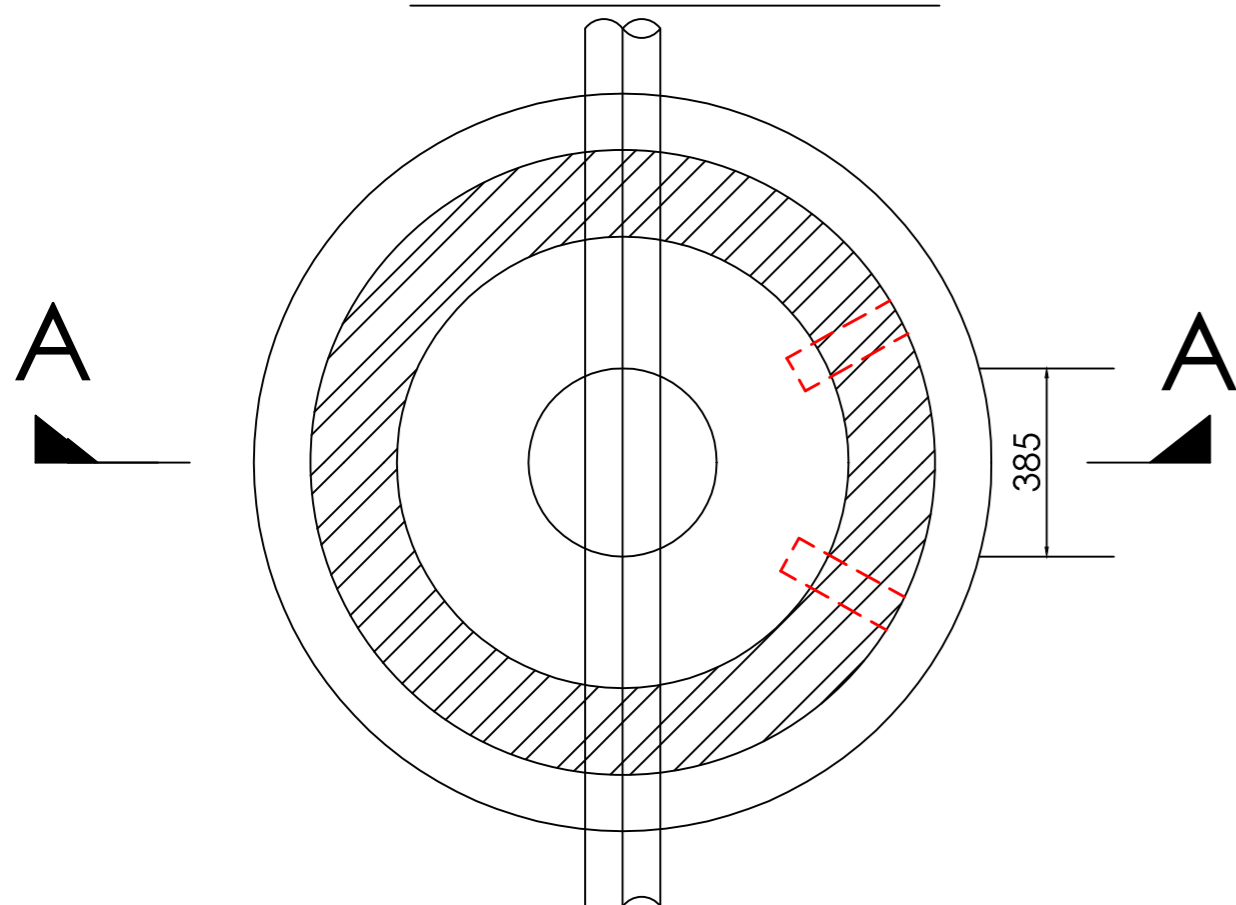


DRAWN BY B.S.PATEL	CHECK BY	DWG NO A-0-01	14-Y-16
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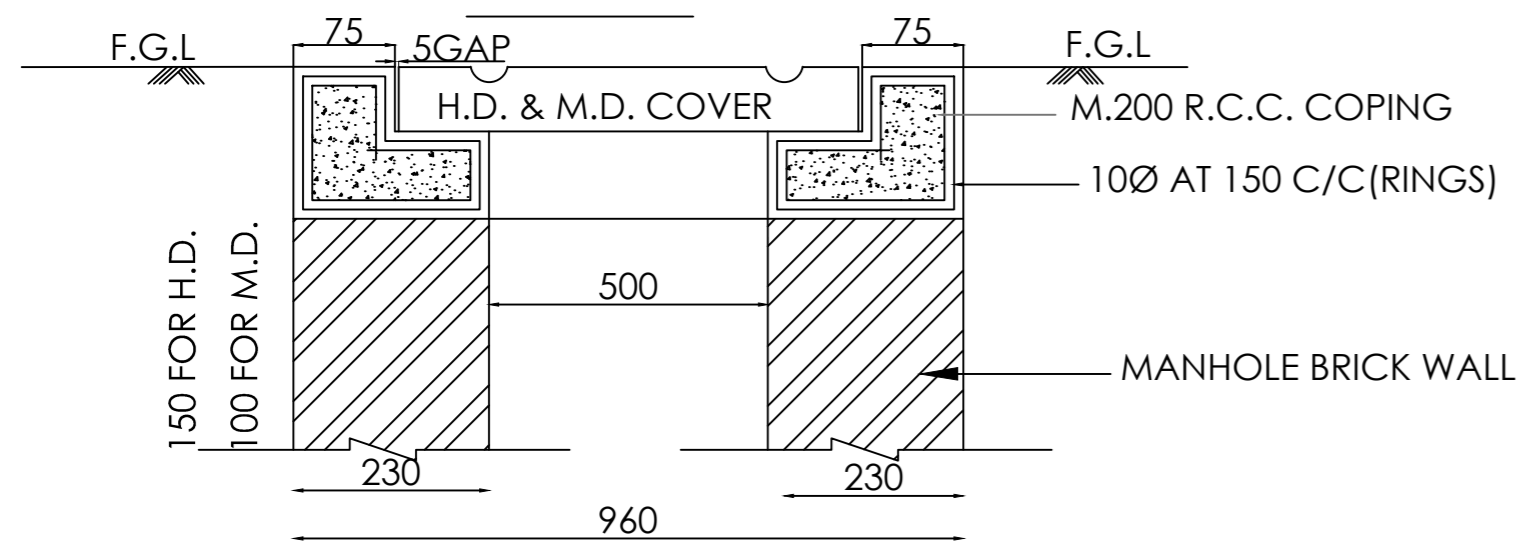
## MANHOLE - A TYPE



**SECTION-AA**



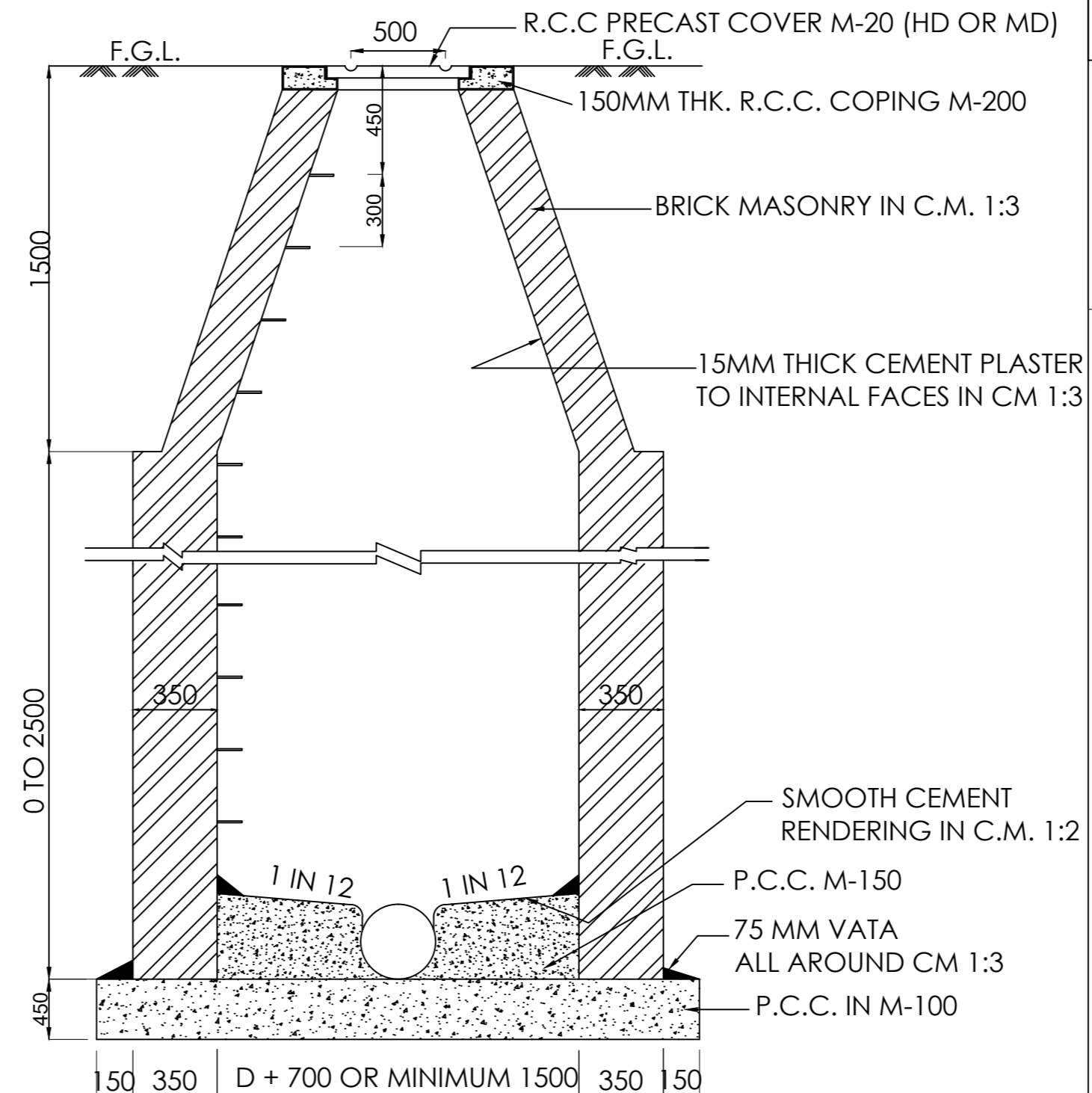
**PLAN**



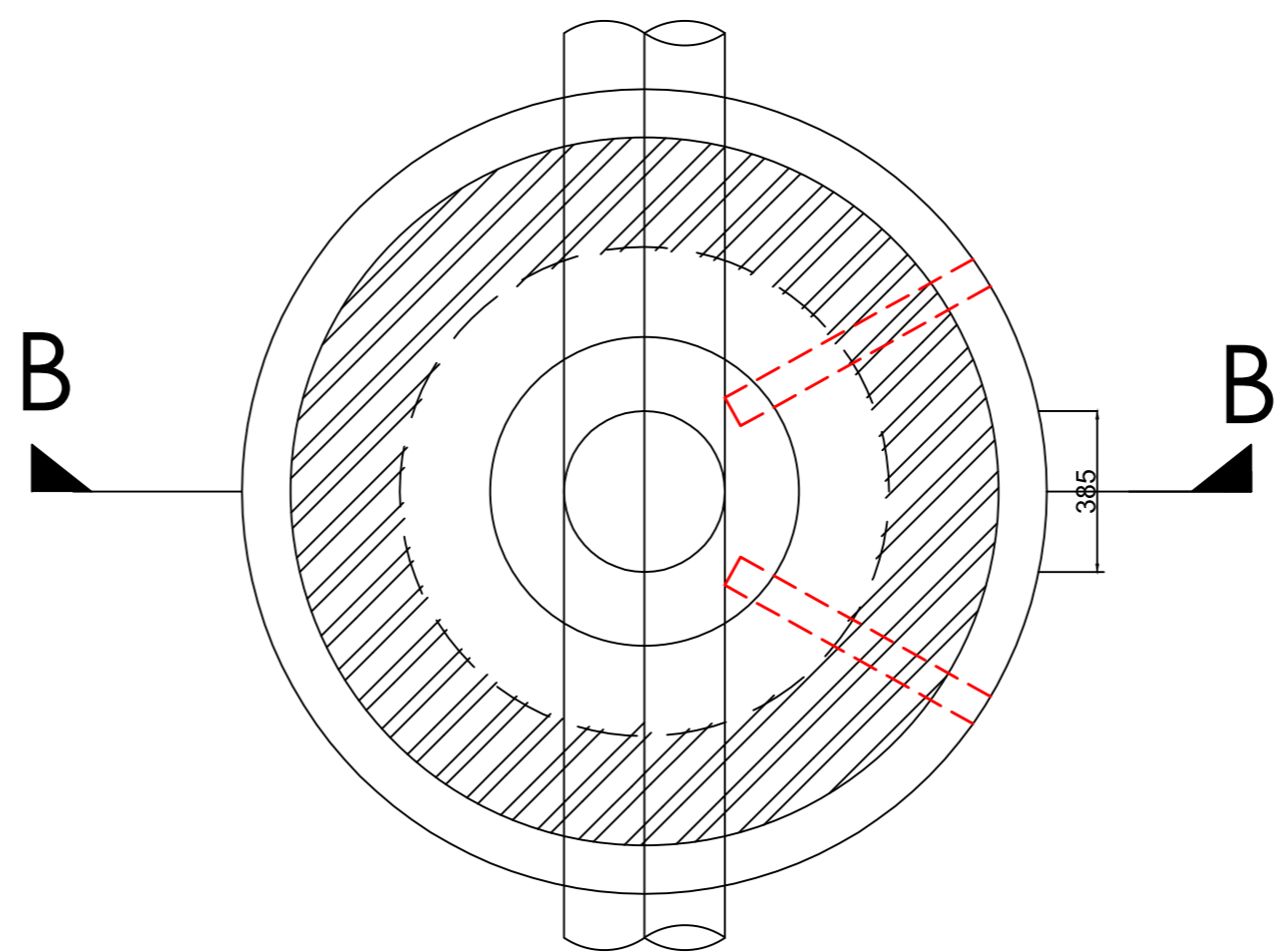
### DETAILS OF R.C.C. COPING M-200

DETAILS OF MANHOLE TYPE-A (CIRCULAR) DEPTH UPTO 1.5 M & PIPE  
DIA. 150 - 500 MM

## MANHOLE - B TYPE



**SECTIONA-BB**

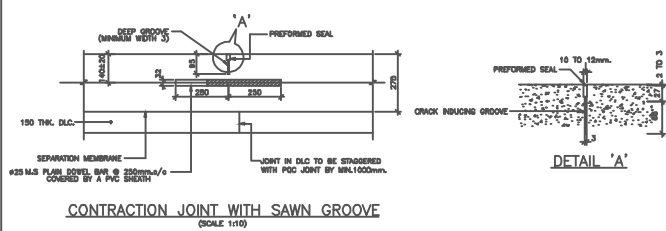


**PLAN**

DETAILS OF MANHOLE TYPE-B (CIRCULAR)  
DEPTH ABOVE 1.5M & UPTO 4.0M FOR DIA. 150-1000MM

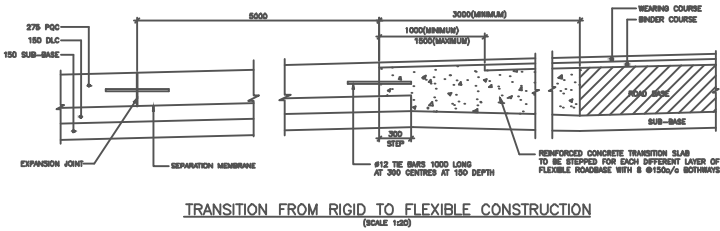
PROPOSED EWS-I TYPE HOUSING AT F.P.100, T.P.-19 (PARVAT-MAGOB), SURAT.

TENDER COPY FOR REFERENCE ONLY



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE DOWEL BARS SHALL BE PLACED AT 250mm CENTERS, THIS SPACING SHALL BE VARIED WHERE NECESSARY SO THAT NO DOWEL BAR IS WITHIN 150 OF A SLAB EDGE OR A JOINT PARALLEL TO THE BARS.
3. CONTRACTION JOINTS SHALL BE PLACED AT 4000 CENTRES.
4. DOWEL BARS TO BE COVERED BY THIN PLASTIC SHEATH FOR MINIMUM OF 2/3 LENGTH FROM ONE END.



NOTE:

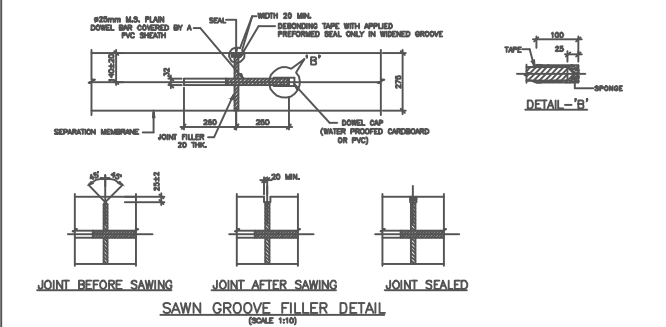
DEPTH OF TRANSITION SLAB SHALL NOT BE LESS THAN 300mm. IF NECESSARY, LAST BAY OF THE RIGID PAVEMENT SHALL BE TAPERED TO MATCH SO THAT THE SUB BASE SURFACE LEVEL IS CONTINUOUS WITHOUT STEPS.

CLIENT	CONTRACTOR	P.M.C.	T.P.I.
ISSUE DATE -		SIGN -	

**SUBJECT:**  
**TYPICAL DETAIL OF CONCRETE PAVEMENT & JOINTS**

NOTES:

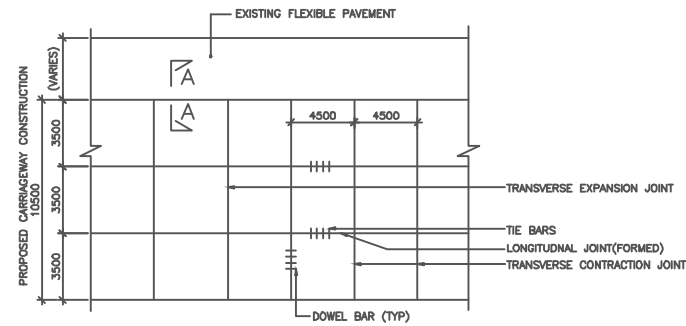
1. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS ARE IN METRES, UNLESS OTHERWISE STATED.
2. DIMENSIONS SHALL NOT BE SCALED OFF FROM THE DRAWING.
3. THE TRANSVERSE CONSTRUCTION JOINTS WILL BE LOCATED AT THE STRUCTURES AS DIRECTED BY THE ENGINEER. CONSTRUCTION JOINT SHALL BE PROVIDED AT 99m OR AT THE END OF DAY'S WORK, WHICHEVER IS LESS. ALSO, IF THERE IS A STOPPAGE OF POURING FOR MORE THAN 30 MIN., CONSTRUCTION JOINT SHALL BE PROVIDED.
4. CONCRETE GRADE FOR PAVEMENT SHALL BE M-40.
5. CONCRETE SHALL ACHIEVE A MIN. 28 DAYS FLEXURAL STRENGTH OF 45 kg/cm. PREFORMED ELASTOMERIC JOINT SEALS USING POLYSULPHIDE OR POLYURETHANE AS THE ONLY BASE POLYMER SHALL BE USED IN JOINTS. THE MATERIAL AND THE MANUFACTURE SEAL SHALL CONFORM TO ASTM D 2628 (AND CRD C548).
6. LONGITUDINAL JOINT SHALL BE FORMED JOINT.
7. PAVING SHALL BE DONE IN THREE LONGITUDINAL POURS, (MAXIMUM).



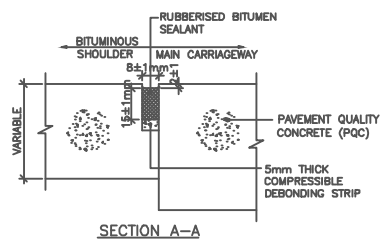
NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE DOWEL BARS SHALL BE PLACED AT 250mm CENTERS, THIS SPACING SHALL BE VARIED WHERE NECESSARY SO THAT NO DOWEL BAR IS WITHIN 150 OF A SLAB EDGE OR A JOINT PARALLEL TO THE BARS.
3. DOWEL BARS TO BE COVERED BY THIN PLASTIC SHEATH FOR MINIMUM OF 1/2 LENGTH PLUS 50 mm.

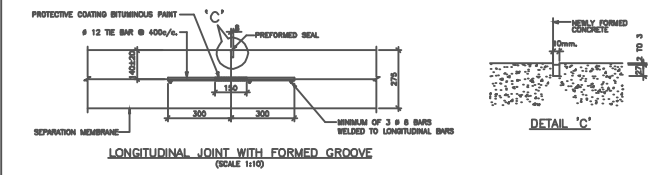
TRANSVERSE CONSTRUCTION JOINT/EXPANSION JOINT



PAVEMENT JOINT PLAN



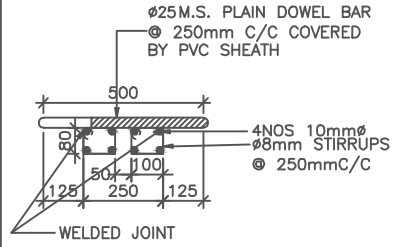
SEALING DETAIL OF LONGITUDINAL JOINT BETWEEN CONCRETE PAVEMENT & FLEXIBLE PAVEMENT



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. LONGITUDINAL JOINTS SHALL BE CONSTRUCTED AND SEALED IN ACCORDANCE WITH THE SPECIFICATION. THE BAR SPACING SHALL BE 400mm M/A. NO TIE BAR SHALL BE PLACED WITHIN 300mm OF A CONTRACTION JOINT.
3. LONGITUDINAL JOINTS SHALL BE PLACED AS SHOWN ON DRAWING OR AS DIRECTED BY THE ENGINEER.

LONGITUDINAL JOINTS (BETWEEN TWO LANES)



DETAILS OF CRADLE ASSEMBLY FOR DOWEL BAR

**PROJECT:**  
**CONSTRUCTION OF CEMENT CONCRETE PAVEMENT AND ALLIED WORKS IN VARIOUS SOCIETY ROADS WITHIN SURAT CITY LIMIT.**  
(For finalisation of Unit for entire year or till further notice)

**DRG. NO:**  
**DATE:**  
**SCALE:**

**JAYESSH A DALAL**  
**PROJECT MANAGEMENT**  
**CONSULTANT**



\*JALAM SHAKTI, BESEDE DHAWALGIR APARTMENT, NR. LOURDS CONVENT SCHOOL, ATHWALNES, SURAT.



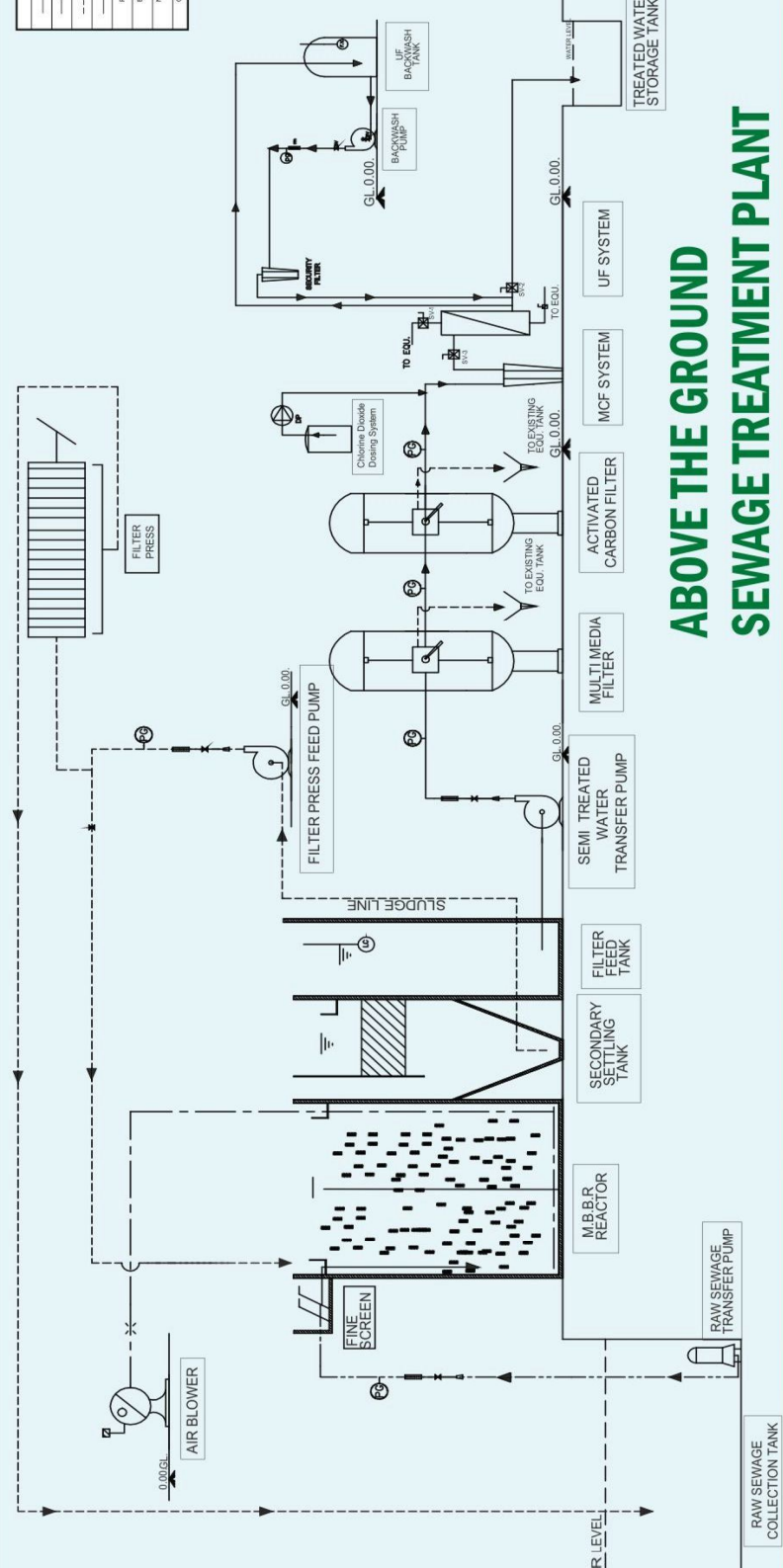
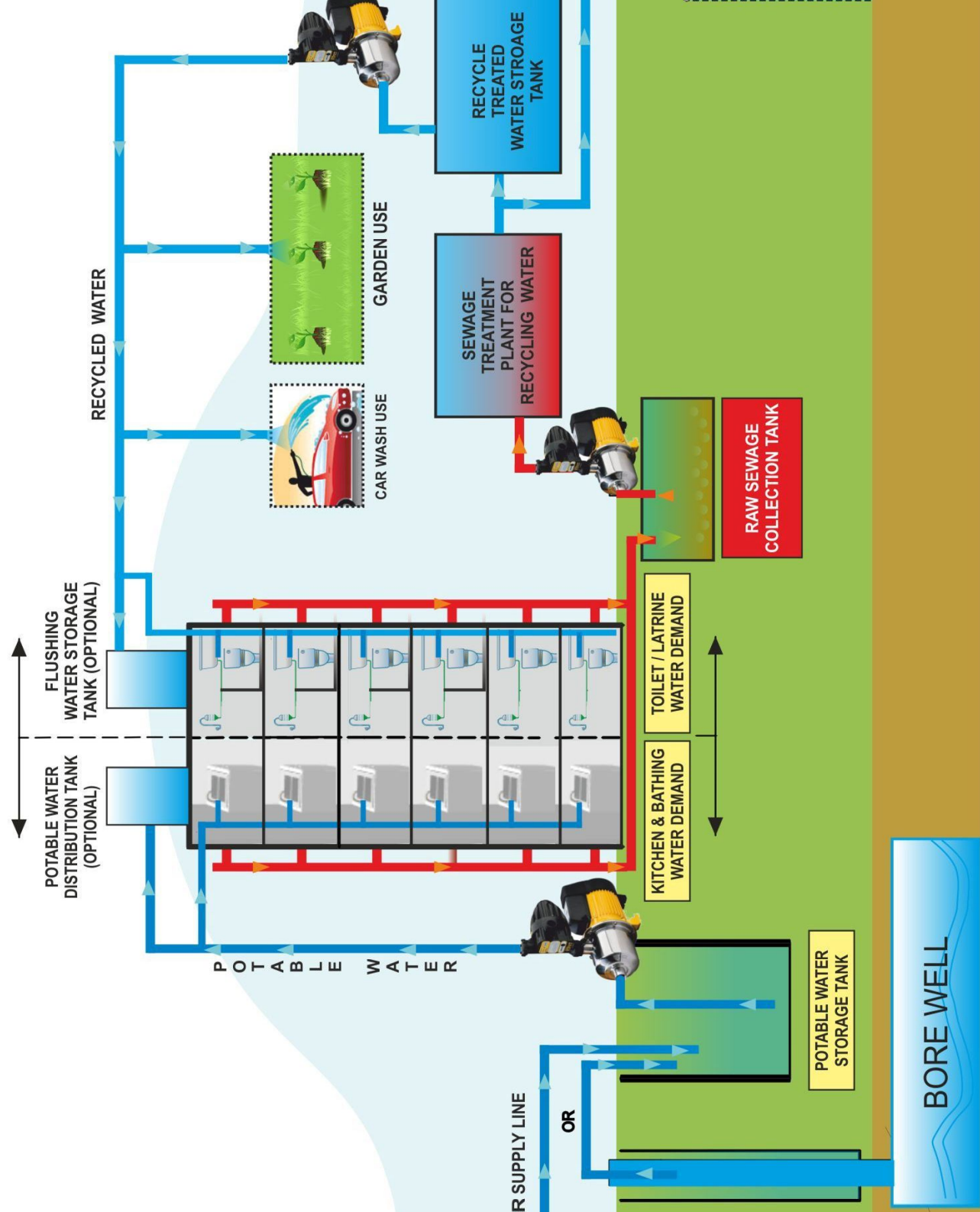


PROPOSED  
SITE

Dindoli

ROAD WITH UTILITY LINES

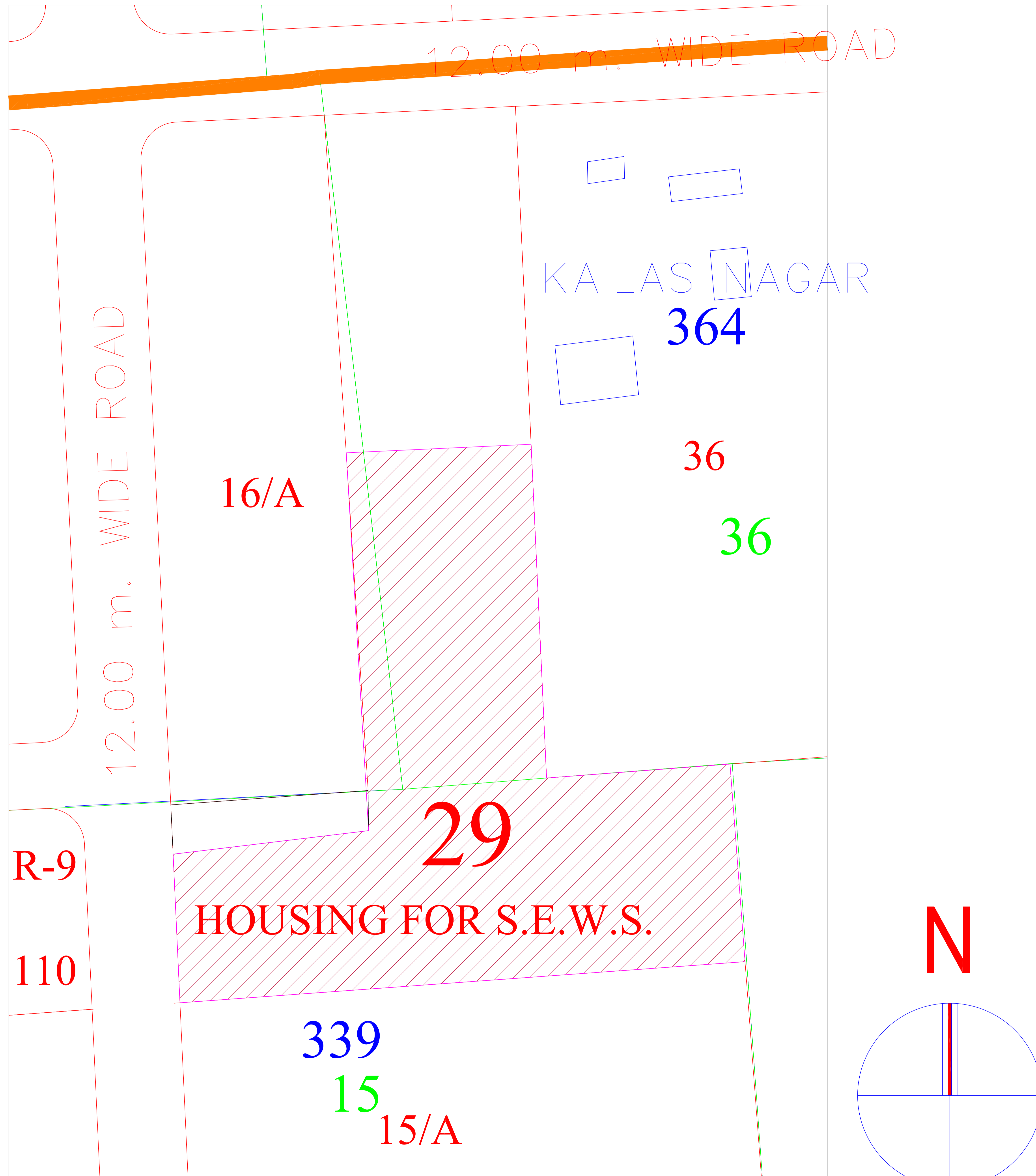
(PROPOSED) SITE WITH HOUSING



# ABOVE THE GROUND SEWAGE TREATMENT PLANT



# PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.



## KEY-PLAN

TENDER COPY FOR REFERENCE ONLY

CLIENT	CONTRACTOR	P.M.C.	T.P.I.
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ISSUE DATE -	SIGN -
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WORKING:-

**KEY PLAN**

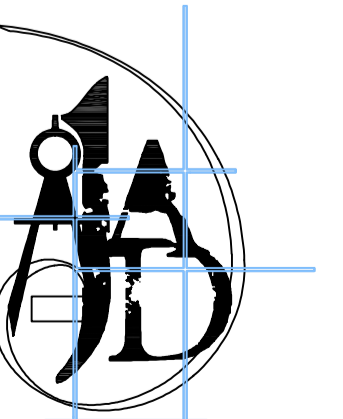
REVISION :	DATE :10-08-2016
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SCALE : N. T. S	
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**KEY PLAN**

PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

JAYESH A DALAL  
PROJECT MANAGEMENT  
CONSULTANT

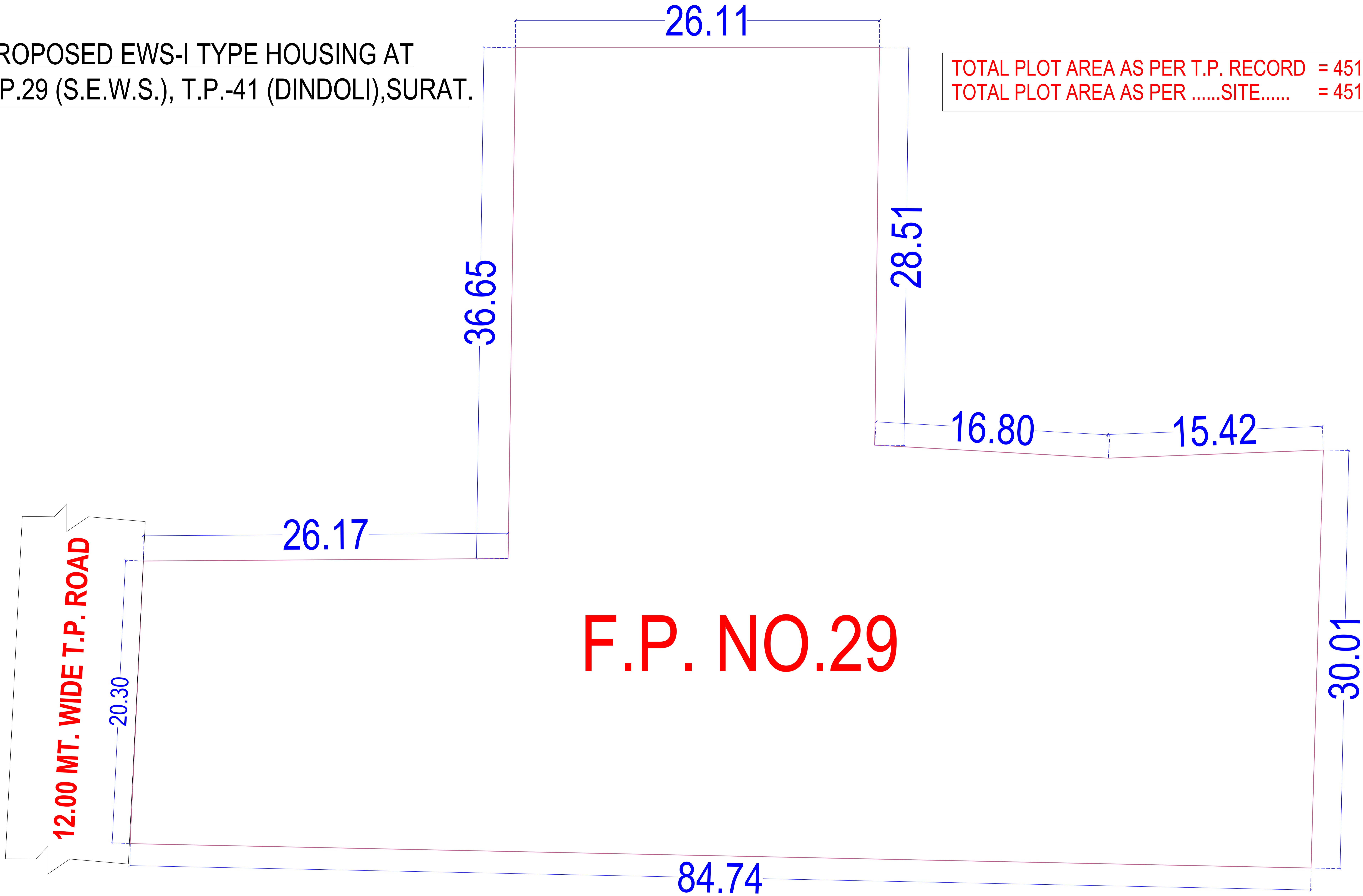


"JALARAM SHAKTI", BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALNES,SURAT.

DRAWN BY B.S.PATEL		SHEET NO 01	14 Y 16
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PROPOSED EWS-I TYPE HOUSING AT  
F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

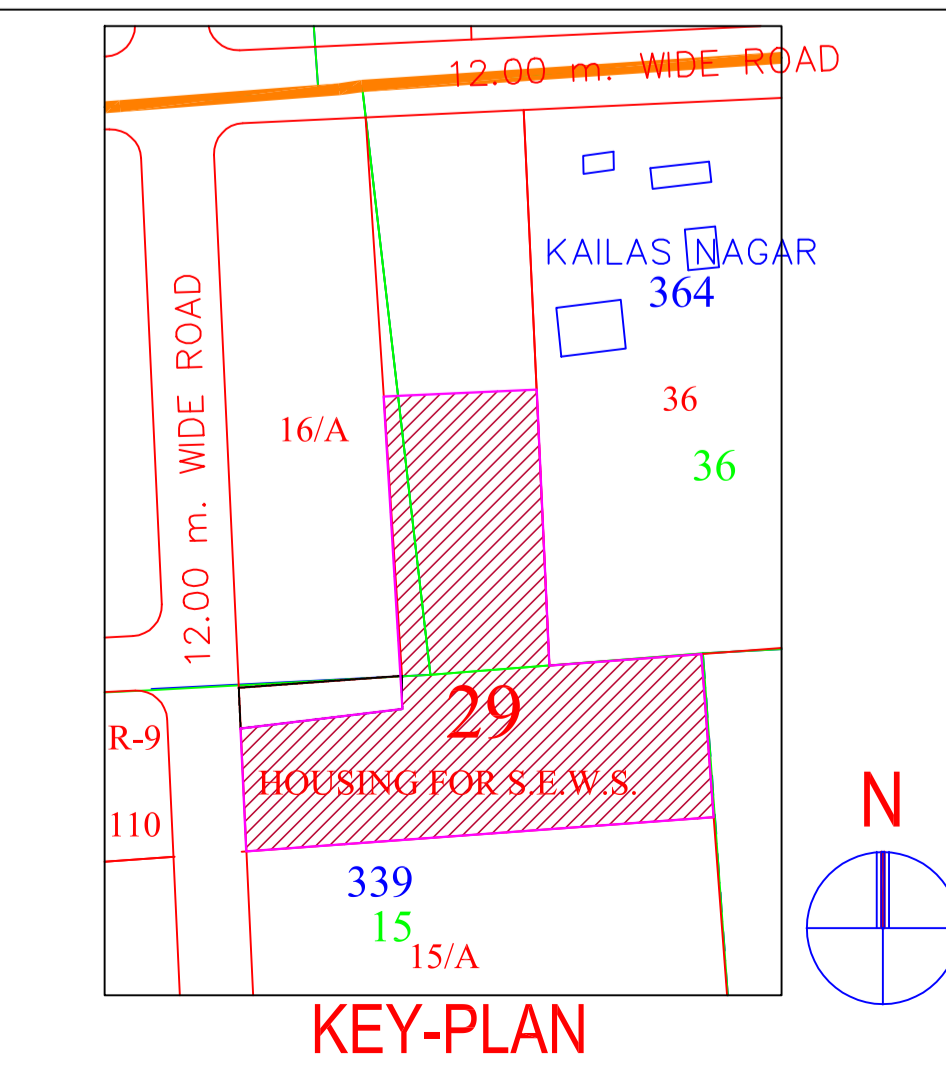
TOTAL PLOT AREA AS PER T.P. RECORD = 4515.00 SQ.MTS.  
TOTAL PLOT AREA AS PER .....SITE..... = 4515.00 SQ.MTS.



**F.P. NO.29**

**LAYOUT PLAN**

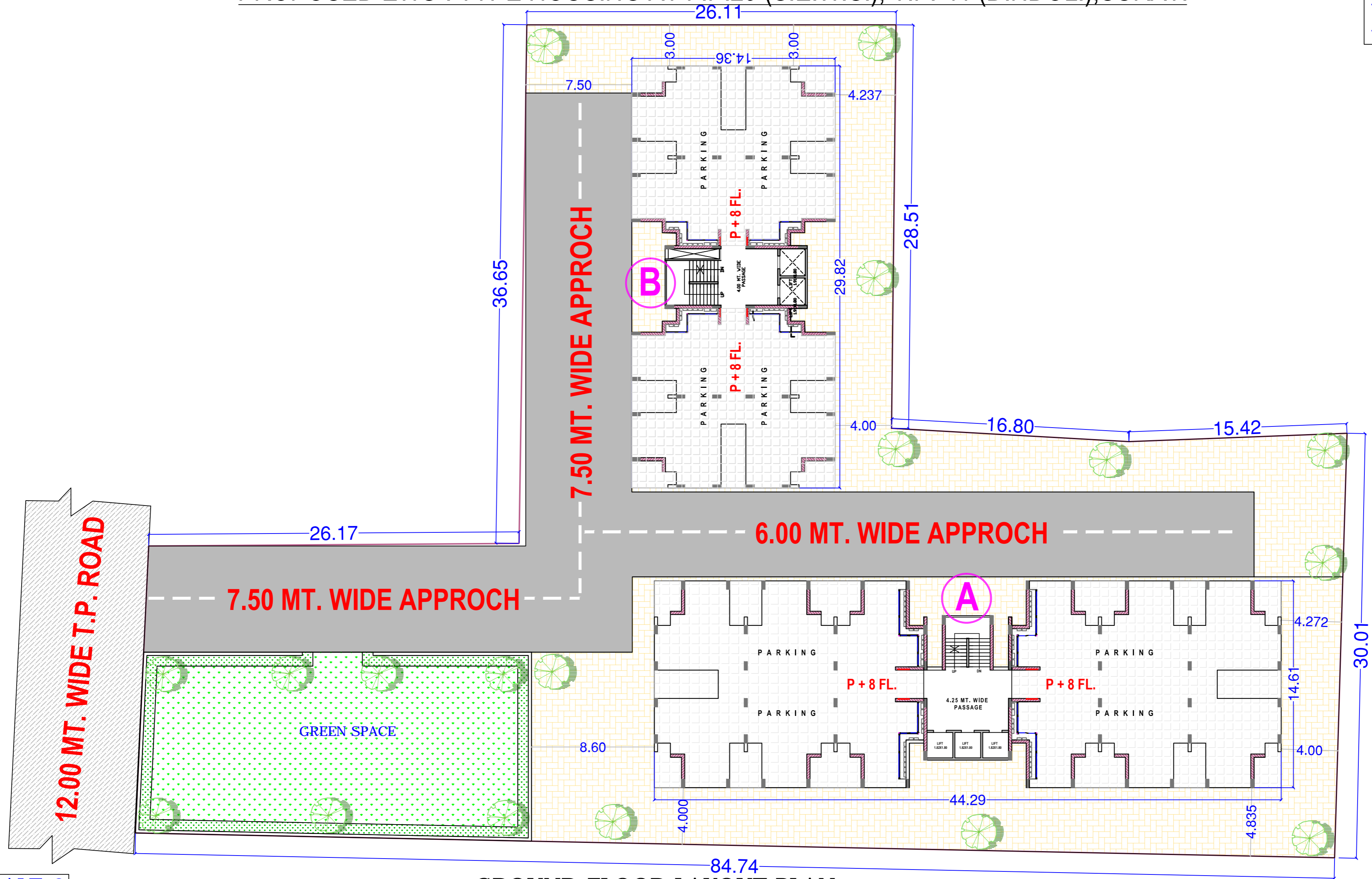
TENDER COPY FOR REFERENCE ONLY			
CLIENT	CONTRACTOR	P.M.C.	T.P.I.
ISSUE DATE -		SIGN -	
WORKING:-			
<b>LAYOUT PLAN</b>			



REVISION :	DATE : 10-08-2016
SCALE :	
<b>LAYOUT PLAN</b>	
PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.	
<b>JAYESSH A DALAL</b> PROJECT MANAGEMENT CONSULTANT	
DRAWN BY B.S.PATEL	CHECK BY
SHEET NO A-01	
14 Y 16	

PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

E.W.S - I



ALT-2

GROUND FLOOR LAYOUT PLAN

PRESENTATION DWG.

LAYOUT PLAN

GROUND FLOOR

BLDG. PLAN PARKING + 8FL.

A & B BLDG.

- 1. A BLDG. = 96 UNIT
- 2. B BLDG. = 64 UNIT
- TOTAL = 160 UNIT

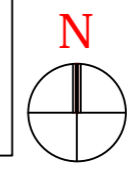
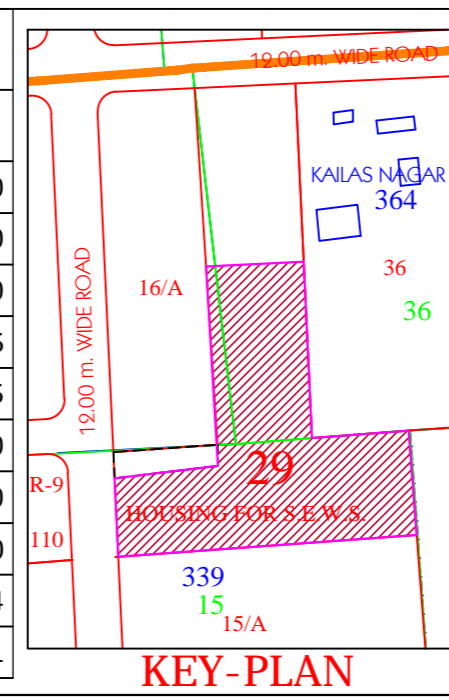
CARPET AREA 26.44 SQ.MTS

BUILT-UP AREA 32.21 SQ.MTS

FLOOR	A-TYPE				B-TYPE			TOTAL		
	No. of flat per floor	BUILT UP AREA	F.S.I. AREA	F.S.I. AREA	No. of flat per floor	BUILT UP AREA	F.S.I. AREA	TOTAL BUILT UP AREA	TOTAL F.S.I. AREA	Total no of flat
GR. FL.	-	494.00	PARKING		-	324.15	PARKING	818.15	-	-
1ST FL.	12	494.00	448.15		8	324.15	288.30	818.15	736.45	20
2nd FL.	12	494.00	448.15		8	324.15	288.30	818.15	736.45	20
3rd FL.	12	494.00	448.15		8	324.15	288.30	818.15	736.45	20
4th FL.	12	494.00	448.15		8	324.15	288.30	818.15	736.45	20
5th FL.	12	494.00	448.15		8	324.15	288.30	818.15	736.45	20
6th FL.	12	494.00	448.15		8	324.15	288.30	818.15	736.45	20
7th FL.	12	494.00	448.15		8	324.15	288.30	818.15	736.45	20
8th FL.	12	494.00	448.15		8	324.15	288.30	818.15	736.45	20
STAIRCABIN & LIFT MACHINE	-	126.88	-		-	89.32	-	216.20		
TOTAL	96	4572.88	3585.20		64	3006.67	2306.40	7579.55	5891.60	160

PROJECT SUMMERY ( T.P.41-DINDOLI) F.P. 29(S.E.W.S.)

DESCRIPTION	F.P. 29, T.P.41
PLOT AREA AS PER RECORD	4515.00
PLOT AS PER SITE	4515.00
PERMISSIBLE F.S.I. (4515.00 X 3.00)	13545.00
PROPOSED GROUND FL. BUILT UP AREA	818.15
PROPOSED TOTAL BUILT UP	7579.55
PROPOSED F.S.I.	5891.60
BALCNCE F.S.I.	7653.40
NOS. OF FLAT	160
CARPET AREA OF UNIT	26.44
B.UP AREA OF UNIT	32.21



REVISION :  
SCALE : N. T. S.

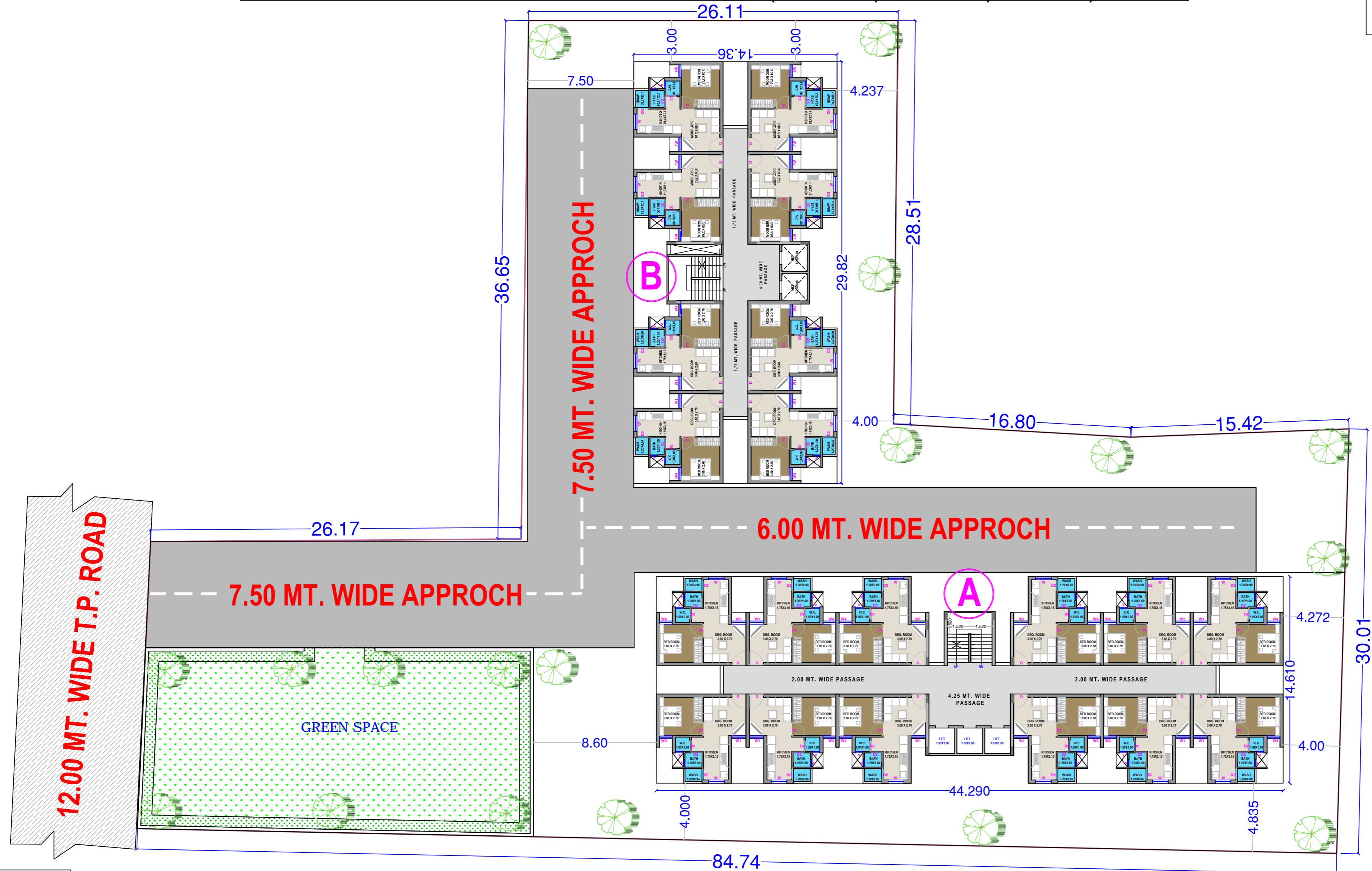
DATE : 28-06-2016  
PROJECT: PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

JAYESSH A DALAL  
PROJECT MANAGEMENT CONSULTANT

DRAWN BY B.S.PATEL CHECK BY SHEET NO A-01 14 Y 16

PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

E.W.S - I



ALT-2

TYPICAL FLOOR LAYOUT PLAN

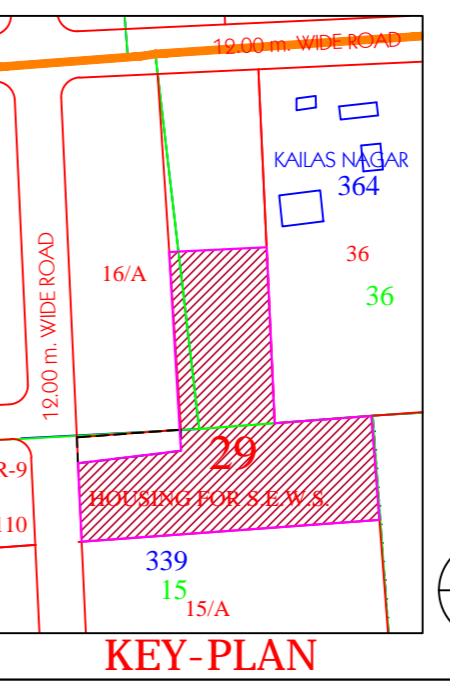
PRESENTATION DWG.

LAYOUT PLAN
TYPICAL FLOOR
BLDG. PLAN + PARKING + 8FL.
A & B BLDG.
1. A BLDG. = 96 UNIT
2. B BLDG. = 64 UNIT
TOTAL = 160 UNIT
CARPET AREA 26.44 SQ.MTS
BUILT-UP AREA 32.21 SQ.MTS

FLOOR	A-TYPE				B-TYPE			TOTAL		
	No. of flat per floor	BUILT UP AREA	F.S.I. AREA	PARKING	No. of flat per floor	BUILT UP AREA	F.S.I. AREA	TOTAL BUILT UP AREA	TOTAL F.S.I. AREA	Total no of flat
GR. FL.	-	494.00	448.15	PARKING	-	324.15	288.30	818.15	-	-
1ST FL.	12	494.00	448.15	8	324.15	288.30	818.15	736.45	20	
2nd FL.	12	494.00	448.15	8	324.15	288.30	818.15	736.45	20	
3rd FL.	12	494.00	448.15	8	324.15	288.30	818.15	736.45	20	
4th FL.	12	494.00	448.15	8	324.15	288.30	818.15	736.45	20	
5th FL.	12	494.00	448.15	8	324.15	288.30	818.15	736.45	20	
6th FL.	12	494.00	448.15	8	324.15	288.30	818.15	736.45	20	
7th FL.	12	494.00	448.15	8	324.15	288.30	818.15	736.45	20	
8th FL.	12	494.00	448.15	8	324.15	288.30	818.15	736.45	20	
STAIRCABIN & LIFT MACHINE	-	126.88	-	-	89.32	-	216.20	-	-	
TOTAL	96	4572.88	3585.20	64	3006.67	2306.40	7579.55	5891.60	160	

PROJECT SUMMARY ( T.P.41-DINDOLI) F.P. 29(S.E.W.S.)

DESCRIPTION	F.P. 29, T.P.41
PLOT AREA AS PER RECORD	4515.00
PLOT AS PER SITE	4515.00
PERMISSIBLE F.S.I. (4515.00 X 3.00)	13545.00
PROPOSED GROUND FL. BUILT UP AREA	818.15
PROPOSED TOTAL BUILT UP	7579.55
PROPOSED F.S.I.	5891.60
BALCNCE F.S.I.	7653.40
NOS. OF FLAT	160
CARPET AREA OF UNIT	26.44
B.UP AREA OF UNIT	32.21



REVISION : DATE : 28-06-2016

SCALE : N. T. S

PROJECT: PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

**JAYESSH A DALAL**  
PROJECT MANAGEMENT CONSULTANT

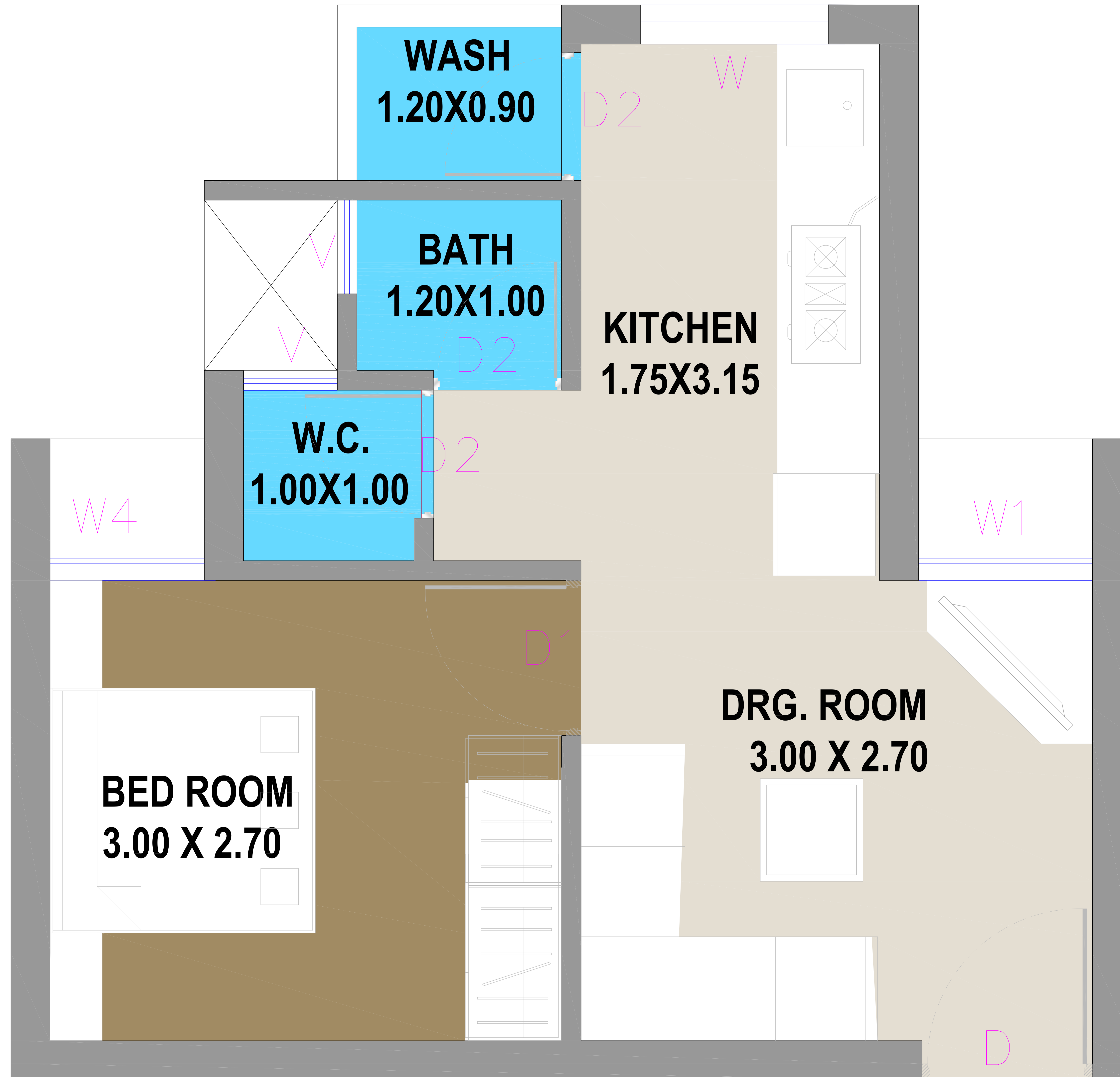
\*JALARAM SHAKTI, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALNES,SURAT.

DRAWN BY B.S.PATEL CHECK BY SHEET NO A-02 14 Y 16

UNIT PLAN

CARPET AREA = 26.44 SQ.MTS

BUILT UP AREA = 32.21 SQ.MTS



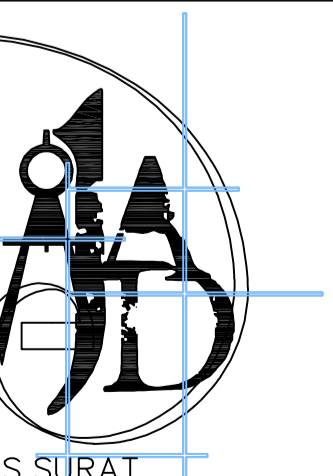
REVISION : DATE : 16-06-2016

SCALE :

PRESENTATION DWG.

PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI),SURAT.

JAYESSH A DALAL  
PROJECT MANAGEMENT  
CONSULTANT



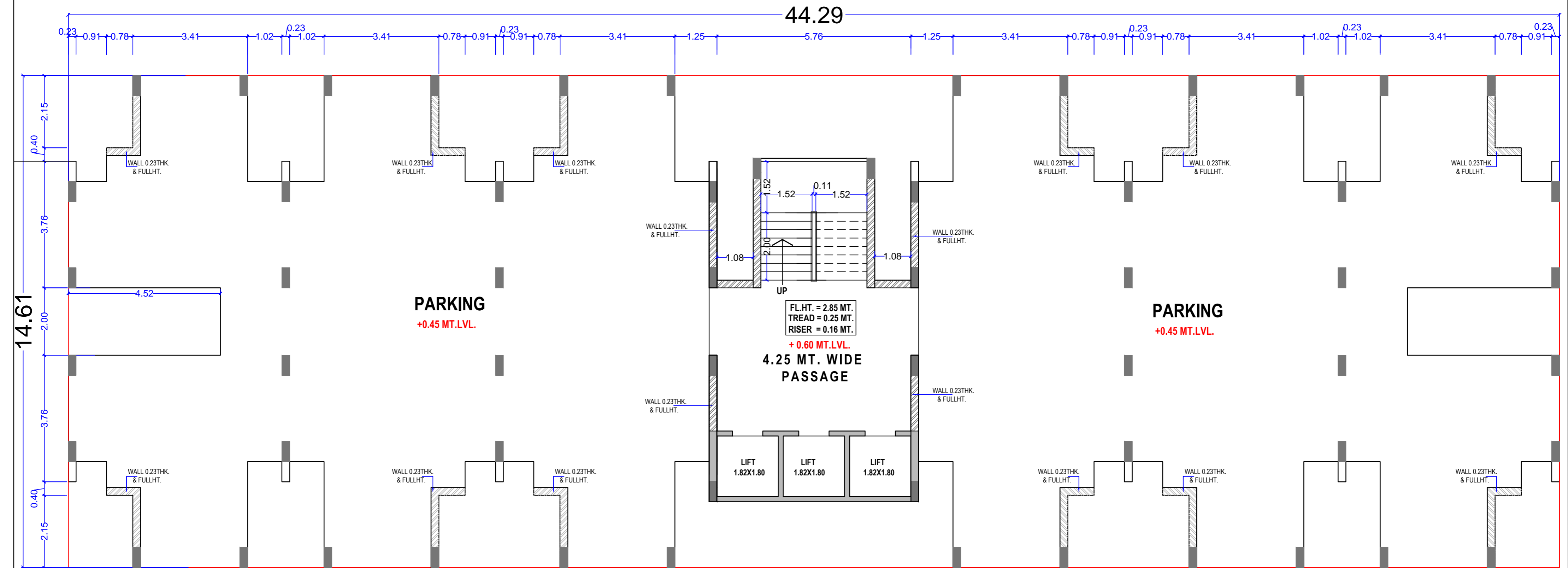
DRAWN BY  
B.S.PATEL

CHECK BY

SHEET NO  
A-03

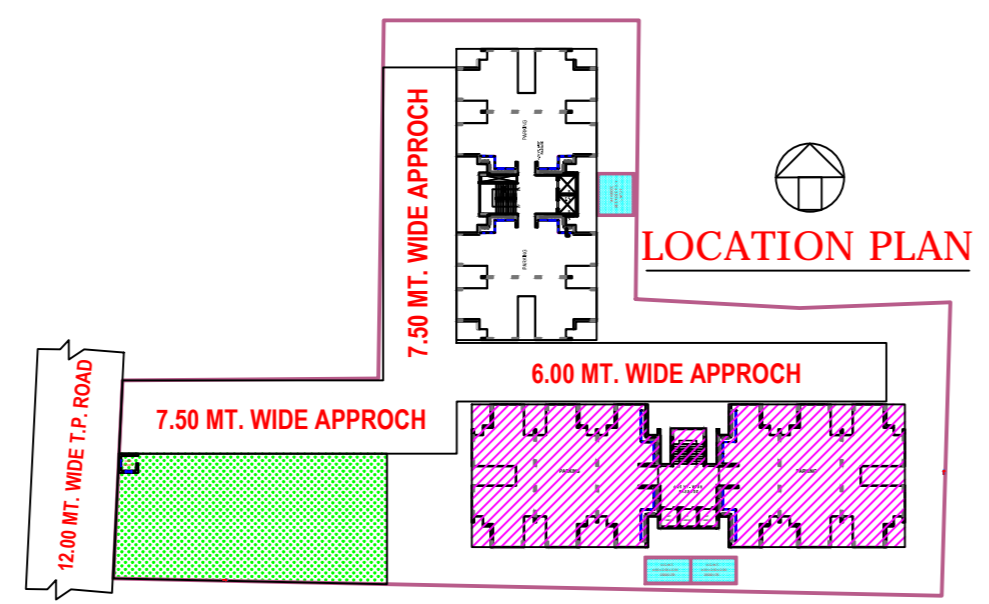
14 Y 16

# PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.



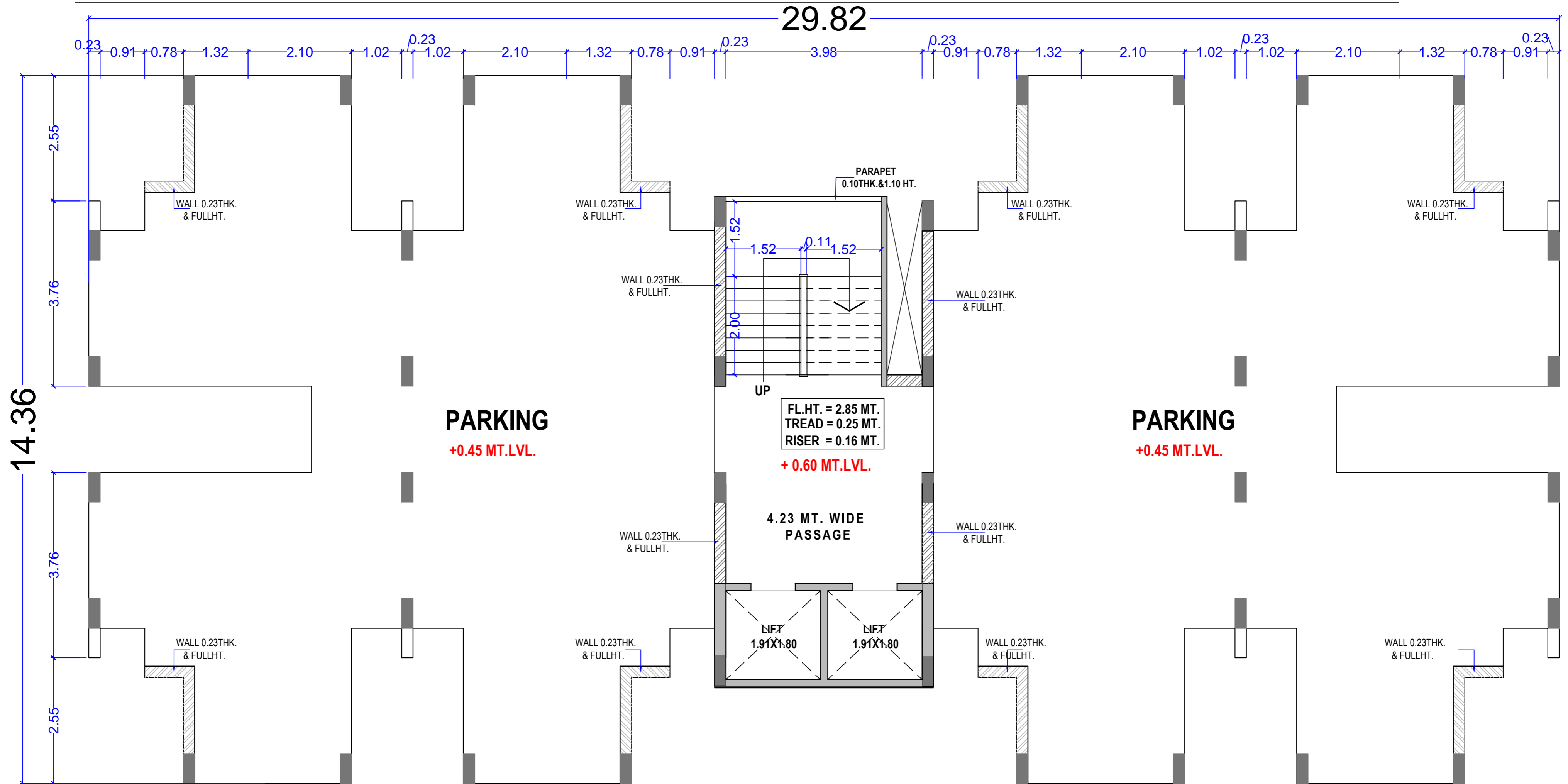
**GROUND(PARKING) FLOOR PLAN**

TENDER COPY FOR REFERENCE ONLY			
CLIENT	CONTRACTOR	P.M.C.	T.P.I.
BASIC WORKING DWG.			
ISSUE DATE -		SIGN -	
WORKING DWG.		A-TYPE (1-BLDG.) (P+ 8 FL.)	
<b>PARKING(GROUND) FLOOR PLAN</b>			



REVISION :	DATE : 28-06-2016
SCALE :	
<b>BASIC WORKING DWG.</b>	
PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.	
<b>JAYESSH A DALAL</b> <b>PROJECT MANAGEMENT</b> <b>CONSULTANT</b>	
<small>*JALARAM SHAKTI, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALINES,SURAT.</small>	
DRAWN BY B.S.PATEL	CHECK BY
SHEET NO A-03	14 Y 16

# PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.



**GROUND (PARKING) FLOOR PLAN**

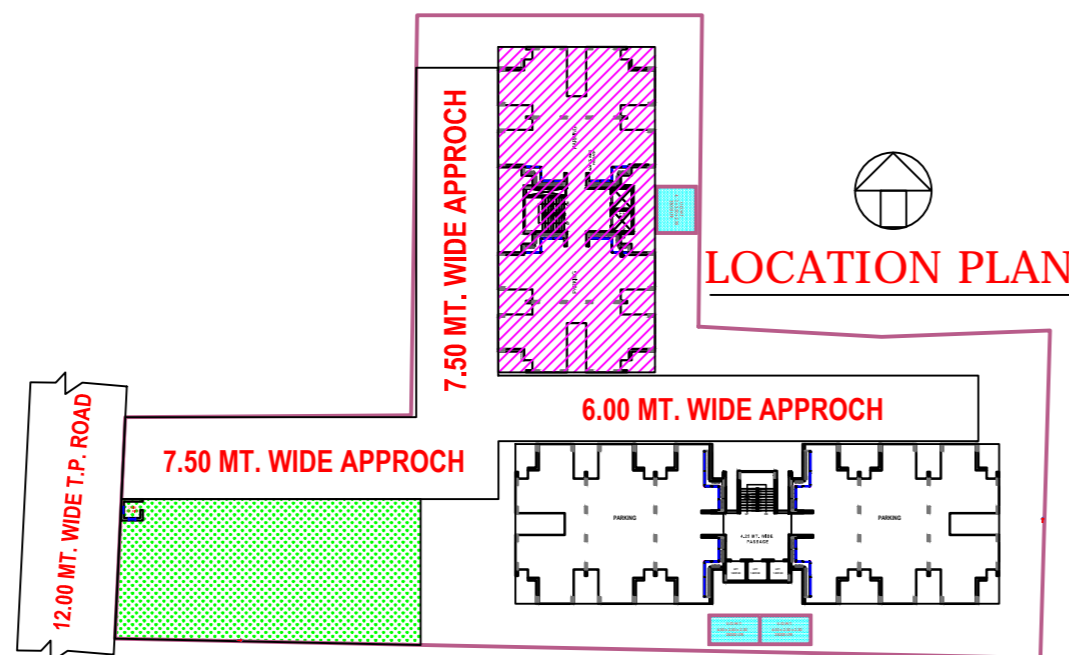
TENDER COPY FOR REFERENCE ONLY

CLIENT	CONTRACTOR	P.M.C.	T.P.I.

BASIC WORKING DWG.

ISSUE DATE - SIGN -  
**WORKING DWG.** B-TYPE (1-BLDG.)  
 (P+ 8FL.)

**GROUND (PARKING) FLOOR PLAN**



REVISION : DATE : 28-06-2016

SCALE :

**BASIC WORKING DWG.**

PROJECT : PROPOSED EWS-I TYPE HOUSING AT  
 F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

**JAYESSH A DALAL**  
**PROJECT MANAGEMENT**  
**CONSULTANT**

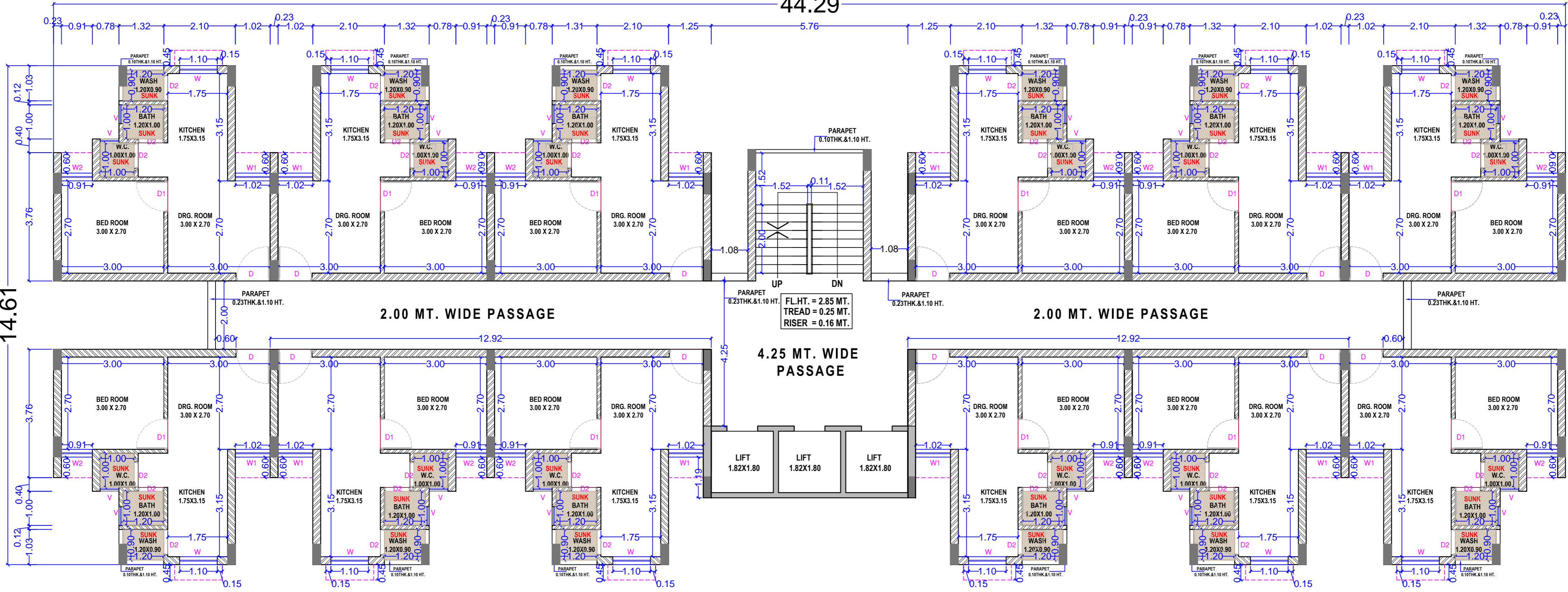
\*JALARAM SHAKTI\*, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALINES,SURAT.



DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-05	14 Y 16
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# PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

44.29



2.00 MT. WIDE PASSAGE

4.25 MT. WIDE PASSAGE

2.00 MT. WIDE PASSAGE

**TYPICAL FLOOR PLAN**  
(1ST. TO 8TH. FL.)

TENDER COPY FOR REFERENCE ONLY

CLIENT	CONTRACTOR	P.M.C.	T.P.I.

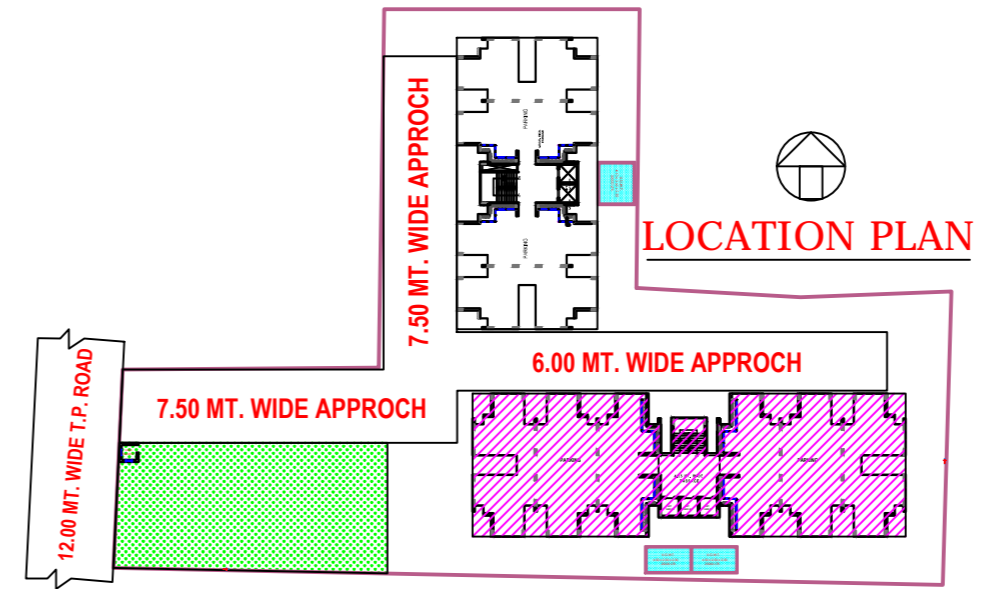
BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG. A-TYPE (1-BLDG.)  
(P+ 8 FL.)

**TYPICAL FLOOR PLAN**

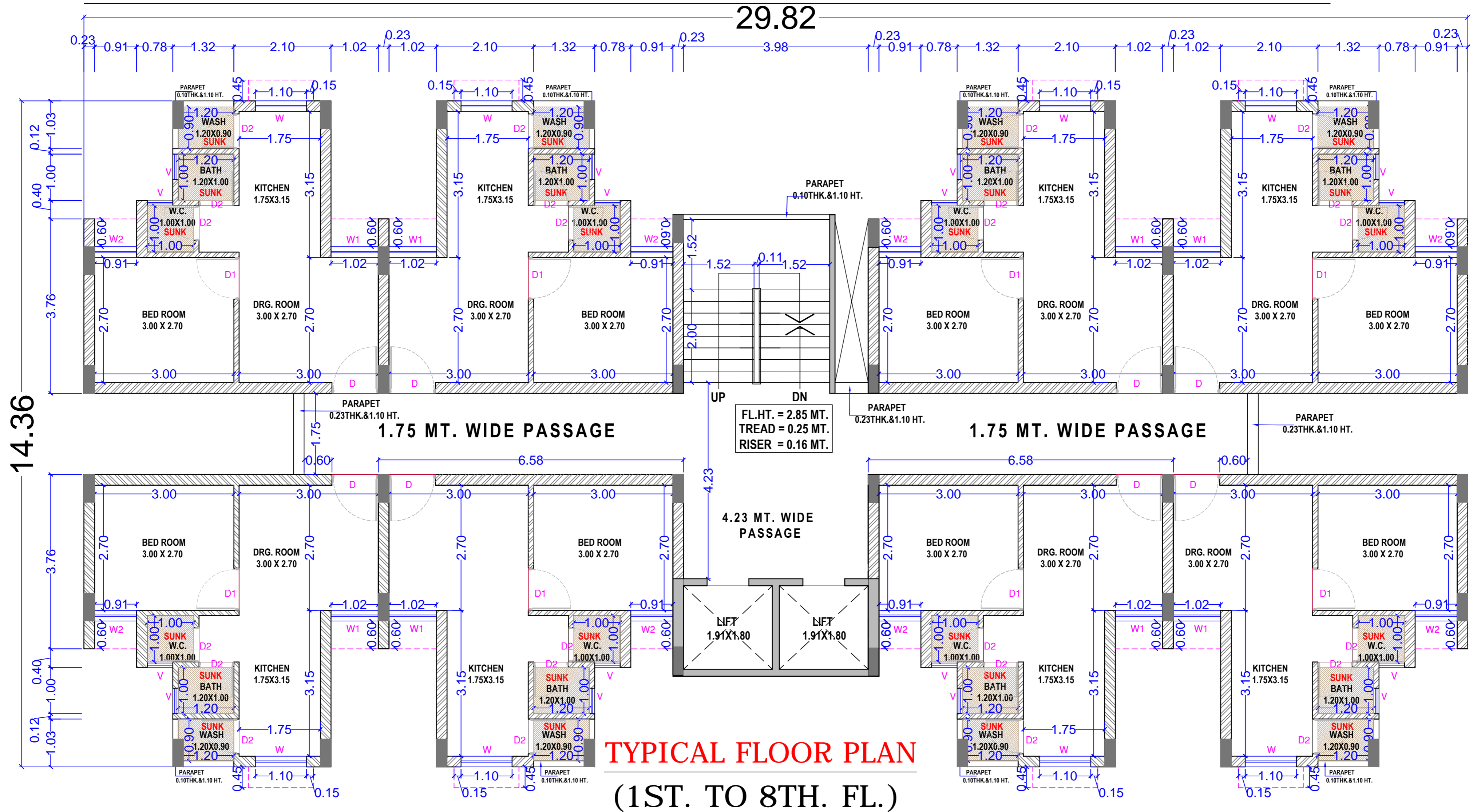
SCHEDULE OF DOORS FOR ONE BLDG.								
SR. NO.	NAME	SIZE (OPENING)	TY.FL.	8th.FL.	TER.FL.	SILL	LINTEL	TOTAL
1.	D	1.00 X 2.10	1X12=12	12X8=96	03	-	2.10	99
2.	D1	0.90 X 2.10	1X12=12	12X8=96	-	-	2.10	96
3.	D2	0.75 X 2.10	1X12=12	12X8=96	-	-	2.10	96
4.	D3(FRP)	0.75 X 2.10	2X12=24	24X8=192	-	-	2.10	192
SCHEDULE OF WINDOW								
1.	W	1.10 X 1.20	1X12=12	12X8=96	01	0.90	2.10	97
2.	W1	1.02 X 1.20	1X12=12	12X8=96	-	0.90	2.10	96
3.	W2	0.90 X 0.90	1X12=12	12X8=96	-	1.20	2.10	96
SCHEDULE OF VENTILATION								
1.	V	0.55 X 0.60	2X12=24	24X8=192	01	1.50	2.10	193



REVISION :	DATE : 28-06-2016
SCALE :	
<b>BASIC WORKING DWG.</b>	
PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.	
<b>JAYESSH A DALAL</b> PROJECT MANAGEMENT CONSULTANT	
<small>*JALARAM SHAKTI*, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALINES,SURAT.</small>	
DRAWN BY B.S.PATEL	CHECK BY
SHEET NO A-04	
14 Y 16	



# PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.



**TYPICAL FLOOR PLAN**  
(1ST. TO 8TH. FL.)

TENDER COPY FOR REFERENCE ONLY

CLIENT	CONTRACTOR	P.M.C.	T.P.I.

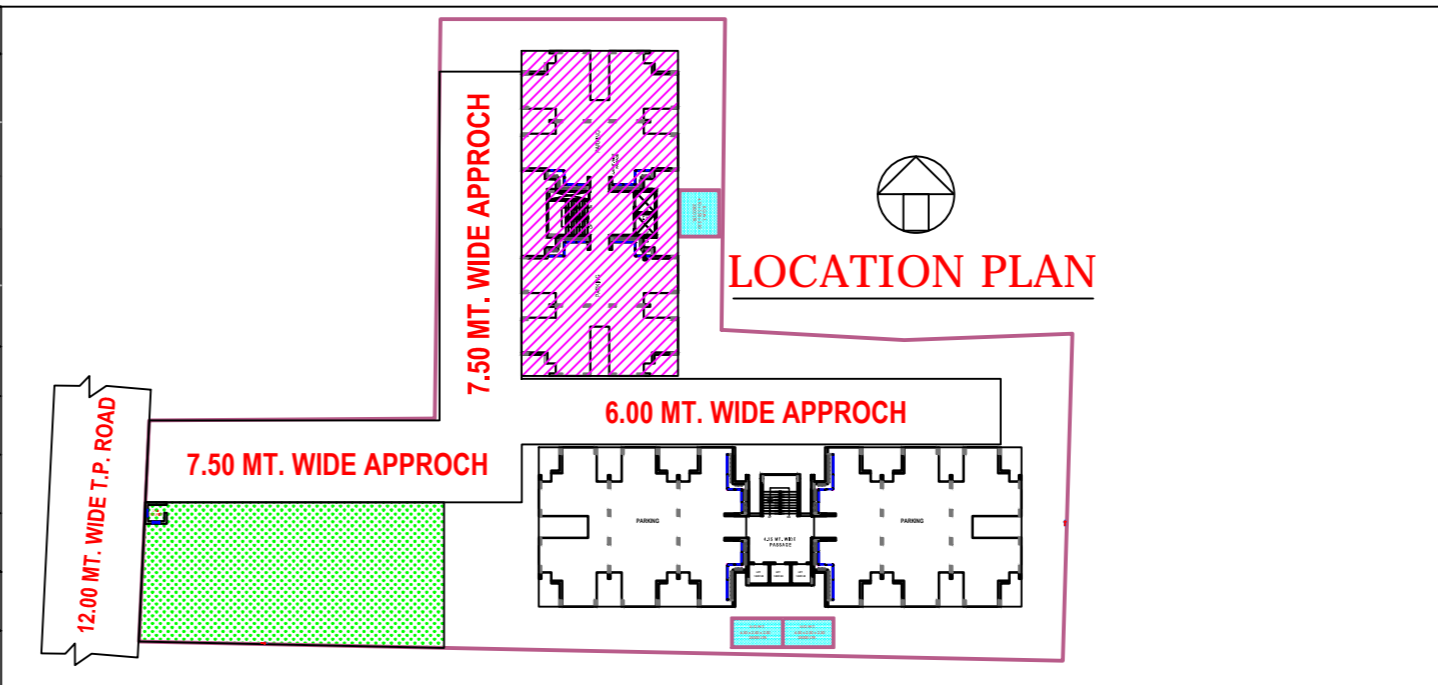
BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG. B-TYPE (1-BLDG.) (P+ 8FL.)

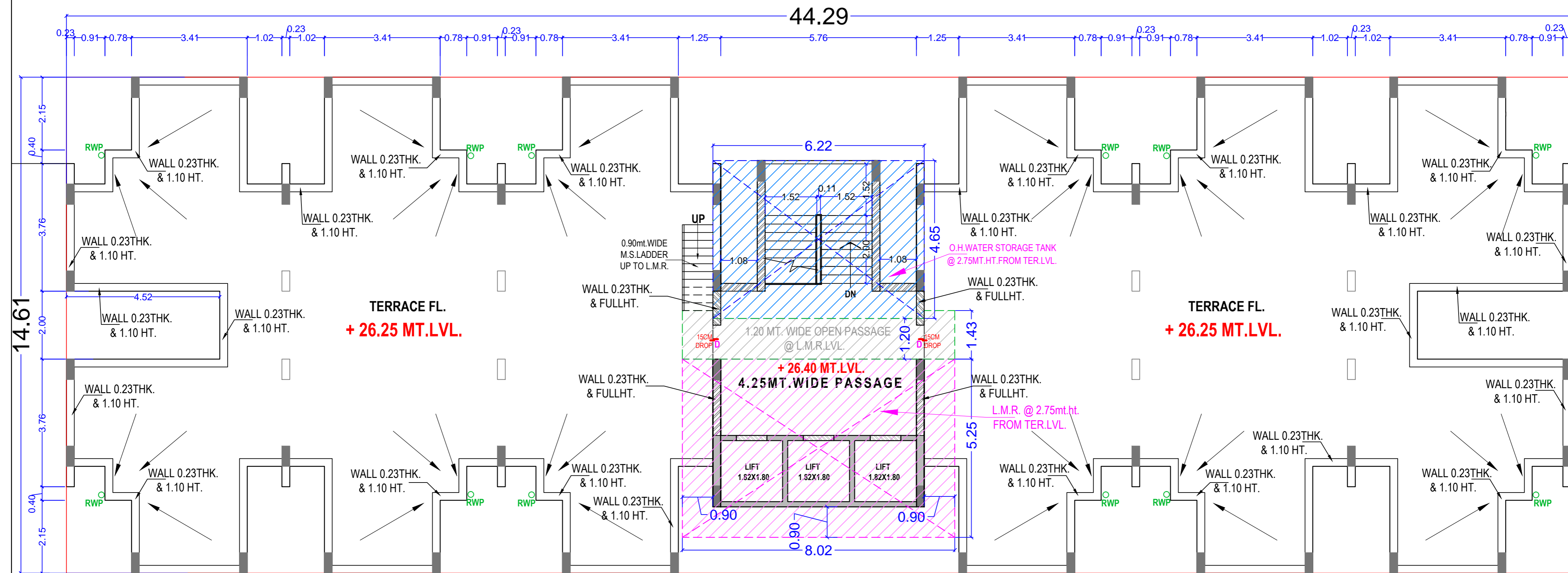
**TYPICAL FLOOR PLAN**

SCHEDULE OF DOORS FOR ONE BLDG.								
SR. NO.	NAME	SIZE (OPENING)	TY.FL.	8th.FL.	TER.FL.	SILL	LINTEL	TOTAL
1.	D	1.00 X 2.10	1X8=8	8X8=64	03	-	2.10	67
2.	D1	0.90 X 2.10	1X8=8	8X8=64	-	-	2.10	64
3.	D2	0.75 X 2.10	1X8=8	8X8=64	-	-	2.10	64
4.	D2(FRP)	0.75 X 2.10	2X8=16	16X8=128	-	-	2.10	128
SCHEDULE OF WINDOW								
1.	W	1.10 X 1.20	1X8=8	8X8=64	01	0.90	2.10	65
2.	W1	1.02 X 1.20	1X8=8	8X8=64	-	0.90	2.10	64
3.	W2	0.90 X 0.90	1X8=8	8X8=64	-	1.20	2.10	64
SCHEDULE OF VENTILATION								
1.	V	0.55 X 0.60	2X8=24	16X8=128	01	1.50	2.10	129



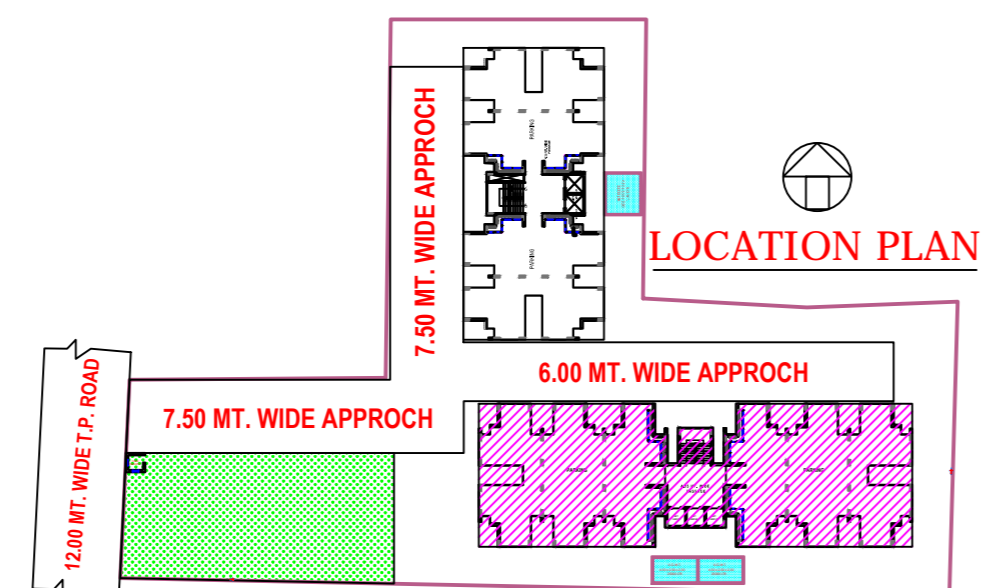
REVISION :	DATE : 28-06-2016
SCALE :	
<b>BASIC WORKING DWG.</b>	
PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.	
<b>JAYESSH A DALAL</b> PROJECT MANAGEMENT CONSULTANT	
DRAWN BY B.S.PATEL	CHECK BY
SHEET NO A-06	
14 Y 16	

# PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.



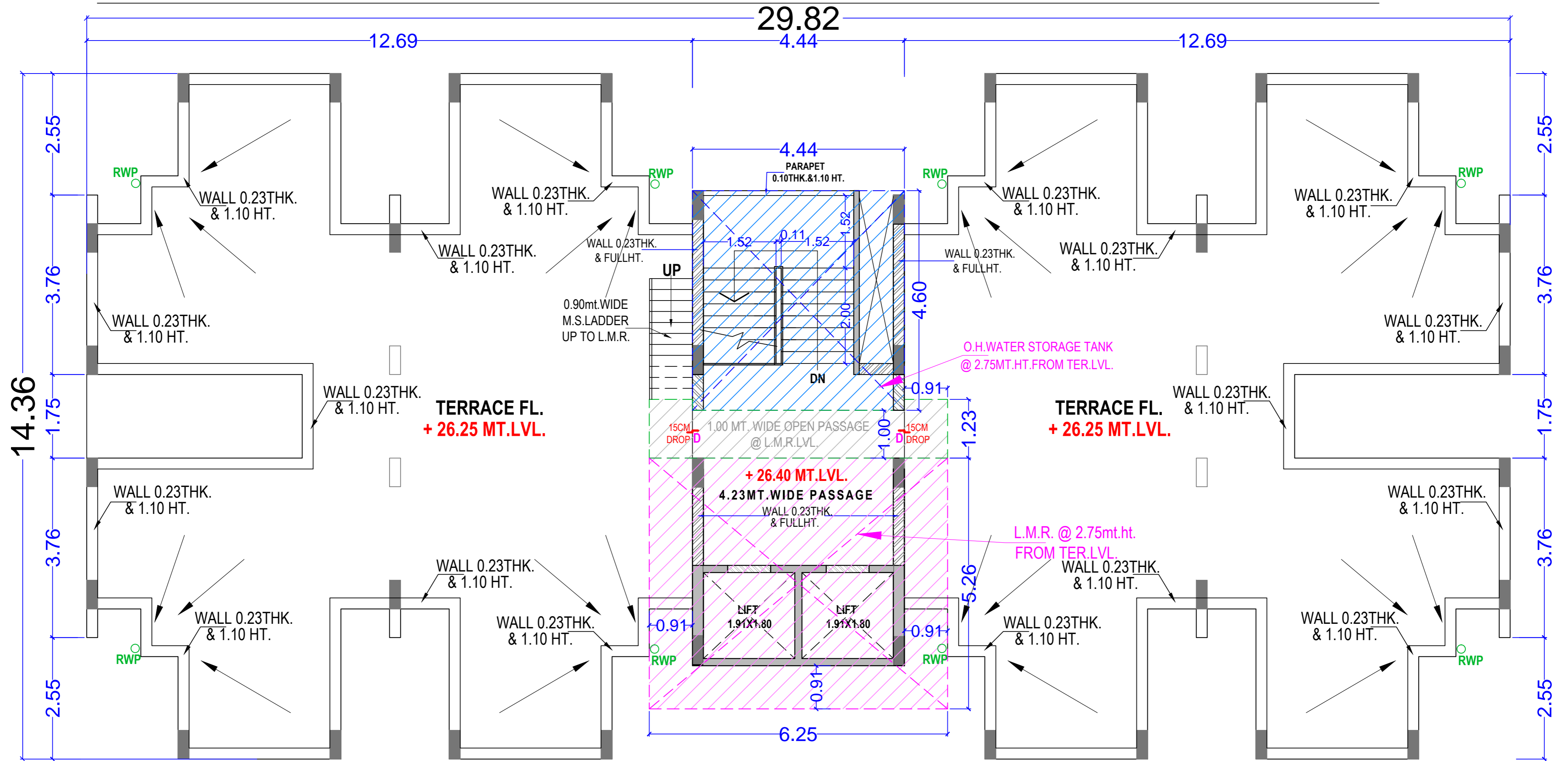
**TERRACE FLOOR PLAN**

TENDER COPY FOR REFERENCE ONLY			
CLIENT	CONTRACTOR	P.M.C.	T.P.I.
BASIC WORKING DWG.			
ISSUE DATE -	SIGN -		
WORKING DWG.	A-TYPE (1-BLDG.) (P+ 8 FL.)		
<b>TERRACE FLOOR PLAN</b>			



REVISION :	DATE : 28-06-2016
SCALE :	
<b>BASIC WORKING DWG.</b>	
PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.	
<b>JAYESSH A DALAL</b> PROJECT MANAGEMENT CONSULTANT	
<small>*JALARAM SHAKTI*, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALINES,SURAT.</small>	
DRAWN BY B.S.PATEL	CHECK BY
SHEET NO A-04a	14 Y 16

# PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.



**TERRACE FLOOR PLAN**

TENDER COPY FOR REFERENCE ONLY

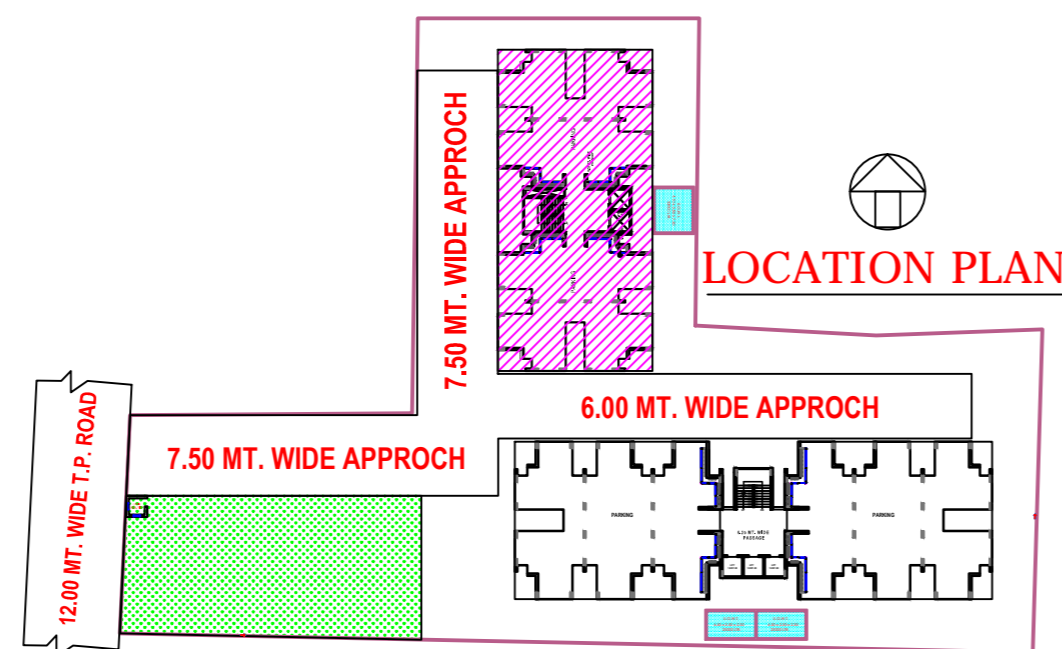
CLIENT	CONTRACTOR	P.M.C.	T.P.I.

BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG. B-TYPE (1-BLDG.) (P+ 8FL.)

**TERRACE FLOOR PLAN**



**LOCATION PLAN**

REVISION : DATE : 28-06-2016

SCALE :

**BASIC WORKING DWG.**

PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

**JAYESSH A DALAL**  
PROJECT MANAGEMENT  
CONSULTANT

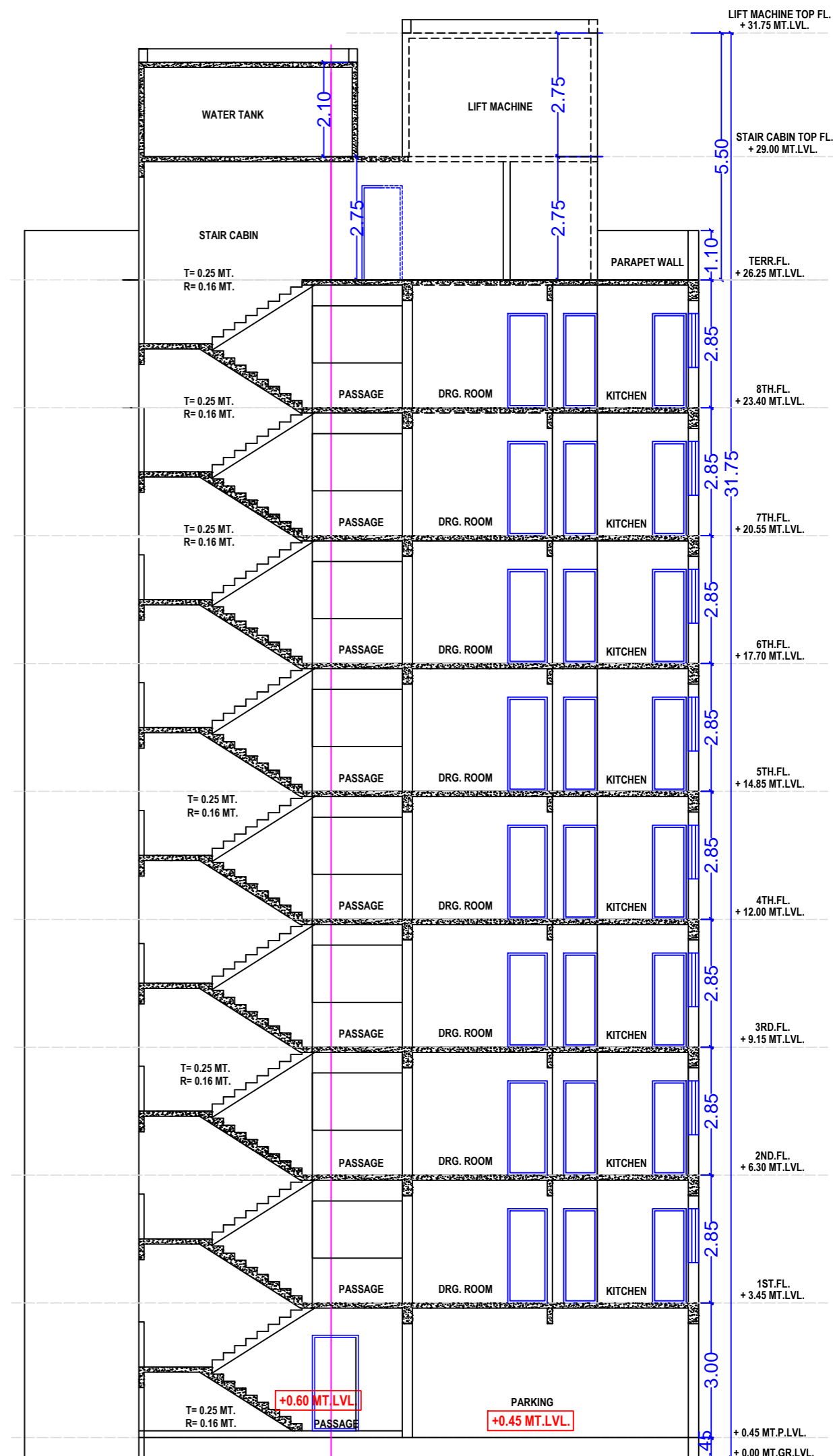


DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-06a	14 Y 16
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# PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.



## FRONT ELEVATION



## SECTION-A-A

TENDER COPY FOR REFERENCE ONLY

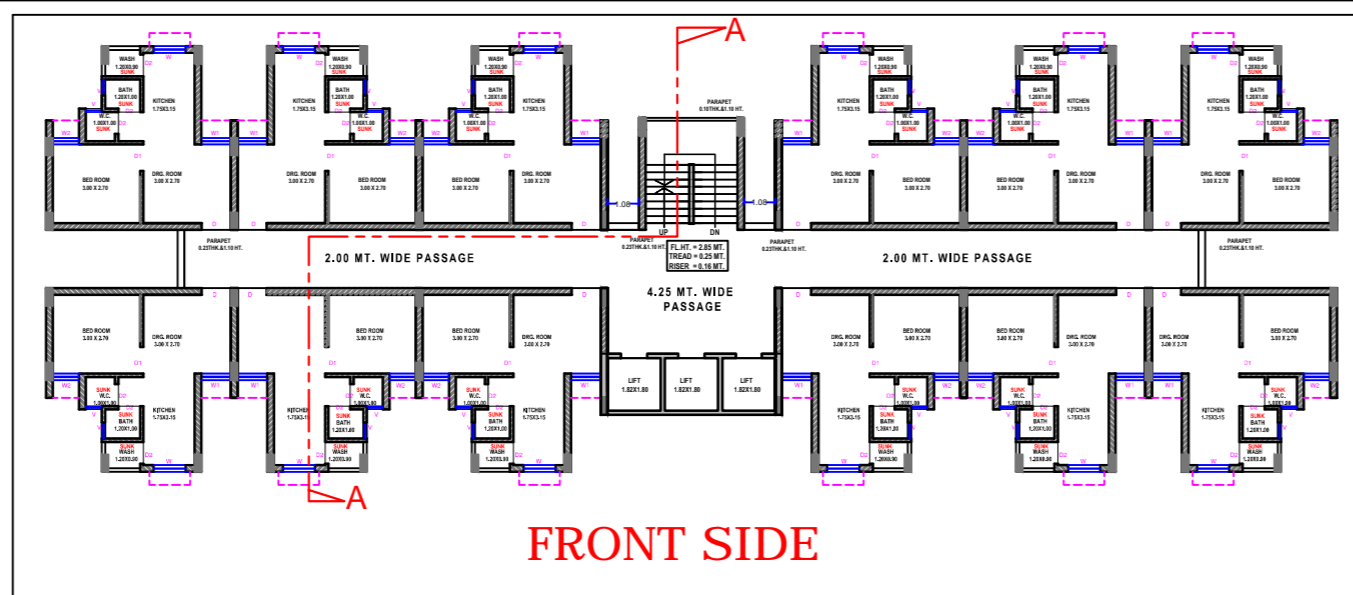
CLIENT	CONTRACTOR	P.M.C.	T.P.I.

BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG. A-TYPE (1-BLDG.)  
(P+ 8 FL.)

**ELEVATION & SECTION**



**FRONT SIDE**

REVISION : DATE : 28-06-2016

SCALE :

**BASIC WORKING DWG.**

PROJECT : PROPOSED EWS-I TYPE HOUSING AT  
F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

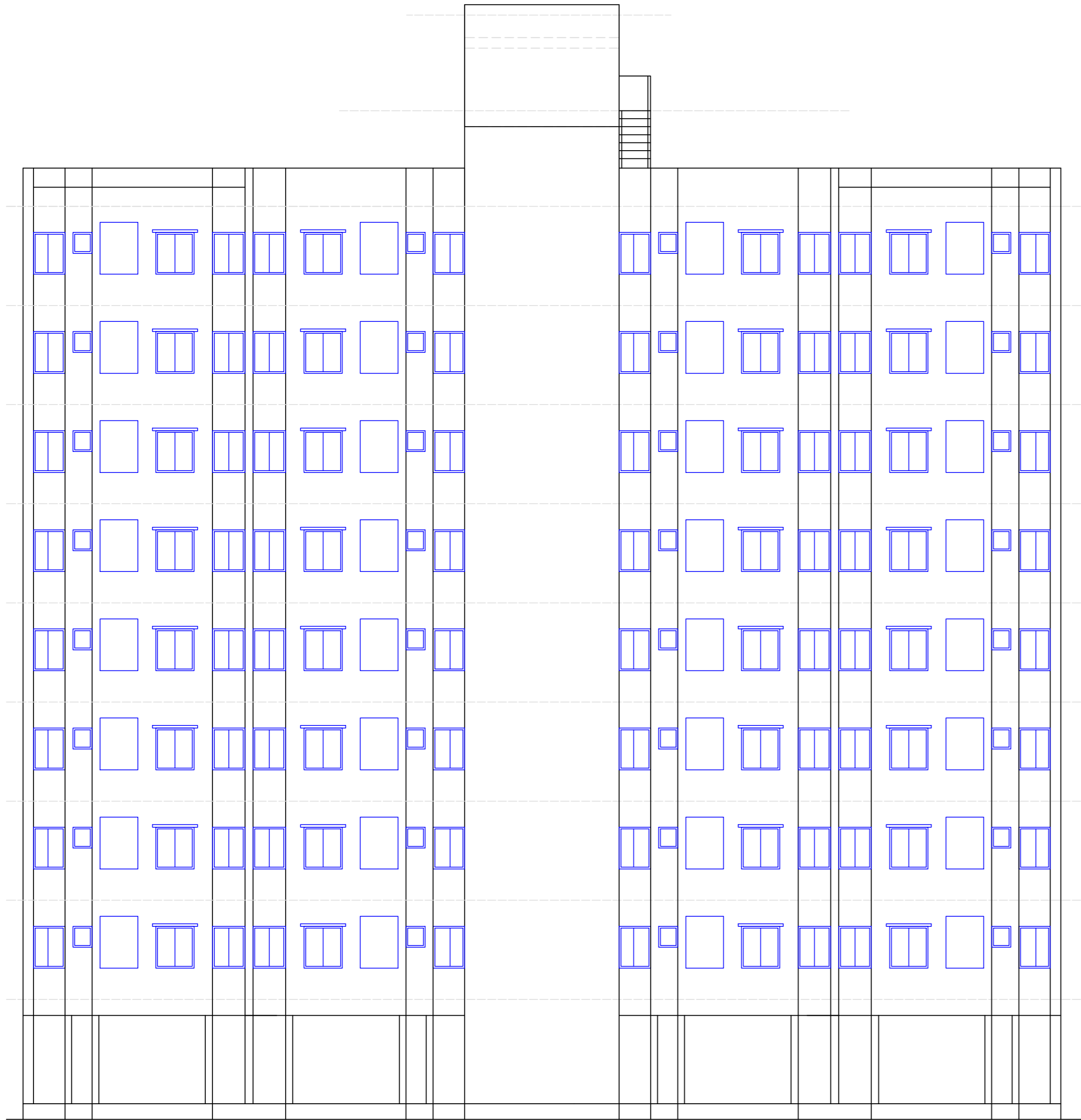
**JAYESSH A DALAL**  
PROJECT MANAGEMENT  
CONSULTANT



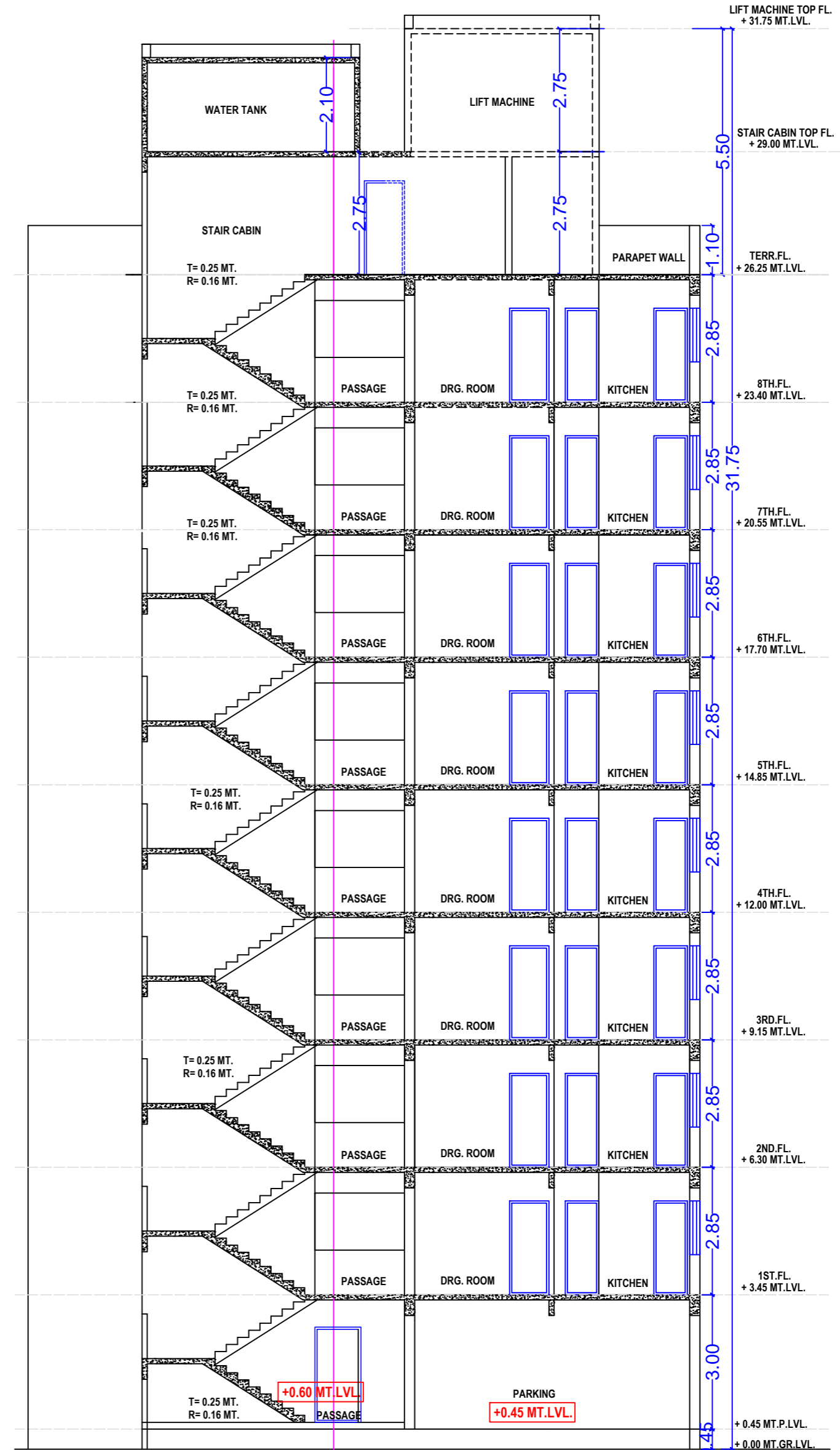
\*JALARAM SHAKTI\*, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALNES,SURAT.

DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-07	14 Y 16
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PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.



FRONT ELEVATION



SECTION-A-A

TENDER COPY FOR REFERENCE ONLY

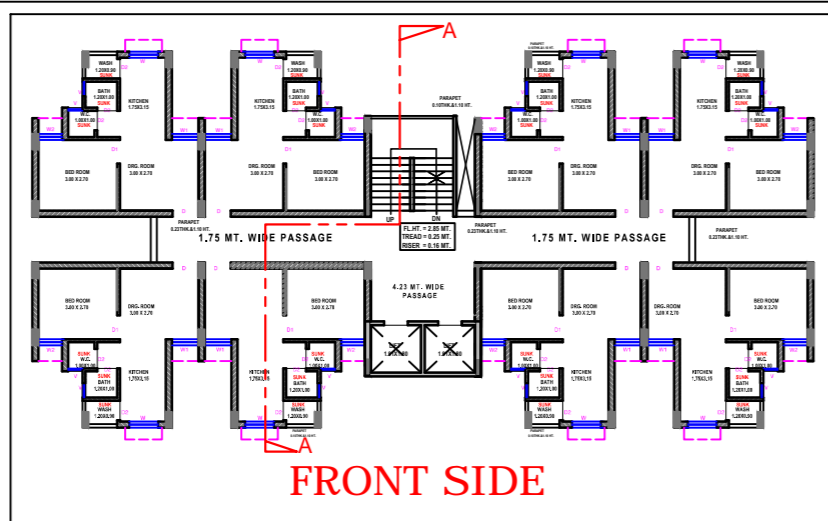
CLIENT	CONTRACTOR	P.M.C.	T.P.I.

BASIC WORKING DWG.

ISSUE DATE - SIGN -

WORKING DWG. B-TYPE (1-BLDG.) (P+ 8 FL.)

ELEVATION & SECTION



FRONT SIDE

REVISION : DATE : 28-06-2016

SCALE :

BASIC WORKING DWG.

PROJECT : PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

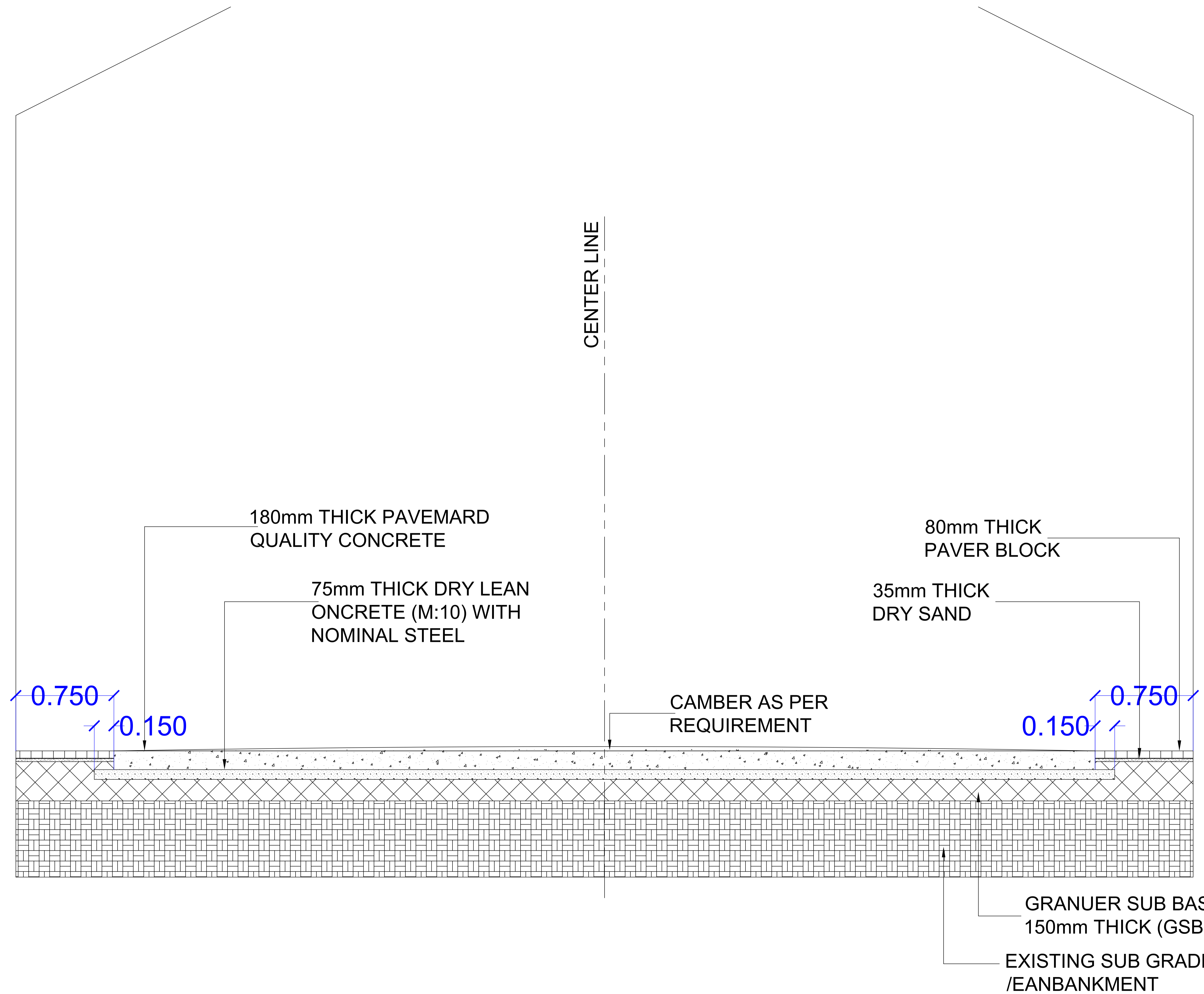
JAYESSH A DALAL  
PROJECT MANAGEMENT  
CONSULTANT



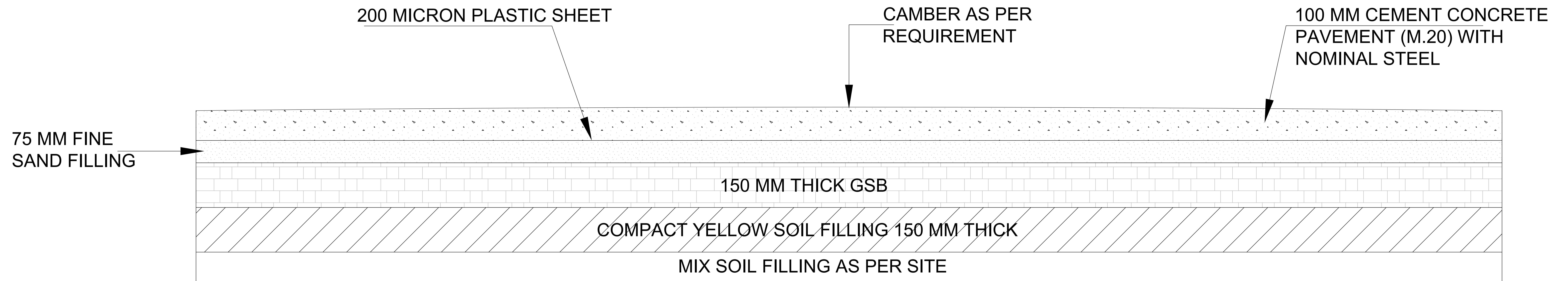
DRAWN BY B.S. PATEL	CHECK BY	SHEET NO A-08	14 Y 16
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# SECTIONAL DETAIL FOR ROAD

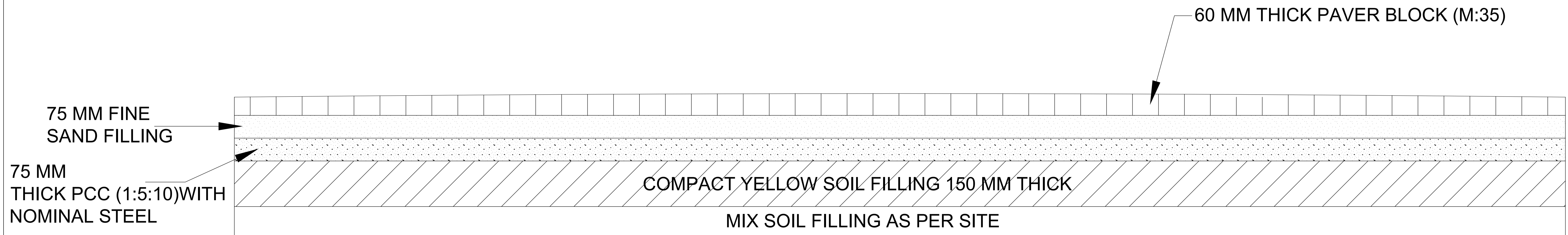


TENDER COPY FOR REFERENCE ONLY				<b>DRAWING TITLE:</b> <b>SECTIONAL DETAIL FOR ROAD</b>	REVISION :	DATE : 10-08-2016	
CLIENT	CONTRACTOR	P.M.C.	T.P.I.		SCALE : N. T. S		
					<b>SECTIONAL DETAIL FOR ROAD</b>		
ISSUE DATE -		SIGN -			PROJECT: PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI),SURAT.		
WORKING:- <b style="color: red;">SECTIONAL DETAIL FOR ROAD</b>					<b>JAYESSH A DALAL</b> PROJECT MANAGEMENT CONSULTANT <small>*JALARAM SHAKTI*, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALINES,SURAT.</small>		
				DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-08	14 Y 16



**NOTE:**  
At Every 4.00 Mt. place 25 mm Deep Groove

## Section Detail For V.D.S.



## Section Detail For Paver Block

TENDER COPY FOR REFERENCE ONLY

CLIENT	CONTRACTOR	P.M.C.	T.P.I.

ISSUE DATE - SIGN -

**WORKING:-**  
**SECTIONAL DETAIL FOR V.D.S. & PAVER BLOCK**

**DRAWING TITLE:**  
**SECTIONAL DETAIL FOR V.D.S. & PAVER BLOCK**

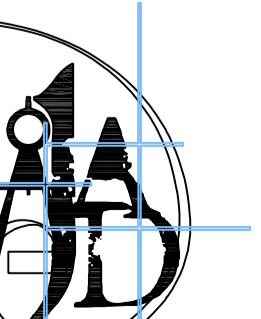
REVISION : DATE : 10-08-2016

SCALE : N. T. S

**V.D.S. & PAVER SECTION DETAIL.**

PROJECT: PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

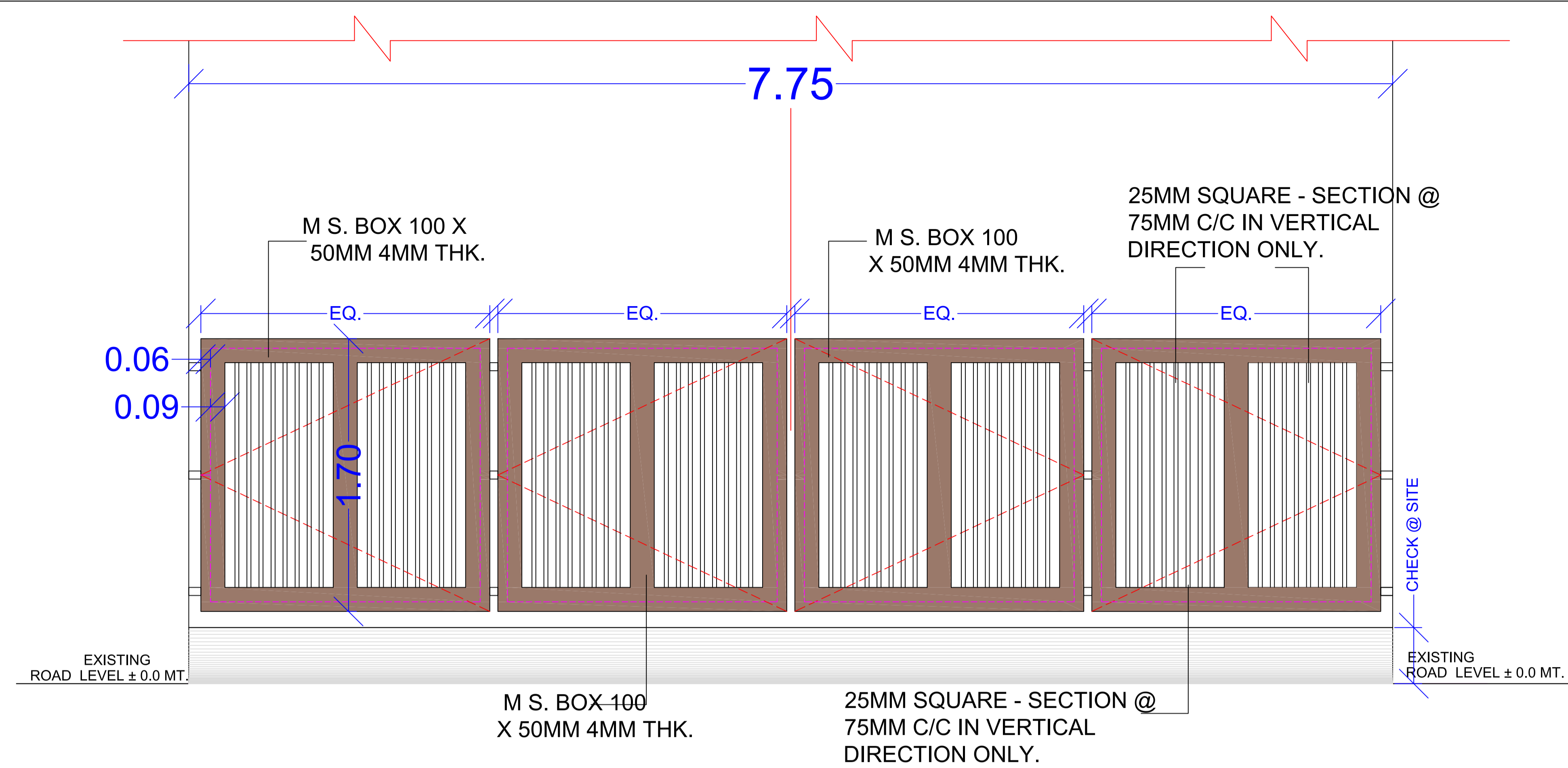
JAYESSH A DALAL  
PROJECT MANAGEMENT  
CONSULTANT



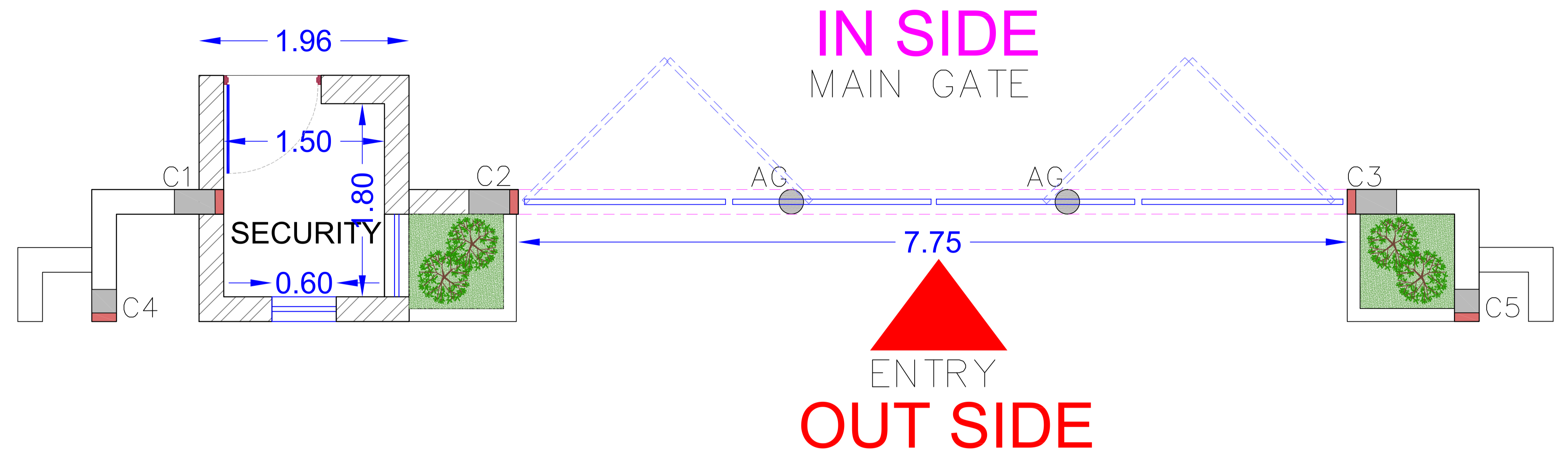
\*JALARAM SHAKTI\*, BESIDE DHAWALGIRI APARTMENT, NR.LOURD'S CONVENT SCHOOL,ATHWALNES,SURAT.

DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-09	14 Y 16
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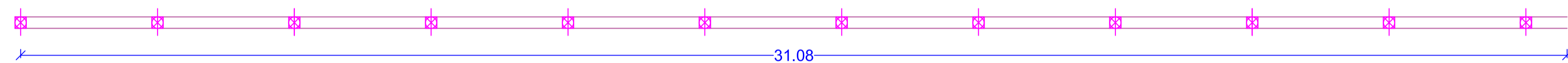




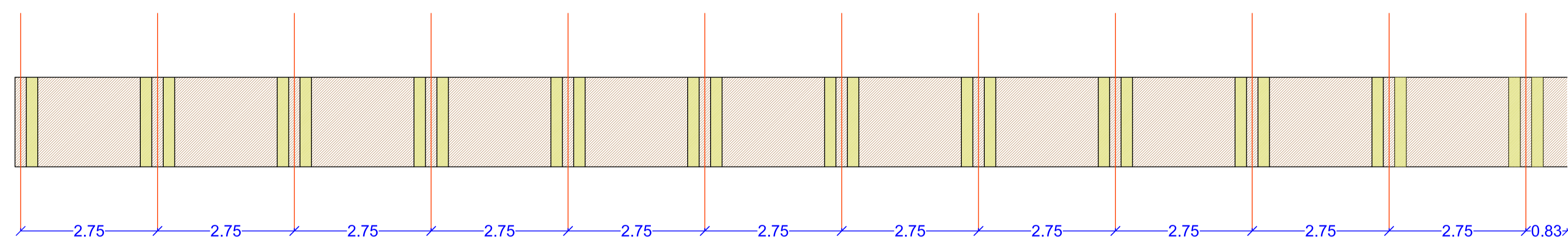
**M.S GATE DETAIL**



**PART PLAN @ FRONT SIDE**

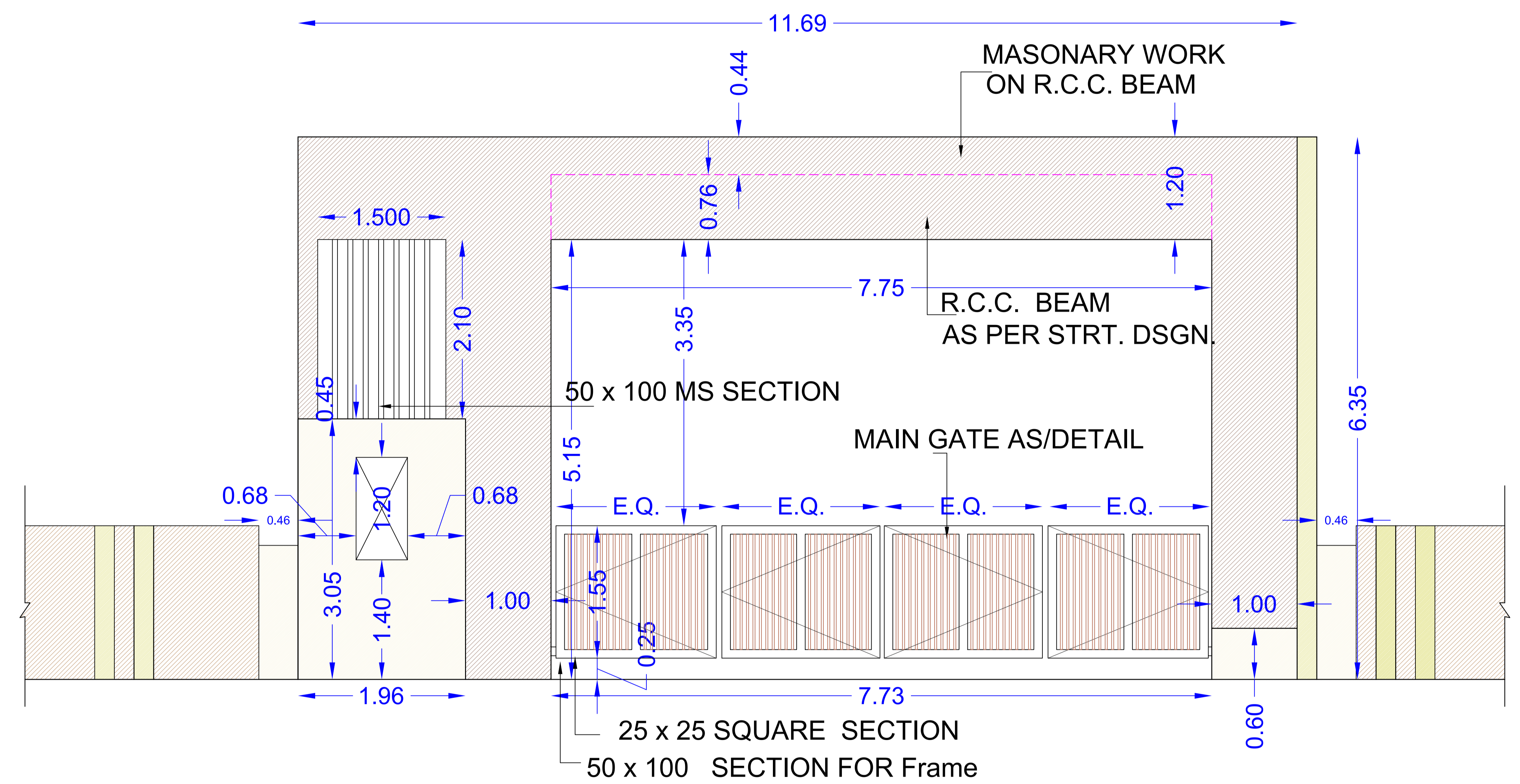


**PART PLAN @ D SIDE**



**PART ELEVATION @ D SIDE**

**COMPOUND WALL DETAIL.**



**PART ELEVATION @ FRONT SIDE**

TENDER COPY FOR REFERENCE ONLY

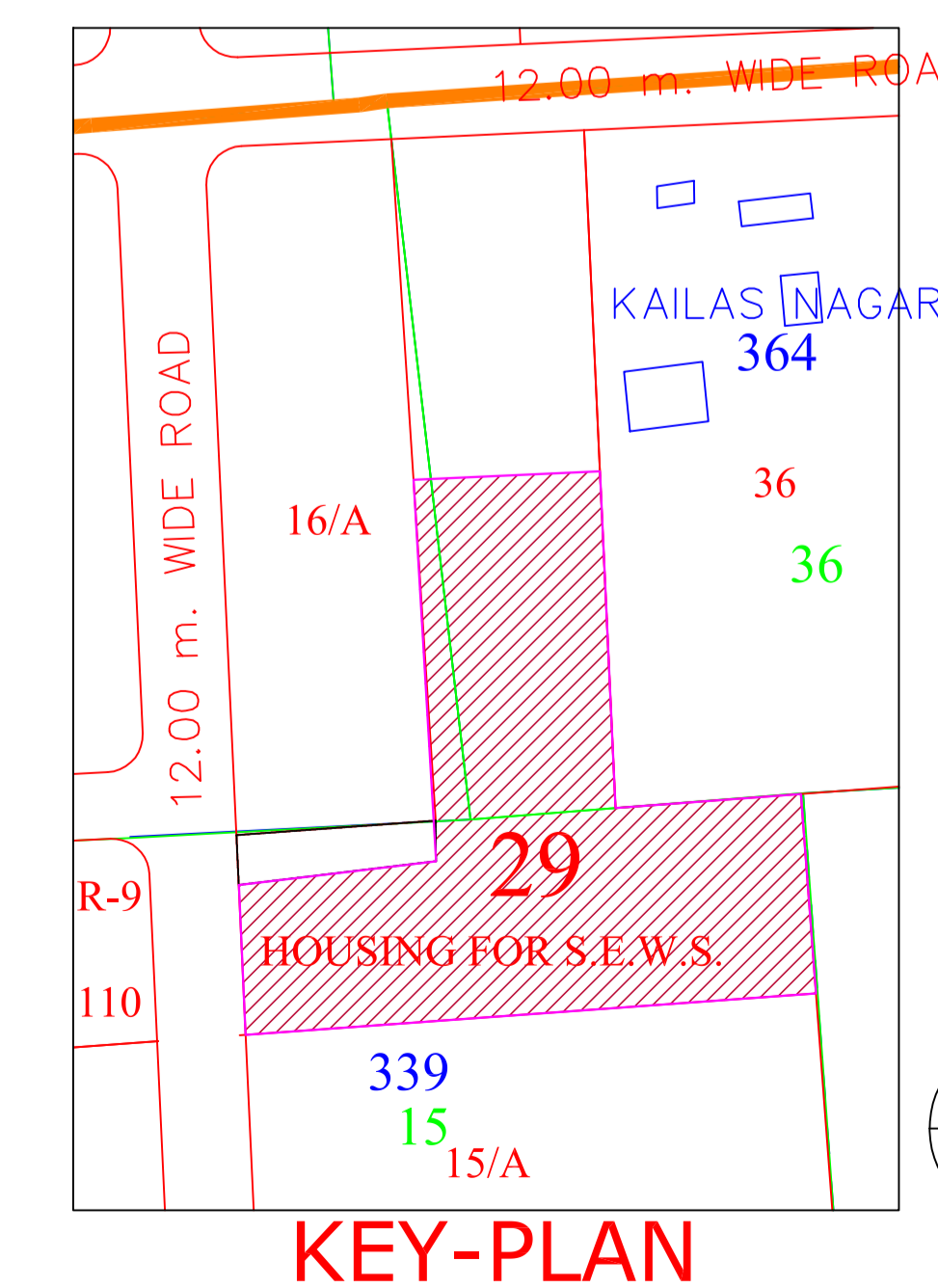
CLIENT	CONTRACTOR	P.M.C.	T.P.I.

ISSUE DATE - SIGN -

WORKING:-

**COMPOUND WALL & MAIN GATE DETAIL.**

**DRG. TITLE:-  
COMPOUND WALL & MAIN GATE DETAIL.**



**KEY-PLAN**

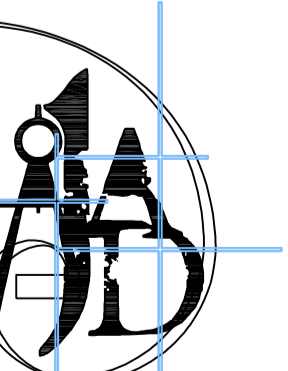
REVISION : DATE : 10-08-2016

SCALE : N. T. S

**COMPOUND WALL & MAIN GATE DETAIL.**

PROJECT: PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

**JAYESSH A DALAL  
PROJECT MANAGEMENT  
CONSULTANT**



"JALARAM SHAKTI", BESIDE DHAWALGIRI APARTMENT, N.R.LOURD'S CONVENT SCHOOL, ATHWALNES, SURAT.

DRAWN BY B.S.PATEL	CHECK BY	SHEET NO A-08	14 Y 16
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# PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

TENDER COPY FOR REFERENCE ONLY

CLIENT	CONTRACTOR	P.M.C.	T.P.I.
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ISSUE DATE - SIGN -

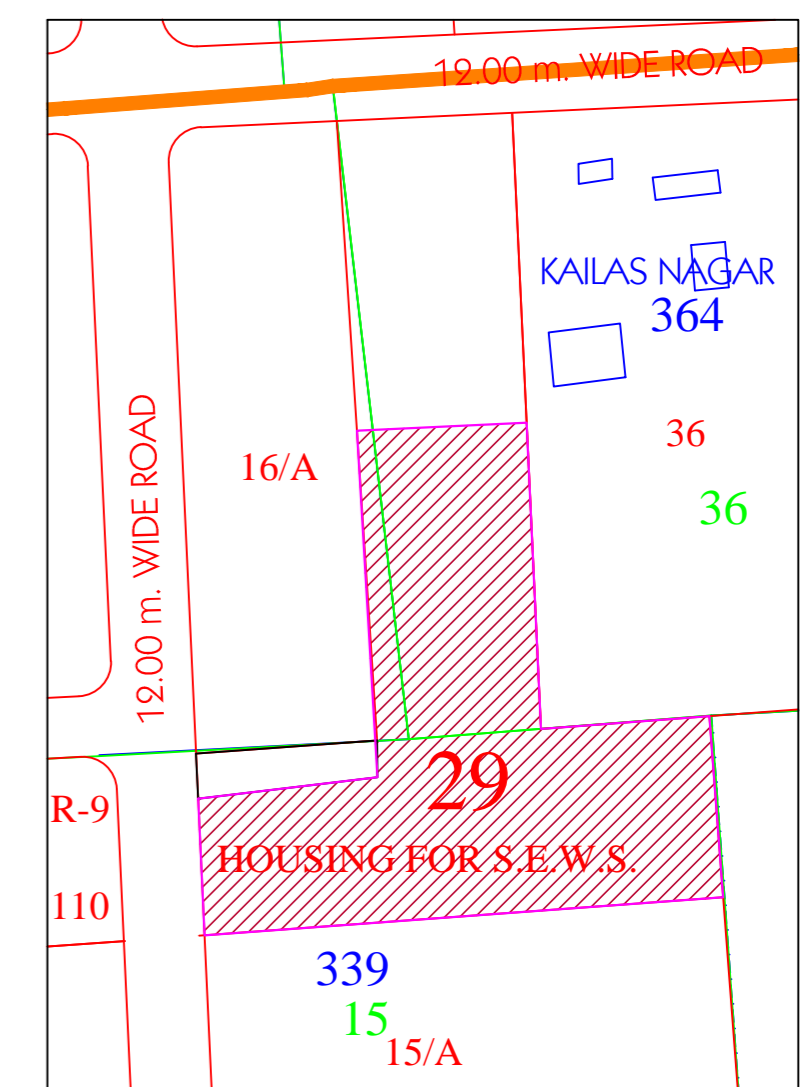
**WORKING:-**

**MANHOLE DETAIL DRG.**

FOR INFRASTRUCTURE  
LAY OUT PLAN

**MANHOLE**

-  M.H-A MANHOLE - A TYPE
-  M.H-B MANHOLE - B TYPE



**KEY-PLAN**

REVISION : DATE : 10-08-2016

SCALE : N. T. S

**MANHOLE DETAIL DRG.**

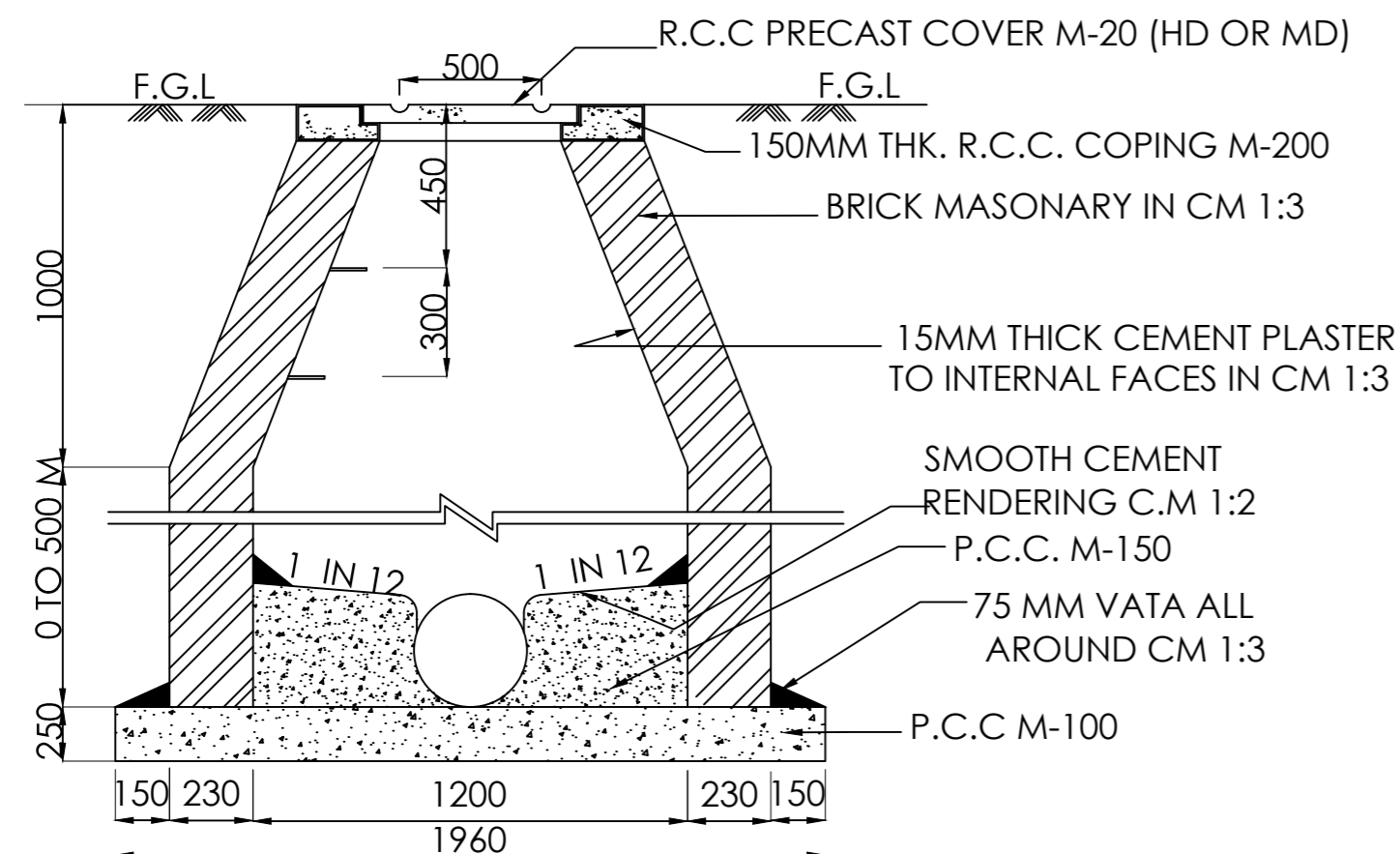
PROJECT : PROPOSED EWS-I TYPE HOUSING AT  
F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

**JAYESSH A DALAL**  
PROJECT MANAGEMENT  
CONSULTANT

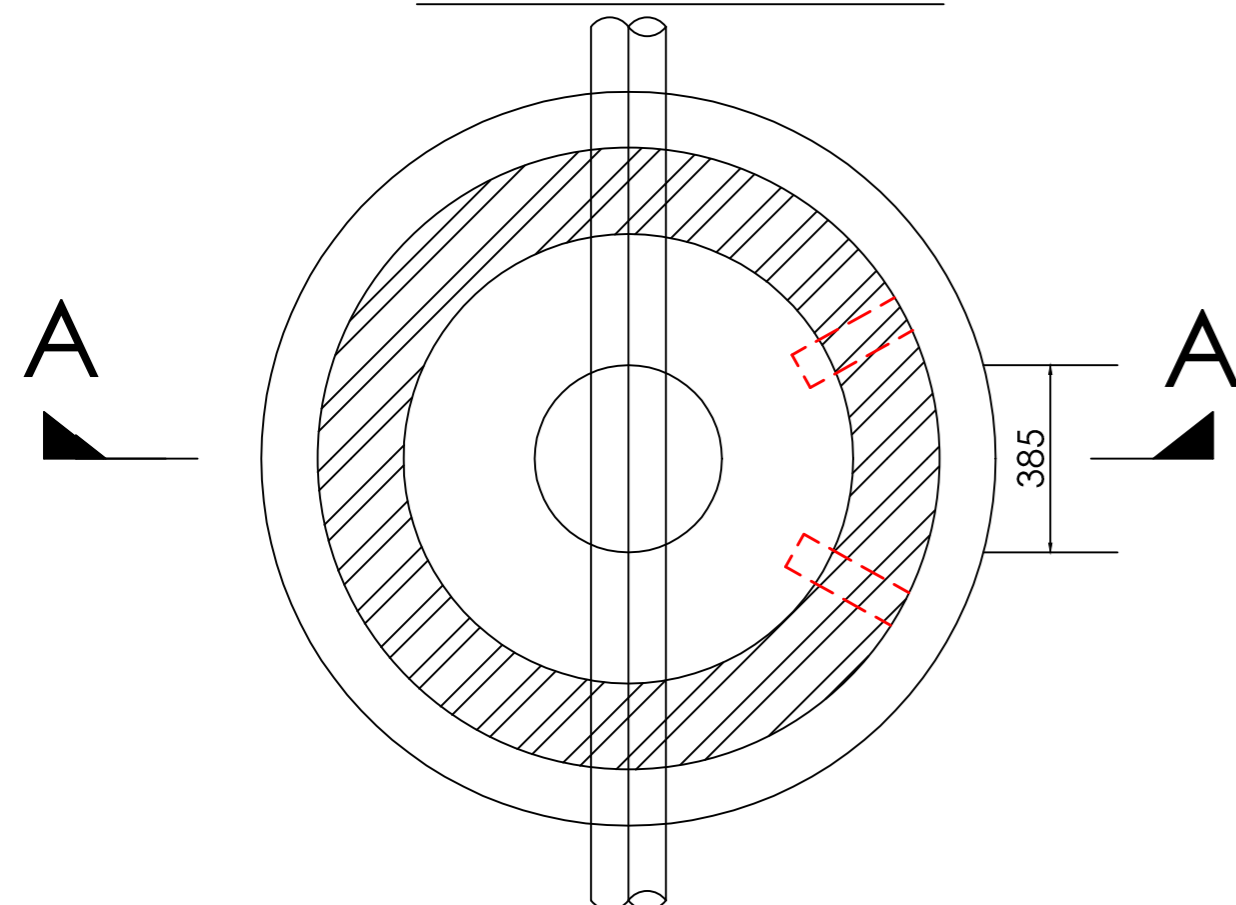


DRAWN BY B.S.PATEL	CHECK BY	DWG NO A-0-01	14-Y-16
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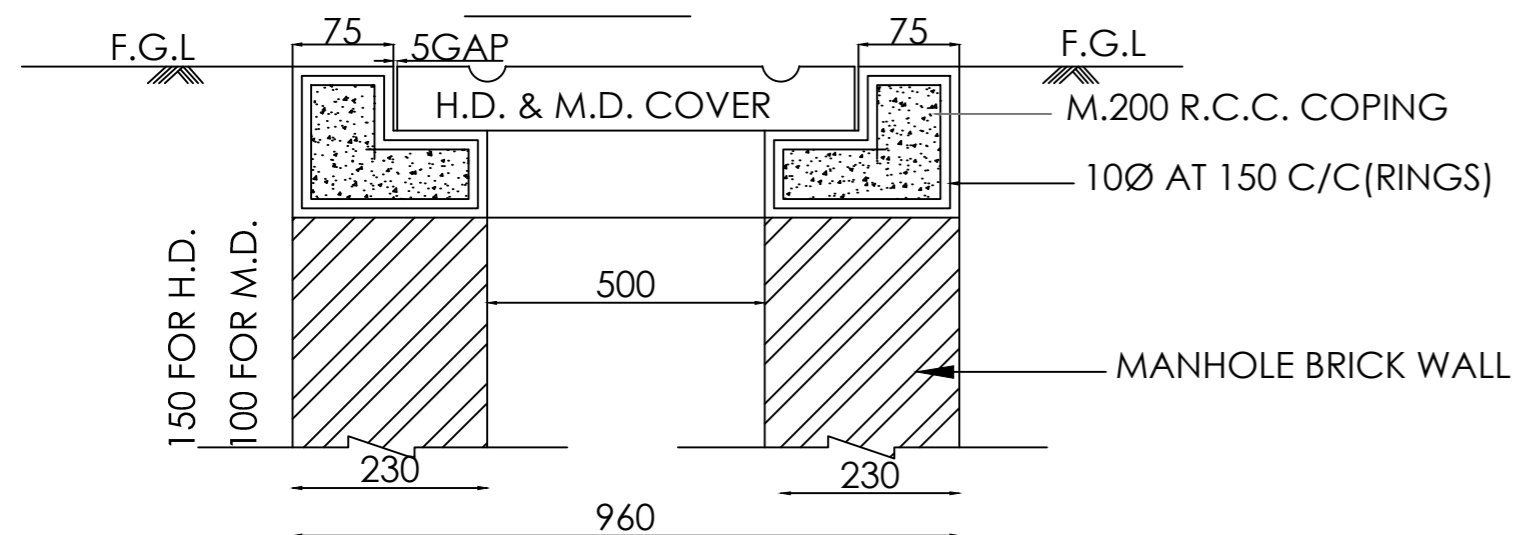
## MANHOLE - A TYPE



**SECTION-AA**



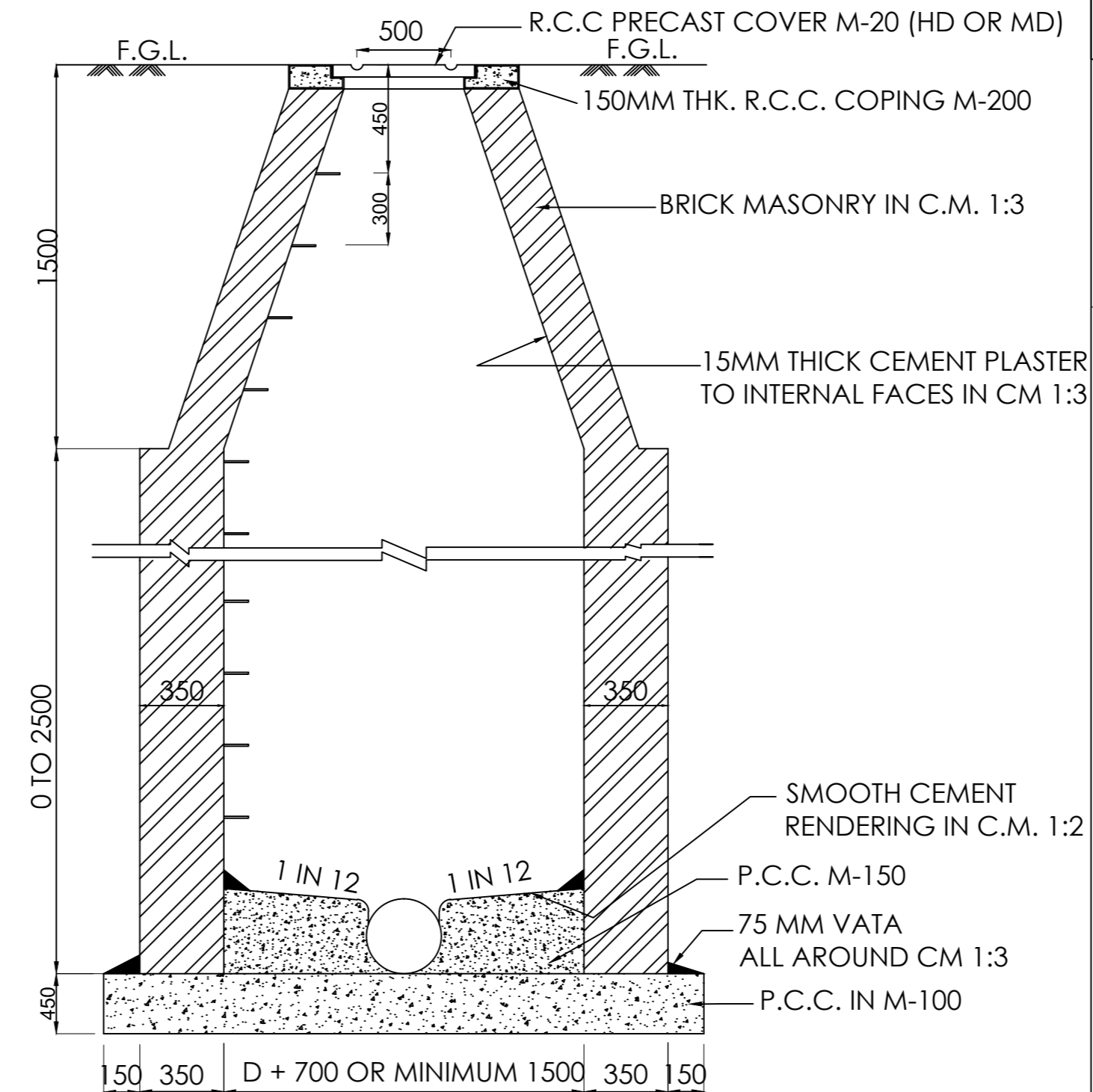
**PLAN**



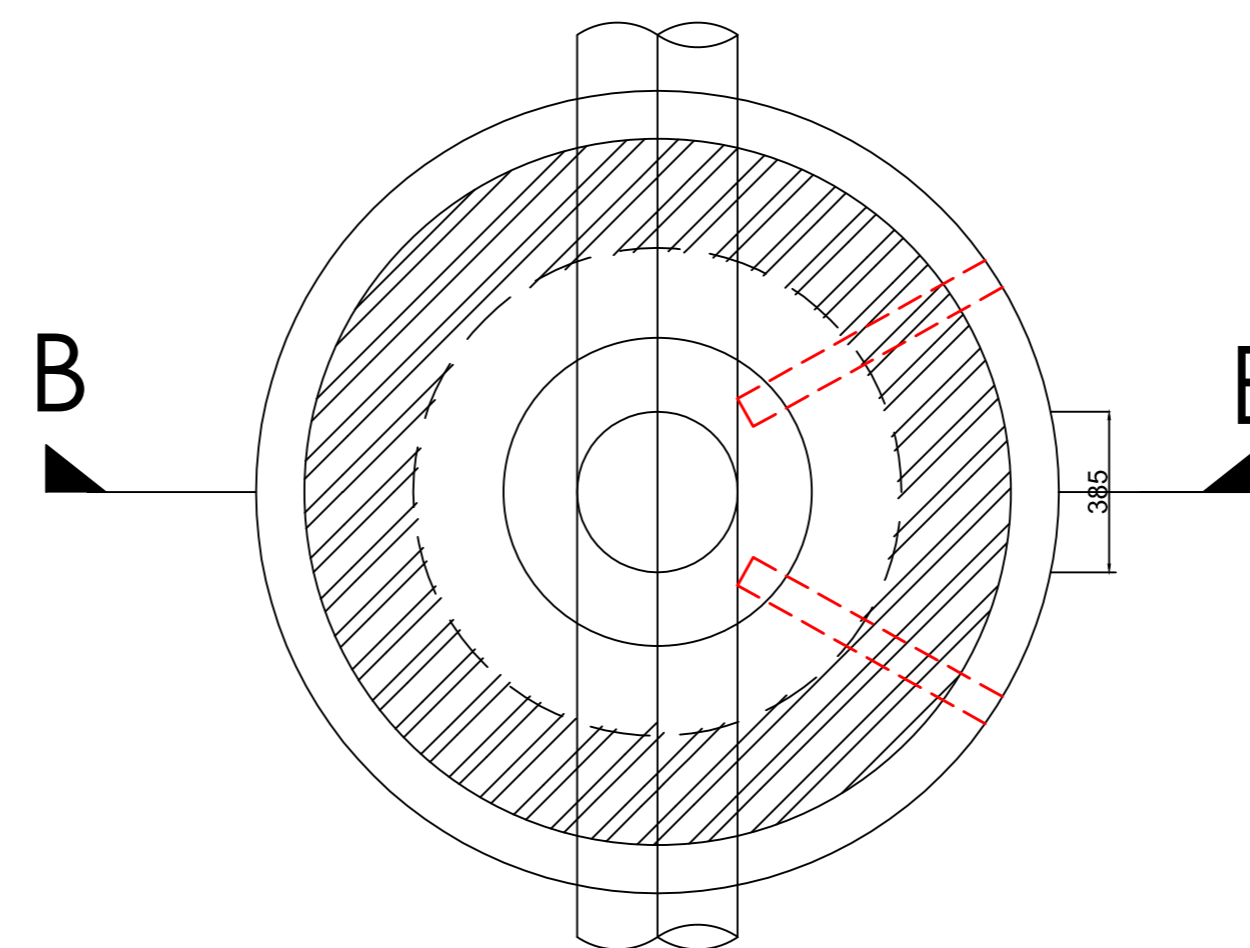
## DETAILS OF R.C.C. COPING M-200

DETAILS OF MANHOLE TYPE-A (CIRCULAR) DEPTH UPTO 1.5 M & PIPE  
DIA. 150 - 500 MM

## MANHOLE - B TYPE



**SECTIONA-BB**



**PLAN**

DETAILS OF MANHOLE TYPE-B (CIRCULAR)  
DEPTH ABOVE 1.5M & UPTO 4.0M FOR DIA. 150-1000MM

PROPOSED EWS-I TYPE HOUSING AT F.P.29 (S.E.W.S.), T.P.-41 (DINDOLI), SURAT.

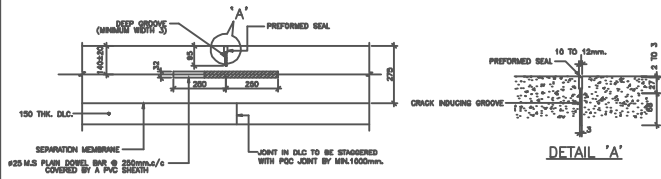
TENDER COPY FOR REFERENCE ONLY

CLIENT	CONTRACTOR	P.M.C.	T.P.I.
ISSUE DATE -		SIGN -	

**SUBJECT:**  
TYPICAL DETAIL OF CONCRETE PAVEMENT & JOINTS

**NOTES:**

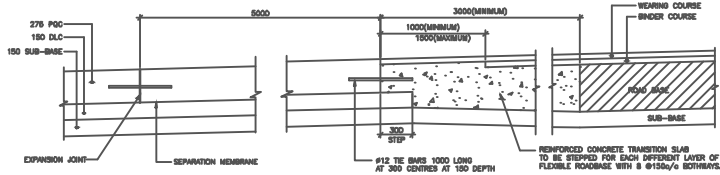
1. ALL DIMENSIONS ARE IN MILLIMETRES AND LEVELS ARE IN METRES, UNLESS OTHERWISE STATED.
2. DIMENSIONS SHALL NOT BE SCALED OFF FROM THE DRAWING.
3. THE TRANSVERSE CONSTRUCTION JOINTS WILL BE LOCATED AT THE STRUCTURES AS DIRECTED BY THE ENGINEER. CONSTRUCTION JOINT SHALL BE PROVIDED AT 90m OR AT THE END OF DAY'S WORK, WHICHEVER IS LESS. ALSO, IF THERE IS A STOPPAGE OF POURING FOR MORE THAN 30 MIN., CONSTRUCTION JOINT SHALL BE PROVIDED.
4. CONCRETE GRADE FOR PAVEMENT SHALL BE M-40.
5. CONCRETE SHALL ACHIEVE A MIN. 28 DAYS FLEXURAL STRENGTH OF 45 kg/cm. PREFORMED ELASTOMERIC JOINT SEALS USING POLYSULPHIDE OR POLYURETHANE AS THE ONLY BASE POLYMER SHALL BE USED IN JOINTS. THE MATERIAL AND THE MANUFACTURE SEAL SHALL CONFORM TO ASTM D 2628 (AND CRD C548).
6. LONGITUDINAL JOINT SHALL BE FORMED JOINT
7. PAVING SHALL BE DONE IN THREE LONGITUDINAL POURS, (MAXIMUM).



CONTRACTION JOINT WITH SAWN GROOVE (SCALE 1:10)

**NOTES:**

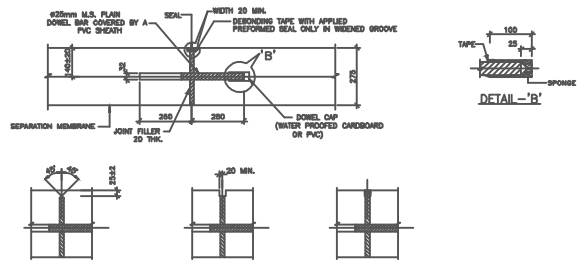
1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE DOWEL BARS SHALL BE PLACED AT 250mm CENTERS. BAR SPACING SHALL BE VARIED WHERE NECESSARY SO THAT NO DOWEL BAR IS WITHIN 150 OF A SLAB EDGE OR A JOINT PARALLEL TO THE BARS.
3. CONTRACTION JOINTS SHALL BE PLACED AT 4500 CENTRES.
4. DOWEL BARS TO BE COVERED BY THIN PLASTIC SHEATH FOR MINIMUM OF 2/3 LENGTH FROM ONE END.



TRANSITION FROM RIGID TO FLEXIBLE CONSTRUCTION (SCALE 1:20)

**NOTE:**

DEPTH OF TRANSITION SLAB SHALL NOT BE LESS THAN 200mm. IF NECESSARY, LAST BAY OF THE RIGID PAVEMENT SHALL BE TAPERED TO MATCH SO THAT THE SUB-BASE SURFACE LEVEL IS CONTINUOUS WITHOUT STEPS.

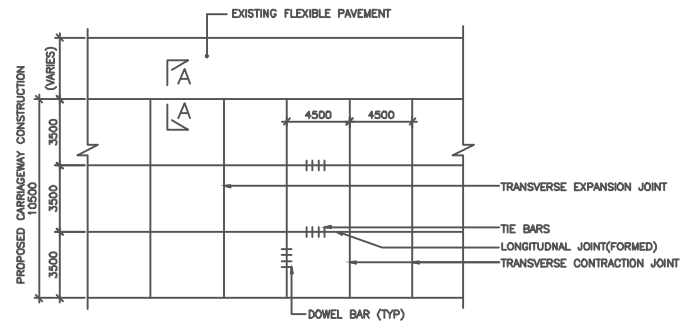


SAWN GROOVE FILLER DETAIL (SCALE 1:10)

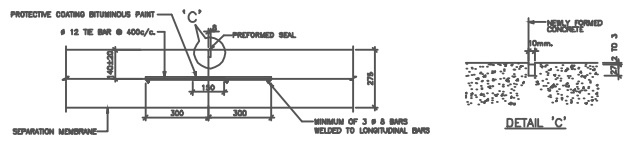
**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. THE DOWEL BARS SHALL BE PLACED AT 250mm CENTERS. THIS SPACING SHALL BE VARIED WHERE NECESSARY SO THAT NO DOWEL BAR IS WITHIN 150 OF A SLAB EDGE OR A JOINT PARALLEL TO THE BARS.
3. DOWEL BARS TO BE COVERED BY THIN PLASTIC SHEATH FOR MINIMUM OF 1/2 LENGTH PLUS 50 mm.

TRANSVERSE CONSTRUCTION JOINT/EXPANSION JOINT



TRAFFIC DIRECTION T  
PAVEMENT JOINT PLAN

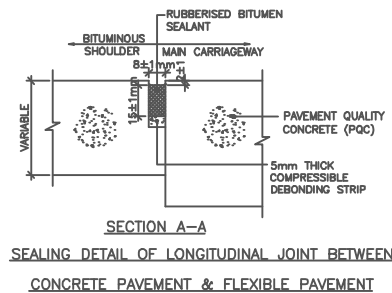


LONGITUDINAL JOINT WITH FORMED GROOVE (SCALE 1:10)

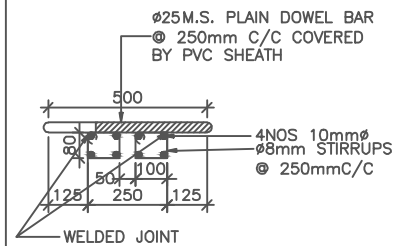
**NOTES:**

1. ALL DIMENSIONS ARE IN MILLIMETRES.
2. LONGITUDINAL JOINTS SHALL BE CONSTRUCTED AND SEALED IN ACCORDANCE WITH THE SPECIFICATION. THE BAR SPACING SHALL BE 400mm c/c. NO. 12 BAR SHALL BE PLACED WITHIN 250mm OF A CONTRACTION JOINT.
3. LONGITUDINAL JOINTS SHALL BE PLACED AS SHOWN ON DRAWING OR AS DIRECTED BY THE ENGINEER.

LONGITUDINAL JOINTS (BETWEEN TWO LANES)



SECTION A-A  
SEALING DETAIL OF LONGITUDINAL JOINT BETWEEN CONCRETE PAVEMENT & FLEXIBLE PAVEMENT



DETAILS OF CRADLE ASSEMBLY FOR DOWEL BAR

**PROJECT:**  
CONSTRUCTION OF CEMENT CONCRETE PAVEMENT AND ALLIED WORKS IN VARIOUS SOCIETY ROADS WITHIN SURAT CITY LIMIT.  
(For finalisation of work for entire year or till further notice)

DRG. NO:  
DATE:  
SCALE:

JAYESSH A DALAL  
PROJECT MANAGEMENT  
CONSULTANT



\*JALANAM BHAKTI, BESIDE CHAWALGIRI APARTMENT, NELLOUR'S CONVENT SCHOOL, ATHWALUR, SURAT.