

BHAVNAGAR MUNICIPAL CORPORATION



Bid Documents For

**Construction of new Cattle box near Shri BALA Hanumaan
Temple - Air Port road, Bhavnagar.**

NOTICE INVITING TENDER & QUALIFICATION CRITERIA

**EXECUTIVE ENGINEER
Building Department
Bhavnagar Municipal Corporation
Mangalsinhji Road,
Bhavnagar – 364 001**

BHAVNAGAR MUNICIPAL CORPORATION	
Notice Inviting On-Line Tender (Short Term)	
Tender Notice No. BUILDING / CATTLE BOX / 2025-26 (Short Term)	
Department Name	: Building Department
IFB No.	: BUILDING / CATTLE BOX / 2025-26 (Short Term)
Name of Project	: SJMMSVY 2024-25
Name of Work	: Construction of new Cattle box near Shri BALA Hanumaan Temple- Air Port Road, Bhavnagar.
Tender Type	: Open – Percentage rate Tender
Estimated Contract Value (INR)	: Rs. 3,57,60,000.00 (Without GST)
Period of Completion (in month)	: 9 (Nine) Months, Including Monsoon period
Bidder Nationality	: LCB (Local Competition Bidding)
Qualification Of Bidder	: Duly registered with R&B in Class "A" Class & Above.
Bid Call (Nos)	: 1
Tender Currency Type	: Single
Tender Currency Settings	: Indian Rupee(INR)
Joint Venture / Consortium	: N.A.
Rebate	: N.A.
Amount Details	
Bid Document Fee	: Rs. 7,080.00 in the Form of DD only
Bid Document Fee Payable To	: Commissioner, Bhavnagar Municipal corporation, Bhavnagar
Bid Security /EMD(INR)	: Rs. 3,57,600.00 In the form of D.D. or F.D.R (except S.B.I Bank)

Bid Security/ EMD in favour of	:	Commissioner, Bhavnagar Municipal Corporation, Bhavnagar
Tender Dates	:	
Bid Document Downloading Start Date	:	Dt. 01/05/2025
Bid Document Downloading End Date	:	Dt.12/05/2025 upto 18:00 Hrs.
Pre-Bid Meeting &Time	:	Dt. 05/05/2025 11:00 am (office of the City Engineer, Municipal Corporation, Bhavnagar)
Last Date &Time of Online Bid Submission	:	Dt. 12/05/2025 18:00
Physical Submission of EMD Document Fee PQ Bid & Supporting all documents	:	Dt. 13/05/2025 to Dt. 19/05/2025 up to 05:00 pm office of the Executive Engineer, Building Department, BMC-Bhavnagar
Opening Of PQ Bid (Online) & TechnicalBid	:	Dt. 20/05/2025, 17:00, if convenient.
Penalty	:	0.10 % of contract value per day to the maximum amount of 10% of contract value
Opening Of Price Bid (Online)	:	Intimation through e-mail / message.
Bid Validity Period	:	180 Days
<u>Qualification of Bidder:</u>	:	<p>Tenderer shall be required to submit the enlisted documents in hard copy along with the Qualification Bid. If documents are insufficient or it does not match the required criteria mentioned below, then the Price Bid of the tenderer shall not be opened.</p> <p>MainlytenderershallfulfillfollowingTechnical&Financialpre-qualificationcriteriaasamain contractor. The tenderer shall fulfill the following all points A to Q requirements /experiences for qualification.</p>

	<p>A. The Bidder must have achieved average annual turnover during last three financial years, ending on 31st March 2025 of Rs. 1,07,28,000.00</p> <p>B. The Bidder shall have positive Net worth for latest financial year(2023-24) of Rs... as on 31st March 2024.</p> <p>C. The Bidder must have experience of successful completion of "similar work"* on its own in India within last 7 years as on date of bid submission</p> <p>(a) One Project of minimum value Rs.80%of the Project Value</p> <p style="text-align: center;">OR</p> <p>(b) Two Projects of minimum value Rs.50%of the Project Value each</p> <p style="text-align: center;">OR</p> <p>(c) Three Projects of minimum value 40% of the Project Value of each</p> <p>Note:* "Similar work" shall mean Construction of Building Work in any of government organizations only. like R&B/Govt./Semi Govt./PSUs/Government Undertaking /Government Companies Department</p> <p>D. Available Bid Capacity (ABC) - must be more than the estimated tender cost. Note: Available Bid Capacity (ABC) will be derived by the following method. ABC is calculated as $ABC=2*A*N-B$</p> <p>Where,</p> <p>A = Maximum value of works executed in any one year during the last five years (up dated to present price level by applying enhancement factor) taking into account the completed as well as works in progress.</p> <p>N=Number of years prescribed for completion of the works for which tenders are invited i.e. $09/12=0.75$</p> <p>B=Value of existing commitments and on-going works to be completed during that next N year (period of</p>
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completion of the works for the tenders are invited.)

Note: The statements/certificate showing the value of existing commitments and on going works as well as the stipulated period of completion remaining for each of the works listed should be signed by the respective Employer or his authorized representative, not below the rank of an Executive Engineer or equivalent.

E. The cost of material supplied by the Government/Client shall not be taken into account for experience purpose.

F. Bidder should submit (1) EPF (2) ESIC registration/documents (2) Notarized Declaration for Litigation History and non Blacklisted agency, without these submission, bidder will outright rejected.

G. An attested copy of registration with R&B etc.
Registration required: "A" Class & Above .

H. **Bank Solvency of Current Financial Year (2025-26) (20% of Tender amount.) of any Nationalized/Scheduled Bank except SBI and Co-operative Bank.**

I. Following enhancement factors will be used for the cost of works executed and financial figures to arrive at common base for the value of the works completed in India. Cut of month shall be considered from month of tender submission.

Year	Multiplying factor
Immediate last year of the assessment year*	1.1
Second	1.21
Third	1.33
Fourth	1.46
Fifth	1.61
Sixth	1.77
Seventh	1.95

	<p>*Here assessment year shall be reckoned from year and month in Which tender is submitted.</p> <p>J. The experience of Joint Venture/Back-to-back work/Nominated Sub-contractors by agencies shall not be considered.</p> <p>K. The Bidder should submit Solvency Certificate minimum value of Rs. (20% of Tender amount.) issued by schedule bank / Nationalized bank (except SBI). (Considering validity as 1year from date of issue of Solvency Certificate)</p> <p>L. The Bidder should submit the list of the works already completed during last 7 year in prescribed Performa and attested copies of certificates issued by head of the office concerned for completed work.</p> <p>M. The Bidder shall submit Declaration regarding the work on hand with the bidder in prescribed Performa. Attested copies of work orders, interim certificate if any shall also be attach as supporting documents for above.</p> <p>N. The Bidder shall submit the attested copy of partnership deed, power of attorney, etc.</p> <p>O. Joint Venture shall not be allowed.</p> <p>P. Even though the Bidder meets the above criteria, they are subject to be disqualified if they have</p> <ol style="list-style-type: none"> i) Made misleading or false presentations in the forms, statements and attach ments submitted in proof of the qualification requirements ;and/ or ii) During verification if it is found from client that of poor performance such as abandoning the works, for financial failure or abnormal delay in work etc. iii) Regarding Litigation, in case where Bidder or JV partner or MOU Partner is involved in illegal practice like any activities of corruption, coercive practice or debarred/blacklisted in last 3 years by Any Govt / Organization in respect of performance of Bidder / MOU partner /JV partner, BMC
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	<p>authority requires that bidders under this contract, observe the highest standard of ethics during the procurement and execution of such contracts.</p> <p>(1) Will reject a proposal for award if it determines that the bidder has engaged in any corrupt or fraudulent practices incompeting for this contractor in past history and</p> <p>(2) Will reject a proposal if it found debarred/blacklisted by any State Govt. /Govt. of India/ Semi Government/ PSU inlast10years.</p> <p>iv) The bidder or MOU partner shall not be under any Insolvency Bankruptcy code (IBC) resolution process at National Company Law Tribunal(NCLT)or undergoneany Corporate Debt Restructuring (CDR) mode in the past 10 years in India from the date of the submission of the bid.</p> <p>Q. The Bidder shall note that in case the Bidder/MOU partner is blacklisted/stated as defaulter/ barred participating in tenders by any of government agencies / semi government agencies/PSU sin Indiaduring last 10years then in that case,the Bidder will be disqualified though the bidder satisfies all the pre-qualification conditions mentioned above, and the bidder will be debarred for next 3 years from participating in tender process for BMC.</p> <p>R. Bidders should be selected based on quality work done by them and if necessary tender committee will inspect bidders on going and completed work.</p> <p>S. The decision of the commissioner to qualify the bidder will be the final.</p> <p>T. Conditional Tenders will be out rightly rejected.</p> <p>U. The applicant must submit this confirmation letter on Rs.300.00 stamp paper with notary for Operating and Maintenance of proposed work shall include</p>
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labour, all materials, plants, plants causalities, fertilizers, pesticides, tools, watering, security of premises shall be responsibility of the Tenderer during the course of work and 2 years after the time of completion certificate from authority and all charges for the same born by the Contractor (Tenderer). 1% from every running bill shall be deducted towards SECURITY DEPOSITE of Operating and Maintenance of proposed work. IT WILL BERELEASEDAFTER COMPLETIONPERIODOF24 MONTHSOFO&M.

- V. If work is not completed within time limit, penalty of 0.10% of per day will be deducted from running bill and it will be upto 10% of contract value.
- W. FDR For EMD and SD, or bank guarantee issued by state bank of India will not be accepted. Bidder should submit FDR or bank guarantee issued by any other nationalized bank only.
- X. Bidder shall quote the rate with all taxes excluding GST. Prevailing GST will be paid extra with RA bills by BMC.

VARIATION IN QUANTITIES

Schedule of prices contain estimated quantities and actual quantities as executed becomes payable at agreed rates.

However, accepted rates will be valid till variation in quantities up to any extent of the quantities so specified.

- Y. Other terms and conditions of the tender shall be read and considered as a part of the tender documents. The rates/prices quoted by the bidders will be final and any sort of escalation will not be considered.

Note:

Star Rate, Price Escalation, price Variation in any items of Schedule-B / Extra item will Not be given by Bhavnagar Municipal Corporation.

If Same will be stated in any Bid Documents will not be

		Considered, i.e. this statement prevails.
<u>Remarks</u>	:	<p>Only Offer of those shall be opened whose EMD & Tender Fee evidence is received electronically along with the bids. However, for the purpose of realization of Demand Draft, bidder shall send them in original through RPAD/SpeedPost/Reg.A.D.so as they reach to the office of Executive Engineers-Building Dept., Bhavnagar Municipal Corporation, Bhavnagar during office hours between Dt. 13/05/2025 to Dt. 19/05/2025. Penaltative action shall be imposed for not submitting the supporting documents in original to E.E. by bidder. All the successful bids, if possible, will be physical document opened Dt.20/05/2025 in presence of tender committee at the City Engineer's Office, Commercial stage will be opened after approved this tender document Bhavnagar Municipal Corporation, Bhavnagar.</p> <p>Note : FDR FOR EMD OR SD, OR BANK GAURANTEEE issued by State Bank of India will not be accepted.</p>
General Terms & Conditions	:	<p>Bidders who wish to participate in this E-Tender will have to procure valid digital certificate asper information Technology Act 2000. Bidders can procure this certificate from any of the Government approved certifying agency i.e. (n) Code Solution.</p> <p>DOWNLOAD OF TENDER DOCUMENT:</p> <p>The tender document for this work is available only in digital format which can be download freeofcostbythe bidder.</p> <p>SUBMISSION OF TENDER:</p> <p>Tenderer shall submit their offer in electronic format on above mentioned web site on or before the scheduled date and time as mentioned, after Digitally Signing the same.</p> <p>Bidders shall upload the tender documents after submitting the DD details fortenderfeesandEMDinformofDD/BankGuaranteedetailsonline.TheDemand Draft toward Tender Document fees</p>

	<p>can be submitted along with Earnest Money Deposit before the due date as specified above.</p> <p>This should be as per details given online and it should be drawn before last date of the uploading of the tender.</p> <p>The intending bidders shall have to submit the following documents in Physical form along with the EMD and tender fees.</p> <ul style="list-style-type: none"> (a) Documents required for evaluation as sought in different annexure duly digitally signed. (b) Power of attorney. (c) Company's profile and certificate of Registration of company under the law. <p>The Bidder should submit price Bid digitally only. <u>Price bid in physical form shall Not be accepted</u> and any such offer if received by Bhavnagar Municipal Corporation same will be outrightly rejected.</p> <p>Technical bid in physical form is not required to be submitted by all bidders. However, non-submission of technical bid does not absolve bidders from and liability of the tender. Only successful bidders have to submit the technical bid duly signed in physical form upon intimation from BMC.</p> <p>OPENING OF TENDER:</p> <p>The Technical Bid will be opened on the specified date online on website www.tender.nprocure.com Bidders or their representative who wish to participate in online tender opening can log on to www.tender.nprocure.com on the due date and time, mark their presence and participate in online tender opening. Bidders who wish to remain present at Bhavnagar Municipal Corporation, only one representative of each firm will be allowed to remain present.</p>
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**Information
for online participation**

1. Internet site address for e-Tendering activities will be www.tender.nprocure.com
2. Interested bidders can view detailed tender notice and download tender documents from the above-mentioned website.
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 & password on their own in registration process.
4. Bidders who wish to participate in this tender need to procure Digital Certificate as per Information Technology Act-2000 using that they can digitally sign their electronic bids. Bidders can procure the same from any of the eCCA 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 380015, India.
Tel: +917926857316
Tel: +917926857317
Tel: +917926857318
E-Mail:
URL: www.tender.nprocure.com
5. Bidders who wish to participate in e-Tender need to fill data in predefined form of tender fee, EMD, PQ (Technical) or experienced details and Price bid only.
6. Bidders should upload scan copies of referenced documents in support of their eligibility of the bid.
7. After filling data in predefined forms bidders need to click on final submission link to submit their encrypted bid.

	Bidder can also submit Document Fees, EMD, Technical bid document & Reference Documents in hard copy if such instructions are given by tendering authority.
Officer Inviting Bids	Executive Engineer, Building Department, Bhavnagar Municipal Corporation, Bhavnagar.
Bid Opening Authority Members in committee	(1) Addl. City Engineer (2) Executive Engineer Building Department (3) Chief Accountant (4) Chief Auditor
Address	Building Department, Bhavnagar Municipal Corporation, Sir Mangalsinhji Road, Bhavnagar
Contact Person	For further details of any query regarding the tender Contact to: Executive Engineer (Building Department), Bhavnagar Municipal Corporation., Sir Mangalsinhji Road, Bhavnagar-364001 Mobile no. 9724513409 E-mail: building.bmcgujarat@gmail.com

Date :
Place: Bhavnagar

Executive Engineer
Building Department
Bhavnagar Municipal Corporation

BHAVNAGAR MUNICIPAL CORPORATION

EXECUTIVE ENGINEER

BUILDING DEPARTMENT

BHAVNAGAR MUNICIPAL CORPORATION

BHAVNAGAR

**Construction of new Cattle box near Shri BALA Hanumaan
Temple - Air Port road, Bhavnagar**

SECTION- II

PRE QUALIFICATION DATA SHEET

(FORM A To K)

PRE-QUALIFICATION DATA SHEET

- The firm (bidder) shall have registration in "A" -class in State of Gujarat or equivalent in other states, or equivalent in class in Central Government.
- Employee Provident fund number is a must.

NOTE:

- If bidders have any technical query regarding work then, bidders have to submit the same well in advance at least before 3 days from the date of pre bid meeting.
- Consortium, JV, Association or collaboration is not allowed.
- Copy of work order/notification for award of work is mandatory document, which establishes that the bidder has been awarded a work, which is claimed to be meeting the experience criteria.
- Submission of adequate proof of completion is mandatory requirement, which establishes that the work under reference has been completed.
- In case these mandatory documents are not enclosed such work shall not be considered in evaluation for meeting the experience criteria.
- All supporting documents pertaining to experience criteria as evidence shall be notarized.

Construction of new Cattle box near Shri BALA Hanumaan Temple - Air Port road, Bhavnagar

Details to be submitted by the tenderer

Tenderer is requested to submit following details to qualify in Technical Bid

Form A

Sr. No.	Item	Details
01	Name and address of Company	
02	Phone no	
	Mobile no	
	Fax no	
	Email ID, Website	
03	Name of Concerned Person	
04	Whether Proprietorship/ partnership/ Pvt Ltd/ Limited co or any other	
05	Number of years of experience in construction / field of similar nature of work - to be attached in technical documents	
06	Income tax PAN registration No copy (copy to be enclosed)	
07	Please confirm on awarding of the work you will take the registration certificate as per statutory requirement under contract labor laws.	
08	Tax no. details VAT (state sales tax) No – copy to be attached in technical documents	
09	Central Sales Tax CST No (copy to be attached)	
10	Service Tax No. (copy to be attached)	
11	Provident Fund Registration Number – Copy to be attached	
12	Registration certificate copy with minimum 'A' Class – Building works in the state of Gujarat or equivalent class in other state or CPWD (copy to be attached)	
13	Liquidated Damages clause – Accepted Liquidated damages for the work delayed/non completion/ non performance of works will be imposed as mentioned in Technical Bid 1	
14	Prices/Charges – Accepted Prices / Charges should be firm and fixed till the completion of work. Quoted price includes all man power, required material, safety measures, PF Contribution, all taxes, VAT and Cess, labor cess, other applicable levies etc.	

	No price increase will be allowed during tenure of contract due to any reason	
15	Payment terms - accepted	
16	I T and other taxes deduction – Agree Taxes will be deducted as per prevailing government rules from the monthly bill	
17	Validity of offer - Accepted	
18	Work completion period as per price schedule - accepted	
19	Deviation sheet attached Deviation sheet to be attached by the bidder mentioning any deviation in technical & commercial. If there is no deviation then with no deviation sheet, submitted on letter head of the bidders	
20	Declaration sheet 1 & 2 – Attached Declarations in prescribed format on letter head of the bidder.	
21	Documents as mentioned in NIT	

Form B

Sr. No.	Item	Details		
01	<p>Latest copy of solvency certificate issued on or after 1st April 2025 may be accepted and same should be issued by Nationalized bank or scheduled approved by Government of Gujarat (except for a cooperative Bank, SBI Bank).</p> <p>Name of Banker</p> <p>Full address :</p> <p>Phone no.</p> <p>e-mail Address.</p> <p>Fax no.</p>			
02	<p>Turnover during last three years:</p> <p>Average Annual financial turnover during the last 3 years, ending 31st March of the previous financial year, should be at least 30% of the estimated cost. Proof for the same from registered chartered accountant shall have to be produced.</p>	<p>Year</p> <p>2024-25</p> <p>2023-24</p> <p>2022-23</p>	<p>Turn over in Rs.</p>	
03	<p>Name of company for whom work carried out during last seven years with copy of orders and satisfactory job completion certificates which should match with criteria mentioned in 02</p>	<p>1.</p> <p>2.</p> <p>3.</p> <p>4.</p> <p>5.</p> <p>n...</p>		

Sr no.	Name of client / Nature of work	Work order no	Date of commencement and completion	Value in Rs.
04	Details / list of equipment/ tools, tackles related to above work, site mentioned and certified on your letter head. All required tools, tackles, can be made available at Bhavnagar Municipal Corporation work site – to be attached in technical documents			
05	Details / list of numbers of employees, supervisory, office administration side, skilled and semi skilled worker, to be proposed to be deployed for this work site mentioned and certified on contractors letterhead to be attached in technical documents			

Note:

- 1) Decision of the Management Authority – Bhavnagar Municipal Corporation regarding the technical qualification is final and binding to the tenderer and no correspondence will be entertained in this regards thereafter.
- 2) It is desirable to furnish all information with necessary documents.
- 3) The above details supported by last financial year balance sheet / profit & loss account etc must be audited by the chartered accountant.
- 4) The above information shall be supported with necessary documents otherwise, the same shall be treated as null & void.

Form C

DETAILS OF PERSONEL WITH THE APPLICANT (ON ROLL)

Name of applicant:

Sr no	Description	On applicants payroll
1	Project Manager	
2	Site Engineer	
3	Number of Engineering Graduates a) Design b) Construction supervision c) Electrical engineer	
4	Number of administrative graduates	
5	Number of skilled employees	
6	Number of unskilled employees	
7	In case of personnel at sr. no 1 to 4 please give name, qualification, present position, professional experience and linguistic ability	
	The certified copy of qualification with an affidavit on stamp paper stating their appointment in the firm shall have to be attached with the annexure	
	The above information shall be supported with necessary documents otherwise the same shall be treated as null & void	

SEAL & SIGNATURE OF BIDDER

Form D

DETAILS OF PERSONNEL TO BE DEPLOYED ON THIS PROJECT BY BIDDER

Name of applicant:

Sr. no	Description	Qualification	Minimum requirements		Yes/No
			Number	Experience in building works	
1	2	3	4	5	6
1	Project Manager	B E Civil	1	10 year experience (5 years on building construction)	
2	Site Engineer	B E Civil	1	10 year experience (5 years on building construction)	
3	Material & quality control engineer	B E Civil / Diploma Civil	1	2 years experience	
				5 years experience	
4	Electrical Engineer	B E Civil / Diploma Civil	1	5 years Experience	

Note:

Availability for this work of project manager having degree in civil engineering with at least ten years of experience including at least five years in building construction works and a material & quality control engineer having degree/diploma in civil engineering with at least five years building construction experience.

Site engineers employed by contractor shall have to have license of Bhavnagar Municipal Corporation to act as 'Civil Engineer', who shall sign all necessary form from approval to completion as per prevalent development control regulations and they shall be kept permanently employed till completion of the project.

SEAL & SIGNATURE OF BIDDER

Form E**PLANT & EQUIPMENTS PROPOSED TO BE DEPLOYED BY THE APPLICANT FOR USE ON THE BUILDING WORK**

Sr no	Name of equipment	Total requirement			Equipment on hand			Equipment to be procured		
		No of units for the projects	Type and make	capacity			No of units for the project	Type and make	capacity	
1	2	3	4	5	1	2	3	4	5	
1	Fully Automatic concrete batching plant of 15 Cmt /Hr of minimum capacity	-								
2	Mobile Concrete mixer with minimum 3 bag weight batcher	1 no								
3	JCB or excavator	1 nos								
4	Goods cum lift of minimum 300 kg capacity	1 nos								
5	Shuttering (steel form work)	600 sq mt								
6	Steel props with accessories	200 nos								
7	Vibrator (needle) + Surface vibrator (operating with electricity or diesel)	2 nos								
8	Water tanker	1 nos								
9	Trucks	1 nos								

	/dumpers with capacity not less than 5 Cu Mt									
10	Standard Testing Laboratory (as prescribed)	-								
11	Pump & Motor	1 set								
12	Generator	1 set								
13	Theodolite & Total station with allied surveying equipments	1 set								

Note:

- 1) The above information may be furnished for each machinery and equipment listed here with
- 2) The location of machinery would be furnished in detail, i.e. (1) site of work (2) own workshop (3) other places
- 3) ~~The documents regarding ownership of machinery/equipment etc and self attested copies of hire purchase agreement if it must be enclosed and for to be procured the copy work order placed shall be furnished. If leased indicate the date when the current lease expires.~~
- 4) ~~Describe the fabrication and workshop facilities (a) to be set up at site (b) to the sub contracted locally (c) to be set up any other place with relevant details.~~
- 5) The above information shall be supported with necessary documents otherwise, the same shall be treated as null and void.

SEAL & SIGNATURE OF BIDDER

Form F

EXISTING COMMITMENT AND ON GOING WORK

Give information about relevant (building works) as well as other works in progress including those where the company has received a letter of intent but a formal contract has not yet been awarded.

Employer	
Engineer responsible for supervision	
Location and description of building works	
Value of contract	
Cost of work executed as on date of bid	
Remaining work to be executed as on date of this bid	
Percentage of financial completion and cost	
Date of work order	
Stipulated date of completion of work	
Likely date of completion	
Reason for slow progress if any	

Note: Non disclosure of any information in the above will result in disqualification of the bidder

SEAL & SIGNATURE OF BIDDER

Form G

EXPERIENCE IN RELEVANT (BUILDING WORKS) PROJECTS COMPLETED

Please furnish information about relevant project (Building works) completed over the past five years

Employer	
Engineer responsible for supervision	
Location and description of building works	
Value of contract	
Cost of work executed as on date of bid	
Remaining work to be executed as on date of this bid	
Percentage of financial completion and cost	
Date of work order	
Stipulated date of completion of work	
Likely date of completion	
Reason for slow progress if any	

Note: Non disclosure of any information in the above will result in disqualification of the bidder

SEAL & SIGNATURE OF BIDDER

Construction of new Cattle box near Shri BALA Hanumaan Temple - Air Port road, Bhavnagar

Form H

ADDITIONAL INFORMATION

CONTRACT

COMPANY

EXPERIENCE

Summary of experience of company in the Neighborhood project and / or neighboring states

FORM I
DETAILS OF LITIGATION (NOTARIZED)

Name of applicant / or parties:

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

Years	Award for /or against applicant	Name of client, cause of litigation and matter of dispute	Disputed amount in rupees
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Note: The above information shall be supported with necessary documents otherwise the same shall be treated as null & void. If the information is to be furnished in this Annexure will not be given and come to the notice subsequently will result in disqualification of bidder. If no information is there to be provided then it should be marked as 'Nil'. This should be notarized.

SEAL AND SIGNATURE OF BIDDER

FORM J
ADDITIONAL INFORMATION

(The applicant can add here any further information relevant to the evaluation of their prequalification bid)

NOTE: The above information shall be supported with necessary documents otherwise the same shall be treated as null and void.

SEAL AND SIGNATURE OF BIDDER

FORM K
DETIALS OF SIMILAR WORK COMPLETED

1	Name of contractor	
2	Name of work	
3	Estimated cost of work put to tender	
4	Revised estimated cost	
5	Tender amount	
6	Date of starting the work	
7	Date of completion of work (as per contract agreement)	
8	Actual date of the completion of work	
9	Amount of the completed work done	
10	State whether the details as above given by the contractor are correct if not state as to what is the correct information	
11	State whether the contractor has executed the work in progress. Satisfactory as per specification if not give the correct position of the work	
12	Period rate & amount of	

	compensation if levied	
13	Period of extension granted if any	
14	Reason for delay, granted if any	
15	Any other remarks: particulars of work Completed	

Note :

1. Decision of the Management regarding the technical qualification in final and binding to the tenderer and no correspondence will be entertained in this regards there after.
2. Only one authorized representative of the tenderer will be allowed to remain present at the time of opening the technical / price bid. Authorized representative must come with his company's letter and with attested signature of the representative recommending him to allow remaining present at the time of opening the respective bid, failing which no representative will be allowed to remain present at the time of opening the bid.
3. Any tender without EMD will be outright rejected.
4. Tender is in two bid system, i.e. Technical Bid and Price Bid. First the technical bid will be opened on the date of opening of the tender in the presence of the tenderer. The same will be scrutinized by the Bhavnagar Municipal Corporation and price bid will be opened only for those tenderers, who qualify themselves in Technical Bid. However, technically qualified tenderer will be informed regarding the date time for the opening of price bid by Fax / email.

-:SPECIAL CONDITIONS:-

1. A certificate in Form no 3A of the Compitant Officer rank not less then Executive Engineer regarding completing a similar nature of work shall have to be produce by the bidder and the same shall be scanned and uploaded along with the bid at the time of submitting bid and with submission of hard copy. A tender without the certificate shall be considered non responsive and will not be opened.
2. For this contract in form B-2 the Government means Bhavnagar Municipal Corporation, Bhavnagar AND Superintending Engineer means City Engineer.
3. The Bank guarantee for the Security deposite shall be submitted for the period of eleven plus three month.
4. 1% from every running bill shall be deducted towareds labor cess.
5. 2.5% of every running bill shall be deducted as retention money and will be refunded at the time of final bill on production of satisfactorily completed the work by the Engineer in charge.
6. The time for completion of the project shall be **NINE** month from the issue of LOI.
7. The defect liability period for the project shall be **05 (FIVE) year** from the work completion certificate issued by Engineer in charge
8. For the Electrical work the contractor shall have to prepare and submit complete electric wiring and installation diagram and submit the same for approval; on the approval the work shall be carried out accordingly.
9. The cost of the permanant electric power connection shall be borne by the Corporation; however the contractor shall liason for release of connection. The authority will extend every support for the application as wel as to produce and submit the documents necessary for approval.
10. The contractor shall have to follow test schedule as per relevant IS standard even if not specify otherwise in the tender, at his own cost.
11. Existing structure, building and all items within have to be protected from all damage. No extra amount will be paid for the same. At the time of hand over of the building - all its parts like flooring, switch boards, electric

fixtures, hardware, toilets etc (mentioned herewith or not) will be checked and have to be in the same condition as at the start of the work. responsibility or any damage and making it good will rest with the contractor.

12. Electricity :- Contractor should put his own electric meter and bear all charges for the same.

13. The bidder to note the following qualifying criteria for bidding.

For Civil/Electrical Works

i) Average Annual financial turnover during the last 3 years, ending 31st March of the previous financial year, should be at least 30% of the estimated cost. Proof for the same from registered chartered accountant shall have to be produced.

ii) Experience of having successfully completed similar works during last 7 years ending last day of month previous to the one in which applications are invited should be either of the following: -

a. Three similar completed works costing not less than the amount equal to 40% of the estimated cost.

or

b. Two similar completed works costing not less than the amount equal to 50% of the estimated cost.

or

c. One similar completed work costing not less than the amount equal to 80% of the estimated cost.

iii) Definition of "similar work" means the work of building construction work.

Signature of Agency

Executive Engineer,
Building Department,
Bhavnagar Municipal Corporation,
Bhavnagar

BHAVNAGAR MUNICIPAL CORPORATION

**EXECUTIVE ENGINEER
BUILDING DEPARTMENT
BHAVNAGAR MUNICIPAL CORPORATION
BHAVNAGAR**

**CONSTRUCTION OF NEW CATTLE BOX NEAR SHRI BALA HANUMAAN TEMPLE-
AIR PORT ROAD, BHAVNAGAR**

SECTION- III

**COMMERCIAL BID
ITEM RATE TENDER AND CONTRACT FOR WORKS**

FORM B-2

FORM B-2

BHAVNAGAR MUNICIPAL CORPORATION

NAME OF WORK:- CONSTRUCTION OF NEW CATTLE BOX NEAR SHRI BALA
HANUMAAN TEMPLE- AIR PORT ROAD, BHAVNAGAR

Issued to:- _____

OPENED BY

ON (DATE)

MEMORANDUM OF WORKS IN BRIEF

1.Name of work : CONSTRUCTION OF NEW CATTLE BOX NEAR SHRI BALA HANUMAAN TEMPLE- AIR PORT ROAD, BHAVNAGAR

2 Estimated Cost : Rs. 3,57,60,000/-

3. Earnest Money : Rs 3,57,600/-

4. Validity period of tender offered **180 days from the stipulated date of receiving of the tender but no modification shall be allowed after the last submission date of tender.**

5. Security Deposit

(i) Demand Draft of Nationalized Bank :- 5% of contract value

(ii) Retention Money : 2.5% of the value of the contract
in the form of FDR

(iii) To be deducted from bills : 2.5% of running bill amount

(iv) Performance Bond : NIL

TOTAL : 10%

6. Time allowed for completion of the work : **09 months (from the L.O.A)**

7. Other details

(I) The tender must be submitted to EXECUTIVE ENGINEER, BUILDING
DEPARTMENT , BHAVNAGAR
MUNICIPAL CORPORATION,
BHAVNAGAR by e-submission as
per the schedule mentioned in the
tender notice

(ii) Mode of Sending the tender : as mentioned in the tender notice

(iii) Description essential to be NA
made on sealed cover :

(iv) Mode of quoting rate : Figures as well as in words in
Schedule"B"

T E N D E R

Date: _____

**To,
Executive Engineer,
Building Department,
Bhavnagar municipal Corporation,
BHAVNAGAR.**

Dear Sir,

We hereby offer to execute the proposed work of

**CONSTRUCTION OF NEW CATTLE BOX NEAR SHRI BALA HANUMAAN TEMPLE-
AIR PORT ROAD, BHAVNAGAR**

Under item contract at the respective rates as mentioned in the accompanying schedule of quantities.

We have studied the site and have read the terms and conditions of work, drawings, special conditions, articles of agreement, conditions of contracts and specifications.

We agree to finish the entire work within **9 (Nine)** months from the date of L.O.A (**letter of acceptance**) of work.

We have deposited as earnest money a sum of **Rupees seventy seven thousand Seven hundred Twenty Only** with you, which amount is not to bear any interest and we do hereby agree that this sum shall be forfeited by you if we fail to execute the contract when called upon to do so, in the event of your accepting our tender.

Yours faithfully,

Name in capital letters

: _____

Name of firm

: _____

Name of directors

: _____

Name of partners

: _____

TENDER TO BE SUBMITTED BY e-submission as mentioned in the tender notice

Article of Agreement

This Articles of Agreement is made on the ____ day of ____ 2023 between The Executive Engineer, Building Department, Bhavnagar Municipal Corporation, Bhavnagar.(here in after called “ The Owner “)

On one part an _____

Whose registered office is situated at

(here in after called "The Contractor") of the other part

WHEREAS the owner is desirous of constructing **CONSTRUCTION OF NEW CATTLE BOX NEAR SHRI BALA HANUMAAN TEMPLE- AIR PORT ROAD, BHAVNAGAR.**

(here in after called “The Work“) at Ruva, Bhavnagar, and has caused Drawings and Bills of Quantities showing and describing the work to be done and prepared by and under the direction of Architect Ashish Jani and whereas the Contractor has supplied the owner with a full priced copy of said Bills of Quantities (which copy is here in after referred to as "the Contract Bills")and whereas the said Drawings (here in after referred to as "the Contract Drawings")and the Contract Bills have been signed by or on behalf of the parties here to: and whereas the Contractor has deposited the sum of **Rupees seventy seven thousand Seven hundred Twenty Only** with the Owner for the due performance of this Agreement.

NOW IT IS HEREBY AGREED AS FOLLOWS :

1. For the consideration here in after mentioned the Contract will upon and

subject to the conditions annexed carry out and complete the work shown upon the contract drawings and described by or referred to in the Contract Bills and in the said conditions.

2. The Owner will pay the Contractor the sum as per the contract (here in after referred to as "the Contract Sum") or such other sum as shall become payable here under at the times as in the manner specified in the said conditions.
3. The term "The Architect " in Conditions shall mean the said Architect Ashish Jani, Plot no 11, Nanbhawadi, Kalanala, Bhavnagar or in the event of his death or ceasing to be the Architect for the purpose of this Contract, such other person as the Owner shall nominate for that purpose, not being a person to whom the Contractor shall object for reasons considered to be sufficient by an arbitrator appointed in accordance with the said Conditions Provided always that no person subsequently appointed to be the Architect under this contract shall be entitled to disregard or overrule any certificate or opinion or decision or approval or instruction given or expressed by the Architect for the time being.
2. The said condition and appendix there to shall be read and construed as forming part of this Agreement, and the parties hereto shall respectively abide by, submit themselves to the conditions and perform the agreements on their parts respectively in such conditions contained.
AS WITNESS the hands of the said Parties.

Signed by the said
in the presence of

Owner

Witness : _____

Name : _____

Address : _____

Signed by the said

Contractor.

Witness : _____

Name : _____

Address : _____

Bank Guarantee is applicable only when the estimated cost of work is more than Rs. 50 lacs.

BANK GUARANTEE

Where as M/s

_____ (hereinafter called the Tenderer) is desirous and preferred to tender for works in accordance with the terms and conditions of tender for the work of **CONSTRUCTION OF NEW CATTLE BOX NEAR SHRI BALA HANUMAAN TEMPLE- AIR PORT ROAD, BHAVNAGAR,**

and where as We Bank, agree to give the tenderer a guarantee for the Earnest Money.

1. Therefore, we hereby affirm that we are guarantors on behalf of the Tenderer up to total rupees _____ in words) Rs. _____ (in figures) and we undertake to pay to The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar Up to his first written demand, without demur, without delay and without the necessity of a previous notice of judicial or administrative procedures and without the necessity to prove to the Bank the defects or shortcomings or debits of the contractor any sum within the limit of Rs. _____.
2. We further agree that the Guarantee herein contained, shall remain in full force and effect during the period that would be taken for the acceptance of tender.
However, unless a demand of claim under this guarantee is made on us in writing on or before the _____ (Date to be specified – will not be less than 180 days from the stipulated date of receiving the tender) we shall be discharged from all liabilities under the guarantee thereafter.
3. We undertake not to revoke the guarantee during its currency except with the previous consent of, The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar in writing.
4. We lastly undertake not to revoke the guarantee for any charge in constitution of the Tenderer of of the Bank.

Date

Guarantor _____

Bank Address _____

Signature & Seal of

5. The contractor shall have to furnish PAN and intimate I.T. ward under which he is accessed.
6. Copies of certificated as regards previous experience, if any, must accompany the tender.
7. Declaration showing all works on hand with the Contractor and the value of works that remains to be executed in each case must accompany the tender.
8. All pages of Schedule 'A' and 'B' and specifications should be initialed by the Contractor.
9. All corrections, erasures and overwriting should be initialed by the Contractor.

10. Discrepancies and adjustment of Errors :

Any error in quantity or amount in Schedule'B' showing items of work to be carried out shall be adjusted in accordance with the following rules.

- (a) In the event of a discrepancy between description in words and figures quoted by a tenderer in the rates column, the description in words shall prevail.
 - (b) In the event of an error occurring in the 'amount' column of the Schedule'B' showing items if work, as a result of wrong multiplication of the unit rate and quantity; the unit rate shall be regarded as firm and multiplication shall be amended on the basis of the rate.
 - (c) All errors in totaling in 'amount' column in carrying forward totals shall be corrected.
 - (d) Any rounding of amount against "items" or in "totals" shall be ignored.
- P

The tendered sum so altered shall for the purpose of the tender be substituted for the sum originally tendered and considered for acceptance.

- 10.(i)It may please be noted that the tender will be considered as invalid, especially, if the requirements as per instruction No. 1 to 10 above are not complied with before submitting the tender. Also please read carefully the face sheet and 'General Rules and Directions for the guidance of contractor's of this form.

(ii)Right is reserved to reject any or all tender(s) without assigning any reason(s)therefore.

- 10-A The tender documents shall have to be filled in either ink or by ball pen.
11. In addition to the above, the tender will also be liable to be rejected outright it-
- (i) The tenderer proposes any alteration in the work specified or in the time allowed for carrying out the work or any condition or correction in any code or mode of Schedule 'B' or specifications.

any of the page of the tender is/are removed or replaced.

- (ii) all corrections, additions or pasted slips are not initialed by the tenderer.
- (iii) Any erasure is made by him in the tender and.
- (iv) The tenderer or in the case of a firm, each partner or the person holding the power of attorney thereof does not sign or signature is/are not attested by a witness on page 15 of the tender in the space provided for the purpose.

11. A certificate of registration as approved contractor should be attached with tender.

DECLARATION FORM

- (i) I/We hereby declare that I/we have visited the site and fully acquainted myself/ourselves with the local situations regarding materials, labor and other factors pertaining to the work before submitting this tender.
- (ii) I/We hereby declare that I/We have carefully studied the conditions of contract, specifications and other documents of this work and agree for execute the same accordingly.

DECLARATION CERTIFICATE

(G.R. date 4-2-89 as revised by GR. No. TNC – 1083/6681/4/C, dated 31-8-1994).

- (iii) I/We hereby declare that my/our near relative are not working in this BHAVNAGAR MUNICIPAL CORPORATION or in its INSTITUTE as an

Ex. Engineer, Deputy Executive Engineer, Assistant Engineer, Additional Assistant Engineer, overseer, Divisional Accountant, Store Keeper,

GENERAL RULES AND DIRECTIONS FOR THE GUIDANCE OF CONTRACTORS

1. All works proposed to be executed by the contractor shall be notified in a form of invitation to tender pasted on a board hung up in the office of the The Executive Engineer, Building Department, Bhavnagar Municipal Corporation, Bhavnagar. and signed by the EXECUTIVE ENGINEER This form will state work to be carried out as well as the date of submitting and opening tenders and the time allowed for carrying out the work, also the amount of earnest money to be deposited with the tender and the amount of the security deposit to be paid by the successful tenderer and percentage. If any, to be deducted from bill. It will also state whether a refund of quarry fees, royalties, octroi dues and ground rents will be granted. Copies of the specifications, designs and drawing and estimated rates, and any other documents required in connection with work which shall be signed by the The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar for the purpose of identification shall also be open for inspection by Contractor at the office of the Executive Engineer during office hours.
Where the works are proposed to be executed according to the specifications recommended by a contractor and approved by a competent authority on behalf of the Governor of Gujarat, such specifications with designs and drawing shall form part of the accepted tender.
2. In the event of the tender being submitted by a firm. It must be signed separated by each partner thereof or in event of the absence of any partner it shall be signed on his behalf by person holding a power of attorney authorizing him to do so. Details of partners will be furnished in Annexure-I along with the copy of partnership deed.
3. Receipts for payment made on account of any work, when executed by a firm, shall also be signed by all the partners except where the Contractors are described in their tender as a firm in which case the receipts shall be signed in the name of the firm by one of the partners or by some other person having authority to give effectual receipts for the firm.
4. Any person who submits a tender shall fill up the usual printed form including the column total according to estimated quantities stating at what rate he is willing to undertake each item of the work. Tender which proposes any alteration in the works specified in the said form of invitation to tender or in the time allowed for carrying out the work or which contain any other condition of any sort, will be liable to rejection. No single tender shall include more than one work but contractors who wish to tender for two or more works shall submit a separate tender for each, Tender shall have the name and the number of the work(to which they refer)written outside the envelope.

OR

The following rule shall apply only to the works having estimated cost of Rs. 100 lacs(Rupees One hundred lacs) and above.(G.R., R & B.D No. TNC -1777-281-C,dated 30-7-1992)

(a) It is not desirable to make any alteration in the works specified in the said tender form of

invitation to tender or in the time allowed for carrying out the work or any other conditions of any sort. However, if it is felt necessary by the tenderer to have any conditions, he shall have to submit a sealed cover containing two separate covers for 'technical bid' and 'price-bid' duly superscribed on the sealed cover. No such tender shall include more than one work but contractors who wish to tender for two or more works shall submit a separate tender for each. Tender shall have the type of bid and the name of the work (to which they refer) written outside the envelopes as under.:

(i) Technical bid for the work of **PROPOSED CONSTRUCTION OF HOSPITAL BUILDING FOR DOG STERILIZATION AND ARV WORK, AT NARI ROAD BHAVNAGAR**

(i) Price bid for the work of **PROPOSED CONSTRUCTION OF HOSPITAL BUILDING FOR DOG STERILIZATION AND ARV WORK, AT NARI ROAD BHAVNAGAR**

(b) If any price bid contains any conditions the same shall have to be rejected outright. Document of payment of earnest money should accompany the technical bid cover.

(c) The tenders i.e. Price-bids and technical bids in separate sealed cover duly completed as above should be submitted simultaneously by e-tendering. The 'Technical and Price' bids shall contain adequate cross reference wherever necessary to ensure clear and proper correlation of them with two bids without any ambiguity whatsoever.

(d) The bidders shall clearly indicate deviation(s) from specifications or the tender conditions very explicitly in the appropriate section and submit a copy of the same with technical bid. It should be very clearly understood by all tenderers that the technical bid should be restricted only to technical matters and stipulations of conditions, if any by tender having financial implications. The price of main tender should not be disclosed in the technical bid.

(e) The technical bid will be opened first as mentioned in the tender notice. The date and time of opening of price bids will be as mentioned in the tender notice after the technical bid proposals are opened and analyzed and all clarifications/price variations, if any obtained.

(f) The conditions specified in technical-bid should invariably be accompanied by proper financial evaluation with mode of calculation specifying assumptions, quantities, rate and ceiling amounts for each condition and shall also accompany the information in the form stating (a) Sr. No. (b) Description of the condition (c) Financial evaluation. (Vide R & B.D.G.R. No./TNC/7777/281-C, dated 30-9-92) (d) Ceiling amount to be added in twice-bid, on case condition is not accepted.

(g) Ceiling amounts shall be binding on the contractors and are liable to be added to the tender amount.

(h) It is necessary that the contractor or his authorized representative remains present at the time of opening of technical-bid as specified in (e) above, so that wanting details and clarifications in respect of any of the details referred to in sub clauses 2 (f) above and the contractor does not furnish the

wanting details as required above on the spot in the presence of other bidders after opening the technical-bid, the tender would be liable to rejection.

(i) The evaluation as given by the contractor as modified by tender opening authority with the ceiling limit will then be intimated to all the bidders who remain present and then, if convenient, the price bid shall be opened on the same day and the combined evolution of the tender of price bid and the technical bid would be worked out. No further opportunity shall be given to the contractors to modify/withdraw conditions at the stage as price bid would be known to all, Govt. however, reserves the right to negotiate about the tenders(s) further with any or all the contractors. In case the Price bids cannot be opened on the same day, then another date will be intimated to the tenderers as in para (e) above.

*The technical bid shall be evaluated first and successful bidders/applicants shall be short listed.

*The "Financial Bids" shall only be opened and evaluated only in respect of the short listed bidders.

5. The officer competent to dispose off the tenders shall have the right of rejecting all or any of the tenders.
6. No receipt for any payment alleged to have been made by Contractor in regard to any matter relating to this tender or the contract shall be valid and binding on The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar unless it is signed by The Executive Engineer
- *8. The memorandum of the work to be tendered for and the schedule of materials to be supplied by The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar and these rates shall be filled in and completed by the office of The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar before the tender form is issued. If a form issued to an intending tenderer has not been so filled in and completed, he shall request the said officer to have it done before he completes and delivers his tender.
9. Under no circumstances shall any Contractor be entitled to claim enhanced rate for any items in the contract.
10. Every contract shall, unless exempted in writing by The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar concerned, produce along this tender a solvency certificate of his financial ability from the Collector of the district within which he resides or a Banker's certificate. If he fails to produce such a certificate his tender will not be considered.
11. All corrections and additions or pasted slips should be initialed.
12. The measurements of work will be taken according to the usual method in use in the Public Works Department and no proposals to adopt alternative

methods will accepted., Architect/Owner decision as to what is the usual method in use in the Public Works Department will be final.

13. The Insurance Company's bond will not be accepted against the security deposit.

13A. In the event of any error or discrepancy in write up of tender documents the contractor

will not take any undue advantage of such error or discrepancy and Architect/Owner shall have powers to interpret and decide correct meaning of contradictory erroneous writing.

14. The contractor will have to construct a shed for storing controlled and valuable materials issued to him under schedule 'A' of the agreement at work-site having double locking arrangement. The materials will then be taken for use in the presence of the Department person. No materials will be allowed to be removed from the site of work.

15. No foreign exchange will be released by the Department for the purpose of plant and machinery required for the execution of the work contracted for.

16. Controlled materials(Essentiality Certificate) : (i)As regard controlled materials The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar will help to arrange for the permit as far as possible and help the Contractor in securing the same. All incidental charges met with in procuring these materials shall be borne by the Contractor himself. Though The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar will help to arrange for the permit as far as possible and help the Contractor in obtaining the materials, it shall not accept any responsibility for any loss or damage on account of delay caused to the Contractor while obtaining the same.

(ii) The contractor shall submit to The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar on close of every calendar month the monthly returns in the prescribed forms as to the receipts and actual use of the controlled materials during the month

(iii) The contractor shall permit The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar /Architect or his representative to inspect the stock of the controlled materials stored by him at any time whenever they or their representative so desire(s).

17. The tender for the work shall remain open for a period of 120 days from the stipulated date of receiving of the tenders for this work and that the tenderer shall not be allowed to withdraw or modify the offer on his own after handing over the tender to postal authorities for dispatch. During this period if any tenderer withdraws or makes any modifications or additions in the terms and conditions of his tender not acceptable to the BHAVNAGAR MUNICIPAL CORPORATION then the BHAVNAGAR MUNICIPAL CORPORATION shall without prejudice to any right remedy be at liberty to forfeit in full the said

ernest money absolutely. In this connection G.R., R & BD No. TNC-IIB-22(10)-C, dated 24-5-90 should be referred to.

૧૮. રસ્તા, પુલો, મકાનોનાં કામનો વર્ક ઓર્ડર ઈશ્યુ થયા પછી તુર્ત જ કામના સ્થળ ઉપર તે કામની નીચેની વિગતો દર્શાવતું બોર્ડ ઈજારદારે પોતાનાં ખર્ચે પ્રદર્શીત કરવાનું રહેશે.

૨૧. પ.૦ લાખથી વધારે કિંમતના રસ્તા/પુલો/ મકાનોનાં કામો ઉપર કામની વિગત દર્શાવતાં બોર્ડ :-

૧. કામના નામ (કામનો પ્રકાર) :	૬. સુપરવાઈઝરી સ્ટાફનું નામ :
૨. વિભાગનું નામ :	૭. કામ શરૂ કરવાની તારીખ :
૩. પેટા વિભાગનું નામ :	૮. કામ પૂરૂ કરવાની તારીખ :
૪. ટેન્ડરની રકમ :	૯. કામનાં સ્પેશીફિકેશન :
૫. ઈજારદારશ્રીનું નામ :	

મકાનોના કામો :

—પાયાના કોન્ક્રીટનું પ્રમાણ..... (સિમેન્ટ, કપચી, રેતી) —ઈંટોનાં ચણતરમાં સિમેન્ટ/રેતીનું પ્રમાણ.....

(સિમેન્ટ, રેતી)

—ભોંયતળીયાના કોન્ક્રીટનું પ્રમાણ..... (સિમેન્ટ, કપચી, રેતી) —ભોંયતળીયે.....સે. મી.

જાડાઈની.....સે. મી. સાઈઝની મોઝેક ટાઈલ્સ.

—બારી બારણા —સાગી લાકડાના/ સ્ટીલ ફ્રેમ/ અન્ય.

આર. સી. સી. કામો :

આર. સી. સી. કામમાં કોન્ક્રીટનું પ્રમાણ..... (સિમેન્ટ, કપચી, રેતી)

આ કામના વિગતવાર સ્પેશીફિકેશન નાયબ કાર્યપાલક ઈજનેરશ્રી,.....પેટા વિભાગની કચેરીઓ ઓફીસના સમય દરમ્યાન

કોઈપણ સમયે જોઈ શકશે. આ કામની માલીકી જાહેર જનતાની છે અને કામમાં ક્ષતિ કે અનિયમીતતા જણાય, તો તે બાબતમાં સંબંધિત અધિક્ષક ઈજનેરશ્રી ,.....વર્તુળ કે જેઓની કચેરી..... સ્થળે છે તેઓનું ધ્યાન દોરવા વિનંતી છે.

(મા. મ. વિ. ઠરાવ નં ટી. એન. સી. ૧૦૮૦-૨૪-સ, તા. ૧૮-૧૧-૧૯૮૧ તથા તા. ૧૭-૮-૨૦૦૨)

૧૯. કરારનામામાં જયા જયા "બેન્ક"નો ઉલ્લેખ છે તે "બેન્ક" એટલે "શેડ્યુલ કે રાષ્ટ્રીયકૃત બેન્ક" જ સમજવી (મા. મ. વિ. નો

તા ૨૭-૮-૦૨ નો ઠરાવ ક્રમાંક ટીએનસી/૧૦૮૦/૧૦૦(૪)સ)

૨૦. કોન્ટ્રાક્ટ હેઠળનાં બાંધકામનાં મકાનોનો ઉપયોગ ઈજારદાર પોતાના મજૂરો, સ્ટાફ કે અન્ય કોઈ હેતુ માટે કરી શકશે નહિં. જો આ શરતનો ભંગ કરવામાં આવશે તો માર્કેટ રેન્ટ પ્રમાણે તેટલી જગ્યાનું ભાડું વસૂલ કરવામાં આવશે.

૨૧. ટેન્ડર જોડના એનેક્ષર ૫ તથા ૬ માં કોન્ટ્રાક્ટરે સાચી માહિતી કાળજીપૂર્વક આપવી. આ માહિતીનાં આધારે કોન્ટ્રાક્ટરનાં ભાવો નીચા હોવા છતાં તે વિચારણા હેઠળનું કામ સમય-મર્યાદામાં કરી શકવામાં કક્ષમ છે કે કેમ તેની ઓફર સૌથી નીચી અને જરૂરીયાત અનુરૂપ છે કે તે બાબત નક્કી કરવામાં આવશે.

Signature of the Contractor

**Executive Engineer,
BUILDING DEPARTMENT,
BHAVNAGAR MUNICIPAL CORPORATION
BHAVNAGAR**

TENDER FOR WORKS

I/We hereby tender for the execution for The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar (here in before and here in after referred to as Owner of the work specified in the underwritten memorandum within the time specified in such memorandum at the tendered rates specified in Schedule 'B'(memorandum showing item of works to be carried out)and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in this tender and Clause 13 of the annexed conditions of contract and agree that when materials for the work are provided by Government, such materials and the rates to be paid for them shall be as provided in Schedule 'A' hereto

MEMORANDUM

Time allowed for the completion of work from date of written order 9 (Nine) months from commencement.

Should this tender be accepted I/We hereby agree to abide by and fulfill the terms and provision of the condition of the contract annexed here to so far as applicable and in default thereof to forfeit and pay to The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar the sums of money mentioned in the said conditions. The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar
(Receipt No. _____ dated _____ for The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar at _____ in respect of sum of Rs./- is forwarded herewith representing the earnest money deposit in full the value of which is to be absolutely forfeited by The Executive engineer, Building department, Bhavnagar Municipal Corporation, Bhavnagar should I/We not deposit the full amount of Security Deposit as specified in the memorandum of works in brief in accordance with Clause I of the said conditions, the sum of which is otherwise Rs. _____.

Name of the Contractor _____
Address _____
Dated the _____ day of _____ 2025
Name of Witness _____
Address _____
Occupation _____

The Tender is hereby accepted by me on behalf of The Governor of Gujarat on the _____ day of _____ 2025.

Signature of the Contractor

**Executive Engineer,
BUILDING DEPARTMENT,
BHAVNAGAR MUNICIPAL CORPORATION
BHAVNAGAR**

ADDITIONAL INSTRUCTIONS TO PERSONS TENDERING

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

- 5 **Erasures** – Persons tendering are informed that no erasures or alterations by them in the tax of the document sent herewith would be allowed and any such erasures or alterations will be disregarded. If there is, any error in his writing, no overwriting should be done, the wrong word or a figure, should be struck out and the correct one written above or near it in unambiguous way. Each correction should be initialed.

Contractor to please read this carefully:

1. The Percentage in Schedule 'B' must be given in words and figures: Amount thus worked out must also be entered in column and the tenderer must strike out grand total of amount.
2. If the tender is taken in favour of the company, a power of attorney in favour of the person who may have signed the tender for the company must accompany the tender.
3. Solvency certificate of a bank or a Revenue Officer of an amount up to 20% of the tendered cost plus the amount of works on hand still to be executed will have to be produced by the contractor.
4. The contractor shall pay Earnest money in the form of 'Cash' or Demand Draft in favour of Owner. Earnest money will not be accepted in form of cheque, Bank Guarantee.

General Rules and Directions for the Guidance of Contractors

1. All works proposed to be executed by the contractor shall be notified in a form of invitation to tender pasted on a board hung up in the office of Owner.
This form will state work to be carried out as well as the date of submitting and opening tenders and the time allowed for carrying out the work, also the amount of earnest money to be deposited with the tender and the amount of the security deposit to be paid by the successfully tendered and percentage, if any, to be deducted from bill. /It will also state whether a refund of quarry fees, royalties, octroi dues and ground rents will be granted. Copies of the specifications, designs and drawing and estimate rates, and any other documents required in connective with work which shall be signed by the Owner for the purpose of identifications shall also be open for inspection by Contractor at the office of the Owner during office hours.

Where the works are proposed to be executed according to the specifications recommended by a contractor and approved by a competent authority on behalf of the Owner, such specifications with designs and drawing shall form part of the accepted tender.

2. In the event of tender being submitted by a firm. It must be signed separated by each partner thereof in event of the absence of any partner it will be signed on his behalf by person holding a power of attorney authorizing him to do so. Details of partner will be furnished in Annexure-I along with the copy of partnership deed.

3. Receipt for payments made on account of any work, when executed by a firm, shall also be signed by all the partners except where the Contractors are described in their tender as a firm which case receipt shall be signed in the name of the firm by one of the partners or some other person having authority to give effectual receipt for the firm.
4. Any person who submits a tender shall fill up to the usual printed form including the column total according to estimated quantities stating at what rate he is willing to undertake each items of the work. Tender which proposes any alterations in the works specified in the said form of invitation to tender or in the time allowed for carrying out the work or which contain any other condition of any sort will be liable to rejection? No single tender shall include more than one work but contractors who wish to tender for two or more works shall submit a separate tender, for each, tender shall have the name and the number of the work (to which they refer) written outside the envelope.
5. At the time of tender opening only authorized representatives will be allowed to remain present. No other contractors will be allowed.
Incase, there is no tenderer or their representative present, Owner will open tender. Tender opening officer will complete tender opening procedures and tender E.M.D. deposit will be handed over to concern officer.
6. The officer without giving any clarification or reasons. Competent to dispose off the tenders shall have the right of rejecting all or any of the tenders.
7. No receipt for any payments alleged to have been made by a Contractor in regard to any matter relating to this tender or the contract shall be valid and binding on Owner unless it is signed by the Owner.
8. The memorandum of the work to be tendered for and schedule of materials to be supplied by Owner and there rates shall be filled and completed by the Owner of before the tenders form is issued. If a form issued to intending tender has not been so filled in and completed, he shall request the said officer to have it done before he completes and delivers his tender.
9. All works shall be measured net by standard measure and according to the rules and customs of the Public Works Department without reference to any local custom.
10. Under no circumstances shall any Contractor be entitles to claim enhanced rate for any items in this contract.
11. All corrections and addition or pasted slips should be initialed.
12. The measurements of works will be taken according to the usual method in use in the Public Work Owner and no proposals to adopt alternative methods will be

- accepted. Owner's decision as to what is the usual method in use in the Public Work Department will be final.
13. The Insurance Company's bond will not be accepted against the security deposit.
 14. The contractor shall have to attach to his tender Income Tax Clearance Certificate of last five years to be obtained from the Income Tax Officer.
 15. The contractor will have to construct a shed for storing controlled and valuable materials issued to him under schedule 'A' of the agreement at work-site having double locking arrangement. The materials will then be taken for use in the presence of the Owner's Representative, no materials will be allowed to removed from the site of work.
 16. No foreign exchange will be released by the Owner for the purpose of plant and machinery required for the execution of the work contracted for.
 17. Controlled materials (Exentiality Certificate): (i) As regard controlled materials the Owner will help to arrange for the permit as far as possible and help the Contractor in securing the same. All incidental charges met with in procuring these materials shall be born by the Contractor himself. Though the Owner will help to arrange for the permit as far as possible and help the Contractor in obtaining the materials, it shall not accept any responsibility for any loss or damage on account of on delay caused to the Contractor while obtaining the same.
 18. The tender for the work shall remain open for a period (120*) day from the stipulated date of receiving of the tenders for this works and that the tendered shall not be not allowed to withdraw or modify the offer on his own after handing over the tender ~~to postal authorities for dispatch~~ if any tenderer withdraws or makes any modifications or additions in the terms and conditions of his tender not acceptable to the Owner then Owner shall without prejudice to any right remedy. Be at liberty to forfeit in full the said earnest money absolutely.
 19. The contractor shall employ such labour that shall produce a valid certificate of having been vaccinated against small pox within a period of last three years.
 20. (1) If the members of Labour Co-operative Societies do not work themselves and obtain commission by subletting the work, as a whole or by dividing work in grope and give work to piece workers, the very purpose of the Scheme would be defected. Therefore the Labour Co-operative Societies will not sublet the work and the member's labours areas of the society will execute the work.
(2) In case where the works required to be carried out by the labours other than the members of the Labours Co-operative societies with the man-days more than 25%, prior permission of the Owner will be necessary.
(3) The labour Co-operative societies shall have to allow the officers of the Co-operative Owner to examine for audit purpose the muster rolls as and when

required.

- (4) Labour Co-operative societies shall have to submit a quarterly return stating the monthly attendance of man-days on the muster rolls of member labourers on each work to the District Registrar as well as to Owner.
- (5) If the labour Co-operative Society is found violating the terms and conditions mentioned above the Labour Co-operative society will be liable for the cancellation of work contract and or registration as decided by the Owner.
21. Immediately after issue of the work order for the works of Roads, Bridges and Buildings, the contractor shall display the board showing brief details of the specifications on the site of work as approved by Owner.
22. The contractor for use of his labourers, staff or for any other purpose will not occupy the building structure under the contract. In case of breach of this condition market rent will be recovered for the unauthorized occupied. The contractor will be fully responsible for damage, injury, death occurs in this case.
23. Tender Shall fill up Annexure 4, 5 based on this information, decision will be taken, whether contractor can complete the work in stipulated time limit, whether rates offered is lowest and according to requirements or not etc.
However Owner may ask the contractor for further justification and based on that final decision will be taken.
24. Owner may decide not to give work to lowest bidder. Owner is free to allocate work to the agency other than lowest one and also work can be split up and can be given to more than one contractor. In all cases Owner's decision will be final and shall be acceptable to all the bidders. Owner thereof will give no reason. Owner will not accept any claim made by bidder on these matters.

Signature of the
Contractor:

Signature of Authority:

LIST OF TERMS AND CONDITIONS CLAUSE

	DETAILS	
Clause 1	Security deposit	
Clause 2	Liquidated damages for delay	
Clause 3	Default by contractor	
Clause 4	Action when the progress of any particulars portion of the work is unsatisfactory	
Clause 5	Non exercise of powers under clause 3 not a waiver	
Clause 6	Power to seize tools, plants, machinery's, materials and stores of the contractor on Invocation of clause 3.	
Clause 7	Extension of time limit	
Clause 8	Final Measurements and final bill on completion of work	

Clause 9	Intermediate and final Payment	
Clause 10	Payment at reduced rates	
Clause 11	Bills to be submitted monthly	
Clause 12	Bills and rates payable	
Clause 13	Material to be supplied by the Owner	
Clause 14	Consumption and return of materials supplied by the Owner	
Clause 15	Safe custody of materials supplied by the Owner	
Clause 16	Drawings / Designs, Instructions of the Architect/Owner and Specification, order of precedence in case of discrepancies	
Clause 17	Excess over Tender Quantities, Extra Items and Variations	
Clause 18	No claim to any payment or compensation for alterations or for Restrictions of work.	
Clause 19	No claim for delay in supply of materials by the Owner	
Clause 20	Claims under the contract	
Clause 21	Remedies for inferior or bad work, materials or workmanship and maintenance clause.	
Clause 22	Defect liability clause.	
Clause 23	Work to be open for inspection contractor's responsible agent to be Present	
Clause 24	Employment of qualified Site Engineer by Contractor	
Clause 25	Notice to be given before work is covered up	
Clause 26	Damage to contract work-in-progress and damages to surrounding Properties	
Clause 27	Damages due to acts of God and unprecedented floods	
Clause 28	Contractor to supply plant ladders, scaffolding etc and is libel for damage arising from non-provision of lights, fencing etc.	
Clause 29	Regulations for scaffolds, working platforms, gangways and stairways	
Clause 30	Regulations for hoisting appliances	
Clause 31	Measure for prevention of fire	
Clause 32	Liabilities to contractors for any damages done in or outside work	
Clause 33	Deleted	
Clause 34	Work not to be sublet; consequences for unauthorized subletting, bringing and becoming insolvent	
Clause 35	Sums payable by way of compensation to be considered as reasonable compensation without reference to actual loss	
Clause 36	Changes in the constitution of firm to be notified	
Clause 37	Works to be under directions of Architect/Owner/Consultant	
Clause 38	Settlement of Disputed and Arbitration	
Clause 39	Lump sums in estimates	
Clause 40	Action where no specifications	
Clause 41	Definition of work	

Construction of new Cattle box near Shri BALA Hanumaan Temple- Air Port road, Bhavnagar

Clause 42	Contractors percentage-whether applied net or gross amount of the bill.	
Clause 43	Royalties	
Clause 44	Compensation under the Workman, Compensation Act	
Clause 45	Liability of the contractor in case of accidents	
Clause 46	Arrangements for personal safely requirements and First aid	
Clause 47	Variation in quantity of work	
Clause 48	Employment of famine or other labour	
Clause 49	Claim for compensation for delay in starting the work	
Clause 50	Claim for compensation for delay in the execution of work	
Clause 51	Entering upon or commencing any portion of work	
Clause 52	Minimum age of persons employed	
Clause 53	The payment of fair wages etc.	
Clause 54	Method of payment	
Clause 55	Employment of scarcity labour	
Clause 56	Rates inclusive of sales tax etc.	
Clause 57	Employment thought Employment Exchange and local labour	
Clause 58	Fair wages	
Clause 59	List of Machinery	
Clause 60	Liabilities of contractor for idleness of Road Rollers deployed by the Owner on contract work	
Clause 61	Local labour on normal rates	
Clause 62	Land on Hire and rental charges	
Clause 63	Vaccination to labourers	
Clause 64	Camp facilities to workers	
Clause 65	Gum boots, hand gloves, masks etc. to labourers	

Construction of new Cattle box near Shri BALA Hanumaan Temple- Air Port road, Bhavnagar

Clause 66	No distinction between Harijans and other workers	
Clause 67	Price Escalation clause.	
Clause 68	Fencing and Lighting	
Clause 69	Liabilities for accident to persons	
Clause 70	Access to site and work on site	
Clause 71	Reports regarding labour	
Clause 72	Treasure trove	
Clause 73	Indemnity	
Clause 74	Insurance of labourers	
Clause 75	Setting out	
Clause 76	Cement Register	
Clause 77	Materials and Works Test Register	
Clause 78	Progress Schedule	
Clause 79	Secured Advance	
Clause 80	Advance Payment	
Clause 81	Advance against machinery's	
Clause 82	Mobilization Advance	
Clause 83	License for contract labour	
Clause 84	Recovery of testing charges	
Annexure-1	Declaration regarding Income Tax, Addresses etc.	
Annexure-2	Basic rates considered by the contractor	
Annexure-3	Performance Bond	
Annexure-4	List of works already completed by the tenderer	
Annexure-5	List of plant and Machinery	
Annexure-6	Declaration regarding works on hand	
Schedule-	Materials to be supplied from Store	

'A'		
Schedule- 'B'	Memorandum showing items of works to be carried out	
Schedule- 'C'	Time Schedule of completion	

TERMS & CONDITIONS OF CONTRACT

Clause 1 Security Deposit: The person/persons whose tender is accepted (hereinafter called the "Contractor" which expression shall unless excluded by, or repugnant to the context include his Legal heirs, executors, administration and assignees) shall (a) Deposit with the Owner a sum sufficient to make up the full security deposit specified in the tender in cash or inform of demand draft to Owner within a period of 10 days from the date of receipt of the notification of acceptance of his tender, or (b) (i) Initial Security Deposit of the total security deposits as specified in the tender form with the Owner in cash or in form of D.D. on receipt of notification of acceptance of his tender. If the Initial security deposit is not paid within the above specified time, no work order will be issued till the issue about delay is finally decided by the competent authority (b) (ii) The Owner shall be deemed to have been authorized to deduct to the balance of the security deposit as specified in the tender form from the amounts that become payable to the contractor for the work done under the contract from time to time, such deduction shall not exceed ten percentage of the amount so payable and the works whose amount paid in cash or by way of deduction shall be estimated amount is more than rupees held by Owner by way of Security deposit. Than rupees fifteen lacks, the contractor shall have to give the performance bond of any schedule bank equivalent to five percentage of the estimated amount put to tender along with the initial security deposits. All compensation, Liquidated damages or other sums or money payable by the contractor to Owner under the terms of this contract shall be deducted from or recouped by the realization of a sufficient part of his security deposit, or from the interest arising there from or performance bond or from any sums which may due or may become due by Owner to the Contractor on any account what so ever and whether in respect of this contract, any other contract, or otherwise. In the event of his security deposit being reduced by reason of any such deduction or recoupment as aforesaid, the contractor shall within ten days thereafter, make good in cash or as aforesaid any sum or sums required to make good the shortfall in the amount of the security deposit. If the amount of the security deposit to above be paid as specified above in cash or by D.D within the period specified above is not paid the tender/contract already accepted should be considered as canceled and legal steps shall be taken against the contractor for recovery of the amounts.

Clause 2 Liquidated damages for delay: -

- (i) If the contractor fails to complete the work under contract by the stipulation date he shall pay liquidated damages of Rs. 0.1 percentage of the contract value per day from the date of delaying the said work up to the date of completion and handing over to the Owner.
- (ii) However also if the contractor fails to complete any part of the works as designed in Schedule (C) by the time indicated against such part, he shall pay Liquidated damages per day from the date of delaying the said part of the works up to the date of completion of the said designated part at the rates shown in the said Schedule of the contract value of part for such failure till the said designated part is completed.
- (iii) The aggregate maximum of liquidated damages payable under clause No. 2 shall not exceed Rs. 0.1 percentage of contract value per day and shall be subject to the maximum amount of ten percentage of the estimated amount put to tender.
- (iv) Delays requiring payment of ten percentage liquidated damages of the amount put to tender for performance shall be sufficient causes for termination of contract and for forfeiture of security deposit including amount of performance bond in respect of works estimated to cost more than Rs. 15 lacks, for performance and registration of the contractor shall also be kept in abeyance for three years from the date as fixed in all cases. (See Schedule (C) on page No. 48)

Clause 3 Default by contractor:- If the contractor shall neglect or fail to proceed with the work with due diligence or if he violates any of the provision of the Contract, the Architect/Owner shall give the Contractor a notices, identifying deficiencies in performance and demanding corrective action. Such notice shall clearly state that is shall not remove any plant; equipment and material form the site. The Owner shall have a lien on all such plant, equipment and material from the date of such notice till the said deficiencies have been corrected as mentioned in the said notice.

If the contractor fails to take satisfactory corrective action within ten days after receipts of notice, the Owner shall terminate the contract in whole. In case the entire contract is terminated the amount of security deposit and performance band if any together with the value of the work done but not paid for, shall stand forfeited to the Owner. The plants, equipment and materials, held under this clause shall then be at the disposal of the Owner to recover the amount equivalent to liquidated damages and registration of the contractor shall be kept in abeyance for three years from the date as fixed in all such cases. The Architect/Owner if necessary shall direct that a part or the whole of such plant, equipment and materials be removed from the site within a stipulated period. If the contractor fails to do so, the Architect/Owner shall cause them or any part of them to be sold holding the net proceeds of such sale to the credit of the Contractor. After settlement of accounts the lien by the Owner of the contractor's remaining plant equipment and balances of materials shall be released.

Termination of the contract in whole shall be an adequate authority for the Architect/Owner to demand discharge of the obligations forms the guarantors of the security for the performance.

Clause 4 If the progress of any particulars portion of the work under Contract is unsatisfactory the Architect/Owner shall, not with standing that the general progress of the works is satisfactory, in accordance with clause 2 be entitled to take necessary action under clause 3, after giving the Contractor ten day's notice in writing and the contractor shall have no claim whatsoever for any compensation for any loss caused to him due to such action.

Clause 5 In any case in which any of powers conferred upon the Architect/Owner by clause 3 hereof shall have become exercisable and the same shall not have been exercised, the non-exercise there of shall not constitute a waiver of any of the conditions hereof and such powers shall notwithstanding be execrable at any future date.

Clause 6 In the event of the Architect/Owner taking action under clause 3, he may, if so desire, take possession of all or any tools, plants machinery, materials and stores in or upon the work or the site thereof or belonging to the contractors or procured him and intended to be used for the execution of the work or any part thereof by paying or allowing for the same in account at the contract rate or in case of contract rates not being applicable at such reasonable rates, as may be comparable to current marker rates where ascertainable of similar articles and comparable condition, to be certified by the Architect/Owner. In the alternative the Architect/Owner may by notice in writing to the contractor or his clerk of the works foreman or other authorized agent require him to

remove such tools, plants, machines materials or stores from the premises within a time to be specified in such notice and in the event of the contractor failing to comply with any such requisition, the Architect/Owner may remove them at the contractor's expenses or the shall remove then by auction or private sale at the risk and cost of the contractor in all respects, and the certificate of the Architect/Owner as to the expenses of any such removal and the amount of the proceeds, and expenses of any such removal shall be final and conclusive against the contractor.

Clause 7 Extension of time:- If the contractor shall desire an extension of the time for completion of the work on the ground of his having been unavoidably hindered in its execution or any other ground he shall apply in writing to the Architect/Owner before the expiration of the period stipulated in the tender or before the expiration of 30 days from the dates on which he was hindered which ever is earlier and the Architect/Owner may, if in his opinion believe that there are reasonable ground for granting an extension, grant such extension as he thinks necessary or proper. The decision of the Architect/Owner in this matter shall be final.

Clause 8 As soon as the work is completed, the contractor shall give a notice of such completion to the Architect/Owner and on receipt of such notice the Architect/Owner shall inspect the work and if he is satisfied that the work is complete in all respects then: -

- (i) For all works costing up to Rs. 50 Lacks (amount put to tender) the final measurements shall be recorded within 45 days from the date of physical completion of the work and the final bill shall be prepared within 45 days from the date of recording final measurement. The completion certificate shall be issued within one month from the date of final measurements subject to the contractor fulfilling his obligation as provided in the contract and subject to the work being complete in all respects.
- (ii) In respect of works costing more than Rs. 50 Lacks (amount put to tender) the final measurements shall be recorded within 75 days from the date of physical completion of the work and the final bill shall be prepared within 75 days from the date of recording final measurements subject to the contractor fulfilling his obligation as provided in the contract and subject to the work being complete in all respects.
When separate period of completion have been specified for item or groups of item, the Architect/Owner shall issue separate completion certificate for such item or group of item.

No certificate of completion shall be issued nor shall the work be considered to be complete till the contractor shall have removed from the premises, on witch the work has been executed, all scaffolding, sheds and surplus materials, except such, as are required for rectification of defects; rubbish and all huts and sanitary arrangements required for his work mans on the site in connection with the execution of the work, as shall have been erected by the contractor for the workman and cleared all dirt from all parts of structure (s) in, upon or around which the work has been executed or of which he may have possession for the purpose of the execution there of and cleared floors, gutters and drains, cased doors and sashes, oiled locks and fastening labelled keys clearly and handed then over to the Architect/Owner or his representative and made the whole premises fit for immediate occupation or use to the satisfaction of the Architect/Owner. If the contactor shall fail to comply with any of the requirements of these conditions as aforesaid, on or before the date of completion of the works, the Architect/Owner may, at the expense of the contractor, fulfill such requirements and dispose of the scaffolding, or surplus materials and except for any sum actually released by the sale thereof less the Cost of fulfilling the requirements is more than the amount realized such disposal as aforesaid the contractor shall forthwith, on demand, pay such excess. The Architect/Owner shall also have the rights to adjust the amount of excess against any amounts that may be the contractor.

Clause 9 No payment shall be made for any work, estimated to cost less than rupees one thousand till after the whole of the side work shall have been completed and a certificate of completion given. But in the case of work estimated to cost more than rupees one thousand, the contractor shall on submitting a monthly bill therefore, be entitled to receive payment proportionate to the part of the work then approved and passed by the Architect/Owner, whose certificate of such approval and passing of the sum so payable

shall be final and conclusive against the contractor. All such intermediate payments shall be regarded as payments by way of advance against the final payments only and as payments of work actually done and completed and shall not preclude the Architect/Owner from requiring bad, unsound imperfect or unskilled work to be removed and taken away and reconstructed. or re-erected, nor shall any such payment be considered as an admission of the contractor or any part thereof in any respect or the accruing of any claims, nor shall it conclude, or affect any way the power of the Architect/Owner as to the final settlement and adjustment of the accounts or otherwise or in any other way vary or effect the contract. The contractor shall submit the final bill within one month of the completion of the work, otherwise the Architect/Owner's certificate of the measurements and of the total amount payable for the work shall be final and binding on all parties.

Clause 10 The rates for item of work shall be valid only when the items concerned are accepted as having been completed fully in accordance with the sectional specifications. In cases where the item of work are accepted as not completed, the Architect/Owner may make payment on account of such item at such reduced rate as the may consider reasonable in preparation of final or on account bill.

Clause 11 Bills to be submitted monthly: A bill shall be submitted by the contractor each month on or before the date fixed by the Architect/Owner for all works executed in the previous month and Architect/Owner shall take or cause to be taken the requisite measurement for purpose of having the same verified and the claim, so for it is admissible shall be adjusted if possible within tenders from the presentation of the bill. If the contractor does not submit the bill within the time fixed as aforesaid, the Architect/Owner may depute a subordinate to measure up the said work in the presence of the contractor or his duly authorized agent whose countersignature to the measurement list shall be sufficient warrant and the Architect/Owner may prepare a bill from such list which shall be binding on the contractor in all respects.

Clause 12 The contractor shall submit all the bills on the printed forms to be had on application at the office of the Architect/Owner. The charges to be made in the bills shall always be entered at the rates specified in the agreement or at the partly reduced rates subject to the approval by the Architect/Owner in the case of Items not completed/executed as per agreements or in the case of any extra work ordered in pursuance of these conditions and not mentioned or provided for in the tender, at the rate here in after provided for such work.

Clause 13 If the specification of the work provides for the use of any special description of materials to be supplied from the Owneral store or if it is required that the contractor shall use certain stores to be provided by the Architect/Owner (such materials and stores and the prices to be charged therefore as here in after mentioned being so far as practicable for the convenience of the contractor but not so as in any way to control the meaning or effect of this contract specified in the schedule of memorandum here to annexed) the contractor shall be supplied with materials and stores as may be required from time to time to be used by him for the purpose of the contract only, and the value of the full quantity of materials and stores so supplied shall be set off deducted any sum then deposit, or the proceeds of sale thereof, if the deposit is held in govt. securities, the same or a sufficient portion thereof shall, in that case be sold for the purpose. All materials supplied to the contractor shall remain the absolute property of Owner and shall on no account be removed from the site of the work, and shall at all time, be open to inspection by the Architect/Owner. Any such materials, unused and in perfectly good condition at the time of completion or termination of the contract, shall be returned to the Owner store if the Architect/Owner so requires by a notice in writing given under his hand. But the contractor shall not be entitled to return any such materials except with the consent in writing of the Architect/Owner and in shall have no claim for compensation on account of any such materials supplied to him as aforesaid but remaining unused by him or for any wastage in or damage thereto.

Clause 14 The contractor shall be entitled use the materials supplied by the Owner only to the extent of quantities of such materials required for execution of the work as per theoretical

calculations. The Architect/Owner may however, on being satisfied that a large quantity of such materials is required for the execution of the work, permit the contractor to use such large quantity of the materials. Such permission shall be given in writing.

Clause 15 All stores and materials such as cement, if the consumption of which exceeds 25 tone and steel etc. supplied to the contractor by Owner shall be kept by the contractor in separate god own provided with a double lock. The key of the lock shall remain with the Architect/Owner or his agent. The godown shall be accessible to the Architect/Owner or his agent at all times. No materials shall be allowed to be removed from the site of the work and any materials required for the execution of the work shall be taken out from the godown only in the presence of a duly authorized agent of the Architect/Owner.

Clause 16 (1) The contractor shall execute the whole and every part of the work in the most substantial and workman- like manner and as regards materials and in other respect in strict accordance with specifications.

The contractor shall also conform exactly, fully and faithfully to the design, drawing and instruction in writing for the work signed by the Architect/Owner. The design and the drawings shall be lodged in the office of the site Architect/Owner to which the contractor shall be entitled to have access for the purpose of inspection at such office during office hours. Where the instructions referred to above are not contained in separate letters addressed to the contractor the same shall be recorded in the work-order book, which shall be maintained and kept on the site of the work. The contractor shall be required to sign such entries in the work-order book for any reason whatsoever, the entry of the instruction in the work-order book shall be deemed to be the due notice to him of the said instructions. The work-order book shall be open for inspection to the contractor on the site of the work during office hours.

(1) The contractor will be entitled to receive one copy of the accepted tender along with the work order free of cost and will also be entitled to receive three sets of contract and working drawing according to the progress of work as and when need free of cost.

(2) The several documents forming the contract are essential part of the contract and requirements occurring in one are binding as though occurring in all. They are intended to be mutually explanatory and complimentary and to describe and provide for a complex work.

In the event of any discrepancy in the several documents forming the contract or in any one document, the following order of precedence should apply:

(a) Dimension and quantities: (i) Drawings (ii) Schedule-B of the Tender form (iii) specifications. On drawing, figures dimensions, unless obviously incorrect, will be following in preference to scaled dimensions.

(b) Description: (i) Schedule – B of the tender form: - (ii) Drawings (iii) Specifications. In the case of defective description or ambiguity, the Architect/Owner is entitled to issue further instruction direction in what manner the work is to be carried out. The contractor cannot take any advantage of any apparent error or omission in drawing or specification and the Architect/Owner shall be entitled to make correction and interpretations as necessary to fulfill plans and specifications.

Clause 17.1 The Architect/Owner shall have power to make any alterations in or addition to the original specifications, drawings, designs, and instructions that may appear to him to be necessary or advisable during the progress of the work and the contractor shall be bound to carry out the work in accordance with any instructions in this connection which may be given to him in writing signed by the Architect/Owner and such alteration shall not invalidate the contract and additional work which the contractor may direct to do in the manner above specified as part of the work shall be carried out by the contractor on the same conditions in all respects on which he agreed to the work and at the same rate as are as specified in the tender for the main work.

Clause 17.2 Except that when the quantity of any item exceeds the quantity as in the tender by more than 30% the contractor will be paid for the quantity in excess of 30% at the rate entered in the S.O.R. of the year during which the excess in quantity is first executed and for the materials consumed in excess quantity the rate materials to be charged would be

the basic rate taken into account for fixing the rate for the S.O.R. above instead of the rate stipulated in schedule – A.

Clause 17.3 If the additional or altered work includes any class of work for which no rate is specified in this contract, then such class of work shall be carried out.

- (i) At the rate derived from the item within the contract which is comparable to the involving additional or altered class of work; where there are more than one comparable items, the items of the contract which is nearest in comparison with regard to or class or classes of the work involved shall be selected and the decision of the owner as to the nearest comparable item shall be final and binding on the contractor.
- (ii) If the rate cannot be derived in accordance with (i) above, such class of works shall be carried out at the rate entered in the Schedule of Rates in the year in which the tender was received. Increased or decreased by the percentage by which the tender amount is more or less as compared to the amount arrived at the rates in the Schedule of Rates for the year in which the tender was received. If the Schedule of rates does not contain all the items, the percentage increase of the tender shall be calculated considering such items which were included in the Schedule of Rates for the year and for materials consumed on such item the rate to be charged would be the basic rate taken into account for fixing the rate in S.O.R. referred to above, instead of the rate stipulated in Schedule (A).
- (iii) If it is not possible to arrive at rate from (i) and (ii) above, such class of work shall be carried out at the rate decided by the competent authorities on the basis of detailed rate analysis after hearing the contractor before a Committee of two Engineers stationed at the same place or the nearest place.

Clause 17.4 If the additional or altered work, for which no rate is entered in the “Schedule of Rates” is ordered to be carried out before the rate is agreed upon then the contractor shall within seven days of the date of receipt by him of the order to carry out the work, inform the Architect/Owner of the rates, which it is his intention to charge for such class of work and if the Architect/Owner does not agree to this rates, he shall by notice in writing be at liberty to cancel his order to carry out such class of work and arrange to carry it out in such manner as he may consider it advisable, provided always that if, the contractor shall commence work or incur any expenditure there of before the rate shall have been determined as lastly herein before mention, then in such cases he shall only be entitled to be paid in respect of the work carried out or expenditure incurred by him prior to the date of the determination of the rate as aforesaid according to such rate or rates as shall be fixed by the Architect/Owner. In the event of the dispute, the decision of owner shall be final.

Where, however the work is to be executed according to the designs, drawings and specifications recommend by the contractor and accepted by the competent authority; the alternation above referred to shall be within the scope of such designs, drawings and specifications appended to the tenders. The time limit of the work shall be extended in the proportion that the increase in the cost occasioned by alternations bears to the cost of the original contract work and the certificate of the Architect/Owner as to such be final and conclusive.

Clause 17.5 For excess in items of well sinking, the rates for sinking in depth beyond the designed depth shall be as per the rate quoted by the contract in the statement of variation, If no rates of variation in sinking are quoted the rate payable shall be the tender rate for sinking designed level increased by the difference of schedule of rate for sinking at designed depth and sinking at final depth.

Clause 18 No claim for any payment of compensation for change or restriction of work: - If at any time after the execution on the contract documents the Architect/Owner shall for any reason whatsoever, require the whole or part of the work, as specified in the tender, be stopped for any period or shall not required the whole of part of the work to be carried out at all or to be carried out by the contractor he shall given notice in writing, stating the fact to the Contractor who shall thereupon suspended or stop the work totally or partially, as the case may be. In any such case, except provided hereunder, the Contractor shall have no claim to any payment or compensation whatsoever except as provided hereunder on

account of any profit or advantage which he might have derived from the execution of the work in full but which he did not so derive in consequence of the full amount of the work not having been carried out, or on account of any loss that he may be put to on account of materials purchased or agreed to be purchased or for unemployment of labour required by him. He shall not have also any claim for compensation by reason of any alterations having been made in the original specifications, drawings, designs and instructions, which may involve any curtailment of the work, as originally contemplated.

- (1) However, the contractor will be entitled for compensation for loss, if any on date of notice, for the purchased materials or for the contract executed for the materials to be purchased for such work. Such compensation will be paid only for actual loss for materials, if such materials so purchased or agreed to purchase is of required quantity/quality and was purchased/contracted to be purchased only for the same work. But no compensation shall be granted to contractor on material for which advance has been given to contractor by owner. The amount of loss for such claim will be decided by Architect/Owner.
- (2) The contractor also will be entitled for compensation of unemployed labourers for 7 days from the date of notice provided that in that opinion of Architect/Owner such labours were working for 7 days prior to the notice and would not be in a position to get employment elsewhere within 7 days from the date of such notice. The contractor should try to employ such unemployed labourers at other places from the date of such notice. In case the Contractor does not agree with decision of Architect/Owner. Engineer regarding the amount of compensation or loss it will be open for the contractor to appeal to Owner. Within one month from the date of knowledge of such decision. In such case the decision of Owner will be final and binding to the Contractor.

The Contractor shall not be entitled for loss of any expected profit of such work.

Clause 19 The contractor shall not be entitled to claim any compensation from Owner on account of delay by Owner in the supply of materials entered in Schedule 'A' where such delay is caused by (i) Non supply due to short allotment of quota in case materials available under quota regulations (ii) Difficulties relation to the supply of railway wagon (iii) Force majeure. (iv) Act of God. (v) Act of the country's enemies or any other reasonable cause beyond the control of Owner.

In the case of such delay in the supply of materials, Owner shall grant such extension of time for the completion of the work as shall appear to the Architect/Owner to be reasonable in accordance with the circumstances of the case. The decision of Architect/Owner for the extension of time shall be accepted as final by the contractor.

Clause 20 Time limit for unforeseen claims: the contractor shall not be entitled to any compensation from Owner on any account unless where allowed by the conditions of this contract. In such cases, the contractor shall have to submit a claim in writing to the Owner within one month of the cause of such claim occurring.

Clause 21 Action & Compensation in case of bad work: If at any time before the expiry of defects liability period as detailed in clause 22. It shall appear to the Architect/Owner or his subordinate in charge inferior quality or that any materials or articles provided by him for the execution of the work are unsound, or of a quality inferior to that contracted for or are otherwise not in accordance with the contract. It shall be law full for the Architect/Owner to intimate this fact in writing to the contractor and then notwithstanding the fact that the work, materials or articles of complained of may have been passed, certificate and paid for the contractor shall be required, or if so required, shall remove the materials or articles so specified in whole in part and the case may provide other proper and suitable materials or articles at his own charge and cost, and in the event of his failing to do so within a period to be specified by the Architect/Owner in the written intimation aforesaid, the contractor shall be liable to pay compensation at the rate of one percent on the amount of the estimate of the rectification for every day not exceeding ten days during which the failure so continues, and in the event of any such failure as aforesaid continuing beyond ten days, the Architect/Owner may rectify or remove, and re-execute the work or remove

and replace the materials complained of as the case may be at the risk and expense in all respects of the contractor. Should the Architect/Owner consider that any such inferior work or materials as described above may be accepted or made use of, it shall be within his discretion to accept the same at such reduced rates as he may fix therefore. However, the contractor shall be responsible for normal maintenance of the work till the final bill for work is prepared by Architect/Owner.

Clause 22 Defect liability periods: The contractor shall be responsible to make good and remedy at his own expense any defect, which may develop or may be noticed before period mentioned hereunder from the certified date completion. The Architect/Owner shall give the contractor a notice in writing about the defects and the contractor shall make good the same within 15 days of receipt of notice. In the case of failure on the part of the contractor, The Architect/Owner shall be entitled to appropriate the whole or any part of the amount of security deposit towards the expenses, if any, incurred by him in rectification, removal or re-execution. The defects liability period shall be 12 months from the certified date of completion.

Clause 23 Work to be open to inspection – contractor or responsible agent to be present: - All works under or in course of execution or executed in pursuance of the contract shall, at all times be open to the inspection and supervision of the Architect/Owner and his subordinates and the contractor shall, at all times during the usual working hours, and all other times for which reasonable notice of the intimation of the Architect/Owner or his subordinate to visit work shall have been given to the contractor, either himself be present to receive orders and instructions or have a responsible agent duly accredited in writing present for that purpose. Orders given to the contractor duly authorized agent shall be considered to have the same force and effect as of they had been given to the contractor himself.

Clause 24 Employment of a qualified site Engineer by the Contractor. The contractor shall employ full-time technically qualified staff during the execution of his work as under:

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

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

Clause 25 Notice to be Given before work is covered up: The contractor shall give not less than five day's notice in writing to the Architect/Owner or his subordinate in charge of the work before covering up or otherwise placing beyond the reach of measurement any work in order that the same may be measured and correct dimensions there of taken before the same is so covered up or placed beyond the reach of measurement and if any work shall be covered up or placed beyond the reach of measurement without search notice having been given or consent obtained the same shall be uncovered at the contractor's expense and any default thereof, no payment or allowance shall be made for such work or for the materials with which the same was executed.

Clause 26 If the contractor or his workmen, or servant shall break, deface injure or destroy any part of the building or the work in question in/on which they may be working or any building, road, fence enclosure or grass land or cultivated ground contiguous to the premises on which the works or any part thereof is being executed or if any damage shall be done the work from any cause whatever before a damage occurred/caused due to normal flood or rain or if any imperfections become apparent in it within three months of the grant of a certificate of completion, final or otherwise by the Architect/Owner, the contractor shall

make good the same at own expenses or in default, the Architect/Owner may cause the same to be made good by the contractor, and deduct the expenses (of which the certificate of the Architect/Owner shall be final) from any sums that may thereafter become due to the contractor or from his security deposit or the proceeds of sale thereof or a sufficient portion thereof.

Clause 27 Neither party shall be liable to the other for any loss or damage occasioned by or arising out of acts of God, such as Unprecedented flood, volcanic eruption, earthquake or other convulsion of nature and other acts such as not but restricted to general strike, invasion, the acts of foreign countries, hostilities, or war like operations before or after declaration of war, rebellion, military or Usurped power which prevent performance of the contract and which could not have been foreseen or avoided by a prudent person.

Note: - "Unprecedented Flood" means the flood crossing the High flood level of the past _____ year(s) which is on the available record.

Clause 28 Contractor to supply plant, ladders, scaffolding etc. and is liable for damage arising from non provision of light, fencing etc.: The contractor shall supply at his own cost all materials (except special materials if any, as may, in accordance with the contract to be supplied from the Owners Stores), plant, tools, appliances, implements, ladder, condrage, tack, scaffolding, and any temporary which may be required for the proper execution of the work whether in the original, altered or substituted form and whether included in the specifications, or other documents forming part of the contract or referred in these conditions or not and which may be necessary for the purpose of satisfying with requirements of the Architect/Owner as to any matter or which under these conditions he is entitled to be satisfied or which he is entitled to require together with carriage therefore to and from the work. The Contractor shall also supply without charge the requisite number of persons with the means and work and materials necessary for the purpose there of setting out works and counting, weighing and assisting in the measurement or examination at any time and from time to time, of the Contractor and the expenses may deducted from any money due to the contractor under the contract or from his security deposit, or proceeds of sale there of a sufficient portion there of. The contractor shall provide all necessary fencing and lights required to protect the public from accident and shall also be bound bear expenses of defense of every suit, action or other legal proceeding at law that may be brought by any person for injury sustained owing to neglect of the above precautions and to pay any damages costs which may be awarded in such suit, action or proceedings to any such person, or which may with the consent of the Contractor, be paid in compromising any claim by any such person.

Clause 29 The Contractor shall provide suitable scaffolds and working platforms, gangways and stairways, and shall comply with the following regulations in connections therewith.

- (a) Suitable scaffold shall be provided for workmen for all works that cannot be safely done from a ladder or by other means.
- (b) A scaffold shall not be constructed and taken down or substantially altered except.
 - (i) Under the supervision of a competent and responsible person.
 - (ii) Appointed by contractor and by competent workers possessing adequate experience in this kind of work.
- (c) All scaffolds and appliances connected therewith and all ladders shall
 - (i) Be of sound materials
 - (ii) Be of adequate strength having regard to the loads and strains to which they will be subjected, and
 - (iii) Be maintained in proper condition
- (d) Scaffolds shall be so constructed that no part thereof can be displaced in consequence of normal use.
- (e) Scaffolds shall not be overloaded so far as practicable the load shall be evenly distributed.
- (f) Before installing the lifting gear on scaffolds, special precaution shall be taken to ensure the strength and stability of the scaffolds.
- (g) A competent person shall periodically inspect scaffolds.
- (h) Before allowing a scaffold to be used by his workmen, the Contractor shall, whether the scaffolds. Has been erected by his workmen or not, take steps to ensure that it complies fully with the regulation herein specified.

- (i) Working platforms, gangways shall be so constructed that no part thereof can bind to contractor, sag unduly or unequally.
 - (i) Be so constructed and maintained having regard to the prevailing conditions as to reduce as far as practicable risks of persons tripping or slipping and-
 - (ii) Be kept free from any unnecessary obstruction.
- (j) In the case of working platforms, gangways working places and stairways at a height exceeding ... (to be specified)
 - (i) Every working platform and every gangway shall be closely boarded unless other adequate measures are taken to ensure safety.
 - (ii) Every working platform and every gangway shall have adequate width, and
 - (iii) Every Working platform, gangway working place and stairway shall be suitably fenced.
- (k) Every opening in the floor to building or in a working platform shall, except for the time and provided with suitable means to prevent the fall of persons or materials.
- (l) When persons are employed on a roof where there is danger of falling from a height exceeding ... (to be specified) meters suitable precaution shall be taken to prevent the fall of persons or materials.
- (m) Suitable precautions shall be taken to prevent persons being struck by articles which might fall from scaffold or other working places.
- (n) Safe means of access shall be provided to all working platform and other working places.

Clause 30 The Contractor shall comply with the following regulations as regards the hoisting appliances to be used by him-

- (a) Hoisting machines and tackle including their attachments, anchorage and supports shall.
 - (i) Be of good mechanical construction, sound materials and adequate strength and free from patent defect, and
 - (ii) Be kept in good repair and in working order
- (b) Every rope used in hoisting or lowering materials or as a means of suspension shall be of suitable quality and adequate strength and free from patent defect.
- (c) Hoisting machines and tackles shall be examined and adequately tested after erection on the site and before use and re-examined in position at intervals to be prescribed by Architect/Owner.
- (d) Every chain, ring, hook, shackle, swivel and pulley block used in hoisting or lowering materials or as a means of suspension shall be periodically examined.
- (e) Every crane driver or hoisting-appliance operator shall be properly qualified.
- (f) No person who is below age of 18 years shall be in control of any hoisting machine, including any scaffolds, nor shall give signals to the operator.
- (g) In the case of every hoisting machine and of every chain, ring hook, shackle, swivel and pulley block used in hoisting or lowering or as a means of suspension the safe working load shall be ascertained by adequate means.
- (h) Every hoisting machine and all gears referred to in preceding regulation shall be plainly marked with the safe working load.
- (i) In the case of hoisting machine having a variable safe working load, each safe working load and conditions under which it is applicable shall be clearly indicated.
- (j) No part of any hoisting machine or gear referred to in regulation 'g' above shall be loaded beyond the working load except for the purpose of testing.
- (k) Motors, gears, transmission, or gear wiring and other dangerous parts of hoisting appliances shall be provided with sufficient safeguards.
- (l) Hoisting appliance shall be provided with such means as will reduce to a minimum the risk of the accidental descent of the load.
- (m) Adequate precautions shall be provided with such means as will reduce to a minimum the risk of suspended load becoming accidentally displaced.

Clause 31 Measures for Prevention of fire: The contractor shall not set fire to any standing jungle, trees, bush wood or grass without a written permit from the Architect/Owner. When such permit is given and also in all cases when destroying cut or dug up trees. Bush wood, grass etc. by fire, the contractor shall take necessary measure to prevent such fire spreading to or otherwise damaging surrounded property.

Clause 32 Liability of contractors for any damages done in or outside work area:

Compensation for all damage done intentionally or unintentionally by Contractor's labours whether in or beyond limits of Owner property including any damage caused by the spreading of fire mentioned in the clause 31, shall be estimated by the Architect/Owner, shall be final and the contractor shall be bound to pay the amount of assessed compensation on demand, failing which the same will be recovered from the contractor as damages in the manner prescribed in clause 1 or deducted by the Architect/Owner from any sums that may be due or become due from Owner to the contractor under the contract or otherwise.

The contractor shall bear the expenses of defending any action or other legal proceeding that may be brought by any person for injury sustained by him owing to neglect or of precautions to prevent the spread of the fire and he shall also pay the damages and cost that may be awarded by the court in consequence

Clause 33 Deleted

Clause 34 Work not to be sublet. Contract may be rescinded and security deposit forfeited for subletting it without approval or for bribing a public officer or if contractor become insolvent:

The contract shall not assigned or sublet without the written approval of the Architect/Owner. And if the contractor shall assign or sublet his contract or attempt to do so or become insolvent or commence any proceeding to get himself be adjudicated an insolvent or make any compromise with his creditors, or attempt to do so the Architect/Owner may, by notice in writing rescind the contract, Also if any bribe, gratuity, gift, loan perquisite reward or advantage, pecuniary or otherwise, shall either directly or indirectly be given promised or offered by the contractor, or any of his servants or agents to any public officer or person in the employ of Owner in any way relating to his office or employment or if any such officer or person shall become in any way directly or indirectly interested in contract, the Architect/Owner may thereupon by notice in writing rescind the contract, in the event of contract being rescinded, the security deposit of the contractor shall thereupon stand forfeited and be absolutely at the disposal of Owner and the same consequence shall ensure as if the contract had been rescinded under clause 3 thereof and in addition the contractor shall not entitled to recover or be paid for any work therefore actually performed under the contract.

Clause 35 Sums payable by way of compensation to be considered as reasonable compensation without reference to actual loss:

All sums payable by a contractor by way of compensation under any of these conditions shall be considered as a reasonable compensation to be applied to the use of Owner without reference to the actual loss or damage sustained and whether any damage has or had not been sustained.

Clause 36 Change in the constitution of firm to be notified: In the case of a tender by partners, any change in the constitution of a firm shall be forthwith notified by the Contractor to Architect/Owner for his information.

Clause 37 Works to be under directions of Architect/Owner/Consultant: All works to be executed under the contract shall be executed under the direction and subject to the approval in all respect of Architect/Owner/Consultant appointed by the Owner for the time being, who shall be entitled to direct at what points or point and in what manner they are to be commenced and from time to time carried on.

Clause 38 (1) Disputes to be referred to arbitrator: The disputes relating to this contract, so far as they relate to any of the following matters, whether such disputes arise during the progress of the work or after the completion or abandonment thereof, shall be referred to the Arbitration Tribunal, Gujarat Sate, Gandhinagar.

Namely-

(i) The rates of payment under clause 5 for any tools, materials and stores, in or upon the works of the site thereof belonging to the contractor or procured by him and intended to be used for execution of the work or any part thereof possession of which may have been taken by the Architect/Owner under the said clause 5 as completed fully in accordance with the sanctioned specifications.

(ii) The reduction in rates made by the Architect/Owner under clause 10 from the items of work not accepted as completed fully in accordance with the sanctioned specifications.

- (iii) The rate of payment for any class of work which is included in the additional or altered work carried out by the contractor in accordance with the instructions of the Architect/Owner under clause 17 and the rates for which is to be befriended under the said clause 17.
- (iv) The rates of payment for materials already purchased or agreed to be purchased by the contractor before receipt of notice given by the Architect/Owner under clause 18, and / or the amount of compensation payable to the contractor under the said clause for loss in respect of such materials.
- (v) The amount of compensation which the contractor shall be liable to pay under clause 21 in the event of his failure to rectify, remove or reconstruct the work within the period specified in the written intimation of the amount of expenses incurred by the Engineer-in-removing and under the said clause 21 in rectifying removing or re-executing the work or in removing and replacing the materials or ratifying complained of.
- (vi) The reduction of rates as may be fixed by the Architect/Owner under clause 21 for, the inferior work or materials rates as accepted or made use of.
- (vii) The amount of compensation payable by the contract for damages as estimated and assessed under clause 32.
- (viii) The amount payable to the contractor the work carried out under clause 40 in accordance with the instructions and the requirements of the Architect/Owner in a case where there are no specifications.
- (2) The provision of section-21 of the GPWD disputes Arbi. Tribunal Act-92 & order issued by the Govt. in connection with this Act will now apply for Arbitration (As per government in N.& W.R.D. letter No. SUT/ 1090/ 2679/K2 Dtd. 9/2/94.
- (3) The provision of Arbitration Act. Shall in so far as they are inconsistent with the provision of this act. Cease of to apply to any dispute arising from a works contract and all arbitration proceedings in relation to such dispute before an arbitrator; court of authority shall stand transferred to the tribunal.
- (4) The awards declared by the arbitrator should be speaking award, giving reasons and calculations for every item of claims. The decision will have to be implemented by all the departments of the State Government and public sector enterprises of Gujarat. (Resolution F.D. No. PB/1088/735/KT/Sachivalaya/Gandhinagar 5th October 1988.)
- (5) In case of dispute leading to the contractor of Government of Gujarat approaching to Court of Law, it shall be within the jurisdiction where the site of work situated.
- (6) The reference to arbitration proceeding under this clause shall not:
 - (i) Affect the right of the Architect/Owner under clause 5 to take possession of all or any tools, plants, materials and stores in or upon the works of site thereof belonging to the contractor or procured by him and intended to be used for execution of the work or any part thereof.
 - (ii) Preclude the Architect/Owner from utilizing the materials purchased by the contractor in any work or from removing such materials to other places, during the period the work is stopped or suspended in pursuance of notice given to the contractor under clause 18.
 - (iii) Entitle the contractor to stop the progress of the work or the carrying out the additional or altered work in accordance with the provisions of clause 17 or as the case may be, of clause 40.

Clause 39 Lump sum in estimates: When the estimate on which a tender is made includes lump sum in respect of part of work, the contractor shall be entitled to payment in respect of the items of work involved or the part of the work in question at the same rates as are payable under this contract for such items, or if the part of the work in question is not the opinion of the Architect/Owner capable of measurement, the Architect/Owner may, as his discretion pay the lump sum amount entered in the estimate and the certificate in writing of the Architect/Owner shall be final and conclusive against the contractor with regard to any sum payable to him, under the provision of this clause.

Clause 40 Action where no specifications: In the case of work for which there is not such specification, such work shall be carried out in accordance with the Standard Specification and in the event of there being no Standard Specification, then in such case the work shall be carried out in all respect in accordance with the instructions and requirements of the Architect/Owner.

- Clause 41 Definition of work:** The expression or "Work" or "Works" where used in these condition shall unless, there be something in the subject or context repugnant to such contraction be construed to mean the work, or the works, contracted to be executed under or in virtue of the contract, whether temporary or permit and whether original, altered, substituted or additional.
- Clause 42 Contractor's percentage whether applied to net or gross amount of the bill:** Percentage referred to in the tender shall be deducted from/added to the gross amount of the bill before deducting the value of any stock issued.
- Clause 43 Non-refund of quarry fees & royalties:** The contractor shall pay the royalty to the competent authority/local body as per rules. The contractor shall furnish quarterly the statement showing quantity of quarried materials, from whom purchased (with full address of the seller) and copies of bills for purchase to the District Officer of the Mining and Geology Owner or authority competent to levy royalty in the area of wok. Copy of such statement shall be furnished to the Owner etc. Contractor shall also furnish such additional information as regards royalty payment to the Owner and the Royalty authority. The royalty charges paid shall be borne by the Contractor and shall not be reimbursed by the Owner.
- Clause 44 Compensation under the workmen's compensation Act:** The contractor shall be responsible for and shall pay compensation to his workman payable under the Workmen's Compensation Act 1923. (VIII of 1923) hereinafter called said Act for injuries caused to the workman. If Owner pays such compensation as principal under sub-section 12(1) of the said Act on behalf of the Contractor it shall be recoverable by Owner shall be recovered in the manner laid down in clause 1 above.
- Clause 45** The contractor shall be responsible for and shall pay the expenses of providing medical aid to any workman who may suffer a bodily injury as a result of an accident. If Owner incurs such expenses, the same shall be recoverable from the contractor for with and be deducted, without prejudice to any other remedy of Owner from amount due or that may become due to the contractor.
- Clause 46** The contractor shall provided all necessary personal safety equipment and first aid apparatus available for the use of the person employed on the site and shall maintain the same in suitable condition for immediate use at any time shall comply with the following regulations in connection therewith:
- (a) The workers shall be required to use the equipment so provided by the Contractor and Contractor shall take adequate steps to ensure proper use of the equipment by those concerned.
 - (b) When work is carried on in approximate to any place where there is a risk of drowning all necessary equipment shall be provided and kept for use and all necessary steps shall be taken for the prompt rescue of any person, in danger.
 - (c) Adequate provision shall be made for prompt first aid treatment of all injuries to be sustained during the course of the work.
- Clause 47** The quantities shown in the tender are approximate and no claim shall Be entrained for quantities of work executed being less than being less than those entered in the tender. In the case of increase in the quantities by more than 30%. The new rate will be paid to the contractor for the quantities in excess of 30%. The rate for the increased quantities as aforesaid will be fixed in the manner specified in clause 17.
- Clause 48 Employment of famine or other labour:** The contractor shall employ any famine, convict or other labour or particular kind or class, if ordered in writing to do so by the Architect/Owner.
- Clause 49** No compensation shall be allowed for any delay caused in the staring of the work on account of delay in making available the full site of land at a time.
- Clause 50 Claim for compensation for delay in the execution of work:** No claim for compensation shall be allowed for any delay in execution of the work on account of Water standing in borrows pits or compartment. The rates are inclusive of hard or cracked soil, excavation

in mud, sub soil water or water standing in borrow-pits and no claim for an extra rate be entertained unless otherwise expressly specified.

Clause 51 Entering upon or commencing any portion or work: The contractor shall not enter upon or commence any portion or work except with the written authority and authority and instruction of the Architect/Owner or of his subordinate in charge of work. Failing such authoritys the Contractor shall have no claim to ask measurement of or payment for work.

Clause 52

Clause 53 The employment of donkeys and / or other animals and the payment of fair wages: For Asphalt work (s) as far as possible, only the contractors should employ the adult persons. If the adult person is not available then the children below the age of 15 (fifteen years) should not be employment under any circumstance.

- (ii) No contractor shall employ donkey or other animals with breaching of string or thin rope. The breaching must be at least three inches wide and should be of tape (Nawar)
- (iii) No animal suffering from sores, lameness or emaciation or which is immature shall be employed on the work.
- (iv) The Architect/Owner or his agent is authorized to remove from the work any person or animal found working which dose not satisfy theses conditions and Owner shall accept no responsibility for any delay caused in the completion work by such removal.
- (v) The Contractor shall pay fair and reasonable wages to the workman employed by him in the contract undertaken by him. In the event of dispute arising between contractor and his workmen on the ground that the wages paid are not fair and reasonable, the dispute shall be referred without delay to the Architect/Owner who shall decide the same. The decision be of the Architect/Owner shall be conclusive and binding on the Contractor, but such decision shall not in any way effect the conditions in the contract regarding the payment to be made by Owner at the sanctioned tender rates.
- (vi) The contractor shall provide drinking water facilities to the works / labourers employed on Owner works. Amenities relating to sanitation shall also be provided to the workers / labourers the Architect/Owner shall give notice writing and if the contractor does not provide this facility to the. Workers / labourers within a period of ten days from the date of the notice writing, the Architect/Owner shall thereupon make the arrangement for drinking water at the cost of the contractor.
- (vii) The contractor shall the amenity of proper shade and shelter to the work's/ labourers and their children on Owner work as soon as the work starts. It is contractor fail to provide shed and shelter; the Architect/Owner shall provide it at the cost of contractor.

Clause 54 Method of payment: Payment to contractor shall be made by cheque drawn on any treasury bank of the Owner provided the amount exceeds Rs.10 amount not exceeding Rs.10 will be paid in cash.

Clause 55 Employment of scarcity labour: If Owner declares a state of scarcity or famine to exist in any village situated within 16 kilometers of the work, the Contractor shall employ upon such parts of the works as are suitable for unskilled labour any person certified to him by the Architect/Owner or by any other person to whom the Architect/Owner may have delegated this duty in writing to be in need of relief and shall be bound to say such persons which may arise in connection, with the implementation of this clause shall be decided by the Architect/Owner whose decision shall be final and binding on the contractor.

Clause 56 The rates to be quoted by the Contractor must be inclusive of all taxes No Extra payment on this account will be made to the contractor.

Clause 57 The Contractor should, as far as possible, obtain his requirement of labourers skilled and unskilled, form the nearest Employment Exchange so as to utilize the local employment potential. If there are no local Employment Exchange or such Exchange are not able to provide the required labour locally, suitable labourers should be utilized to the maximum extent possible.

Clause 58 Fair Wages: If Contractor fails to pay within '7' (Seven) days to the labourer(s) /workers(s) the minimum wages prescribed by the Owner under the Minimum Wages Act, 1948 as in force from time to time, the Architect/Owner shall be at liberty to deduct the amount payable to the labourer/workers from his (Contractors) bill or deposit(s) payable by the Contractor after making due inquiries and establishing the claim(s) of the labourer(s) / worker(s).

The Contractor shall not be entitled to any payment of compensation on account of any loss that the contractor may have to incur on account of the action as aforesaid. Before the action as aforesaid, is enforced, a notice in writing to the contractor shall be issued by the Architect/Owner to pay the wages as per Minimum Wages Act in force at the relevant time, If Contractor does not act as aforesaid within seven days, then the action contemplated as above shall be taken against him.

Clause 59 List of machinery: The contractor shall also give of machineries in his possession and which they propose to use on the work.

Clause 60 (i) In case, the roller deployed by Owner for the use on contract work is kept idle by the contractor for want of adequate labour and materials, the contractor will have to pay rental charges as per prevailing rules even though items of rolling and watering are to be carried out by the Owner.

(ii) If the contractor does not plan his program so as to suit the requirement of the Owner, the proportionate rental charges on roller shall be recovered from the contractor.

Clause 61 Local labours on normal rates: The contractor shall have to engage local labour and person seeking employment where available on normal rate.

Clause 62 Rent will be recovered from the contractor for the land given to them for stacking materials well as for contractor of temporary hutments etc.

Land measuring Charges

1. One hectare of less	Rs.5 Per month
2. More than 1 hectare & up to 2 hectares	Rs.10 Per month
3. More than 2 hectare & up to 3 hectares	Rs.15 Per month
4. More than 1 hectare & up to 4 hectares	Rs.20 Per month

Clause 63 The contractor shall employ only such labour who shall produce a valid certificate of having been vaccinated against small-box within a period of last three years.

Clause 64 Huts: The contractor shall build sufficient number of huts on a suitable plot of land for use of the labourers according to the following specifications.

- (1) Huts of bamboo's and grass may be constructed.
- (2) A good site shall be selected. High ground removed from jungle but well provided with trees shall be chosen wherever it is available. The neighborhood of rank jungle, grass or weeds should particularly be avoided. Camps should not be established close to large cuttings of earthwork.
- (3) The lines of huts shall have open spaces of at least 10 m between rows. When a good natural site cannot be procured, particular attention should be given to the drainage.
- (4) There should be no over-crowding. Floor spaces at the rate of 2.8 Sq. m. per head shall be provided. Care should be taken to see that the huts are kept clean and in good order.
- (5) The contractor must find out his own land. If he wants Owner land, he should apply for it and pay assessment for it.

2. **Drinking Water:** The contractor shall as far as possible, provide an adequate supply of chlorinated pure potable drinking water for the use of labourers. This provision shall be at the rate of not less than 4.5 liters per head. No provision need-be made where there is a suitable nalla, river or well within 4.0 km of the camp. However arrangement should as possible, be made to chlorinate water by chlorinated tablets before it is allowed for drinking purpose.

3. **The contractor shall contract semi permanent latrines for the use of Labourers on the following scale, namely:**
 - (a) Where females are employed, there shall be at least one latrine for every 25 females
 - (b) Where males are employed, there shall be at least one latrine for every 25 males. Provided that where the number of males or female exceed 100, it shall be sufficient if there is one latrine for every 25 males or females, as the case may be up to the first 100 and one for every 50 thereafter.
4. **Privacy in latrines:** Every latrine shall be under cover and so partitioned off as secure privacy, and shall have a proper door and fastenings.
5. **Notice to be displayed outside latrines and urinals:** (1) where workers of both sexes are employed there shall be displayed outside each block of latrine and urinal a notice in the language understood by the majority of the workers For Men Only or For Women Only: as the case may be.
5(2) The notice shall also bear the figures of a man or a women, as the case may be.
6. **Urinals:** There shall be at least one urinal for male/female workers up to 50 employed at a time provided that where the number of male or female workmen, as the case may, be exceeds 500, it shall be sufficient if there is one urinal for every 50 males or females up to the first 500 and one for every 100 males or females or part thereof.
7. **Latrines and Urinal to be accessible:** (1) The latrines and urinals shall be a conveniently situated and accessible to workers at all times at the establishment (2) (i) The latrines and urinals shall be adequately lighted and shall be maintained in a clean and sanitary condition at all times (ii) Latrines and urinals other than those connected with a flush sewage system shall comply with, the requirements of the Public Health Authorities.
8. **Water for latrines to be accessible:** Water shall be provided by means of pipes or tanks otherwise so also be conveniently accessible in or near the latrines and urinals.
9. **Bathing and washing places:** (1) The contractor shall construct sufficient number of bathing places; every unit of 20 persons being provided with a separate bathing place. (2) Washing places should also be provided for the purposes of washing clothes. Every unit of 30 persons shall have at least one washing place. (3) Such bathing and washing places should be suitably screened and separate places provided for male and female workers. (4) Such facilities shall be conveniently accessible and shall be kept in clean and hygienic condition.
10. **Drainage:** The contractor shall make sufficient arrangement for draining away the sewerage water as well as water from the bathing and washing places and shall dispose off this water in such a way as not to cause nuisance. The contractor should obtain permission from the Gujarat Water Pollution Control Board, Gandhinagar if water is so be drained in river or near the well. The contractor would put malarial oil once in week stagnant water round about in the residence.
11. **Medical facilities:** The contractor shall engage a medical officer with a traveling dispensary for a camp having 500 or more persons if there is no Government's or other private dispensary situated within 6 km. from the camp.
12. **Conservancy and cleanliness:** The contractor shall provide the necessary staff for effecting the satisfactory conservancy and cleanliness of the camp to the satisfaction of the Architect/Owner. At least one sweeper per 200 persons should be engaged Conservancy staff should dump refuse in compost pit, away from the labour camp.
13. **Health Provisions:** The District Health Officer of the District or the Deputy of Health Services shall be consulted before opening a labour camp and his instructions. on

matters, such as the water supply, sanitary convenience, the camp-site, accommodation and food supply shall be followed by the contractor.

- 14. Precautions against epidemic:** (a) The authorities in charge of the colonies should get the labourers inoculated against cholera and plague and vaccinated against smallpox at the time of recruitment, if they are not inoculated or vaccinated within 6 months or 3 years respectively prior to the date of recruitment.
(b) When, in any labour camp there is an epidemic disease or threatened with such an outbreak, the authorities in charge of the labour camp should ensure that all the inmates of the labour colonies are inoculated or vaccinated as the case may be depending on the diseases, within 72 hours after the outbreak.
(c) The authorities in charge of the labour colony should arrange to communicate by wire regarding the outbreak of the epidemic diseases on the very day of outbreak, to the Mamlatadar of the Taluka the District Health officer or to the Deputy Director Public Health in charge of that area and the Director of Public Health. Thereafter they should continue to send daily reports to the above officers in the prescribed form regarding the progress of the epidemic disease.
(d) When the authorities in charge of the labour colony suspect or have reason to believe that any inmate of the labour colony suffering from the infections or contagious disease, they shall forthwith arrange for the segregation of such person to isolated huts to be specifically provided for the purpose and also for their treatment.
(e) As regional malaria epidemic outbreaks are likely to occur in such project areas, the authorities in charge of the labour colony should report promptly the occurrence unusual incidence of cases of malaria and also inform the District Health Officers of the District Deputy Director of Public Health (Malaria) and the Director of Public Health and also arrange to institute all necessary ant malarial measures as may be advised by the officials of the Public Health Officer.
(f) The authorities in charge of the colonies should also arrange to carry out other measures that may be recommended by the officials of the Public Health Officer necessary to prevent or control the spread of disease.
- 15. Rest rooms:** (1) In every place where in contract labour is required to halt at night in connection with the contract works and in which employment of contract labour is likely to continue for three months or more, the contractor shall provide and maintain rest rooms or other suitable alternative accommodation within fifteen days of the employment of contract labour.
(2) If the amenity referred to in sub rules is not provided by the contractor within the period prescribed the employer shall provide the same within a period of fifteen days of the expiry of the period laid down in the sub-rule (1)
(3) Separate rooms shall be provided for women employees.
(4) Effective and suitable provision shall be made in every room for securing and maintaining adequate ventilation for the circulation of fresh air and there shall also be provided and maintained sufficient and suitable natural or artificial lighting.
(5) The rest rooms or other suitable alternative accommodation shall be of such dimensions as to provide latest a floor area of 1 sq. mt. for each person making use of rest rooms.
(6) The rest rooms or other suitable alternative accommodation shall be so contracted as to afford adequate protection against heat, wind, rain and shall have smooth, hard and impervious surface.
(7) The rest rooms or other suitable alternative accommodation shall be at convenient distance from the establishment and shall have adequate supply of wholesome drinking water.
- 16. Canteen Facilities:** (1) In every establishment of contract work and wherein work regarding the employment of contract labour is likely to continue for six months and wherein contract labour numbering one hundred or more are ordinarily employed, the adequate canteen facilities shall be provided by the contractor for the use of such contract labour within sixty days of the commencement of contract labour.
(2) If the contractor fails to provide the canteen facilities of within time laid down the same shall be provided by the principal employer within sixty days of the time allowed to the contractor.

(3) The canteen shall be made by the contractor or principal employees as the case may be in an efficient manner.

17. Accommodation in canteen: (1) The canteen shall consist of at least dining hall, kitchen storeroom, pantry and washing places separately for workers and for utensils.

(2) (i) The floor shall be made of smooth and impervious materials and inside walls shall lime-washed or color washed at least once in each year, provided that inside walls of the kitchen shall be lime-washed every four months.

(3) (i) The premises of the canteen shall be maintained in clean and sanitary condition.

(ii) Wastewater shall be carried away in suitable covered drains and shall not allowed to accumulate so as cause nuisance.

(iii) Suitable arrangements shall be made for collection and disposal of garbage.

18. Accommodation in dining hall: (1) The dining hall accommodates at a time, at least 30% of the contract labour working at a time.

(2) The floor area of the dining hall excluding the area occupied per dinner to a accommodated shall as prescribed in sub rule (1)

(3) (i) A portion of the dining hall and service counter hall be partitioned and reserved for women workers, in proportion to their numbers (ii) Washing places for women shall be separate and screened to secure privacy.

(4) Sufficient table, stools, or benches shall be available for number of diners of be accommodated as prescribed in sub rule (1)

19. Equipment in Canteen:

(1) (i) There shall be provided and maintained sufficient utensils, crockery cutlery, furniture and any other equipment necessary for the efficient running of the canteen.

(ii) The furniture utensils and other equipment shall be maintained in a clean and hygienic condition.

(2) (i) Suitable clean clothes for the employees serving in the canteen shall also be provided and maintained.

(ii) A service counter, if provided, shall have a top of smooth and impervious materials.

(iii) Suitable facilities including adequate supply of hot water shall be provided for the cleaning of utensils and equipment.

20. Foodstuff to be served: The foodstuff and other items to be served in the canteen shall be in conformity with the normal food habits of the contract labour.

21. Prices to be displayed: The charges for foodstuff, beverages and other items served in the canteen shall be based on "no profit, no loss" and shall be conspicuously displayed in the canteen.

22. Canteen to be run on "No profit no loss" basis: in deriving the prices of food stuffs and other articles served in the canteen, the following items shall not be taken into consideration as expenditure, namely.

(a) The rent for the land and building

(b) The depreciation and maintenance charges for the building and equipment provided for in the canteen.

(c) The cost of purchase, repairs and replacement of equipment including furniture, crockery, cutlery and utensils.

(d) The water charges and other charges incurred for lighting and ventilation.

(e) The interest on the amount spent on the provisions and maintenance of furniture and equipment provided for in the canteen.

The local officers should check up whether, facilities as offered and which are admissible under the existing rules and orders are made available to the workers and enforce upon the contractors the necessity of adhering to the instructions from promotion of welfare of the workers according to the terms of the contract.

23. Books of accounts and registers of the canteen: The books of accounts and registers and other documents used in connection with the running of the canteen shall be produced on demand to an inspector.

24. Audit of the Accounts of the canteen: The accounts pertaining to the canteen shall be audited once every 12 months by registered accountants and auditors, provided that Labour Commissioner may approve of any other person to audit the accounts. If he is satisfied that it is not feasible to appoint a registered accountant and auditor in view of the site or the location of the canteen.

Clause 65 Contractor shall have to arrange for supply of gumboots. Hand gloves, mask etc. Invariably to the labourers/ workers engaged the contractor on asphalt work.

Clause 66 The contractor shall not show any distinction between Harijan and other class of labourers/workers employed to the carry out the work.

Clause 67 Price variation Clause: Price variation: For (A) Labour (B) Materials and (C) P.O.L. The amount payable to the Contractor for the work done shall be adjusted for increase or decrease in the rates of labour/materials excepting those materials supplied by Owner as per Schedule A and P.O.L. as under:

(A) Labour: Increase or ~~DELETED~~ in the cost due to labour shall be calculated quarterly in accordance with the following formula.

$$VI = 0.75 \times \left\{ \frac{PI}{100} \times R \times \frac{i - io}{io} \right\}$$

VI = Increase or decrease in the cost of work during the during the quarter under consideration due to change in rates of labour.

R = The value of work done in rupees during the quarter under consideration, after excluding the value of extra item and after deducting the cost of.

(i) Materials supplied from the Owner store to the Contractor at fixed rate as specified in schedule A and

(ii) Value of cement and steel brought by the contractor valued at star rate plus the increases / decrease for which price adjustment is done under sub-clause (B-2) below:

io = The average consumer price index for industrial workers for the quarter in which tenders were opened (as published in * ...)

i = The average consumer price index for industrials for the quarter under consideration.

PI = Percentage of labour components (specified in Schedule...)

* This refers to average consumers price index (Wholesale) for industries workers as applicable to Ahmedabad / Bhavnagar as published by Owner of India. Ministry of Labour Bureau.

*** (B) Materials other than Cement and steel and asphalt:** The increase or decrease in cost of materials other than cement and steel shall be calculated quarterly in accordance with the following formula.

$$Vm = 0.75 \times \left\{ \frac{PI}{100} \times R \times \frac{i - io}{io} \right\}$$

(ii) Value of cement and steel brought by the contractor valued at star plus the increase/decrease for which price adjustment is done under clause below:

io = The average wholesale price index (all commodities) for the quarter in which tenders were opened. (as published in @.

i = The average wholesale price index (all commodities) for the quarter under consideration, after excluding the value of extra items and after deducting the cost of.

Pm = Percentage of materials component (specified in schedule...) of items

@ = For materials wholesale price index as published by Reserve Bank of India should be referred to

(C) P.O.L.: The increase or decrease in the cost of petrol, diesel, oil and lubricants shall be calculated quarterly in accordance with the following formula.

$$Vd = 0.75 \times \left\{ \frac{Pd}{100} \times R \times \frac{(D - Do)}{Do} \right\}$$

Vd = Increase or decrease in the cost of work during the quarter under consideration (ii)
Value of cement steel brought by the contractor valued at star plus the increase/decrease for which price adjustment is done under sub clause above: -

Do = The average price of high-speed diesel (HSD) fixed by I.O.C. for the district which the work is to be carried out for the quarter in which the tenders were opened.

D = The average price of HSD fixed by the I.O.C. for the district in which the work is to be carried out the quarter under consideration.

Pd = Percentage of P.O.L Component (specified in schedule) of the item.

Conditions except for B-2 Formula:

- (1) No adjustment shall be done for the work done in the first twelve months of the limit. Adjustment payable/ recoverable will be calculated for the remaining work done during the subsequent period.
- (2) The sum total price adjustment will be limited to ... % of the subsequent period. Less the cost at cement and steel valued at input rates mentioned as under on which the sanctioned estimated is based.

QUANTITY

Input rate per ton

Cement: _____ Mts. Rs. _____
Mild Steel: _____ Mts. Rs. _____
HYSD Bars: _____

- (3) The quarter referred to in the above formula shall mean the quarter of the calendar year January to March, April to June, to September and October to December, Even is the tenders are opened in the middle of a quarter, the average index for the calendar quarter will be considered. The same principle would apply for identifying the quarter when the work is completed in the middle of calendar quarter.
- (4) The value of extra items will be excluded for working out the value of 'R' in the above formula in all these cases. **DELETED**
- (5) Intermediate payment of exclamation to be made under this clause on each occasion shall be limited in such a manner that the up-to-date payment of escalation will not exceed the proportionate percentage of the ceiling of escalation as related to the proportionate value of the contract cost.
- (6) Price adjustment shall be applicable only for work that is carried out within the stipulated time or extensions thereof as are not attributable of the contractor. No claims for price adjustment other than those provided herein shall be entertained.
- (7) This clause will be applicable in respect of which of the estimated cost put to tender is above Rs.25.00 lacs and the time limit involved in more than 12 months.

STAR RATES

QIANTITY

Cement Rs. _____ Mt.
Mild Steel Rs. _____ Mt.
HYSD Steel Rs. _____ Mt.

[The above star rates are linked with Reserve Bank of India price index for steel and cement for the month in which the DTPs are approved. The rate for asphalt will be based on the rate of Koyli Refinery prevailing in the month in which the estimate is prepared.

The month in which DTPs are approved will be specified in the tender document.

Star rates should be mentioned in the tender copy as under:

- I. For Cement, Price of cement from authorized dealer should be obtained for the month in which the D.T.P.s are approved and mentioned as star rate before issue of tender copy.
- II. For steel & H.Y.S.D. bars, rate of SAIL should be obtained for the month in which the DTPs are approved and mentioned as star rate before issue of tender copy.
- III. For basic index specific month in which the DTPs are approved should be mentioned before issue of tender copy]

The fluctuations in rates of cement and steel shall be adjusted in the bills payable to the constrictors as under:

DELETED

$$A = B \times \left\{ \frac{CI - 1}{Co} \right\} \times D$$

A= Difference of Amount payable or recoverable

B= Star rate of steel/cement

CI- The (Quarterly) average corresponding index for steel cement for the quarter under consideration (as published in monthly bulletin for Reserve Bank of India)

Co- Price index of cement/steel for the month in which the DTPs are approved published in monthly bulletin of Reserve Bank of India).

D- Qty. of cement/steel actually brought by the contra (for on site of work and consumed in the work during the quarter duly supported bill as recorded in cement consumption register or MB (for steel)

Conditions for variation in prices of cement and steel only: -

- 1 No Ceiling for escalation for difference in the cost of steel and cement will be applicable.
- 2 This clause shall be operative from the date of issue of work order and up to expire of original and extended time limit.
- 3 This formula shall be used individually for cement/mild steel and Tor steel for calculating adjustment.
- 4 The cement and steel brought by the contractor on site of work shall be used only after the Owner tests the same is tested by the owner.
- 5 If such materials are not found, as per the requirement of I.S. specification, the contractor for which no claim shall be entertained shall remove the same.
- 6 This clause will be applied to the work estimated to cost above Rs.15 lacks. And the time limit involved is more than 12. Months.

Conditions for variation in rates of asphalt only: -

1. The contractor shall procure asphalt directly from refinery or oil Company only.
2. The contractor will not be furnished "P" from for purchase of quantity of asphalt required for this work. **DELETED** e test certificate regarding the grade of
3. The contractor will have to produce in original all the gate passes issued by the refinery and also the bill in original to the Architect/Owner.
4. The contractor shall furnish the GERI Laboratory or other Laboratory approved by R & B Department shall have to be produced.
5. The difference between two actual rates of purchase as per original bill of the refinery produced and the star rate as indicated below for the quantity of asphalt actually used in the work during original time limit only will be paid/ recovered after the asphalt is consumed in said part of work. No escalation for the works estimated to cost up to 15 Lacks and involving use of asphalt will be payable.
Star rate per MT Rs. _____ Rupees
6. The difference will be payable/recoverable from the date of issue of work order and this price variation will not be subject to any ceiling.
7. No advance payment or secured Advance will be payable against asphalt.
8. This part of clause for price variation of asphalt will be applicable for works estimated to cost above Rs. 15 Lacks and involving use of asphalt.

Clause 68 FENCING AND LIGHTING:

- (a) The contractor shall unless otherwise specified, be responsible for the proper fencing lighting grading and taking of the necessary safety measures for all works comprised in the contract and for the proper provision of temporary road, way foot-way, guards, fences, caution notices etc. as far as the same may be tendered necessary by reasons of the work for the accommodation of foot passengers or other traffic and of Owners and occupiers of adjacent property and the public and shall remain responsible for any accidents that any occur on account of his failure to take proper & timely precautions.
- (b) All the arrangements made for fencing and lighting shall be maintained by the contractor through the currency of the contract till the physical taking over of the work by Owner.

Clause 69 LIABILITIES OF ACCIDENTS TO PERSONS:

Responsibilities and liabilities of the contractor under Worker's Compensation Act are given in clause No.44 in addition following shall also apply: (a) On the occurrence of an accident, which result in death of workmen employed by the contractor or which is so

serious as likely to result in death of any such workmen the contractor, shall within 24 hours of happening of such accident (s) intimate, in writing to the Architect/Owner the fact of such accident(s). The contractor shall indemnify Owner against all loss or damage sustained by the Owner resulting directly or indirectly from his failures to give intimation in the manner aforesaid including the penalties or fines, if any, payable by the Owner as a consequence of Owners failure to give notice under the Workmen's Compensation Act or otherwise to conform to the provisions of the said act in regard to such accident(s).

(b) In the case of an accident, in respect of which compensation may become payable under Workmen's Compensation Act, whether by the contractor or by the Owner as principal Employer, it shall be lawful for the Architect/Owner to retain out of money due and payable to the Contractor, such sum or sum of money as may, in the opinion of the Architect/Owner, be sufficient to meet such a liability. The opinion of the Architect/Owner shall be final in regard to all matters arising under this clause.

Clause 70 ACCESS TO SITE AND WORK IN SITE: The Engineer may, if he considers fit from to time, enter upon any land (s) which may be in possession of the contractor this contract for the purpose of agent or by other contractors, at his opinion and the contractor shall in accordance with the requirements of the Architect/Owner afford all reasonable facilities for execution of the work including occupation of lands by structure of otherwise for any other contractor employed by the site of work Owner and his workmen or for the workman of the Owner who may be employed in the execution on or near the site of the work not included in the contract or of any contract in connection with or ancillary to the work and in default, the contractor shall be liable to the Owner for any delay or expenses incurred by reason of such default, Provided always that if damage arising make a statement of the same to the Architect/Owner who shall from time assess the value in his judgment of such damage and the Owner shall from time to time pay to the contractor the amount (if any) accepted as justified by the Architect/Owner.

Clause 71 REPORTS REGARDING LABOUR:

The contractor shall submit the following reports to the Architect/Owner:

- (a)(i) A daily report in the suitable form of the strength of labour, both skilled and unskilled employed by him on the work(s). The contractor shall increase or decrease the strength both skilled and unskilled. If directed by the Architect/Owner. The submission of such reports shall not, however, relieve the contractor of his responsibilities and duties regarding progress or any obligations under the contract.
- (ii) A classified weekly returns in suitable form of the number of person employed on the works during the proceeding week.
- (iii) A weekly medical report in the suitable form showing the health of the contractor's camp, the number of person's ill incapacitated and the nature of their illness.
- (iv) A report of any accident, which may have occurred to be sent within 24 hours of occurrence.
- (v) Such other report as may be prescribed.

Clause 72 Treasure Trove:

In the event of discovery by the contractor or his employees, during the progress of work of any gold, silver, oil or other minerals of any description and precious stones, treasures, coins, quantities, relic, fossils or other articles or value of interest whether geological archaeological or any other such treasure & other things shall be deemed to be the absolute property of the Owner and the contractor shall duly preserve the same to the satisfaction of the Architect/Owner from time and relieve the same such person as the Architect/Owner may appoint.

The contractor shall take all reasonable precautions to prevent his workmen or any other person from removing or damaging any such articles or things, immediately after the discovery thereof and before removed acquaint the Architect/Owner with such discovery and carry out his orders for the disposal of the same.

Clause 73 Indemnity:

The contractor shall indemnify the Owner against all actions, suits claims & demands through or made against the Owner in respect of work of this contractor against any loss

damage to Owner in consequences of any action or suit being brought against the contractor anything done or omitted to be done in execution of the work of this contract.

Clause 74 Insurance of Labours:

The contractor shall be responsible to arrange for insurance of all labourers, skilled and unskilled workers, and supervisors' etc. employed by him as per labour regulation of the state.

Clause 75 Setting out:

The contractor shall be responsible for the true and proper setting out of the works and the correctness of positions, levels, dimensions and alignments of all parts of the work and for the provisions all necessary instruments, appliance and labour in connection therewith, if at any time during the progress of the work, any errors, appear or arise in the position, levels, dimensions or alignment of any part of the work, the contractor, on being required to rectify such errors by the Architect/Owner shall at his own expense do so to the satisfaction of the Architect/Owner. If however, such error is based on incorrect data supplied in writing by the Architect/Owner: the expenses of rectifying the same shall be borne by the Owner. The checking of and setting out of any line or level by the Architect/Owner or his representative shall not in any way, relieve the contractor of his responsibilities for the correctness of the error. The contractor shall carefully protect and observe all benchmarks site nails, page and other things used in setting out of the work

Clause 76 Cement Register:

A register in the prescribed form showing day-to-day receipt, consumption and balance of cement on site of work will be maintained by the Owner, which shall invariably be signed daily by the contractor or his authorized representative in token of its correctness.

Clause 77 Materials and Works Test Register:

A register in the prescribed form showing day to day receipt consumption and balance of cement on the site of work by the contractor and every entry there of shall invariably be checked by the Architect/Owner.

Clause 78 Progress Schedule:

- (a) The contractor shall furnish within one month (unless extended by Architect/Owner) of the order to start the work, the progress schedule in quadruplicate indicating the date of starting, the monthly progress expected to be achieved and the anticipated Completion date of each major item of work to be done by him also indicating dates of procurement and setting up the materials plants and machinery. The schedule should include a statement of proposed general and detailed arrangements for carrying out works, and of item, order and manner in which it is proposed general and detailed arrangements for carrying out works, and of item order and manner in which it is proposed that these shall be executed. The schedule should be framed keeping requirement of the clause 2 of tender form in view and be such as in practice to the achievement towards completion of the work in the time limit and of the particular items on the dates specified in the contract and shall have the approval of Architect/Owner. Further, the dates for the progress, as in this schedule shall be adhered to.

In case it is found necessary, at any stage to alter the schedule, the contractor shall submit in good time a revised schedule incorporating necessary modification proposed and get same approved from the Architect/Owner. No revised schedule shall be operative without such acceptance in writing. The Architect/Owner is further empowered to ask for more detailed schedules. Any week-by-week for any item or items and the contractor shall, supply the same as and when asked for.

- (b) The Architect/Owner shall have, at all times, the right without in any way vitiating this contract forming grounds for any claim, to alter the order of the work of any part thereof and the contractor shall after receiving such direction, proceed in the order directed. The contractor shall also revise the progress, schedules accordingly and submit four copies of the revised schedule to the Architect/Owner within seven days of the said Engineer's direction to alter the order of works.

- (c) The contractor shall furnish sufficient plant. Equipment and labour and shall work such hours and shifts as may be necessary to maintain the progress of the work as per approved progress schedule. The working and shift hour shall comply with all the Owner regulations in force shall be such as may be approved by the Architect/Owner and the same not be varied without the prior approval of Architect/Owner.
- (d) The contractor shall from time to time, as may be required by the Architect/Owner. Furnish the Architect/Owner with a statement in writing of the arrangements he proposes to adopt for the execution of this contract and the Architect/Owner may, if he considers necessary at any time advise alternation in the same, which the contractor shall adopt on notice there of.
- (e) The progress schedule(s) shall be in the form of progress chart, forms, statements and/or reports as may be approved by the Architect/Owner.
The contractor shall submit four copies showing the progress of the work in the of a chart etc. at periodical intervals as may be specified by Architect/Owner.
- (f) The approval of the progress schedules by Architect/Owner shall not relieve the contractor of
Schedule required by the Architect/Owner shall not entitle the contractor to any extra payment.

Clause 79 Secured Advance to Contractor:

- (1) Before any secured advance for metal is paid to the contractor, the metal shall have to be tested for its quality in the laboratory Contractor's request for such secured advance will be considered only after test results of metals are received and results are satisfactory.
- (2) Advance on security of materials brought to site will not exceed 75% of the value (as assessed by the Architect/Owner) of such materials provided that the are of imperishable nature.
- (3) Recovery of advances will not be postponed until the whole of the work entrusted is completed. Secured advance will be recovered within 3 months from the month in which secured advance is given.
- (4) Secured advance is permissible on materials, which are all actually brought on site and are required by the contractor for use on items of works for which rates for finished work have been agreed upon.
- (5) Secured advance will be given only on materials for which the contractor pays the full value to the seller.

Clause 80 Advance Payment: Advance Payment for the work done, but not Measured, may be made up to 80% of the approximate value work done as shown in the progress reports of approximate measurement Sheets with location furnished by Architect/Owner subject to the following conditions: -

- (1) That in the case of advance payment on the item of earthwork payment should be made on the basis of detailed measurements except during the monsoon period (June to September).
- (2) That the detailed measurement should be recorded within the month from the date of payment of the bill incorporating the advance payment. However in the case of sectional measurements of earthwork, detailed measurements should be recorded within their months instead of one month stipulated above.
- (3) If, on recording of the detailed measurements, it is found that advance payment shall be refunded forthwith by the contractor or demand, if it cannot be adjusted from the bill in which the item/s on which advance payment was given are recorded by measurements.

Clause 81 Advance Against Machineries:

- 1. Secured advance on plants and machinery's brought to the site of work is admissible for the contracts estimated to cost more than Rs. Ten Lacks.
- 2. Simple interest in such advances granted to contractor against plants and machinery's brought to work sites be charged at the rate of ...% per annum.
- 3. The recovery of the advance shall be effected from the second month in which advance is given. recovery will be completed by the time seventy five percent of scheduled time is completed.
- 4. Such advance will be limited to 5 percent of the estimated amount put to tender.
- 5. The advance will be limited to 5 percent actually brought to the of work

6. The machinery and equipment on which the advance is granted shall be of full undisputed Ownership of the contractor, and they shall be hypothecated to Owner and also comprehensively insured till the advance granted is fully recovered. The hypothecation deed shall be executed separately before the advance is actually given.
7. The advance will be granted as 75 percent of the cost of new equipment for which the contractor is able to produce purchase-voucher and other documents. This will not be applicable in the case second-hand equipment purchased by the contractor.
8. In the case of used or second-hand equipment brought by the contractor, advance will be allowed at 50 percent of the value of the equipment arrived at in following manner:-
 - (a) For used equipment, for which the records of original purchase price and utilization are available, depreciated value, so worked out.
 - (b) For used equipment, for which proper records of purchase price and past utilization are not available, approved valuer will assess the value. The value assessed will be based on the probable age of the equipment, its present condition and its probable depreciated value, in working out depreciation age of the equipment, its present condition and probable Owner of spares, repair, reconditioning of the equipment's shall not be taken into account towards the capital cost. The value arrived at by the will approved valuer will be final.
9. No. Advance may be allowed for equipment which is more than 8 years old or which has already worked for more than 80 percent of its life.
10. No. Advance shall be given to transport-vehicles like jeeps, station-wagons, estate-car and such other vehicle ordinarily required for transport purposes.
11. The recovery will have to be completed within the stipulated period of completion of work i.e. _____ months

Clause 82 Mobilization Advance:

1. Mobilization advance to the extent of 5% of the estimated cost may be granted at the commencement of the work after the contractor has set up camp on site has brought machinery equipment and centering etc., for well-sinking and has completed the work of service road, water-supply and lighting arrangements on the site of works which are estimated to cost over Rs.40 lacks.
2. The advance will carry a simple interest at the rate of ____% Per annum.
3. The recovery of advance shall commence from the sixth month from the month in which the advance is paid and full recovery of advance and interest shall be completed by the end of _____ month from the ~~date of issue of the work order~~ **DELETED** order, in other words, the recovery of advance and interest will spread over a spell of ...months or less a above in equal installments.
4. A bank guarantee from a schedule commercial bank shall have to be produced for the amount of advance applied for; the bank guarantee can be scaled down to the extent of recovery of advances.
5. Mobilization advance will be treated as interest bearing refundable loan for purpose. The responsibility of the Contractor for the refund of Mobilization Advance is absolute and not dependent upon the completion of the work. The contractor will have to refund the advance with accrued interest irrespective of the fact whether either party of abandoned or finalized prematurely breaches the contract.

Clause 83 Before starting the work, the contractor will have to obtain the license from the District Assistant Labour Commissioner under the Contract Labour (Regulation and Abolition) Act, 1970 and contract Labour (Regulation and Abolition) Gujarat rules 1972 after paying necessary fees and deposit on the basis of the number of labourers to be employed on the work and will have to supply two true copies of the said license to the Deputy Executive Engineer before the work is started.

Clause 84 One percent of estimated cost put to tender for this work after deducting the cost of materials as per Schedule 'A' valued at basic rate in the sanctioned estimate shall be deducted from the running account bills of the contractor for testing the quality of materials and workmanship, no additional testing charges in addition to the above shall be recovered from the contractor.

However in respect of work involving use of asphalt, the contractor will set up the site testing Laboratory and will provide testing instruments etc. as under:

Laboratory: The contractor will construct pucca structure of minimum 25 square meter area duly connected with water and electric supply to house site testing Laboratory.

Instruments: The contractor will provide and install the instruments as per following I.S. Standard to carry out the test prescribes therein.

1. Penetration test as per I.S. 1203.
2. Softening point test as per I.S. 1204.
3. Ductility test as per I.S. 1208
4. Viscosity test as per I.S. 1206.
5. Specification gravity test as per I.S. 1202.

The instruments provided should be as per I.S. Standard, so certified and be regularly and periodically calibrated.

Frequency of tests will be as indicated in specifications and as referred in R. & B. D. G. R. No. SSR – 1099 – IB/91 (9) – C dated 26-7-1999.

Annexures: - The information in the following annexures specimens should be furnished on separate letter pad if necessary

Annexure 1

To,
Executive Engineer
Building Department,
Bhavnagar Municipal Corporation
_____ Bhavnagar

DATE:

PLACE:

Details regarding my/our partners our Company (in the case of limited Company) Names, address (es), telephone numbers(s) Income Tax No etc. are as under:

Sr. No.	Names(s) of Person/ Partner Director of the company	Full address of the Places of business (with pin code)	Telephone No. (s) (office)	Residential Address(es)	Telephone No. (s) Resi.	Full address of income tax Office ward where income tax return is filed
1	2	3	4	5	6	7

I/We hereby agree to intimate to you about change if any, in the above mentioned address (es) and telephone No. (s) within Fifteen days of its occurrence till my/our deposit, for the said work paid by me/us is not returned to me/us.

Dated Signature of

Tenderer

Annexure 3

PERFORMANCE BOND

(SEE CLAUSE NO. 1)

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

.....Principal (Contractor)
.....Surety (Bank)

Sum of Bond (express in words and figures)

Contract No. and date of contract

KNOW ALL MEN BY THESE PRESENTS, THAT WE, THE PRINCIPALS AND SURETY above named are held and firmly bound up to the hereinafter called the Employer in the amount stated for payment of which sum, well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors jointly and severally, firmly by these presents subject to the provisions of which the aforesaid Contractor on demand and without demand on a claim being made by the employer.

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

NOW THEREFORE, if the Principal shall well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of said contract during the original terms of the said contract and any extensions thereof that extensions thereof that may be granted by the Employer with or without notice to the surety and during the life or any guarantee required under the contract and shall also well and truly perform and fulfill all the undertakings, covenants, terms, conditions and agreements of any all duty and unduly authorized modifications of said contract may hereafter be made, notice of which modifications to the surety being hereby waived or shall pay over, make good and reimburse to the Employer all loss and damages which the employer may sustain by reason of failure or default on the part of said Principal so to do. We further agree that the guarantee herein Contained shall remain in full force and effect during the period that would be taken for the validity of the said Contract, and that it shall continue to be enforceable till all the dues of the employer under or by virtue of the Contract have been fully paid and its claims satisfied or discharged or till the Employer certifies that the terms and conditions of the Contract have been fully and properly carried out by the said Contractor and accordingly discharges the guarantee. Unless a demand or claim under this guarantee is made on us in writing on or before the we shall be discharged from all liability under this guarantee thereafter.

IN WITNESS WHERE OF, the above bounded parties have executed this instrument under their several seals on the date indicated above the name and corporate seal of each corporate partly being hereto affixed and these presents duly signed by its undersigned by its undersigned representatives, pursuant to authority of its governing body.

In the presence of witness
Principal

1. as to(seal)
2. as to(seal)
3. as to(seal)
4. as to(seal)
by Affix Corporate Seal

Attested

Corporate surety

Address

Business

Affix by corporate Seal

Title

For and on behalf of the Employer

Annexure 4

LIST OF WORKS ALREADY COMPLETED BY TENDERER

Sr. No.	Name of work	Place	Cost On completion	Time taken in months To complete the work	Remarks
1	2(a)	2(b)	3	4	5

* Necessary certificate from the officer concerned shall be attached with the tender.

Annexure 5

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

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

* Necessary certificate from the officer concerned shall be attached with the tender.

Sign
of Tender

Annexure 6

DECLARATION REGARDING WORKS ON HAND WITH TENDERER

Sr. No.	Name of work	Place	Estimated Cost	Date of issue of work order	Stipulated period of completion	Amount of work done on date of filling tender	Brief detail of delay if any	Remarks
1	2(a)	2(b)	3	4	5	6	7	8

* **Size of Tender**
Signature of Tenderer
with Date

Note 1: Amount of work in column 6 should be given the month previous to the month in which tenders are invited.

* Necessary certificate from the officer concerned shall be attached with the tender.

SCHEDULE 'A'

Schedule showing (approximate) the materials to be supplied from the store for work contracted to be executed and the rates at which they are to be charged for

Particulars	Approximate Quantity	Rate of which the materials will be charged to the contractor		Place of delivery
1	2	Unit 3	Rate in Rupees 4	5

SCHEDULE – 'B'

Memorandum showing items of works to be carried out

Items No.	Quantities estimated but may be more or less	Item of work	Estimated Rates		Unit	Total Amount according to estimated quantities
1	2(a)	2(b)	In figure 3	Inwards 4	5	6

I/We am/are willing to carry out the work at ...% above/below percent (should be written in figures and words) of the estimated rates mentioned above. Amount of my/our tender works out as under.

*Estimated amount			*Estimated amount	
Put to tender	Rs. ...		Put to tender	Rs....
Add: ...% above	Rs. ...		Deduct ...% below	Rs....
Total	Rs. ...		Net	Rs....
In words			In words...	

(Please strike out whichever is not applicable)

Note: 1 All work shall be carried out as per Public Works Owner Handbook and other standard specification or as directed.

Note: 2 All the column is Schedule be filled in ink and the total of the entries in the last column should be struck by the contractor under his signature.

Note: 3 Rates quoted include clearance of site (prior commencement of work and at its close) in all respect and hold good for work under all condition, site, moisture, weather etc.

Note: 4 to be continued on additional sheets, if found necessary.

SCHEDULE – ‘C’

Time Schedule, for completion of different designate parts of the work and rte of liquidated damage of be paid by the Contractor, if he fails to complete the part of work within stipulated the limit it as detailed above:

Percentage of time of the total time limit	Time schedule of completion percentage of work	Rate of liquidated damages per day
1	2	3
<u>Earth Work</u>		
25%	16%	0.1%
50%	50%	0.1%
75%	75%	0.1%
100%	100%	0.1%
<u>Buildings Works</u>		
25%	10%	0.1%
50%	40%	0.1%
75%	80%	0.1%
100%	100%	0.1%
<u>Road Work</u>		
25%	25%	0.1%
50%	50%	0.1%
75%	75%	0.1%
100%	100%	0.1%
<u>Bridge work</u>		
25%	10%	0.1%
50%	40%	0.1%
75%	80%	0.1%
100%	100%	0.1%

BHAVNAGAR MUNICIPAL CORPORATION

**EXECUTIVE ENGINEER
BUILDING DEPARTMENT
BHAVNAGAR MUNICIPAL CORPORATION
BHAVNAGAR**

**CONSTRUCTION OF NEW CATTLE BOX NEAR SHRI BALA HANUMAAN TEMPLE- AIR
PORT ROAD, BHAVNAGAR**

**SECTION- IV
GENERAL CONDITIONS OF CONTRACT
(Administrative)**

GENERAL CONDITIONS OF CONTRACT

ADMINISTRATIVE

1. DEFINITIONS:

The following words shall have the meaning here in assigned to them except where the subject of context otherwise requires.

(i)	"Employer"	:	Shall mean Bhavnagar Municipal Corporation and shall include his (their) legal representative/s, assign/s of successors.
(ii)	"Civil Engineer" Engineer-In-Charge/ Purchaser/Owner	:	Civil Engineer / Engineer – In – Charge/Purchaser/Owner shall mean the Civil Engineer of Bhavnagar Municipal Corporation and shall include any person nominated by Civil Engineer/Engineer-In-Charge to supervise the works.
(iii)	Notice in Writing	:	Or written notice shall mean a notice in written, typed or printed characters sent (unless delivered personally or otherwise proved to have been received) by registered post to the last known private or business address or registered office of the address and shall be in the ordinary course of post it would have been delivered.
(v)	Approved and Directed	:	Shall mean approved or directed by Civil Engineer/ Engineer – In – Charge/Purchaser/Owner.

1. SCOPE OF CONTRACT:

The contractor shall carry out and complete the said work in every respect in accordance with this Contract and with the directions of and to the satisfaction of Engineer-In-Charge/Architect/Civil Engineer. The Engineer-in-Charge/Architect/ Civil Engineer may in his absolute discretion and from time to time issue further Drawings and/or written instructions, details, directions and explanation which are hereafter collectively referred to as "Engineer-In-Charge/Architect/Civil Engineers' Instruction" in regard to:

1. The variation or modification of the design, quantity or quantity of works of the addition or omission or substitution of any work.
2. Any discrepancy in the Drawings or between the Schedule of Quantities and/or Drawings and/or specifications.
3. The removal from the site of any rejected materials and the substitutions of other material its place approved by the Civil Engineer/Architect/Engineer-In-Charge.
 - a. The removal and/or re-execution of any works executed by the contractor.
 - b. The dismissal from the works or any persons employed by the contractor whose presence is undesirable or detrimental in the opinion of the employer.
 - c. The opening up for inspection of any work covered up.
 - d. The amending and making good of any defect.

4. The Contractor shall forthwith comply with duly execute any work comprised in such Engineer-In-Charge/Architect/Civil Engineers instructions always that verbal instructions, directions and explanations given to the Contractor or his representative upon the works by the Engineer-In-Charge/Architect/Civil Engineer shall, if involving variation, be confirmed in writing to the Contractor within seven day's by the Architect/Civil Engineer.
5. If compliance with the Engineer-In-Charge/Architect/Civil Engineers' instructions as aforesaid involves work and/or expense and/or less beyond that contemplated by the Contractor then unless the same were issued owing to some breach of this contract by the Contractor the employer shall pay to the Contractor on Engineer-In-Charge/Architect/Civil Engineer's Certificate the price of the said work (as an extra to be valued as hereinafter provided) and/or expense and/or less.
6. In case any change or alternation in the work shall result in a decrease of the work to be performed or materials furnished, no allowance shall be made to the Contractor for loss of anticipated profits.
7. Acceptance by the Contractor of the final payment on this contract shall constitute a waiver of all claims against the Purchaser.
8. Any conditional tender will not be entertained and will be rejected.
9. Bidders are advised to visit the site to study the actual working conditions, before submitting their offers. Bidders shall go through the Drawings, Item description, Specifications, Units and Tender conditions in details, in case of any discrepancy observed/ any item overlooked keeping in mind standard requirements/ construction practice clarification should be asked before quoting the rates.
10. Successful Bidder is required to insure the whole work and their personnel under Workman Compensation Act against any accident, minor and major injuries arising out of the work situation. Bhavnagar Municipal Corporation will not pay any charges against the same.
11. The successful bidder shall have to start the work period of 15 days from the date of Letter of Intent. In case of non-compliance with the above condition, the action may be taken.
12. The contract shall be item rate contract. The rate quoted is inclusive of all labour and material required for the job.
13. Bidders are expected to quote competitive and workable rates.
14. The Scope of work under this tender is "providing and laying / fixing "the materials. In the event of missing of above phrase in the description of schedule of quantities will not mean that materials will be supplied by Bhavnagar Municipal Corporation and Tenderer has to deploy only laborers for completing the work.
15. Quantity mentioned in the schedule of quantities against each item is only for guidance to quote the rate and no claim will be entertained on either increase or decrease in the quantity.
16. The rate of particular item appearing in more than one schedule shall be the same. If the tenderer quotes different rates for an item appearing in more than one schedule, the rate lowest amongst the quoted rates shall be considered/applicable for payment of that item.
17. The contractor will have to accept the minimum of the Unit rates (for rate only items) amongst the quoted by the prequalified bidders, whose price bids are considered.
18. The Bhavnagar Municipal Corporation reserves the right of altering the Drawings and nature of work by adding to or omitting any items of work or having portions of the same carried out without prejudice to this contract.

19. The Successful Bidder have to make his own arrangement for water and electricity for construction work and other purposes. Water is to be supplied to contractor through water meter on payable basis at single point. The water charges will be recovered at the rate of Rs.15/- per KL. Further distribution and uninterrupted water supply to be managed by contractor.
20. No escalation in price/ rate will be allowed on any ground. Even if there is a delay in completion of the work due to client, then extension in time limit may be granted with an explicit understanding that no price escalation will be paid. However, in any case no claim is entitled for idle machinery and man power.
21. Extra item/ Additional work would be executed on permission, such items executed only special expertise needed and major financial implication not involved. If there may be any extra work, contractor has to bring it to the notice of Bhavnagar Municipal Corporation well in advance with expected cost of execution. In absence of detailed specifications, the work should be carried out based on either relevant IS code and / or with fair engineering practice.
22. No mobilization advance shall be given by Bhavnagar Municipal Corporation for this contract.
23. All the rates quoted by the Tenderer must be inclusive of all required materials, labors, taxes and duties applicable like , Royalty, Octroi , transportation, sales tax, labour cess, Professional Tax, turnover tax, etc excluding GST and including loading, unloading at site.
24. Rates quoted shall be inclusive of all current taxes/duties, sales tax, VAT and Cess, Royalty and levies and all other charges and rates to complete the work out excluding the GST. No separate charges will be paid on this account. If the rates of current taxes, sales tax, VAT, etc. undergo any revision during contractual completion date. If any variation take place after contractual date of completion, the same shall not be allowed even if delayed are accepted by bidder.

Note : Only GST will be paid extra with RA bills as per prevailing norms.

No statutory variation shall be admitted, if current taxes, sales tax/ duties, sales tax, Cess, labour cess, VAT, etc. become payable because of exceeding the prescribed limit for turnover of tenderers after the date of offer.

Note: Above clause will hold good and govern the contract

In case, if similar condition/ clause elsewhere in tender document complied conflict with the clause, the clause mentioned in this paragraph will prevail and govern the contract.

25. Successful Tenderer will have to submit three copies of detailed bar chart to ensure timely completion of the work.
26. Successful Tenderer/contractor shall keep necessary records, maintain required documentations, submit as built drawings, submit product/service guarantee provided by vendors/ suppliers as deemed required by Engineer- in- charge.
27. Project durations mentioned in this contract and the quality of work are the most important parameters under this contract, contractor is expected to follow the best practice to achieve both parameters. This has to be followed for all three buildings as well as the complete premise as the complete work for the complex is to be carried out simultaneously. Contractor is also expected to follow stringently all environment, health, safety and housekeeping rules, regulations and guidelines as per statutory requirements along with the requirements mentioned in the approved project Environment, Health and Safety (EHS) plan.

28. Contractor shall follow up and coordinate with Client for statutory requirements like Power requirements and BU permission.
29. Commissioning approvals like Fire, Lift and DG etc. To be taken by contractor.
30. RA bill must be submitted along with the names of laborers employed for the work, salaries/ payment made to them, PF code no., amount of P.F. deducted from the salary made to the labours and employer's contribution amount deposited in RPFC office till the previous month duly certified by project office, failing which no payment will be made for the RA bill submitted by the Contractor.
31. The contractor will have to submit 'NO DEMAND CERTIFICATE' along with the final bill of the work, as per the Performa given.
32. Successful Tenderer is supposed to enter into an agreement with the corporation on an appropriate stamp paper (to be provided by the contractor) after accepting the Letter of Intent
33. The quoted rates should hold good for working as per drawings related from time to time.
34. In overall interest of work and for better coordination Engineers in charge may ask the contractor to stop the work for time being for which no compensation will be paid.
35. Contractor shall abide by the provision of labour laws, contract labour regulations and Abolition act (contract Act-37 of 1970) pertaining to the employment of the labour and shall get yourself register with regional provident fund commissioner and inform Bhavnagar Municipal Corporation about the registration number by submitting the copy of the number allotted by RPFC. The contractor shall have to submit the copy of labour license from the competent authority for the subject work.
36. Contractor shall be responsible for and shall pay any compensation to their workman payable under the workman's compensation Act, 1923 (VII of 1923) for injuries caused to the workman. If such compensation is paid by Bhavnagar Municipal Corporation as principal under sub-section (1) of section 12 of the said act on behalf of the contractor, it shall be recovered by Bhavnagar Municipal Corporation from the contractor under section (2) of the said section. Contractor shall pay such amount of compensation on demand, failing which the same will be recovered from the running bills.
37. Contractor has to submit month wise labour payment record along with RA bill, failing which no payment will be made for the respective RA bill.
38. Roads, passages, approach at work site should be kept clean all the time. Material/Machineries should be stacked/ kept in proper manner so it should not obstruct day to day vehicular traffic.
39. Successful bidder has to produce bill of the materials used in the execution is asked for by the client or consultant.
40. Successful Bidder have to erect the board, mentioning work details at work site at his own cost.
41. Contractor has to bring and install fully automatic concrete batching plant of 15Cmt/Hr minimum capacity as per space provided within the campus or in surrounding area as per agreement with client as per bylaws requirements. Concrete should not be used for other commercial purpose from this plant.
42. Bhavnagar Municipal Corporation may issue copy of work order to Geology and mining department for their information and further necessary action with regarding to Royalty clearance certificate. However, contractor will have to submit "Royalty Clearance Certificate" along with the submission of final bill issued from the District Geology and Mining department.

43. Successful Bidder shall maintain following register and (or) records at site and provide the same to the Engineer in charge and (or) Client's Representative as and when required:

1	Muster Roll
2	Labour Register
3	Hinderance Register
4	Material Register (Material Account Statement)
5	Stock Register
6	Material Testing Register
7	Assets Register
8	Daily Work Register
9	Welding Roster
10	Site Instruction Book
11	Daily Progress Report
12	Any other documents required by Engineer In Charge or Client's Representative

3. Assignment and Sub-letting:

The whole of the works included in the Contract shall be executed by the contractor and the Contractor shall not directly or indirectly transfer, assign or underlet the Contract or any part/share there of or interest there in without the written consent of the employer/Civil Engineers, and no such action shall relieve the Contractor from the full entire responsibility of the Contract or from active superintendence or the works during their progress.

1. Ascertainment of Extra Item Rates:

Extra items, as and when necessary, shall be executed only after asked to do so, and the rates for same shall be derived from similar item of the existing contract and if it not possible then from prevailing market rates considering total 15 % towards overheads, supervision, profit etc.

- a. The net rates or prices in original tender shall determine the valuation of the extra works where such extra work is of similar character and executed under similar conditions as the work priced therein.
- b. Where the extra works are not of similar character and/or executed under similar conditions as aforesaid or where the omissions vary the conditions under which any remaining items of works are carried out or if the amount of any omission or addition relating to the amount of the Contract works or any part thereof shall be such that in the opinion of the Engineer-In-Charge/Architect/Civil Engineers the net rate price contained in the Priced Schedule of Quantities or Tender or for any item to the works involves loss or expense beyond the reasonably contemplated by the Contractor is by reason of such omission or addition rendered unreasonable or in applicable, the Engineer-In-Charge/Architect/Civil Engineers shall fix such other rate of price as in the circumstances he shall think reasonable and proper.
- c. Where extra work cannot be properly measured or valued, the Contractor shall be allowed day work prices as the net rates stated in the Tender or

the Prices Schedule of Quantities or, of not so stated, then in accordance with the local day work rates and wages for the district, provided that in the either case vouchers specifying the daily time (and if required by the Engineer-In-Charge/Architect/Civil Engineers, the workmen's names and material employed by delivered for verification to the Engineer-In-Charge/Architect/Civil Engineers or his representative at or before the end of the week following that in which the work has been executed).

- d. The measurement and valuation in respect of the Contract shall be completed within 1 month of completion of the Contract works.

2. Certificate of Virtual Completion:

The works shall not be considered as completed until the Engineer-In-Charge/Architect/Civil Engineers has certified in writing that they have been virtually completed and the Defects Liability Period shall commence from the date of such Certificate.

3. Contractor to abide by all legal provisions and to co-operate with other contractors working at site:

- (a) It is agreed that the Contractor will insure at his cost, in full conformity with appropriate Indian Law and Regulations such as Payment of wages Act, workmen's Compensation Act, Industrial Dispute Act. Third Party Risk Insurance etc, and in particular that the Contractor will alone be liable for any retirement or lay off compensation or any compensation Payable to his workman under any law of the land.
- (b) It is agreed that while executing this work the Contractor shall have to abide by the provisions of all labour laws like Factories Act, Payment of wages Act, Contractor, Labour and Regulations Act, workmen's Compensation Act, Provident Fund Act; Mines applicable and related to labour inforce from time to time. Any liability arising out of breach thereof shall be chargeable to the contractor.
- (c) The contractor shall give all the facilities and cooperate with the Contractor working on the site i.e. structural Contractor, Plumber, Tiler, Electrician, Machinery erector etc. All contractors working the job are expected to and will be required to co-operate with each other for the speedy progress and due completion for the work. The decision for the employer on any point of dispute between the various Contractors shall be final and binding.
- (d) It will be contractor's sole responsibility to perform duly or arrange for due performance of all works incidental to or connected with the job on site.
- (e) The contractor will abode by the Provision of labour laws, contract Labour Regulations and Abolition Act (Control Act-37 of 1970) pertaining to the employment of the labour and shall get themselves registered with the Regional Provident Fund Commissioner and inform the Bhavnagar Municipal Corporation about the registration number by submitting the copy of the number allotted to you by R.P.F.C.
- (f) The contractor shall be responsible for and shall pay any compensation to their workmen payable under the Workman's Compensation Act, 1923

(VII of 1923) for injuries, cause to Workman. If such compensation is paid by Bhavnagar Municipal Corporation as principal under Sub-Section (1) of Section 12 of the said act on behalf of the Contractor. It shall be recovered by Bhavnagar Municipal Corporation from the contractor under Section (2) of the said Section. The contractor shall pay such amount of compensation on demand, failing which same will be recovered from your running bills.

7. Insurance:

7.1. GENERAL INSURANCE

- (a) Where the Purchaser/employer/owner/client has not arranged for a storage-cum-erection insurance cover for the entire project at his cost, the Contractor shall make suitable insurance arrangements to cover the plant/equipment to be supplied and erected under this contract. Suitable storage-cum-erection insurance will insure the works against destruction, loss of theft, or damage. In transit during erection or otherwise, or by fire, flood under exposure to the weather or through riot, civil commotion, Earthquake, Terrorism for the full value thereof until take over. Purchaser will be coinsured without any additional cost to the Purchaser. In case the Purchaser will be coinsured without any additional cost to the Purchaser. In case the Purchaser has arranged for a storage-cum-erection insurance cover, the contractor will be coinsured without any additional cost.
- (b) Contractor shall provide and maintain until the works under the contract are completed and accepted by the Purchaser, insurance coverage as specified hereunder.
 - (i) Workmen's Compensation and road Vehicle Third Party Insurance.
 - (ii) Third Party Liability and Property Damage Insurance.

Such insurance shall be affected with an Indian insurer and in terms acceptable to purchaser. Contractor when requested by Purchaser shall produce receipts for current premium there under. If the Contractor fails to effects such insurance, Purchaser may effect and keep such insurance and deduct the cost thereof from moneys due to contractor or recover same as a debit from the Contractor.

The contractor shall provide and maintain the above Insurance Policies until the supply and erection works under the contract are completed and accepted by the Bhavnagar Municipal Corporation and also you will be coinsured with Bhavnagar Municipal Corporation without any additional cost as per the following in the insurance policies.

"Name & Address of Insured: Bhavnagar municipal Corporation, Bhavnagar as principal – M/s. (Contractor's name & address) as Contractor and all their Sub-contractors."

Site of Work:

- (c) Contractor and his sub-contractor shall not commence any work at site until Insurance as specified hereunder has been affected.

7.2 TRANSIT INSURANCE

The contractor may arrange the transit Insurance for the supply of materials/ equipments to be supplied at site against all transit risks such as damages, loss, breakage, theft, fire etc. Bhavnagar Municipal Corporation will not pay anything on this account.

Where the Bhavnagar Municipal Corporation has not arranged for Storage-cum-erection Insurance Cover for the entire project at your cost, you shall make suitable Insurance arrangement to cover the plant / equipment to be supplied and erected under this Contract. Suitable Store-Cum-erection Insurance will insure the work against destruction, loss by theft or damage in transit during erection or otherwise by fire, flood, earthquake, exposure to the weather or through note Civil Commotion, for the full value thereof until take over, you will be Co-insured without any additional cost thereof to the Bhavnagar Municipal Corporation.

Contractor shall provide and maintain until the works under the Contract are completed and accepted by the Bhavnagar Municipal Corporation, Insurance coverage as specified hereunder:-

- a. Workman's Compensation and road vehicle third party insurance.
- b. Third party Liabilities and Property Damage Insurance for an amount specified by the Bhavnagar Municipal Corporation.

Contractor shall not commence any work at site until insurance as specified has been effected in place.

(8) **SECURITY DEPOSIT & RETENTION MONEY:**

The successful tenderer shall pay Security Deposit @5% of the Contract Value by Demand Draft or by Bank Guarantee of Nationalized Bank within 15 days from the date of issue of order as per attached format valid upto 63 (Sixty three) months. Other deposit @ 2.5 % of contract Value in the form of FDR(Except SBI). If you fail to pay Security Deposit within 15 days from the date of order, order will be deemed to be cancelled and EMD paid by you shall be forfeited.

The Security Deposit and Retention Money shall be forfeited if the work is abandoned before completion.

The Security Deposit shall be refunded within a period of three months reckoned from the expiry of the defect liability period of 60 (Sixty) months starting from the date of completion of entire work on demand by you.

Retention money deposit will be deducted from R.A. Bills @ 2.5 % of value of completed work amount. This 2.5 % will be released after one month from virtual completion of the work and balance 7.5 % deposit will be released after defect liability period.

Security Deposit and Retention Money Deposit shall not bear any interest.

- (9) The rates quoted are inclusive of all taxes, like service tax sale tax etc. duties, octroi, levies as applicable. If rate of excise duty and sales tax on items offered by you undergo any revisions during contractual period completion day, the same shall be allowed as

STATUTORY VARIATION. However if any variation takes place after contractual date of completion of work, the same shall not be allowed, even if delayed works are accepted by purchasers.

No STATUTORY VARIATION shall be admitted if the excise duty becomes payable because of exceeding the prescribed limit for turn over of the tenderer after the date of offer.

- (10) The contractor shall not change the constitution of your firm during the currency of the Contract period.
- (11) **Progress Report:**
The contractor shall submit to the employer every Monday before 12 noon weekly progress charts and reports in quadruplicate in such forms and giving such information as may be required by the employer and also to formulate further programme of work as may be desired to state the number of labour and aftisan employed on the works and the approximate quantity of important items of work executed and materials collected on site.
- (12) **Contractors' Engineer for Supervision of Works:**
The contractor will have to employ competent qualified engineers and supervisors for the job as may be directed by the employer. Contractor shall furnish the details of qualification & engineer assigned to the work, including experience in supervising the work.

Sr. no	Description	Qualification	Minimum requirements	
			Number	Experience in building works
1	2	3	4	5
1	Project Manager	B E Civil	1	10 year experience (5 years on building construction)
2	Site Engineer	B E Civil	1	10 year experience (5 years on building construction)
3	Material & quality control engineer	B E Civil / Diploma Civil	1	2 years experience
				5 years experience
5	Electrical Engineer	B E Civil / Diploma Civil	1	5 years Experience

The Contractor will have to submit list of persons deputed by him for the Contract indicating their name, age, address along with P.F. Nos.

The contractor shall furnish adequate, courteous and competent labour, supervisors and engineers of all categories for the duration of the work to maintain progress in accordance with the requirements of the scheduled completion.

Contractor shall be completely responsible for the satisfactory completion of work notwithstanding that they may have been assisted by the purchaser/owner and/or the consulting engineers in doing so.

The contractor shall immediately remove from work whenever requested to do so by the purchaser and/or the consulting engineers, any person considered by the purchaser and/or the consulting engineers to be incompetent, to be disorderly or for any other reason unsatisfactory or undesirable to the purchaser and/or the consulting engineer and such person shall not again be employed on the work without the written consent of the purchaser.

None of the contractor's superintendents; supervisors or engineers may be withdrawn from the work without due notice being given to the purchaser and/or the engineers, further, no such withdrawals shall be made if it will jeopardize successful completion of the work.

The contractor shall take all precautions necessary and shall be responsible for the safety of the work to be performed by him and shall furnish and maintain all lights, fencing, guards, signs, temporary roads and passages, or other protections necessary for the purpose. In default thereof the purchaser may provide such facilities as he may deem necessary and charge the cost thereof to the contractor. The contractor shall be responsible for any loss and damage to his personnel, material, tools or other articles used or held for use in connection with such work. Such work shall be carried on to completion without damage to any work or property of the purchaser or of others.

The purchaser reserves the right to perform or have performed in and about the works during the time when the contractor is performing his work hereunder, such other work as the purchaser desires and the contractor shall make all reasonable effort to perform his work there under in such manner as will enable such other work to be performed without hindrance from the contractor and shall make no claim for damage against the purchaser arising out of such other work or interference there from. The contractor shall work in harmony with such other contractors regardless of race, religion, colour or national origin and any dispute between contractors shall be arbitrated by the purchaser.

(13) Running Bills:

The payment of R.A. Bill shall be made on the Presentation of the bill for the work done for the value not less than Rs. 50,00,000/-(Fifty lakhs) excluding final bill after the same is duly checked and verified by site engineer. Payment will be made within 30 days after deducting of following and after receipt of documents/R.A. Bills.

- a. Income-tax and T.D.S. on works contract as per Provision of Income Tax Act and Sales Tax Act.
- b. Security Deposit/Retention Money Deposit.
- c. Cost of any Services/Material provided by the Bhavnagar Municipal Corporation.
- d. Other deduction if any like workers welfare cess, etc..

No certificate given or payment made shall be considered as conclusive evidence of the satisfactory performance of the work covered by this contract, either wholly or in-part, nor shall any certificate or payment be construed as acceptance of defective work or

improper material or as reliving the contractor from his responsibilities under the contract.

(14) **Jurisdiction:**

Any dispute arising out of the Contract shall be subject to the jurisdiction of the Bhavnagar Court only.

- (15) Contractor shall be responsible for and shall pay any compensation to your workman payable under the Workman's Compensation Act, 1923 (VII of 1923) for injuries, cause to the Workman. If such compensation is paid by Bhavnagar Municipal Corporation as principal under Sub-Section (1) of Section 12 of the said act on behalf of the Contractor. It shall be recovered by Bhavnagar Municipal Corporation from you under Section (2) of the said Section. You shall pay such amount of Compensation on demand, failing which same will be recovered from your running Bills.

- (16) All terms and conditions as mentioned above together with the general conditions and specification of materials and technical specifications mentioned in tender documents shall be read and considered as a part of the Contract/Work Order.

(17) **LOCAL FACILITIES / LOCAL CONDITIONS:**

- a. Electric power required for construction purpose will be on the scope of contractor. If you need uninterrupted power supply, you have to arrange for standby DG Set at your own cost for the duration of such requirement.
- b. For required quantity of Water for construction, Bhavnagar Municipal Corporation shall provide with adequate water connections at any one point of the site but contractor shall have to make necessary arrangements for storage as well as pumping of the same.
- c. Water required for any other purpose that is at contractors own colony including labour camp will have to be arranged by contractor at his cost.
- d. The space required for construction of temporary structure like office, storage sheds and other utilities etc. will be provided to you for your own purpose only. The space allotted shall be within site. No space will be provided by Bhavnagar Municipal Corporation for your labour and facilities for labour housing shall be your sole responsibility. On completion of entire work, the site so allotted shall be your sole responsibility. On completion of entire work, the site so allotted shall be cleared of all encumbrances and handed over to Bhavnagar Municipal Corporation after completion of the work.
- e. You will be responsible for the Safe Custody of materials purchased and stored by you for work.

- (18) All construction materials shall be got approved from the Engineer-In-Charge/ Consultants/Owners. Materials so approved and/or having ISI mark shall only be utilized for the work.

- (19) The contractor shall maintain registers as mentioned below and other registers as instructed by the consultant/Engineer – In – Charge from time to time and these shall be made available to the consultants/ Engineer – In – Charge for verification whenever required by the consultants / Engineer – In – Charge.

- (a) Cement, reinforcing steel, structural steel and other materials.
- (b) Material testing (bricks, cement, concrete, steels etc.)

- (c) Joint measurements of work.
- (d) Ground levels, contours etc.
- (e) Record of earth and other material brought to site / taken out of site.
- (f) Day to day labour employment.

(20) **WORKS TO BE CARRIED OUT:**

The contractor shall, except where otherwise stated, include all labour, materials, tools, equipment and transport which may be required in preparation for and for the full and entire execution and completion of the works as shown on drawings, and as described in the Priced Bills of Quantities and Specifications.

The drawings, Specifications and Priced Bills of Quantities shall be deemed to have been prepared in accordance with good practice and recognized principles and the descriptions given therein shall be held to include waste on material carriage, carrying in return of empties, hoisting, setting, fitting and fixing in position and all other labours necessary in and for the full and entire execution and completion as aforesaid, to the entire satisfaction of the Owner / Architect / Consulting Engineer. In the event of any dispute as to what was necessary for the entire execution and completion of the works as aforesaid, the opinion of the Owner / Architect / Consulting Engineer shall be final and binding to both the Contractor and Owners.

Any error in description or in quantity in the Priced Bills of Quantities, or any omission there from shall not vitiate the contract or release the contractor from the execution of the whole or any part of the works comprised therein according to the drawings and Specifications or from any obligations under the contract.

In the case of discrepancy between the Priced Bills of Quantities, the Specifications and / or the drawings, the Owner/Architect/Consulting Engineer shall be the sole deciding authority as to which shall prevail, and their decision shall be final, binding and conclusive.

The contractor shall be deemed to have carefully examined and to have full knowledge of the Special Conditions, General Conditions, Specifications, Notes on Bill of Quantities, Priced Bills of Quantities, Drawings and other documents forming part of the contract and also to have satisfied himself as to the nature and character of the works to be executed and of the site, local facilities of access and all other relevant matters and details to affect the execution and completion of the works in accordance with the terms and conditions of the contract. No extra charges consequent on any misunderstanding or otherwise will be allowed.

If certain items are to be carried out but are not included in the Specifications, the same should be executed according to the Specifications of Bureau of Indian.

Standards / Good Engineering Practice / As Directed by Engineer – In – Charge/ Architect.

(21) **COVERING-IN WORK (FOUNDATIONS):**

The contractor shall give reasonable notice in writing to the Owner/Architect/Consulting Engineer whenever any work is to be permanently covered or concealed, whether by earth or other means and in default of so doing, shall, if required by the Owner/Architect/Consulting Engineer, uncover such work at his own expense.

Should the contractor refuse or neglect to comply with this condition, the Architect/Consulting Engineer may employ other workmen to open up the same and the cost thereof as certified by the Owner/Architect/Consulting Engineer, whose certificate shall be final, binding and conclusive on all parties to the Contract, shall be borne by the Contractor. Notwithstanding all above at any time prior to the expiry of the maintenance period, the Contractor shall, if and when required by the Owner/Consulting Engineer make openings down to any part of the works to allow for its full examination and if the said work is found in any way defective, all expenses of such examinations and making good the defective work shall be borne by the Contractor.

Extra soil required for filling etc. shall be obtained only from those places for which the Owner/Architect/Consulting Engineer has given prior written approval.

(22) **TOOLS, PLANTS & EQUIPMENT:**

The Contractor shall at his own expense supply, bring to the site, use and maintain all tools, plant and equipments required for the execution of the contract. All tools, plant and equipment brought to the site shall not be removed on the site without the prior written approval of the Owner/Architect/Consulting Engineer. But whenever the works are finally completed or the contract is terminated for reasons other than the default of the contractor, the contractor shall forthwith remove from the site all tools, plants and equipment (other than such as may have been provided by the employer) at his own expense.

Tools & Tackles brought by you must be recorded with our Personnel Department / Security Department at the time of Entry and shall be taken back after completion of the work only with obtaining permission from Owner/Purchaser.

(23) **STORES AND MATERIALS – GENERAL:**

The Contractor shall, at his own expense, supply all stores and materials required for the Contract.

All stores and materials to be supplied by the Contractor shall be the best of the respective kind described in the Specifications and Priced Bills of Quantities and shall conform to the specifications in each and every respect. The contractor, if so required by the Owner/Architect/Consulting Engineer shall furnish the Owner/Architect/Consulting Engineer with proof to the satisfaction that the stores and materials proposed to be used or already incorporated in the works, conform to the Specifications.

The Contractor shall at his own expense and without delay, supply samples of stores and materials proposed to be used in the execution of the work as may be required by the Owner/Architect/Consulting Engineer for their approval. The Owner/Architect/Consulting Engineer may reject all stores and materials, which in their opinion do not correspond both in quality and character with the approved samples.

If for some reasons, the contractor cannot procure and supply the stores and materials as described in the Specifications and Priced Bills of Quantities, the same shall be substituted by stores and materials as approved and specified by the Owner/Architect/Consulting Engineer, which will be binding to all the parties concerned.

(24) **STORES AND MATERIALS – ON SITE:**

(i) Stores and materials required for the works are to be kept/stored by the contractor only at the places to be indicated by the Owner/Architect/Consultant Engineer.

(ii) The Owner/Architect/Consulting Engineer shall have power to inspect and

examine at any time any stores and materials intended to be used in or on the works, either on the site or at any factory or workshop or other places where such stores and materials are being constructed or manufactured or any place where the same are lying or from which they are being obtained and the Contractor shall give such facilities as may be required to be given for such inspection and examination.

- (iii) The contractor shall arrange to carry out various tests on the building materials as required and specified on a regular basis. The contractor shall also maintain proper records and registers for such tests and test results and keep the Owner/Architect/Consulting Engineer informed of the same. The records and registers for materials, tests and test reports shall be available at site for inspection by the Owner/Architect/Consulting Engineer. The costs of sampling, arranging for testing, testing and maintenance of records etc. shall be borne by the contractor.
 - (iv) The Owner/Architect/Consulting Engineer shall be entitled to have tests carried out/conducted of any stores or materials supplied by the contractor who shall provide at his own expense all facilities which the Owner/Architect/Consulting Engineer may require for this purpose. If at the discretion of the Owner/Architect/Consulting Engineer an independent expert is employed to make any such tests, his charges shall be borne by the contractor.
 - (v) Should the Owner/Architect/Consulting Engineer consider at any time during the construction or reconstruction or prior to the expiration of a period of twelve calendar months after the works have been handed over to the employer (hereinafter referred to as the maintenance period) that the stores or materials provided by the contractor are unsound, or of a quality inferior to that contracted or not meeting the standards of the Bureau of Indian Standards or otherwise not in accordance with the contract (in respect whereof the decision of the Owner/Architect/Consulting Engineer shall be final binding and conclusive) notwithstanding that the stores or materials may have been inadvertently passed, certified, and paid for, the contractor shall forthwith remove the stores or materials and provide other proper and suitable stores or materials at his own expense and in the event of his failing to do so within a period to be specified by the Owner/Architect/Consulting Engineer, the Owner/Architect/Consulting Engineer may get them removed and replaced by other agency at the risk and expense of the contractor. The liability of the contractor under this condition shall not extend beyond the maintenance period aforesaid, except as regards stores or materials for which the Owner/Architect/Consulting Engineer shall have provisionally given notice to the contractor to replace.
- (25) **REMOVING STORES AND MATERIALS FROM SITE:**
All stores and materials brought to the site shall not be removed off the site without the prior written approval of the Owner/Architect/Consulting Engineer. But whenever the works are finally completed, the Contractor shall at his own expense forthwith remove from site all surplus stores and materials originally supplied by him and upon such removal, the same shall (again) vest in the contractor. All stores and materials issued to the contractor by the employer for incorporation or for fixing in the works and which making an allowance for reasonable wear and tear and/or waste, have not on completion of the works been so incorporated, shall be returned by the contractor or fixed at his own expense to the place of issue, after weighing/counting/measuring the same as directed by the Engineer-in-Charge/Architect.

(26) **EXECUTION OF WORK:**

The Contractor shall be entirely responsible for the due execution of the contract in all respect in accordance with the Tender Documents including drawings, Specifications, Bills of Quantities and all other terms and conditions of the contract. The works shall be executed in a workman like manner and to the satisfaction in all respects of the Owner/Architect/Consulting Engineer who shall communicate or confirm his instructions to the Contractor in respect of the execution of the work in a "Work Site Order Book" to be maintained at the site office of the Owner/Architect/Consulting Engineer (or in Contractor's site Office) and the Contractor shall visit this office daily and shall confirm receipt of such instructions etc. by signing the relevant entries in this book. Such entries shall be deemed as 'Orders or Notices' in writing within the intent and meaning of these conditions.

If, in the judgment of the Purchaser, it becomes necessary at anytime to accelerate the work the Contractor when ordered and directed by the Purchaser, shall augment the labour force at any particular points and accelerate such portion of his work, as may be required to enable others to hasten and property engage and on their work, all as directed by the Purchaser.

If, as a result of the work schedule agreed by the Contractor, he is required to order his men to perform overtime, the Purchaser shall not liable to pay any additional compensation over the contract price to the Contractor.

(27) **Suspension for Convenience:**

The Purchaser for his convenience may suspend this Contract in whole or in part at any time by written or by e-mail notice to the Contractor. Such notice shall state the extent and the effective date of such suspension, and on the effective date thereof Contractor shall promptly suspend such work to the extent specified and during the period of such suspension shall properly care for and protect all work and materials, housing and equipment on hand for construction under this Contract. Contractor also shall promptly supply the Purchaser copies of all outstanding orders for materials equipment and services, and shall take such action relative to such orders as may be directed by the Purchaser. If the performance of the works thus suspended. Contractor shall be entitled to the reimbursed for all additional expenses incurred by reason of such suspension as agreed upon by the Contractor and the Purchaser.

(28) **ATTENDING UPON(COORDINATION OF SITE WORKS):**

The Contractor shall be responsible for the co-ordination and scheduling of his works with the works of the Contractors or agencies undertaking the following items of work:

- (a) Construction of civil works,
 - (b) Sanitary, plumbing and water supply,
 - (c) External drainage,
 - (d) Pavement and roads,
 - (e) Compound wall, fencing etc.,
 - (f) Water proofing,
 - (g) Electrical Works,
 - (h) Lift, machinery, piping and other erection works,
 - (i) Telephone conducting work, and any other works not forming part of this contract.
- The contractor shall also be responsible to attend upon each trade and sub-contractor(s) nominated or otherwise and rectify and/or repair the general works done by him which may have been disturbed by the process of various trades and sub-contractor's work to the satisfaction of the Owner/Architect/Consulting Engineer and leave the buildings/works clean, tidy, neat and ready for the immediate occupation/use, all at his own cost.

(29) **CONTRACTOR'S SUPERVISION:**

The contractor shall either himself supervise the execution of the contract or shall appoint a competent agent approved by the Owner/Architect/Consulting Engineer to act in his stead. If the contractor fails to appoint a suitable agent on being ordered to do so, the Owner/Architect/Consulting Engineer shall have full powers to suspend the execution of the works until such date as a suitable agent is appointed and the Contractor shall be held responsible for the delay so caused to the works.

Orders given to the contractor's agent shall be considered to have the same force as if they had been given to the Contractor himself.

The contractor or his agent shall be in attendance at the site during all working hours, and shall superintend the execution of the works with each additional assistance in each trade, as the Owner/Architect/Consulting Engineer may consider necessary.

The contractor or his accredited agents shall attend, when required and without asking any charge for doing so, either the office (Head Office and/or field office) of the Architect/Consulting Engineer or the works to receive instructions.

The Owner/Architect/Consulting Engineer shall have full powers, and without giving any reason, to require the Contractor immediately to cease to employ in connection with this contract any agent, servant or employee whose continued employment in the works is, in his opinion, undesirable.

Notwithstanding the supervision by the Owner/Architect/Consulting Engineer during the execution of the work, the contractor shall be fully responsible for the supervision of the work and shall not be entitled to plead any default on the part of the Owner/Architect/Consulting Engineer for supervising the work.

(30) **SETTING OUT THE WORKS:**

The Owner/Architect/Consulting Engineer shall supply dimensioned drawings, levels and other information necessary to enable the contractor to set out the works. The Contractor shall set up the works and shall provide and fix all setting out apparatus required and shall solely be responsible for the correctness and maintenance of the setting out and the levels and other information furnished by him.

(31) **PROPERTY FOUND DURING EXCAVATION:**

Materials of any kind obtained from excavation on the site shall remain the property of the employer and shall be disposed of as the Owner/Architect/Consulting Engineer directs. All usable stuff obtained from the excavations, shall be carefully stacked at site as directed by the Owner/Architect/Consulting Engineer without any extra charge.

(32) **LAYING OF FOUNDATIONS:**

The contractor shall not lay any foundations until the excavation for the same has been examined and approved in writing by the Owner/Architect/Consulting Engineer.

(33) **SAFETY CODE:**

(a) Excavation and Trenching:

All trenches, 1.5 meters or more in depth, shall at all times be supplied with at least one ladder for each 30 meter in length or fraction thereof. Ladder shall be extended from bottom of trench to at least one meter above surface of the ground. Sides of a trench shall be stepped back or as and where necessary irrespective of depth or depths, be given suitable slope, or securely held by timber bracing, so as to avoid the danger of sides collapsing, at the contractors own risk and cost. Excavated material shall not be placed within 1.5 meters of edge of trench or within a distance equal to half of depth of trench, whichever is more and in no case the same will be placed in areas to be excavated. All surplus

excavated material shall be disposed off at the required place as directed by the Architect. Cutting shall be done from top to bottom; under no circumstances shall undermining or undercutting be done.

- (b) Suitable scaffolds shall be provided for workmen for all work which cannot safely be done from the ground, or from solid construction, except for such short period works as can be done safely from ladders. When ladder is used, an extra mazdoor (labourer) shall be engaged for holding the ladder and if the ladder is used for carrying materials as well, suitable footholds and handholds should be provided and the ladder shall be given an inclination not steeper than 1 to 4 (1 horizontal and 4 vertical).
- (c) Scaffolding or staging more than 3.25 meters above or below the ground floor, swung or suspended from an overhead support or with stationery support, shall have a guard rail properly attached, bolted, braced and otherwise secured at least 1 meter high above the floor or platform of such scaffolding or staging and extending along the entire length of the outer/external side and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.
- (d) Working platform, gangways and stairways shall be so constructed that they do not sag unduly or unequally, and if height of a platform or gangway or stair ways is more than 3.25 meters above or below ground level (or floor level), it shall be closely bordered/guarded have adequate width and be suitably fenced, as described in (c) above.
- (e) Every opening in floor of a building or in a working platform shall be provided with suitable means to prevent fall of persons or materials by providing suitable fencing or railing with a minimum height of one meter.
- (f) Safe means of access shall be provided to all working platforms and other working places. Every ladder shall be securely fixed. No portable single ladder shall be over 9 meters in length. Width between side rails in a ladder shall in no case be less than 300mm. for ladder up to and including 3 meters in length. For longer ladders this width shall be increased at least 6 mm for each additional 300mm. of length. Uniform step spacing shall not exceed 300mm.
- (g) All scaffolds, ladders and safety devices mentioned or described herein shall be maintained in a safe condition and no scaffold, ladder or equipment shall be altered or removed while it is in use.
- (h) No materials on any of the sites shall be so stacked or placed as to cause danger or inconvenience to any person of the public. The contractor shall provide all necessary fencing and lights to protect public from accidents and shall be bound to bear 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 costs which may be awarded in any such action or proceedings to any such person or which may with the consent of the contractor be paid to compromise any claim by any such person.
- (i) Adequate precautions shall be taken to prevent danger from electrical equipment.
- (j) Demolition:
Before any demolition work is commenced and also during the process 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 source of danger or a cable or apparatus used by 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 a building shall be so overloaded with debris or materials as to render it unsafe.

(K) Safety and Protection :

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

- (j) Workers employed on mixing asphaltic materials, cement and lime mortars/concrete shall be provided with protective footwear and protective hand gloves.
- (ii) Those engaged in welding works shall be provided with welders' protective eye-shields.
- (iii) Those engaged in handling any material, which is injurious to eyes, should be provided with protective goggles.
- (iv) Stone breakers shall be provided with protective goggles and protective clothes and seated at sufficiently safe intervals.
- (v) When workers are employed in sewers and manholes, which are in use, the contractor, shall ensure that the manhole covers are opened and manholes are ventilated at least for an hour before workers are allowed to get into them. Manholes so opened shall be cordoned off with suitable railing and provided with warning signals or boards to prevent accident to public.
- (vi) Whenever men/women are employed on the work of lead painting, the following precautions shall be taken.

No paint containing lead or lead products shall be used except in the form of pastes or ready-made paint. Suitable masks shall be supplied, for use by workers, when paint is applied in this form of spray or a surface having lead paint dry rubbed and scrapped. Overall shall be supplied by the Contractor to workmen and adequate facilities shall be provided to enable working painters to wash during and on cessation of work.

- (l) When work is done near any place where there is risk of drowning, all necessary equipment shall be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger. Adequate provision shall be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.
- (m) Use of hoisting machines and tackles including their attachments, anchorage and supports shall conform to the following:
 - (i) These shall be of good mechanical construction, sound material and of adequate strength and from patent defect and shall be kept in good working order.
 - (ii) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years shall be in-charge of any hoisting machine including any scaffold winch nor shall such person give signals to operator.

- (iii) In case of every hoisting machine and of every chain ring hook, shackle swivel and pulley block used in hoisting or lowering or as means of suspension, safe working load shall be ascertained by adequate means. Every hoisting machine and all gear referred to above shall be plainly marked with safe working load. In case of hoisting machine having a variable safe working load, the safe working load and the conditions under which it is applicable shall be clearly indicated. No part of any machine or of any gear referred to above in this paragraph shall be loaded beyond safe working load except for the purpose of testing.
- (iv) In case of departmental machine, safe working load shall be notified by the Owner/Architect/Consulting Engineer and/or the Employer. As regards contractor's machines, the contractor shall notify safe working load of each machine to the Owner/Architect/Consulting Engineer whenever he brings it to site of work and get it verified by the Owner/Architect/Consulting Engineer.
- (n) Motors, gearing, transmission, electric wiring and other dangerous parts of hoisting appliances shall be provided with such means as will reduce to the minimum the risk of accidental decent of load; adequate precautions shall be taken to reduce to a minimum risk of any part of the suspended load becoming accidentally displaced. When workers are employed on electrical installations, which are already energized, insulating mats, wearing apparel such as gloves, sleeve and boots, as may be necessary shall be provided. Workers shall not wear any rings, watches and carry keys or other materials, which are good conductors or electricity.
- (o) These safety provisions shall be brought to the notice of all concerned by display on a notice board located at a prominent place at the work spot. Persons responsible for ensuring compliance with the safety code shall be named therein by the contractor.
- (p) These safety provisions shall be brought to the notice of all concerned by display on a notice board located at a prominent place at the work spot. Persons responsible for ensuring compliance with the safety code shall be named therein by the contractor.
- (q) Notwithstanding the above conditions (a) to (p) the contractor is not exempted from the operation of any other Act or Rule in force.

The Contractor shall at his own expense arrange for the safety provisions indicated from (a) to (o) above or as required by the Owner/Architect/Consulting Engineer in respect of all labour directly or indirectly employed for performance of the works and shall provide all facilities in connection therewith. In case the contractor fails to make arrangements and provide necessary facilities as aforesaid, the Owner/Architect/Consulting Engineer shall be entitled to do so and recover the costs thereof from the contractor. However, responsibility of any accident remains with the contractor.

Failure to comply with model rules for labour welfare, safety code or the provisions relating to report on accidents shall make the contractor liable to pay to Employers as liquidated damages an amount not exceeding Rs. 1000/- for each default or materially incorrect statement. The decision of the Owner/Architect/Consulting Engineer in such matters based on reports from the Inspection Officers as defined above shall be final and binding and deductions for recovery of such liquidated damages may be made from any amount payable to the contractor.

(34) Arbitration

In case of dispute in interpretation of LOI/Agreement/Work order clauses, the decision of Chief General Manager will be final. However if the contractor disagrees with it he can appeal to the Managing Director of Corporation.

All questions, differences, what so ever which may at anytime arise between the parties to this contract in connection with the contract for any matter arising out of or in relation there to , which remain unresolved even at appellate level shall be referred to sole arbitrator as per the provision of Arbitration Act 1966 and the venue of the arbitration proceeding shall be at Bhavnagar. The language of Arbitration shall be in English.

Note: Matter relating to any dispute or difference arising out of this tender and subsequent contract based on the bid shall be subjected to the exclusive jurisdiction of courts at Bhavnagar only.

(35) Force-Majure

- (a) **Force-majure** is herein defined as (1) any cause which is beyond control of a Supplier or Purchaser as the case may be (2) natural phenomena including but not limited to weather condition, floods, droughts, earthquakes and epidemics (3) acts of any Government authority domestic or foreign including but not limited to war, declared or undeclared, priorities, quarantine, embargoes, licensing control of production or distribution restrictions (4) accidents and disruptions including but not limited to fires, explosions, breakdowns of essential machinery or equipment (5) transportation delay due to force major or accidents (6) strikes, slowdown, lockouts and sabotage (7) failure or delay in the Supplier's source of supply due to foregoing force major causes and (8) failure to reach agreements as set forth below.
- (b) The Contractor shall not be liable for delays in performing his obligation resulting directly or indirectly from any Force majeure cause as referred to and defined in paragraph (a) above.
- (c) The Contractor shall within 10 days from the beginning of any such delay notify the Purchaser/Owner in writing of the cause of delay.

(36) EXTENSION OF TIME:

If the opinion on the owner/architect/consulting engineer the work is delayed by force major the owner/purchaser/architect/consulting engineer/engineer-in-charge shall make fair & reasonable extension in the completion date of individual items of work and of the contract as a whole. The owner/purchaser/architect/consulting engineer/engineer-in-charge will communicate such extension to the contractor in writing. No other claim in this respect for compensation or otherwise however will be admissible.

The owner/purchaser/architect/consulting engineer/engineer-in-charge will have the power to grant post-facto extension of time.

Upon the happening of any such event causing delay, the contractor shall immediately give notice thereof in writing to the owner/purchaser/architect/consulting engineer/engineer-in-charge but shall nevertheless use constantly his best endeavour to prevent or make good the delay and shall do all that may reasonably be required to the satisfaction of the owner/purchaser/architect/consulting engineer/engineer-in-charge to proceed with the works.

(37) APPROVAL OF WORKS BY STAGES:

All work embracing more than one process shall be subject to examination and approval at each stage thereof and the Contractor shall give due notice in writing to the owner/Architect/Consulting Engineer when each stage is ready. In default of such notice being received, the owner/Architect/Consulting Engineer shall be entitled to approve quality and extent thereof and in the event of any dispute the decision of the owner/Architect/Consulting Engineer thereon shall be final and conclusive.

(38) INSPECTION OF THE WORK:

The owner/Architect/Consulting Engineer/Employer shall have power at any time to inspect and examine any part of the works and the contractor shall give such facilities as may be required to be given for such inspection and examination.

Should the owner/Architect/Consulting Engineer consider, at any time during the construction or reconstruction or prior to the expiration of the maintenance period, that any work has been executed with unsound, imperfect or unskillful workmanship or of a quality inferior to that contracted for, or not otherwise in accordance with the Contractor (in respect whereof the decision of the owner/Architect/Consulting Engineer shall be final, binding and conclusive) the Contractor shall on demand in writing from the owner/Architect/Consulting Engineer specifying the fault, notwithstanding the same may have been inadvertently passed, certified and paid for, forthwith rectify or remove and reconstruct the work so specified, in whole or in part as the case may require, at his own expense, and in the event of his failing to do so within a period to be specified by the owner/Architect/Consulting Engineer in their demand aforesaid, Employer may arrange to carry out the work by other means at the risk and expense in all respects of the Contractor under the condition that the same shall not extend beyond the maintenance period except as regards workmanship which the owner/Architect/Consulting Engineer shall have previously given notice to the Contractor to rectify.

In case the Employer carrying out any work at the risk and expense of the Contractor under the provisions of this condition, the Employer may do so by any means and agency at their sole discretion and the cost thereof as certified by the owner/Architect/Consulting Engineer shall be final, binding and conclusive on the parties.

(39) RECORDS AND MEASUREMENTS:

The Contractor shall submit to the owner/Architect/Consulting Engineer 'Dimension Sheets' in approved form, detailing the measurements of all works done by him in pursuance of this Contract. Such 'Dimension Sheets' shall be submitted in four copies, and one copy shall be returned to the Contractor duly certified by the owner/Architect/Consulting Engineer, on the basis of which the Contractor shall submit the On-Account Bills and Final Bill. The 'Dimension Sheets', certified by the owner/Architect/Consulting Engineer shall be final record as to the quantities of work actually executed under this contract and shall be conclusive evidence in respect

thereof. Unless otherwise specified, the whole works are to be measured as per method stipulated in the latest BIS Code IS:1200 or General Good Engineering Practice and the interpretation thereof by the owner/Architect/Consulting Engineer shall be final and binding on the contracting parties.

In the event of any dispute as to the method of measurements, the opinion of the owner/Architect/Consulting Engineer shall be final, binding and conclusive to all concerned.

(40) **EVALUATION:**

All works measured shall be valued on the basis of the rates of priced bill of quantities attached in so far as such rates or prices apply. Where the rates in the priced bill of quantities do not apply, the value shall be based upon rates or prices deduced therefrom so far as it is practicable to do so or otherwise such rates are to be determined by the owner/Architect/Consulting Engineer.

(41) **VALUATION OF SUB-STANDARD WORKS:**

Any item or items of work which are found to be executed by the contractor with faulty workmanship not in accordance with the tender specifications, such items shall be valued and paid for at reduced rate(s) deemed fit solely at the discretion of the owner/Architect/Consulting Engineer provided always that these will not cause any harm with regard to the strength and stability of the structure(s). Such payments of sub-standard work do not relieve the contractor of his responsibility for the stability / performance of the item of work or the structure as a whole and does not prejudice the right of the employer for his claims against defects during maintenance period due to such sub-standard works.

(42) **COMPLETION CERTIFICATE:**

- (i) As soon as the work is completed, the Contractor shall give notice of such completion to the Owner/Architect/Consulting Engineer and within 30 days of receipt of such notice, the Owner/Architect/Consulting Engineer shall inspect the work and shall furnish the Contractor with a certificate of completion (as per performa given below) indicating (a) the date of completion, (b) defects to be rectified by the Contractor and/or (c) items for which payment shall be made at reduced rates. When separate periods of completion have been specified for items or groups of items, the Owner/Architect/Consulting Engineer shall issue separate Completion Certificates for such items or groups of items. No Certificate of completion shall be issued, nor shall the work be considered to be complete till the Contractor has removed, from the premises on which the work has been executed, all scaffoldings, sheds, and surplus materials (except such as are required for rectification of defects), rubbish and all huts and sanitary arrangements required for his workmen on the site in connection with the execution of the work as shall have been erected by the Contractor for the workmen and cleaned all dirt from all parts of work sites, in, upon or about which the work has been executed or on which he may have had possession for the purpose of the execution thereof and cleaned floor, gutters and drains, eased doors and sashes, locks and fastenings, labels and keys and hand them over to the Owner/Architect/Consulting Engineer or Employer or his representative and make the whole premises fit for immediate occupation or use to the satisfaction of the Owner/Architect/Consulting Engineer. If the Contractor shall fail to comply with any of the requirements of these conditions as aforesaid, on or before the date of completion of the works, the Owner/Architect/Consulting Engineer may at the expense of the Contractor, fulfill such requirements and dispose of the scaffoldings, surplus materials and rubbish etc. as he may think fit and the Contractor shall have no claim in respect of any such scaffolding or surplus materials except for any sum actually realized by the sale thereof, less the cost of

fulfilling the requirements and any other amount that may be due from the Contractor. If the expense of fulfilling such requirements is more than the amount realized on such disposal as aforesaid, the Contractor shall forthwith on demand pay such excess.

- (ii) If at any time before completion of the entire work, items or groups of items for which separate periods of completion have been specified, have been completed, the Owner/Architect/Consulting Engineer with the consent of the Contractor, take possession of any part or parts of the same (any such part(s) being hereinafter in this condition referred to as 'the relevant part' notwithstanding anything expressed or implied elsewhere in the Contract).
- (a) Within 30 days of the date of completion of such items or groups of items or on possession of the relevant part, the Owner/Architect/Consulting Engineer shall issue a completion certificate for the relevant part as in condition (i) above provided the Contractor fulfills his obligations under that condition for the relevant part.
- (b) The maintenance period in respect of such items and the relevant part shall be deemed to have commenced from the certified date of completion of such items or relevant part as the case may be.
- (c) For the purpose of ascertaining compensation for delay in respect of any period during which the works are not completed, the relevant part will be deemed to form a separate item or group, with date of completion as given in the Contract or as extended and actual date of completion as certified by the Architect under this condition.

PROFORMA FOR CERTIFICATE OF COMPLETION

To,
M/s.

Ref : Your letter dated _____

Re : Virtual Completion for Civil Construction Work of _____ for
M/s. _____ at _____.

Reference to the above and as requested by you, we hereby certify that the civil construction work of _____ for M/s. _____ at _____ was virtually completed as on _____.

Thanking you,
Yours faithfully,

Notes:

- (1) This certificate shall be issued by the consultants on a written request by the contractors after completing the work; excluding the points of minor repairs.
- (2) After the client has taken possession of the premises or has started using the premises or has consented to issuance of such certificate to the contractor.
The maintenance period of the contract starts from the date of virtual completion of the works.

(43) **FINAL BILL:**

The contractor shall submit his final bill within three months after the date of virtual completion of work mentioned in the certificate. In case final bill is not submitted within three months after the date of virtual completion of work, the last R. A. bill submitted by the contractor will be consider as final bill. Contractor shall obtain a virtual completion certificate from Architects/Consulting Engineers on virtual completion of the work.

The contractor shall submit to the Owner/Architect/Consulting Engineer his "Final Bill" drawn in approved manner on the basis of the "Dimension Sheets" certified by the Owner/Architect/Consulting Engineer. The Final Bill shall be accompanied by all abstracts, vouchers etc. supporting it.

No other claim will be entertained after the receipt of the Final Bill.

Final bill will not, however be paid until the contractor has cleared the site to the satisfaction of the Architects/Consulting Engineers/Employers and a "No Demand Certificate" as per Performa is given by the Contractor.

(44) **Removal of Debris:**

The Contractor shall at all times keep the site from of rubbish, debris and surplus materials so as to render the place of work clean and safe for all personnel working in the area and upon completion of the work and leave the works and work site in a clean and finished condition. If the Contractor fails to comply such work will be performed by the Purchaser at Contractor's expense.

(45) **MAINTENANCE (DEFECT LIABILITY PERIOD):**

The Contractor guarantees the whole of the materials and the work. He shall protect the works until the completion of the same as certified in writing by the Owner/Architect/Consulting Engineer.

He shall also maintain in good condition the whole of the works until the expiration of the maintenance period of twelve months after the certified completion of the works as a whole or in sections, and he shall also be liable for the soundness and stability thereof, and be responsible for injury to any person or property owing to any settlement, failure, defect, damage or fault due to any cause whatsoever other than earthquake or fire during this period. However the Contractor shall indemnify the owner against such accidents. This liability and responsibility shall not be affected or removed by any certificate or satisfaction or for payment or money which the Owner/Architect/Consulting Engineer may at any time give or has given. Moreover, the Contractor shall, at his own cost, restore such settlement, failure, defect, damage, or fault without charge to the Employer or the Employer may restore such settlement, failure, defect, damage at the Contractor's risk and cost. In any case the Contractor shall be liable for and shall pay and make good to the Employer or other person or parties being entitled thereto, all losses, costs and expenses they or any of them may be put to or be liable to by reason or in consequence of the settlement, failure, damage or defect and the Employer may deduct the amount of the settlement, failure, damage or defect and the Employer may deduct the amount of losses, cost or expense from any sum due or to become due to the Contractor or may recover the same from him.

In the event of the works being taken possession of and occupied by the Employer, under the provisions of these conditions, the Contractor shall be liable for the cost of maintenance, during 12 months from the date of completion, as certified in writing by the Owner/Architect/Consulting Engineer and the Owner/Architect/Consulting Engineer's certificate as to the amount of cost of completing the works under this contract and as to the amount of the const of the maintenance during the said term of twelve months shall be final, binding and conclusive upon all parties to this contract.

The Employer shall, notwithstanding, be at liberty to use the said work during the maintenance period.

The defects or other faults which may appear within the said maintenance period and which in the opinion of the Owner/Architect/Consulting Engineer who shall be the sole deciding authority in this respect have arisen from material or workmanship not in accordance with the Contract shall be rectified by the Contractor at his own cost to the satisfaction of the Owner/Architect/Consulting Engineer. The contractor shall deploy best resources to carryout the rectification works in shortest possible period in response to the notice issued by the Owner/Architect/Consulting Engineer specifying the defects and directing the rectification thereof. Failing this rectification, the Employer will be at liberty to rectify the said defects by and through any other agency at their sole discretion entirely at the risk and cost of the Contractor. In the event of such rectification being carried out by the employer on default of the Contractor, the Employer shall be entitled to recover from the Contractor and/or deduct from the Contractor's dues such sum of money as may be certified by the Owner/Architect/Consulting Engineer as has been reasonably expended by the Employer for the rectification of the said defects. The certificate of the Owner/Architect/Consulting Engineer in this respect as aforesaid shall be final, binding and conclusive to the parties. Provided always that the liability of the Contractor under this condition shall not extend beyond the maintenance period as aforesaid except as regards the defects and faults which the Owner/Architect/Consulting Engineer may have previously given notice to the Contractor to rectify.

The Contractor shall guarantee the installation/work for a period of 12 months from the date of issue of completion certificate. Any damage or defect or imperfection that may arise or lie undiscovered at the time of issue of completion certificate, connected in any way with the equipment or materials supplied by him or in the workmanship shall be rectified or replaced by the contractor at his own expense as deemed necessary by the Owner/Architect/Consulting Engineer or in default, the Owner/Architect/Consulting Engineer may cause the same to be made good by other agency and deduct expenses (for which the certificate of Owner/Architect/Consulting Engineer shall be final) from any sums that may be then due to or at any time thereafter, become due to the Contractor or from his security deposit.

(46) TERMINATION OF CONTRACT FOR DEFAULT:

The Employer may, without prejudice to any other right or remedy which shall have accrued or shall have accrued thereafter to the Employer, terminate the Contract as a whole or so far as it is applicable to that section or sections of works in which the Contractor has made default, by giving seven days clear notice, in any of the following cases.

If the Contractor,

- (a) Being an individual, or if a firm, any partner thereof shall at any time be adjudged bankrupt or have a receiving order or orders for administration of his estate made against him or shall take any proceedings for liquidation or compensation under any Bankruptcy Act for the time being in force or make any conveyance or assignment of his effects or composition or arrangement for the benefit of his creditors or purport to do so or if any application be made under any insolvency Act for the time being in force for the sequestration of his estate or if a trust deed be granted by him for benefit of his creditors, or
- (b) Being a company shall pass a Resolution of the Court shall make an order for the liquidation of its affairs or a receiver or a Manager on behalf of the Debenture Holders or circumstances shall arise which entitle the Court or debenture holders to appoint receiver or Manager.

- (c) Refuses or persistently neglect to comply with a notice in writing from the Owner/Architect/Consulting Engineer requiring him to remove defective work or improper materials etc. or,
- (d) Fails to comply with any of the terms and conditions of the Contract, or after "Seven Days Notice" in writing with orders properly issued there under, or,
- (e) Suspends the works or part of it before completion without reasonable cause, or fails to proceed with the works with reasonable diligence; or,
- (f) Fails to complete the works and clear the site on or before the date of completion, or
- (g) Assigns, transfers, sublet or attempts to assign, transfer, or sublet, any portion of the works without the prior written approval of the Owner/Architect/Consulting Engineer.
- (h) Fails to execute the work as per the Specifications and with desired workmanship.

Whenever the Employers exercise their authority to cancel the contract under the conditions, the Employer may complete the works by any means at the Contractors risk and expense. The contractor shall be entitled to receive payment for the work to the value thereof less the cost of completion of the works in his default as certified by the Owner/Architect/Consulting Engineer (which certificate shall be final, binding and conclusive) and if the cost so certified, exceeds the sum of the Contract, the Employer may recover the deficit from the Contractor by other means. Provided always that the Contract shall not be terminated for defaults mentioned in Para (c), (d), (e) and (f) above unless the Contractor continues with such default for seven days after notice in writing by registered post has been given to him by the Owner/Architect/Consulting Engineers and a copy of the same has been obtained by the Employer.

In the event the Contract is terminated in part as aforesaid, the Contractor will not be released from any of his obligation remaining to be done by him.

In the event of any such termination as aforesaid, the Employer shall, without being responsible to the Contractor for the fair wear and tear of the same, be entitled to seize and take possession and have free use of all materials, tools, tackle or other things which may be on the site, for use in carrying out or reconstructing the work to the exclusion of any right of the Contractor over the same and the Employer shall be entitled to retain and apply any balance sum which may otherwise be then due on the Contractor by him, to the payment of the cost of execution of such work as aforesaid.

If the cost of executing the work as aforesaid shall exceed the balance due to the Contractor and the Contractor fails to make good the deficit, the said materials, tools, tackle construction plant or other things, the property of the Contractor as may not have been used up in the completion of the works, may be sold by the Employer, and the proceeds be applied towards the payment of such difference. The Contractor on demand shall pay any outstanding balance existing after crediting the proceeds of such sale from the Employer. But when all expenses, costs and charges incurred in the completion of the work are paid by the Contractor all such materials, tools, tackle, construction plant or other things not used in the completion of the works and remaining unsold shall be removed by the Contractor.

(47) **Board for Site:**

A board of size approximately 8' x 6' as per drawings shall be made and put at an approved place on the site. The board shall be painted in approved colours, as directed by the Architect/Engineer - in - charge. This shall be provided by the contractor at his own expenses.

Following details shall be mentioned on the board.

CONSTRUCTION OF NEW CATTLE BOX NEAR SHRI BALA HANUMAAN TEMPLE- AIR PORT ROAD, BHAVNAGAR

- a. The proposed construction and the Employer
- b. The Architects
- c. The building Contractor
- d. The structural Consultant
- e. Any other specialist consultant
- f. Consulting Engineers

For and on behalf of owner

(Signature & Stamp of the Tenderer)

(Signature of the Owner)

SPECIAL CONDITIONS OF CONTRACT

1. **SPECIAL CONDITIONS IN CONJUNCTION WITH GENERAL CONDITIONS ETC:**
Special Conditions of Contract shall be read in conjunction with the General Conditions of Contract, Specifications of work, Drawings and other documents forming part of this contract wherever the context so requires.
2. **SPECIAL CONDITIONS TO OVERRIDE GENERAL CONDITIONS IN CASE OF VARIANCE:**
Where any portion of the General Conditions of Contract is repugnant to or at variance with any provisions of the Special Conditions of Contract, then unless a different intention appears the provisions of the Special Conditions of Contract shall be deemed to over-ride the provisions of the General Conditions of Contract and shall to the extent of such repugnancy, or variations, prevail.
3. **INSPECTION OF SITE BEFORE SUBMISSION OF TENDER:**
The Contractor must visit the site of work before submission of the tender to fully satisfy himself on all questions relating to and concerning the existing conditions of site and performance thereon. The contours and the levels if indicated in the drawings are approximate and tentative only. He must fully acquaint himself before submission of tender as to the facilities of site, limitations as to the extent and position of working space, the existing facilities like access roads etc. for transportation of materials and storing and stacking the same at places within the site and for all other matters concerning the site and effecting the performance of the work. No claim shall be admitted on ground as mentioned here above.
4. **ADMISSION TO SITE:**
The contractor will not be allowed to enter on or take possession of the site until instructed to do so by the Owner/Architect/Consulting Engineer. The Contractor shall provide all necessary temporary access roads to works as may be directed by the Owner/Architect/Consulting Engineer and shall adopt, alter and maintain the same as required and directed by the Owner/Architect/Consulting Engineer during the currency of the works and shall clear away and make good on the completion of the works, all at his own expense and as directed by the Owner/Architect/Consulting Engineer. No photographs of the site or of the works or any part thereof shall be taken, published, or otherwise circulated without the prior permission of the Employer. The Owner/Architect/Consulting Engineer shall have the power to exclude from the site any person whose admission thereto may be in his opinion undesirable for any reason whatsoever.
5. **STAKING OUT BASE LINES AND LEVELS:**
The Contractor shall layout his work subject to the approval of - the Owner/Architect / Consulting Engineer and shall be responsible for all measurements in connection herewith. The Contractor shall at his own expense furnish all stakes, platforms, equipments, ranges and labour that may be required in setting or laying any part of the work. The Contractor shall be held responsible for the proper execution of the work to such lines and grades as may be established or indicated on the drawing etc.
The Contractor shall check the bench marks, levels etc. established in the drawings before setting out any lines and levels and shall provide Theodolite, dumpy levels, prismatic compass, chains, steel tapes and all other surveying instruments found necessary for carrying out the work at his own expense
If any discrepancies are found in levels, benchmarks etc., the same shall be informed immediately in writing to the Owner/Architect/Consulting Engineer for his decisions. The Owner/Architect/Consulting Engineer's decision in this regard shall be final and binding. No claim shall be admitted on any grounds as stated here above.
6. **USE OF EXPLOSIVE:**

The Contractor shall have to obtain permission from the Employer before use of explosive on any work or on the site. If explosives are required to be used for any work, the same shall be stored in a special storage container to be provided by and at the cost of the Contractor in accordance with the laws/rules relating to the possession and storage of explosives for the time being in force. The Contractor shall forthwith obtain a license required by such law for the storage and use of explosives, and all operations in which or for which explosives are employed shall be at the sole risk and responsibility of the Contractor and the Contractor shall fully and effectively indemnify the Employer. The Contractor shall be responsible for any accident to workmen, public or property due to blasting operation.

7. **MAKE AND OTHER DETAILS OF MATERIALS:**

The Contractor shall furnish a list of the makes and other details of various materials he proposes to use on the work and this would be subject to the approval of the Owner/Architect/Consulting Engineer.

8. **LIST OF MACHINERY:**

The Contractor shall, along with the tender submit a schedule of machinery and equipment he proposes to use at site in support of his assurances to adhere to the time schedule specified for the entire completion of work.

9. **CONCRETING AND PLASTERING:**

If the silt-contain in sand supplied on site exceeds 3%- contractor shall have to prewash this sand and sand sieving and washing plant shall be employed for RCC as well as plastering work.

10. **CERTIFIED PLUMBERS:**

Certified plumbers shall be employed by the contractor on the work for all plumbing and sanitation works.

11. **LICENSED ELECTRICAL SUPERVISORS AND LINEMEN:**

The contractor must employ licensed electrical supervisors and linemen to execute the work.

12. **CONFLICT IN TERMS & CONDITIONS:**

When terms & conditions & specifications are in conflict with the terms & conditions mentioned else where, it is to be understood that those in specifications will govern. In the event of any ambiguity or discrepancy the same shall be brought to the notice of owner/purchaser/engineer-in-charge/consultant for clarification.

13. Contractor should not carry out any work at night without prior permission in writing from the EIC, which shall be given at his discretion.

14. Penalty for delayed work will be 0.10% of contract value per day and maximum upto 10 % of amount of complete work.

15. Water charges to be borne by the contractor

16. Electricity charges to be borne by the contractor

17. Incase any item is not activated or there is excess / saving in any extent quantity for any items, it will not lead to any dispute or conflict and it will be paid as per approved rate only.

BHAVNAGAR MUNICIPAL CORPORATION

**EXECUTIVE ENGINEER
BUILDING DEPARTMENT
BHAVNAGAR MUNICIPAL CORPORATION
BHAVNAGAR**

**CONSTRUCTION OF NEW CATTLE BOX NEAR SHRI BALA HANUMAAN TEMPLE-
AIR PORT ROAD, BHAVNAGAR**

**SECTION- V
ELECTRICAL SPECIFICATIONS**

SPECIFICATIONS FOR ELECTRICAL WORKS

**SUBJECT TO THE GENERAL CONDITIONS OF
CONTRACT IN FORCE
(1986)
GENERAL**

1. Wiring Rules :

The installation generally shall be carried out in conformity with relevant Indian Standard Specifications and code of practices prevalent. Indian Electricity Rules 1956 and Indian Electricity Act. 1910 as amended form the time to time.

2. Definition :

The definition of terms shall be in accordance with Indian Standard code of Practice for Electrical wiring Installation IS-732-1982 except for the definition of point in case of Internal Electrical Installation. For definition of point wiring and measurement of Electrical works IS-59008-1970 shall be referred to.

3. Voltage and Frequency of Supply :

All current consuming devices shall be suitable for frequency of 50 C/s and system of voltage meant for unless otherwise specified.

4. Layout of wiring and its description:

(i) The wiring shall be carried out as per Schedule "power" wiring must be in screwed conduit and shall be kept separate and distinct from lighting wiring. All wiring must be done on the distribution system with main and branch distribution boards at convenient centres and without isolated fuses. All conductors shall be run as far as possible along the walls and ceiling as to be easily accessible and capable of being thoroughly inspected. The balancing of circuits will be arranged before hand by the Executive Engineer C. P. Division No. 3.

(ii) Within one month of the taking over the installation, the Contractor shall supply to the Executive Engineer, C. P. Division No. 3 a complete set of wiring diagrams of the same on drawings to be supplied when available by the Executive Engineer, C. P. Division No. 3., and to the satisfaction of the Executive Engineer, C. P. Division No. 3. and these wiring plans shall be "Drawings" within the meaning of the term as used in the General Conditions of contract.

5. Conductors :

All conductors unless otherwise specified shall not be less than 1.5 Sq. mm. for point wiring and 2.5 Sq. mm. for mains. Conductors for power and lighting circuits shall be of adequate size to carry the designed circuit load without exceeding the permissible thermal limits for the installation, and such sizes will be stipulated in specifications and or drawings.

6. Cables :

6.1 All cables shall conform to relevant Indian Standards.

6.2 Conductors of all cable except the flexible cable shall be of aluminium. The smallest aluminium conductors for the final circuit shall have nominal cross sectional area of not less than 1.5 Sq. mm. The minimum size of the aluminium conductors for power wiring shall be 4 Sq. mm.

6.3.1 Conductors of flexible cables shall be of copper. The minimum cross sectional area of such a cables shall be 14.0193 mm. The flexible cable shall have uniform and adequate insulation.

6.3.2 Unless the flexible cables and conductors are protected by armour or though rubber or PVC Sheath, these shall not be used in workshops and other places where they are liable to mechanical damage.

6.3.3 Core flexible cables shall be used for connecting single phase Appliances for phase, neutral & earth connections.

7. Fall of Potential :

The cross sectional area of all conductors inside buildings shall be so proportioned to their lengths that the drop in voltage between main fuses and the farthest point of any lump shall not exceed three percent of the voltage of the consumer's with all the consuming devices in use.

7.1 If the CABLE SIZE is increased to avoid the voltage drop in circuit current rating of the cable shall be more than that for which the circuit is designed. In each circuit or sub circuit every cable shall have a current rating not less than that of the fuse which protects the circuit or sub circuit respectively for current higher than the full load current.

8. Ratings of lamps and fans socket out lets : Points and exhaust fans

8.1 Incandescent lamps installed in residential and non-residential buildings shall be rated at 60 watts & 100 watts respectively.

8.2 Table fans and ceiling fans shall be rated at 60 watts, exhaust fan shall be rated according to their capacity.

8.3 5 Amp. socket outlet points and 15 Amp. sockets outlet points shall be rated at 100 watts and 1000 watts respectively for the purpose of load assessment unless values of the load are known or specified.

9. Tests :

9.1 Before the installation is commissioned following tests shall carried out :

- (1) Insulation Resistance test
- (2) Polarity Tests of Switches
- (3) Earth Continuity tests
- (4) Earth Electrodes Resistance test

- 9.2.1.1** The insulation resistance shall be measured between earth and the whole system of conductors or any section thereof with all fuses in place and all switches closed, and except in earthed concentric wiring all lamps in position or both poles of the installation otherwise electrically connected together direct current pressure of not less than twice the working pressure provided that it need not exceed 500 volts for medium voltage circuits where the supply is derived that it need not exceed 500 volts for medium voltage circuits where the supply is derived from the three wire D.C. or a poly phase. A.C. System, the neutral pole of which is connected to earth either direct or through added resistance, the working pressure shall be deemed to be that which is maintained between the phase conductor and the neutral.
- 9.2.1.2** The insulation resistance shall also be measured between all conductors to one pole or phase conductor of the supply and all the conductors connected to the neutral or to the order pole or phase conductors of the supply with all lamps in position and switches in 'OFF' position and its value shall be not less than in that specified in Sub-Clause 9.2.1.3.
- 9.2.1.3** The insulation resistance in Megohms measured as above shall not be less than 50 Megohms divided by the number of outlet or when PVC insulated cables are used for wiring 12.5 Megohms divided by number of outlets.
- 9.2.1.4** Where a whole installation is being tested, a lower value than that given by the formula, subject to a minimum of 1 Megohm is acceptable.
- 9.2.1.5** A preliminary and similar test be made before lamps, etc. are installed and in this event the insulation resistance to earth should be not less than 100 Megohms divided by the number of outlet or when PVC insulated cables are used for wiring 25 Megohms divided by number of outlets.
- 9.2.1.6** The term "Outlet" includes every switch except that a switch combined with a socket outlet, appliance or lighting fitting is regarded as one outlet.
- 9.2.1.7** Control rheostat heating and power appliance and electric sign may, if required, be dis-connected from the circuit during the test, but in that event the insulation resistance between the case or frame work, and all live parts of each rheostat, appliance and sign, shall be not less than that specified in the relevant Indian Standard Specification or where there is no such specification shall be not less than half a Megohm.
- 9.2.2 Polarity Test :**
- 9.2.2.1** In a two wire installation a test shall be made to verify that all switches in every circuit have been fitted in the same conductor throughout & such conductor shall be labeled or marked for connection to the phase conductor or to the non-earthed conductor of the supply.
- 9.2.2.2** In a three wire or a four wire installation a test shall be made to verify that every non-linked single pole switch is fitted in a conductor which is labeled or marked for connection to one of the phase conductor of the supply.
- 9.2.2.3** The installation shall be connected to the supply for testing. The terminals of all switches shall be tested by a test lamp one lead of which is connected to the earth. Glowing of test lamp to its full brilliance, when the switch is in 'on' position irrespective of appliance in position or not shall indicate that the switch is connected to the right polarity.
- 9.2.3 Earth Continuity Test :**
- The earth continuity conductor including metal conduits and metallic envelopes of cables in all cases shall be tested for electric continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or earth leakage circuit breaker measured from the connection with the earth electrode to any point in the earth continuity conductor in the completed installation shall not exceed one ohm.
- 9.2.3.1 Earth Electrode Resistance Test :**
- Earth electrode Resistance test may be carried out by Megger Earth Testers containing a direct reading ohm-meter, a hand driven generator and auxiliary electrodes.
- 9.3** On completion an electric installation (addition and alteration) a certificate shall be furnished by the Contractor countersigned by the certified Supervisor under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as given in Appendix-'B' in addition to the test certificate required by Local Electrical Supply Authorities.
- 10. Joint and looping back :**
- Unless with the sanction of Executive Engineer Divisions all joints in conductor shall be means of approved mechanical connectors in suitable and approved junction boxes but looping back system shall be preferable. In wiring unless otherwise specified Phase and live conduct shall be looped at the switch box where as a neutral conductor can be looped from light, fan or socket. In non-residential buildings,

neutral and earth continuity wire shall be brought to each of the switch boards should be of adequate size to accommodate at least one number of 5 Amps. socket outlet and control switch in future.

11. Switches :

Main Switchgears, Switch Board and their location :

- 11.1** All main switches (other than those of iron clad pattern) carrying current of 10 Amp. and above shall be fitted for back connections and shall be suitably protected.
- 11.2** All switches and circuit breakers shall be constructed in accordance with the I. S. 4237-1967. General requirement for switchgear and control gear for voltage not exceeding 1000 volts and other relevant I.S. provided also that spring shall be either of phosphor bronze or if steel shall be copper or Nickel plated and that handle shall be so fastened that they do not tend to unscrew or become loose.
- 11.3** All main switches shall be either of metal clad enclosed pattern or of any insulated enclosed pattern which shall be fixed at close proximity to the point of entry of supply.
- 11.4** Switch boards shall not be erected above gas, stoves, or sinks or within 2.5 m. of any washing unit in the washing rooms of laundries or in the bath rooms, lavatories, toilets or kitchens.
- 11.5** Switch boards, if unavoidably fixed in places likely to be exposed to weather, to drip or to abnormal moist temperature the outlet casing shall be weather proof and shall be provided with glands or bushing of adopted to receive screwed conduit according to the manner in which cables are run PVC and double flanged bushes shall be fitted in the holes of the switches for entry and exit of wires.
- 11.6** A switch board not be installed so that its bottom is within 1.25 m. above the floor unless the front of the switch board is completely enclosed by a door or the switch board is located in a position to which only authorized persons have access.
- 11.7** Switch boards shall be recessed in the wall if so specified in the schedule of work or in the special specification. The front shall be fitted with hinged pannel of other suitable material such as bakelite in wood frame with locking arrangement, the outer surface of door being flush with the walls. Ample room shall be provided at the back for connections and at the front between the switchgear mountings and the door.
- 11.8** Equipments which are on the front of a switch board shall be so arranged that inadvertently personal contact with live parts is unlikely during the manipulation of switchgears, changing of fuses or like operations.
- 11.9** No holes other than the holes by means of which the panel is fixed shall be drilled closer than 1.3 cms. form any edge of the pannel.
- 11.10** The various live parts, unless they are effectively screened by substantial barriers of non-hydroscopic, no-inflammable insulating material, shall be so spaced that space shall not be maintained between such parts and earth.
- 11.11** The arrangement of gear shall be such that they shall be readily accessible and their connections to all instruments and apparatus shall also be traceable.
- 11.12** In every case in which switches and fuses are fitted on the same pole, these fuses shall be so arranged that the fuses are not alive when their respective switches are in the off position.
- 11.13** No fuses other than fuses in instrument circuit shall be fixed on the back of or behind a switch board pannel or frame.
- 11.14** All the metal switchgears and switch boards shall be painted, prior to erection with one coat of antirust primer. After erection they shall be painted with two coats of approved enamel or aluminium paint as required on all sides whenever accessible.
- 11.15** All switch board connected to medium voltage and above shall be provided with 'Danger Notice Plate' conforming to relevant Indian Standards.

12. Control at Point of Commencement of Supply :

- 12.1** There shall be a linked main switchgear with fuse on each live conductor of the supply mains at the point of entry. The wiring throughout the installation shall be such that there is no break in the neutral wire except in the form of a linked switchgear. The neutral shall also be distinctly marked. In this connection Rule 32 (2) of the Indian Electricity Rules, 1966 (See Appendix - 'A') shall also be referred.
- 12.2** The main switchgear shall be situated as near as practicable to be termination of service line and shall be easily accessible without the use of any external aid.
- 12.3** On the main switchgear, where the conductor of a two wire system or an earthen neutral conductor of a multi-wire system or a conductor which is to be connected thereto, an indication of a permanent

nature shall be provided to identify the earther neutral conductor. In this connection Rule 32 (1) of Indian Electricity Rules, 1956 (See Appendix 'S') shall be referred.

13.0 Switch Board & Distribution Boards : Metal clad switch gear shall preferably be mounted on any of the following types of Board.

13.1 Hinged type Metal Boards : These shall consist of a box made of sheet metal not less than 2 mm. thick and shall be provided with a hinged cover to enable the board to swing open for examination of the wiring at the back. The joints shall be welded. A teak wood board, thoroughly protected both inside and outside with good insulating conforming to IS-347-1952 specification for varnish shellac for general purpose, and of not less than 6.5 mm. thickness, shall be provided at the back for attachment of incoming and outgoing cables. There shall be a clear distance of not less than 2.9 cm. between the teak wood board and the cover, the teak wood board and the cover, the distance being increased for larger boards in order that on closing of the cover, the insulation of the cables is not subjected to damage and no short length of cables is subjected to excessive twisting or bending in any case. The board shall be security fixed to the wall by means of rag bolts, plugs of wooden Gutties and shall be provided with a locking arrangement and earthing stud. All wires passing through the metal board shall be bunched. Alternatively, hinged type metal boards shall be made of sheet munted on channel or angle iron frame.

Note : Such type of boards are particularly suitable for small switch-boards for mounting metal-clad switchgear connected to supply at low voltages.

13.2 Fixed type Metal Boards : These shall consist of an angle of channel of iron frame fixed on the wall or on floor and supported on the wall at the top if necessary. There shall be a clear distance of one meter in front of the switch board. If there are attachments of base connections at the back of the switch board Rules 51 (1) (c) of Indian Electricity Rules, 1956 shall apply.

NOTE : Such type of boards are particularly suitable for large switchboard for mounting large number or switchgears of higher capacity metal clad switchgears or both.

13.3 Teakwood Boards : for small installations connected to a single phase 230 volts supply teak wood boards may be caused as main boards or sub-board. These shall be of seasoned teak or other durable wood with solid back imprenated with varnish of approved quality with all joints dovertailed.

13.4 In large size medium voltage installations, before proceeding with actual construction of the boards, a proper drawing showing the detailed dimensions and design including the disposition of the mountings, which shall be symmetrically and neatly arranged for arriving at the overall dimensions, shall be prepared and approved by the Engineer-in-charge.

13.5 Recessing of Boards : Where so specified the switch boards shall be recessed in the wall. The front shall be fitted with hinged pannel of teak wood or other suitable materials such as bakelite, or with unbreakable glass doors in teak wood frame with locking arrangement, the other surface of the door being flush with the walls. Ample room shall be provided at the back for connection and at the front between the switchgear mountings.

13.6 Arrangement of Apparatus :

(a) Equipment which is on the front of switch board shall be so arranged that inadvertently personal contact with live parts is unlikely during the manipulation of switches, changing of fuses or like operation.

(b) No apparatus shall project beyond any edge of pannel. No fuse body shall be mounted within 2.5 cm. of any edge of the panel and no hole other than holes by means of which the panel is fixed shall be drilled closer than 1.3 cms from any edge of the pannel.

(c) The various live parts, unless they are effectively screened by substantial barriers of non-hydroscopic, non-inflammable insulating material, shall be so spaced that an arc cannot maintain between such parts and earth.

(d) The arrangement of the gear shall be such that they shall be readily accessible and their connections to all instruments and apparatus shall also be easily traceable.

(e) In every case in which switches and fuses are fitted on the same pole, these fuses shall be so arranged that the fuses are not alive when their respective switches are in the 'OFF' position.

(f) No fuses other than fuses instrument circuit shall be fixed on the back of or behind a switch board pannel or flame.

13.7 Marking of Apparatus :

- (a) Where a board is connected to voltage higher than 250 volts, all the apparatus mounted on it shall be marked in the following colours to indicate the different poles or phases to which the apparatus of its different terminals may have been connected.

Alternating Current

Three-phase-red

Yellow & Blue

Natural-Black

Direct Current

Three wire system-2 outer wires

Positive red & Negative Blue

Natural-Black

Where fuse-wire three phase wiring is done, the neutral shall be in on colour and the other three wires in another colour.

- (b) Where a board has more than one switch, each such switch shall be marked to indicate which section of the installation it controls.
- (c) All markings required ounder the rule shall be clear permanent.

13.8 Main & Branch Distribution Board :

13.8.1 Main and branch distribution boards shall be of any type mentioned in 13.1

13.8.2 Main distribution boards shall be provided with a switch or air circuit breaker on each pole of each circuit a fuse on the phase or live conductor and a link on the neutral or earthed conductor of each circuit. The switches shall always be linked.

13.8.3 Branch Distribution Board :

13.8.3.1 Branch distribution boards shall be provided with a fuse or a miniature circuit breaker or both the adequate rating setting chosen on the live conductor of each circuit and the earthed neutral conductor shall be connected to a common link and be capable of being disconnected individually for testing purposes. At least one spare circuit of the same capacity shall be provided on each branch distribution board.

13.8.3.2 In residential installations, lights and fans any be wired on a common circuit, such sub, circuit shall not have more than total of ten points of lights, fans and socket outlets. The load of such circuit shall be restricted to 800 watts. If a separate fan circuit is provided, the number of fans in the circuit shall not exceed ten. Power sub-circuits shall be designed according to the load but in no case shall there be more than two outlets on each sub-circuits.

13.8.3.3 In industrial and other similar installations requiring the use of group control of switching operation, circuits, for socket outlets any be kept separate form fans and lights. Normally fans and lights may be wired on a common circuit, however, if need sub-circuit shall not exceed 3000 Watts. In case of new installation, all circuits and sub-circuits shall be designed by making provision of 20 percent increase in load due to any future modification. Power sub-circuits shall be designed according to the due to any future modification Power sub-circuits shall be designed according to the load but in no case shall there be more than four outlets in each sub-circuits.

13.9 Installation of Distribution Boards :

13.9.1 The distribution fuse-boards shall be located as near as possible to be center of the load they are intended to control.

13.9.2 These shall be of either metal-clad type, or all insulated type. But, if exposed to weather or damp situations, they shall be of the weather proof type and, if installed where exposed to exposed to explosive dust, vapour or gas, they shall be of flame proof type.

13.9.4 Where two or more distribution fuse boards feed low voltage these distribution boards shall be :

(1) Fixed not less than 2 m. apart, or

(2) Arranged so that it is not possible to open two at a time, namely they are interlocked and the metal case is marked 'Danger 415 Volts', or

(3) Installed in a room or enclosure accessible to only authorized persons.

13.9.5 All distribution boards shall be marked 'Lighting', 'Power', as the case may be and also marked with the voltage and number of phases of the supply. each shall be provided with a circuit list giving details of each circuit which it controls and the current rating of the circuit and size of fuse-element.

13.9.6 Triple pole distribution boards shall not be generally used for final circuit distribution unless specific approval of Engineer-in-charge is obtained. In special cases where use of Triple pole distribution boards are inevitable they shall be of H.R.C. fuse type only.

13.10 Wiring and Distribution Board :

- 13.10.1** In wiring a branch board, total load of the consuming devices shall be divided, as far as possible, evenly between the number of ways of the boards leaving the spare circuit for future extension.
- 13.10.2** All connection between pieces of apparatus or between apparatus and terminals on a board shall be neatly arranged in a definite sequence following the arrangement of the apparatus mounted thereon, avoiding unnecessary crossing.
- 13.10.3** Cables shall be connected to a terminal only be soldered or welded or crimped lugs using suitable sleeve, lugs or ferrules unless the terminal is of such a form that it is possible to securely clamp them without the cutting away of cable stands.
- 13.10.4** All bare conductor shall be rigidly fixed in such a manner that clearance of at least 2.5 cms. is maintained between conductor of opposite polarity or phase and between the conductors and any material other than insulating material.
- 13.10.5** If required a pilot lamp shall be fixed and connected through an independent single pole switch and fuse to the bus-bars of the board.
- 13.10.6** In a hinged type board, the incoming and outgoing cables shall be fixed at one or more points according to the number of cables on the back of the board leaving suitable space in between cables and shall also, if possible be fixed at the corresponding points on the switch board panel. The cables between these points shall be arranged to on the switch board panel. The cables between these points shall be arranged to form a "U" or "S" shaped loop which shall be of such length as to allow the switchboard panel to swing through an angle of not less than 90°.
- 14.0 Capacity of Circuits :**
- 14.1** Lights and fans may be issued on a common circuits and such a circuit shall not have more than a total of ten points of lights, fan and socket outlets, or a load of 800 watts whichever is less. The power circuits shall be designed with a maximum of two outlets per circuits generally when load is not known or specified. In non-residential buildings at important District centres however one outlet per circuit may be preferred. The circuit shall be designed based on the loading of the circuit where not specified, the load shall be taken as 1 KW per outlet, Where the load is more than 1 KW it should be controlled by a isolator switch or miniature circuit breaker.
- 15.0 Passing Through Walls and Floors :**
- 15.1** Where conductors pass through walls one of the following methods shall be employed. Care shall be taken to see that wires pass very freely through protective pipe or box and that the wires pass through in a straight line without any twist or cross in wires, on either ends of such holes.
- (a) A teak wood box extending through the whole thickness of the wall shall be buried in the wall and casings or conductors shall be carried so as to allow 1.3 cms. air space on three sides, of the casing conductor.
 - (b) The conductor shall be carried either in a rigid steel conduit conforming to "IS : 1653-1964 specification for Rigid Steel conduits of Electrical wiring (Revised) or a rigid non-metallic conduit conforming to "IS : 2509-1963 specification for Rigid Non Metallic conduits for Electrical Installations, or in a porcelain tube of such size which permits easy drawing in. The end of conduit shall be neatly bushed with porcelain, wood or other approved material.
 - (c) Insulated conductors while passing through floors shall be protected from mechanical injury by means of rigid steel conduit (see "IS 1653-1964) to height not less than 1.5 m. above the floors and flush with the ceiling below. This steel conduit shall be earthed and securely bushed.
- 15.2** Where a wall tube passes outside a building so as to be exposed to weather, the outer end shall be belt mounted and turned down wards, and properly bushed on the open end.
- 16.0 Fixing to Walls and Ceilings :**
- Plugs for ordinary walls or ceilings shall be of well seasoned teak or other approved hardwood not less than 5 cm long 2.5 c. square on the inner end and 2 cm. square on the outer end. They shall be cemented into walls to within 7.5 mm of the surface, the remaining being finished according to the nature of the surface plaster or lime punning.
- 16.1** Where owing to irregular crossing or other reasons the plugging of the walls or ceiling with wood plugs presents difficulties, the wood casing, wood batten, metal conduit or cleat (as the case may be) shall be attached to the wall or ceiling in an approved in the walls before they are plastered.
- 16.2** To achieve neatness, plugging of walls or ceiling may be done by an approved type of asbestos, metallic or a fiber fixing plug.
- 17.0 Branch Switches :**

Where the supply is derived from a three-wire or four-wire source, and distribution is done on the two wire system, all branch switches shall be placed in the outer or live conductor of the circuit and no single-phase switch or fuse shall be inserted in the middle wire, earth or earthed neutral conductor of the circuit, Single-pole switches (other than for multiple control) carrying not more than 15 amperes may be of tumbler type which shall be 'ON' when the handle is down.

18.0 Fittings :

Where conductors are required to be threaded through tubes or channels formed in the metal work of fittings these must be free from sharp angles or projecting edges and such size that will enable them to be wired the conductors used for the final sub Circuits without removing the boarding, taping or outer covering. As far as possible, all tubes and channels should be of sufficient size to permit 'Looping back' of wires cables and flexible cords other than those designed for high temperature shall not be used for wiring fittings except for portable fittings. All fittings must have not less than a half inch male nipple. Fittings and lamp holders for gas filled lamps shall be adequately ventilated.

- 18.1 Where light fitting is supported by one or more flexible cords, the maximum weight to which the twin flexible cords may be subjected shall be as follows :

<i>Nominal cross sectional Area cord. mm²</i>	No. & Dia in mm of wires.	Max Permissible weight Kg.
0.5	16/0.2	1.7
0.75	24/0.2	2.6
1.0	32/0.2	3.5
2.5	48/0.2	5.3
3.5	80/0.2	8.8
4	128/0.2	14.0

- 8.2 No inflammable shade shall form a part of light unless such shade is well protected against all risks of fire. Celluloid shade or light fitting shall not be used under any circumstances.

8.3 Fitting of Wire :

The use of fitting wire shall be restricted to the internal wiring and the lighting fittings. Where fitting wire is used for wiring, the sub-circuit loads shall be terminated in a ceiling zone or connector from which they shall be carried into the fitting.

9.0 Lamp Holders :

Lamp holders for use on brackets and the like shall be in accordance with "IS : 1258-1967, specification for Bayonet lamp holder and all those for use flexible pendants shall be provided with cord grips. All lamp holders shall be provided with shade carriers. Where centre contact Edison screw lamp holders are used, the outer or screw contacts shall be connected to the middle wire, the natural, and the earthed conductor of the circuit.

20. Outdoor Lamps :

External and road lamps shall have weather proof fittings of approved design so as to effectively prevent the admission of moisture. An insulating distance piece of moisture proof materials shall be inserted in the fittings. Flexible cord and cord grip lamp holders shall not be used where exposed to weather. In verandahs and similar exposed situations where pendants are used, they shall be of fixed rod type.

21.0 Lamps :

All incandescent lamps, unless otherwise required and suitably protected, shall be hung at a height of not less than 2.5 m above the floor level, They shall be in accordance with IS : 418 : 1957 specification for Tungsten Filament General service electric lamps.

22.0 Fans, Regulators and Clamps :

22.1.0 Ceiling fans :

Ceiling fans including their suspension shall conform to * IS 374-1960 specification for electric ceiling fans and regulators (Revised) & to the following requirements :

- (a) All ceiling fans shall be wired to ceiling roses or to special connector boxes, to which fans rod wires shall be connected and suspended from hooks or shackles with insulators between hooks and suspension rods. There shall be no joint in the suspension rod, but if joints be unavoidable then such joints shall be screwed to special couplers of 5 cm minimum length and both ends of

pipes shall touch together within couplers, and shall in addition be secured by means of split pins; alternatively, the two pipes any be welded.

- (b) Fans clamps shall be of suitable design according to the nature of construction of ceiling on which these clamps are fitted. In all cases fan clamps shall be fabricated from tested new metal of suitable sizes and they shall be as close fitting as possible. Fan clamps for reinforced concrete roots shall be buried with the casting end due care shall be taken that they shall serve the purpose. Fan clamps for wood beams shall be of suitable flat iron fixed on two sides of the beam and according to the size and section of the beam one or two mild steel bolts passing through the beam shall hold both flat irons together. Fan clamps for steel joint shall be fabricated from tested flat iron to fit in rigidly to the bottom flange of the beam. Care shall be taken during fabrication that the metal does not crack while hammering to shape. Other fan clamps shall be made to suit the position, but in all cases care shall be taken to see that they are rigid and safe.

NOTE : All fan clamps shall be so fabricated that fans revolve steadily.

- (c) Canopies on top and bottom of suspension rod shall effectively hide suspensions and connections to fan motors, respectively.
- (d) The lead-in-wire shall be nominal cross-sectional area not less than 1.0 mm² with copper and 1.5 mm² with aluminium and shall be protected from abrasion.
- (e) Unless otherwise specified, the clear distance between the ceiling fan and the floor shall not be less than 2.75 m.

22.2.0 Exhaust Fans :

For fixing of an exhaust fan, a circular hole shall be provided in the wall to suit the size of the frame which shall be fixed by means of rag-bolts embedded in the wall. The hole shall be neatly plastered with cement and brought to the original finish of the wall. The exhaust fan shall be connected to exhaust fan point which shall be wired as neat to the holes as possible by means of a flexible cord, care being taken that the blades rotate in the proper direction.

23.0 Attachment of fittings and accessories :

23.1 In other than conduit wiring, all ceiling crosses, brackets, pendants and accessories attached to walls or ceilings shall be mounted on substantial teak wood block twice varnished after all fixing holes are made in them. Blocks shall be not less than 4 cms. deep. Brass screws only shall be used only shall be used for attaching fittings and accessories to their base blocks.

24.0 Interchangeability :

Similar part of all switches, lamp holders, distribution fuse-boards ceiling roses, brackets, pendants, fans and all other fittings of the same type shall be interchangeable in each installation.

25.0 Conduit Wiring System :

25.1.1 Type and size of conduit - All conduit pipes shall be conforming to *Is : 1653-1964, furnished with galvanized or stove enameled surface. All conduit accessories shall be of threaded type and under no circumstances pin grip type or clamp type accessories be used. No steel conduit less than 16 mm. in diameter shall be used. The number of insulated conductors that can be drawn into rigid steel conduit are given in Table II

25.1.2 Bunching of cables - Unless otherwise specified, insulated conductors of AC supply and DC supply shall be bunched in separate conduits.

25.1.3 Conduit - joints : conduit pipes shall be joined by means of screwed couplers accessories only (*IS L 2667-1964).

Specification for Fittings for Rigid Steel Conduits for Electrical Wiring) : In long distance stances straight runs of conduit, inspection type couplers at reasonable intervals shall be provided or running threads with couplers and jam-puts (in the latter case the bare threaded portion shall be treated with anti-corrosive preservative) shall be provided. Thread on conduit pipes in all cases shall be between 11 mm to 27 mm long sufficient to accommodate pipes of full threaded portion of couplers or accessories Cut ends of conduit pipes shall have no sharp edges nor any of buries left to avoid damage to the insulation of conductors while pulling them through such pipes :

TABLE - II
MAXIMUM PERMISSIBLE NUMBER OF 250-V
GRADE SINGLE CORE CABLES THAT CAN BE DRAWN INTO RIGID STEEL CONDUIT
(CLAUSE 6.5.1.1)

Size of cable		Size of conduit (mm.)													
Nominal	No. and	16	:	20	:	25	:	32	:	40	:	50	:	63	:
Crossect- ional area.	Dia. in mm of wires	:	:	:	:	(No. of cables, Max)	:	:	:	:	:	:	:	:	:
		S	B	S	B	S	B	S	B	S	B	S	B	S	B
1.0	1/1.12 5	4	7	5	13	10	20	14	-	-	-	-	-	-	-
1.5	1/1.40 4	3	7	5	12	10	20	14	-	-	-	-	-	-	-
2.5	1/1.80 3	2	6	5	10	8	18	12	-	-	-	-	-	-	-
4	1/2.24 3	2	4	3	7	6	12	10	-	-	-	-	-	-	-
	(3/1.06*) (7/0.85)														
6	1/2.80 2	-	3	2	6	5	10	8							
	(7/1.06*)														
10	1/3.55+	-	-	2	5	4	8	7	-	-	-	-	-	-	-
	7/1.40*	-	-	2	-	4	3	6	5	8	6	-	-	-	-
16	7/1.70 -	-	-	-	2	-	4	3	7	6	-	-	-	-	-
25	7/2.24 -	-	-	-	-	-	3	2	5	4	7	6	9	7	
35	7/2.50 -	-	-	-	-	-	2	-	4	3	7	5	8	6	
50	7/3.00+	-	-	-	-	-	-	-	-	2	-	5	4	6	5

***For Cu. Conductors only.**

+ For Al. conductor only.

NOTE 1 The cable shows the maximum capacity of conditions for the simultaneous drawing-in of cables. The table applies to 250 volts grade cable. The columns headed 'S' apply to runs of conduit which have distance not exceeding 4.25 M between draw in boxes, and which do not deflect from the straight by angle of more than 15°. The columns headed 'B' apply to runs of conduit which deflect from the straight by an angle of more than 15°.

NOTE 2 In case of inspection type draw-in box has been provided and if the cables is first drawn through one straight conduit, then through the drawn box, and then through the second straight conduit, such systems may be considered as that of a straight conduit even if the conduit deflects through the straight by more than 15°.

25.1.4 Protection against dampness - In order to minimize condensation or sweating inside the tube, all outlets of conduit system shall be properly drained and ventilated, but in such a manner as to prevent the entry of insects as far as possible.

25.1.5 Protection of conduit against rust : The outer surface of the conduit pipes, including all bends, unions, tees junction boxes, etc., forming part of the conduit system shall be adequately protected against rust particularly when such system is exposed to weather. In all cases, no bare threaded portion of conduit pipe shall be allowed unless such bare threaded portion is treated with anti-corrosive preservative or covered with approved plastic compound.

25.1.6 Fixing of conduit - Conduit pipes shall be fixed by heavy gauge saddles, secured to suitable wood plugs or any other approved plug with screws in an approved manner at an interval of not more than one metre but on either side of couplers bends or similar fittings. Saddles shall be fixed at a distance of 30 cm. from the centre of such fittings.

25.1.7 Bends in conduit - All necessary bends in the system including diversion shall be done by bending pipes. or inserting suitable solid or inspection type normal bends, elbows or similar fittings; or by fixing cast iron inspection boxes whichever is more suitable. Conduit fitting shall be avoided as far as possible. On conduit system exposed to weather, where necessary, solid type fitting shall be used. Radius of such bends in conduit pipes shall be not less than 7.5 cm. No length of conduit shall have more than the equivalent of four quarter bends from outlet, the bends at the outlets not being counted.

25.1.8 outlets - All outlets for fitting switches etc. shall be boxes of suitable metal or any other approved outlet boxes for other surface mounting or flush mounting system.

25.1.9 Conductor - All conductor used in conduits wiring shall preferably be stranded. No single-core cable or nominal Cross-sectional area greater than 130 mm² shall be enclosed in a conduit and used for alternating current.

25.1.10 Erection and earthing of conduit - The conduit of each circuit or section shall be completed before conductors are drawn in. The entire system of conduit after erection shall be tested for mechanical and electrical continuity throughout and permanently connected to earth conforming to the requirements specified under 7 by means of special approved tupe earthing clamp efficiently fastened to conduit pipe in a workman like manner for a perfect continuity between each wire and conduit Gas or water pipes shall not be used as earth medium. If conduit pipes are liable to mechanical damage they shall be adequately protected.

- 25.2 Recessed Conduit wiring system with Rigid Steel conduits** - Recessed conduit wiring system shall comply with all the requirements for surface conduit wiring system specified in 6.5.1.1 to 6.5.1.10 and addition, conform to the requirements specified in 6.5.2.1 to 6.5.2.4.
- 25.2.1 Making of chase** - The chase in the wall shall be neatly made and be of ample dimensions to permit the conduit to be fixed in the manner desired. In the case of buildings under construction, chases shall be provided in the wall, ceiling etc., at the time of their construction and shall be filled up neatly after erection of conduit and brought to the original finish or the wall.
- 25.2.2 Fixing of conduit in chase** - The conduit pipe shall be fixed by means of staples or by means of saddles not more than 60 cm. apart. Fixing of standard bends or elbows shall be avoided as far as practicable and all curves maintained by bending the conduit pipe itself with a large radius which will permit easy drawing in of conductors. All threaded joints of rigid steel conduit shall be treated with some approved preservative compound to secure protection against rust.
- 25.2.3 Inspection boxes** - Suitable inspection boxes shall be provided to permit periodical inspection and to facilitate removal of wires, if necessary. These shall be mounted flush with the wall. Suitable ventilating holes shall be provided in the inspection box covers.
- 25.2.4 Type of accessories to be used** - All outlets such as switches and wall sockets, may be either or flush mounting type or surface mounting type.
- (a) Flush mounting type** : All flush mounting outlets shall be of cast iron mild steel boxes with a cover of approved insulating material or shall be a box made of suitable insulating material. The switches and other outlets shall be mounted on such boxes as would be approved. The metal box shall be efficiently earthed with conduit by an approved means of earth attachment.
- (b) Surface mounting type** - If surface mounting type outlet box is specified, it shall be of any approved insulating material and outlet mounted in an approved manner.
- 25.2.5** When crossing through expansion joints in buildings, the conduit sections across the joint may be through flexible conduits of the same size as the rigid conduit.
- 25.3 Conduit Wiring system with Rigid Non-Metallic Conduits** : Rigid Non-Metallic conduits are used for surface, recessed and concealed conduit wiring.
- 25.3.1 Type and size** - All non metallic conduits used shall conform to IS : 2509-1963-The conduit may be either threaded type or plain type as specified in IS : 2509-6913* and shall be used with the corresponding accessories (See IS : 3419-1965) specification for Fittings for Rigid Non-Metallic Conduits).
- 25.3.2 Bunching off cables** - Conductors of AC supply and DC supply shall be bunched in separate conduits. The number of insulated cables that may be drawn into the conduits are given in Table III. In this table space factor does not exceed 40 percent.

TABLE - III
MAXIMUM PERMISSIBLE NUMBER OF 250 VOLTS GRADE SINGLE -
CORE CABLE THAT MAY BE DRAWN INTO RIGID NON-METALLIC CONDUITS

Size of cable		Size of conduit (mm.)					
Nominal Cross Sectional Area	No. & Diameter in mm. of wires	16	20	25	32	40	50
		(Number of Cables, Max)					
mm ²							
1.0	1/1.12*	5	7	13	20	-	-
1.5	1/1.40	4	6	10	14	-	-
2.5	1/1.80	3	5	10	14	-	-
	3.1.06*						
4	1/2.24	2	3	6	10	14	-
	7/0.85*						
6	1/2.80	-	2	5	8	11	-
	7/1.06*						
10	1/3.55+	-	-	4	7	9	-
	7/1.40*						
16	7/1.70*	-	-	2	4	5	15
25	7/2.24	-	-	-	2	2	6
35	7/2.50	-	-	-	-	2	5
50	7/300+	-	-	-	-	2	3
	19/1.80						

* For copper conductors only.

+ For aluminium conductors only.

- 25.3.3 Conduit joints** - Conduit joints shall be jointed by means of screwed or plain couplers depending on whether the conduits are screwed or plain. Where there are long runs of straight conduit. Inspection type couplers shall be provided at intervals. For conduit fittings and accessories reference may be made to IS : 3419-1965.
- 25.3.4 Fixing of conduits** - The provision of 25.1.6 shall apply except that the spacing between saddles or supports is recommended to be 60 cms. for rigid non-metallic conduits.
- 25.3.5 Bends in conduit** - Wherever necessary, bends or diversions may be achieved by bending the conduits (See 6.5.3.9) or by employing normal bends, inspection bends, inspection boxes, elbows or similar fittings.
- 25.3.6.** Conduit fittings shall be avoided, as far as possible on outdoor system.
- 25.3.7 Outlets** - All the outlets for fittings, switches, etc., shall be boxes of substantial construction. In order to minim use condensation or switching inside the conduit, all outlets of conduit system shall be properly drained and ventilated, but in such a manner as to prevent the entry of insects, etc. as far as possible.
- 25.3.8** For use with recessed conduit wiring system the provisions of 6.5.2.1 to 6.5.2.4 shall apply.
- 25.3.9** Heat may be used to soften conduit for bending and forming joints in case of plastic conduits. As the material soften when heated, fitting of conduit in close proximity to hot surfaces should be avoided. Caution should be exercised in the use of the conduit in locations where the ambient temperature is 500 C or above. Use of such conduits in place where ambient temperature is 600 C or above is prohibited.

*PVC INSULATED P.V.C. SHEATHED OR T.R.S. WIRING SYSTEM***26.0 GENERAL :**

This system of wiring, is suitable for low pressure installation, and shall not be used in places exposed to sun and rain nor in damp places, provided they are sheathed in the special approved protective covering and well protected to withstand dampness.

26.1 Attachment to walls and ceiling :

26.1.1 All cables on brick walls, stone or plastered walls ceiling shall be run on well seasoned, perfectly straight and well varnished on four sides, teak wood or any approved hardwood battens not less than 10 mm finished thick, width of which shall be such as to suit total width of cables laid on the batten, prior correction, these shall be painted with one coat of varnish or approved paint of colour to match with surrounding. These battens shall be secured to wall and ceilings by flat head wood screws to rows plug or phill plug at an interval not exceeding 75 cm. Wood plug can be used only with special approval of the Engineer-in-charge. The flat head wood screws shall be counter within wood batten and smoothed down with file.

26.1.2 Where wiring is to be carried out along the face of the rolled steel joints, a wooden batten of adequate width shall first be laid on the same and dipped to it as inconspicuously as possible. The wiring should then be fixed to this backing in the ordinary way. Where wiring passes through structural steel work, the hole shall be suitably bushed to prevent the abrasion of the cables.

26.1.3 Attachment to false ceiling : In no case, the open wiring shall be run above the false ceiling without the approval of Engineer-in-charge.

26.2.0 Link dips : Only aluminium alloy clips/joint clips shall be used. The thickness shall be 0.32 mm (30 SWG) for lengths of 25 mm to 40 mm and 40 mm (28 SWG) for lengths of 50 mm to 80 mm. The width shall not be less than 8 mm in all these cases. Link clips/joint clips shall be so arranged that one single clip shall not hold more than two core or three single core TRS of PVC insulated and PVC sheathed upto 2.5 sw. mm. above while a single clip shall hold a single twin core or two single core cables. The clips shall be fixed on varnished wood batten switch iron pins and spaced at interval of 15 cm both in the case of horizontal and vertical runs.

26.3.0 Bends in wiring : The wiring shall not in any circumstances be bent so as to form an abrupt right angle but must be rounded off at the corners to radius not less than six times the overall diameter of the cable.

26.4.0 Protection of wiring form Mechanical Damage :

26.4.1 In cases where there are chances of any damage to wiring, such wiring shall be drawn complying with the all the requirements of conduit wiring system.

26.4.2 Such protective covering shall in all cases be fitted on all down drops within 1.5 m. from the floor or from floor level up to the switch board whichever is less.

26.5.0 Passing through floors: All cables taken trough floor shall be enclosed in heavy gauge steel conduit extending 1.5 m. above the floor or up to the switch board, whichever is less and flush with the ceiling below or by means of any approved type of metallic covering. The ends of all conduits or pipes shall be neatly bushed with porcelain wood or other approved material. The conduit pipes, shall be security earthed.

26.6.0 Passing through walls: When conductors pass through walls, any one of the following methods shall be employed. Care should be taken to see that wires pass very freely through protective pipe or box and that wires pass through in a straight line without any twist or cross in wires on either ends of such holes.

(a) A box of teak wood or approved hard wood extending through the hole thickness of the wall shall be buried in the wall and casings or conductors shall be carried so as to allow 1.3 cm air space on the three sides of the casing or conductor.

(b) The conductors shall be carried in an approved heavy gauge solid drawn or lap weld conduit or in a porcelain tube of such a size that it permits easy drawing in, the ends conduit shall be neatly bushed with porcelain, wood or other approved material.

26.6.1 Where a wall tube passes outside a building so as to be exposed to weather, the outer end shall be mounted and turned downwards and property bushed on the open end. The conduit shall be neatly arranged so that the cables enter them without bending.

26.7.0 Buried cables: The TRS or PVC sheathed cable shall not normally be buried directly in plaster. Where so specific in the special specification they may be taken in teak wood channeling of ample capacity or conduit pipe buried in the wall.

26.8.0 Stripping of outer covering - While cutting and stripping of the outer covering of the cable care shall be taken that the sharp edge of the cutting instrument does not touch the inner insulation of the conductors. The protective outer covering of the cables shall be stripped off near connecting terminal and this protective covering shall be maintained up to the close proximity of connecting terminals as far as practicable. Care shall be taken to avoid hammering on link clips with any metal instrument

after the cables are laid. Where junction boxes are provided they shall be made moisture proof with a plastic compound.

27.0 PAINTING WORK IN GENERAL:

27.1 Paints : Paints, oils varnishes, etc., of approved make in original to the satisfaction of the Engineer-in-charge shall only be used.

27.2 Preparation of surface : The surface shall be thoroughly cleaned and dusted before painting is started. The proposed surface shall be inspected by Engineer-in-charge or his authorized agent and shall have received the approval before painting is commenced.

27.3 Application : Paint shall be applied with brush. The paint shall be spread as smooth & even as possible. Particular care shall be paid to rivets, nuts, bolts and cover lapping. Before drawing cut, it shall be continuously stirred in the smaller containers with a smooth stick while it is being applied. Each coat shall be allowed to dry out sufficiently before a subsequent coat is applied.

27.4 Scope : Painting on old surface in indoor situations will not include primer coat except where specially mentioned in the schedule of work or special specification. However, where rust has formed on iron and steel surfaces the spots will be painted with one anti-rust primer coat.

27.5 Precautions : All furniture fixtures glazing floors, etc., shall be protected by covering. All stains, smears, polishing, dropping of every kind shall be removed. While painting of wiring etc. it shall be ensured that painting of wall ceiling etc., is not spoiled in any way.

27.6 Painting of conduit and accessories: After installation surface of conduit pipes, fittings switch and regulator boxes, etc. shall be painted with two coats of approved enamel paint or aluminium paint as required to match the finish of surrounding wall trusser, etc.

28 Link clip :

The clip for batten wiring shall be of Aluminium conforming to I. S. specification No.2415-1975.

APPENDIX - 'A'

Important Clauses of Indian Electricity Rules, 1956 Following clauses of Indian Electricity Rules, 1956 shall in particular be taken care of in the execution of electrical works

Clause No

Subject

3. Authorisation.

- 29. Construction, installation, protection, operation and maintenance of electric supply lines and apparatuses.
- 31. Cut-out on consumer's premises.
- 32. Identification of earthed and earthed neutral conductors and position of switches and cut-out therein.
- 33. Earthed terminal on consumer's premises.
- 36. Handling of electric supply lines and apparatus.
- 41. Distinction of circuits of different voltages.
- 42. Accidental charge.
- 43. Provisions applicable to protective equipment.
- 44. Instructions for restoration of persons suffering from electric shock.
- 45. Precautions to be adopted by consumers, owners, electrical Contractors, Electrical workmen and suppliers.
- 46. Periodical inspection and testing of consumer's installation.
- 48. Precautions against leakage before connection.
- 50. Supply to consumers.
- 51. Provisions applicable to medium, high voltage installations.
- 58. Point of commencement of supply.
- 59. Precautions against failure of supply; Notice of failures.
- 61. Connection with earth, (Low and Medium Voltage system).
- 64. Use of energy of high and extra-high voltage system.
- 67. Connection with earth. (High & Extra-high voltage system).
- 68. General conditions as to transformation and control of energy.

All Clauses under Chapter VIII on Overhead Lines.

- 137. Mode of entry.
- 138. Penalty for breaking seal.
- 139. Penalty for breach of rule 45.
- 140. Penalty for breach of rule 82.
- 141. Penalty for breach of rules.

APPENDIX - 'B'

Form of Completion Certificate

I/We certify that the installation detailed below has been installed by me/us and tested and that to the best of my/our knowledge and belief, it complies with Indian Electricity Rules 1956 as well as the C.P.W.D. General Specification for Electrical Works 1972.

Electrical Installation at Voltage and system of supply

(1) Particulars of Works :

(a)	Internal Electrical Installation	No. Total Load	Type of system of wiring.
(i)	Light point		
(ii)	Fan point		
(iii)	Plug point		
	(a) 3 pin 5 Amp.		
	(b) 3 pin 15 Amp.		

(b) Others :

Description	HP/KW
(a) Motor: (i)	
(ii)	
(iii)	

(c) Other Plants:

(d) if the work involves installation of overhead line/or underground cable :

- (a) (i) Type & Description of overhead line.
(ii) Total length & No. of spans.
(iii) No. of street light & its description
(b) (i) Total length of under ground cable & its size.
(ii) No. of joint.

End joint:
Tee joint:
St. through joint:

(2) Earthing :

- (i) Description of earthing electrode :
(ii) No. of earth electrodes :
(iii) Size of main earth lead :

(3) Test Results :

- (a) Insulation Resistance :
- | | | | | |
|-------|---|---|-----|---------|
| (i) | Insulation resistance of the whole system of conductors to earth | | | |
| | Megohms | | | |
| (ii) | Insulation resistance between the phase conductors and neutral | | | |
| | Megohms | | | |
| | Between phase | R | and | neutral |
| | Megohms | | | |
| | Between phase | Y | and | neutral |
| | Megohms | | | |
| | Between phase | B | and | neutral |
| | Megohms | | | |
| (iii) | Insulation resistance between the phase conductors in case of polyphase supply. | | | |
| | Between phase | R | & | phase Y |
| | Megohms | | | |
| | Between phase | Y | & | phase B |
| | Megohms | | | |
| | Between phase | B | & | phase R |
| | Megohms | | | |

(b) Polarity Test:

Polarity of non-linked single pole branch switches.

(c) Earth continuity Test:

Maximum resistance between any point in the earth continuity conductor including metal conduits & main earthing lead.
ohms

(d) Earth Electrode Resistance:

Resistance of each electrode.

- (i) ohms
- (ii) ohms
- (iii) ohms
- (iv) ohms

(e) Lighting Protective System:

Resistance of the whole of lighting-protective system to earth
before any bounding is effected with electrode and

metal in/on the structure.
ohms

Signature of Supervisor

Signature of Contractor

Name & Address

Name & Address

SPECIFICATION

All Specification, standard, publication etc. specified mean the latest standards, publication etc. pertaining to Electrical Installation and should conform to the following wherever applicable.

- (1) Indian Electricity Act. 1910 with its amendments.
- (2) Indian Electricity Rules, 1956 and its amendments.
- (3) Indian Electricity supply Act. 19948.
- (4) Regulation for Electrical Equipment in building by I.E.F. London.
- (5) The Factory Act, 1948 and its amendments.
- (6) I. S.-732-1982 Part-I, II & III code of practice for Electrical wiring and fittings in buildings for low and medium voltages.
- (7) I. S. 4064-1967 H. D. Air break switches and fuses for Voltages not exceeding 1100 volts.
- (8) I.S. 3043 - Earthing code of practice for
- (9) I.S. - 1554 Part-I 1970 PVC insulated (Heavy duty) Electrical Cables for working voltages upto and including 1100 volts.
- (10) I.S. : 694 - 1964 Part - II - PVC insulated cable with Alluminium conduits (revised) for voltages upto 1100 volts.
- (11) I.S. : 5908-1970 Electrical installations in buildings method of measurements of.
- (12) I.S. : 4237-1967 General requirement for switchgear and control for voltage not exceeding 1000 volts.
- (13) I.S. 1653-1964 - Rigid steel conduits for electrical wiring (revised)
- (14) I.S. : 2509-1973 - Rigid steel conduits for electrical installation. (First revision)
- (15) I.S. : 1258 - 1967 - Bayonet lamp holders (First revision)
- (16) I.S. : 418-1957 - Tungsten-Filament General service electric lamps (Third revision)
- (17) I.S. : 374-1966 - Fans and Regulators, ceiling type, electric (second revision)
- (18) I.S. : 2667-1964 Fittings for rigid steel conduits for electrical wiring.
- (19) I.S. : 3419-1976 - Fitting for rigid non-metallic conduits (First revision)
- (20) National Electric Code, 1986

ANNEXURE - I
Abstract of the Wiring Rules of the Institution of Electrical Engineer
(referred to in the specification)
DEFINITIONS (See Clause 2 of the Specification)

Systems :

All electrical system in which all the conductor and apparatus are electrically connected to a common source of supply.

- (1) **Earthed:** Effectually connected to the general mass of the earth, Solidly earthed means earthed without the intervention of a fuse, switch, circuit-breaker, resistor reactor or solenoid.
- (2) **Uninsulated Conductor:** A conductor without provision, by the interposition of a dielectric or otherwise, for its insulation from earth.
- (3) **Bare :** Not covered with insulating material.
- (4) **Diaelectric :** Any material which offers high resistance to the passage of the an electric current.
- (5) **Bunch Conductor :** When more than one conductor is contained within a single duct or groove or when they are run enclosed and not spaced apart from each other.
- (6) **Points :** In wiring as per I.S. : 5908-1970-Method of measurements of electrical installation in buildings.
- (7) **Switch Board :** An assemblage of switchgear with or without instruments, but the term does not apply to a group of local switches in a final sub-circuit where each switch has its own insulating base.

NOTE : *In the Electricity (Factories Act) special regulations, 1908 and 1944 the term "Switchboard" includes "Distribution board".*

- (8) **Single pole switch :** A switch suitable for closing and or opening a circuit on one phase or pole only.
- (9) **Linked switches :** A switch the blades of which are so linked mechanically as to make or break all poles simultaneously or in a definite sequence.
- (10) **Fuse Switch :** A switch the moving part of which carries one or more fuses.
- (11) **Three Wire System :**

(a) Outer Conductor: Those between which there is the greatest difference of potential. This use of the word outer must not be confused with the use of the work when applied to the external conductor of a concentric main.

(b) Neutral Conductors: The term includes the neutral conductor of a 3 phase 4 wire system, the conductor of a single phase or d. c. installation which is earthed by the supply undertaking (or otherwise at the source of the supply) and the middle wire of common return conductor of a 3 wire D. C. or single phase A.C. system.

- (12) **Semi enclosed machine:** One in which the ventilating openings in the frame are covered with -
 - (a) Grids expanded metal or wire gauge, with openings of less than 1/4 inch so as to obstruct free ventilation.
 - (b) Wire gauge, in which the opening are less than 1/4 inch but not less than 3/32 inch (diameter or width) :
 - (c) Screens with smaller openings than the above.
- (13) **Totally - enclosed Machine:** One in which the enclosing case and bearings are dust proof and which does not allow circulation of air between the inside and outside of the case.
- (14) **Pipe Ventilated Machine:** An enclosed machine in which the frame is so arranged that the ventilating air may be conveyed to it through a pipe attached to the frame, the ventilation opening maintained by the fanning action produced by the machine - itself.
- (15) **Forced draught Machine:** An enclosed machine in which the ventilating air supply is maintained by an independent fan external to the machine itself.
- (16) **Protected Machine:** One having end shield bearings and in which there is free access to the interior without opening doors or removing covers.

SWITCHES AND CIRCUIT BREAKERS

(See clause II of Specifications)

(17) Switches and Circuit Breakers :

Switches and circuit breakers (rules 2b.36 and 37) whether fixed separately or combined with lamps, holders or fittings, must comply with the following requirements :

- (a)** Overt heating must not take place at the point of contact or elsewhere, when the full current flows continuously.
- (b)** They must be so constructed or arranged that the contacts cannot accidentally close when left open.
- (c)** The basis must be of incombustible, non-conducting and moisture proof material.
- (d)** Circuit breaker must be so arranged and placed that no combustible material is endangered by their action.
- (e)** Unless placed in an engine room or in a compartment especially arranged for the purpose, they must have their live parts covered. The covers must be of incombustible material and must be either non-conduction or of rigid metal and clear of all internal mechanism. For more than 6 amperes, at pressures exceeding 125 Volts metal covers must be lined with insulating material.
- (f)** In positions where they are liable to injury or come into contact with goods, they must be further protected by an open fronted box or other suitable guard.
- (g)** Handles must be insulated and so arranged that the hand cannot touch live metal, or be injured through and adjacent fuse blowing.
- (h)** Switches having a handle projecting through an open slot in the cover, must not be used.

Signature of Contractor

**EXECUTIVE ENGINEER
BUILDING DEPARTMENT
BHAVNAGAR MUNICIPAL
CORPORATION, BHAVNAGAR**

SECTION F-1A

GENERAL REQUIREMENTS

1.1 Scope of works :

The work covered by electrical specification consists supplying and installing, electrical wiring system complete in strict accordance with this specification and the applicable drawing and subject to the terms and conditions of the contract. It includes -

- (a) Conduit and wiring system for fans, lighting points, clocks, sockets, etc., including fixing of lighting fixtures and fans etc., **and miscellaneous points.**
- (b) Conduit and wiring system for **exhaust fans sockets etc.**
- (c) Panel boards, distribution boards.
- (d) Complete power and lighting
- (e) Grounding system.
- (f) Conduits system.
- (g) Street lighting system
- (h) Other miscellaneous electrical

1.2 Completeness of Contract:

Any work fittings accessories or apparatus which may not have been specifically mentioned in the specification but which are necessary in the equipment for efficient working of the plant should be deemed to be included in the contract and should be executed and provided by the Contractors. All plant and apparatus should be complete in all the details, whether such details, are mentioned in the specifications or not.

Three prints and one permanent negative of each of the finally approved drawings incorporating all the modifications proposed by the Department should be submitted. No modifications should be made in a drawing already approved by the Engineer-in-charge without his prior consent.

Approval of the Contractor's drawing will not relieve the Contractor of any part of his obligation to meet all the requirements of the contract.

1.3 Guarantee :

The performance of all the equipment's and the installations should be guaranteed at least for a minimum period of one year from the date of taking over the installation by the Department. All equipments must comply with the relevant IS-BS specifications.

1.4 Interchangeability:

All corresponding parts of similar plant and equipment should be interchangeable in every way.

1.5 Tools:

All special tools required for dismantling and assembly of the equipment covered by the contract shall be supplied as obligation under the contract.

A list of items to be supplied by the Contractor should be submitted along with the tender.

SECTION F-2A***Specifications for Electrical Installation in Buildings*****1 GENERAL :**

1.1 These specifications relate to the electrical installations in the buildings of P.W.D. Electrical. The specifications cover general requirements to be fulfilled. These general specifications are supplemented by the specifications for the particular buildings separately attached.

1.2 These specifications are governed by the General conditions of the contract attached hereto.

1.3 APPLICABLE RULES AND REGULATIONS :

1.3.1 Installation shall be carried out in conformity with the regulations for electrical equipment's of buildings, published by the institute of Electrical Engineers London (14th Edition 1966 and as amended up to date) hereinafter referred to as the I.E.E. wiring regulations. Where these specifications or the special specifications for the particular building attached hereto are at variance with the I.E.E. regulations these specifications or special specifications as the case may be, shall be followed. The installation shall also comply with the requirements of the Indian Electricity Act. 1910 as amended up to date and rules issued there under and also the regulations for the electrical equipments of buildings issued by the Bombay Regional Council of Engineer Association of India. Where not specified otherwise, the installation should generally follow the Indian standard codes of practice and in their absence the relevant British Standard of practices. All the materials shall comply with the relevant Indian Standard or British Standard specifications.

1.4 DEFINITIONS :

1.4.1 The definitions of terms in the I.E.E. Regulations shall apply in general.

1.5 DRAWINGS:

1.5.1 The preliminary drawings only indicate the general scheme of requirement. The exact position of all points, control switch boxes, runs of wiring and/or conduits joint boxes, inspection boxes, mains, and sub-distribution boards, mains etc., shall be got approved by the Engineer-in-charge. All circuits shall be clearly numbered in wiring diagrams and building plans. The detailed design of a switch-board, special fixture or any other part of the electrical installation as may be called for by the engineer-in-charge shall also be supplied by the Contractor and should be got approved by the Engineer-in-charge. Three sets of completion drawings and wiring diagrams showing the installations as executed shall be supplied by the Contractor along with the completion certificate.

1.6 MATERIALS :

All Materials shall be new and of the best quality conforming to the relevant I.S.B.S. specifications. They must be the products of reliable manufacturers of many years of standing. All like parts of materials shall be interchangeable. In case of equipments such as circuit breakers, switch fuses etc., a descriptive and illustrated literature shall accompany the tender. The names of manufacturers of various materials shall be furnished in proforma in Appendix-I Sample of materials wherever required should be approved by the application of suitable paints. The supply of all equipments, switchgears etc. shall be complete with accessories, fittings and mountings as may be required for their proper performance, and as specified in the relevant IS-BS Code of Practice and Standards.

1.7 WORKMANSHIP :

1.7.1 Good workmanship and neat finished appearance are the prerequisites for complying with the clauses of these specifications. With a view to ensure fine workmanship the tenderers shall employ licensed wiremen with an experience of not less than 5 years in the type of work they are engaged. The work should be done under supervision of licensed Electrical Supervisors with good educational qualifications and considerable experience.

1.7.2 Tenderers shall furnish the names of Supervision and their wiremen who will be engaged in this work with details of their experience.

1.8 CO-OPERATION WITH CIVIL AND OTHER WORKS CONTRACTORS :

1.8.1 The tenderer, after the award of the contract, shall co-operate with the civil and other Contractors and shall co-ordinate his work with the work of other Contractors with the least amount of dislocation and in reference to the other works. Tenderers shall go through the drawings carefully and shall furnish the Engineer-in-charge with all the details of openings in the walls etc. they may be required for concealing any of the electrical equipments or accessories. Where the Contractor fails to furnish such information as may be required for the purpose of concealing the equipments etc., they shall be made at his (Contractor) cost and expense. Any alteration to parts of the building shall be carried out with prior permission of the competent authority. All changes of the structural work shall be made good at the contractor's expense and brought to the original shape finish and colour.

1.9 TESTING :

The electrical Contractor shall be completely responsible for the testing and commissioning of those installations covered by these specifications in compliance with the standard procedure, in obtaining permission of the Government Electrical Inspector. Any modification which is demanded by Government Electrical Inspector shall have to be carried out within the scope of the contract. The contractor shall submit four copies of drawings of installations as per regulations for shall be provided by the Contractor for carrying out the installation work. All tests shall be carried out in the presence of the Engineer-in-charge or his authorized representative and his approval obtained for the test results.

1.10 COMPLETION CERTIFICATE AND MAINTENANCE GUARANTEE :

1.10.1 After the completion of the installation and testing, the Contractor should furnish a certificate in the proforma in Appendix-III, at the time of taking over the installation by the Department. The installation shall be guaranteed for period of 12 months from the date of taking over by the Department. During the period of guarantee all defects in material or in workmanship shall be rectified or replaced free of cost to the Department.

1.11 TENDERER'S ABILITY :

1.11.1 In order to enable the Department to assess the ability of the tenderer to execute the work, the tenderer shall furnish evidence of his experience and capacity to carry out the work of the magnitude and nature.

1.12 RATES :

1.12.1 The rates of items shall include all taxes, transport, loading and unloading charge and all such charges that may be required to be incurred for the supply and installation of the materials at site. The rates shall be firm and variations in the market are not entertained. Break up figures as required in the schedule of work shall also be furnished. As far as possible indigenous materials only shall be included for supply. Where it is unavoidable, imported items may be included and tenderer should clearly indicate materials, quantity, rate and amount of these items.

1.13 STORAGE SPACE :

No covered storage space will be provided by the Department. The Contractor has to make his own arrangement. However, the Department may give an open space near the place of execution where the Contractor can build his own stores for executing the work.

1.14 DEPARTURE FROM SPECIFICATIONS :

The tenderer should clearly indicate departure, if any, from the specifications with reasons for the same.

1.15 EXTRA ITEMS :

Rates for extra items shall generally be derived from the rates already available in the schedule. Where it is not possible, the rates shall be mutually agreed upon and the Contractor shall furnish a detailed analysis of the rates claimed by him.

2. TECHNICAL SPECIFICATIONS :**2.1 Supply System :**

The wiring installations shall be suitable for 3 phase 4 wire, 400-400 v 50 cycles system of supply. Colour code of different phase shall be followed as per standard.

2.2 Wiring for Lights and Fans :

2.2.1 Looping system of wiring shall be adopted. No joints shall be made at intermediate runs of cables and where they are unavoidable, such joints shall be through approved mechanical connections.

2.2.2 Point Wiring :

Point wiring shall consist of the branch wiring from the switch board together with the controlling switch or push as far as and including the ceiling rose or any other approved connector or socket, outlets. In case of more than one light being controlled by one switch the wiring upto the ceiling rose of the first light including the switch shall be considered as primary, point, Loop wiring from light shall be considered as a 'Secondary' point and rates shall be quoted separately, including final connections to fixtures and plugs.

2.2.3 Conductors :

No conductor for final sub circuit wiring for light and socket outlets shall have a cross section less than that of 2.5 sq. m (aluminium).

2.2.4 Loading :

No final sub-circuit radiating from the fuse board of a sub-distribution board and wires with 25 sq. m. (At.) cable shall carry more than 10 lights, fans or socket outlets or a connected load of 800 watts whichever is greater. The following wattages may be assumed for estimating the load on each sub-circuit unless otherwise known or specified.

Incandescent Lamps	100	watts
Ceiling fans	60	watts
5-A Socket Outlets (lighting)	100	watts
4. ft. fluorescent tube	50	watts
5. ft. fluorescent tubes	100	watts

In each sub-distribution board at least one way preferably two ways shall be left spare for future requirement. A wiring diagram giving the details of the exact utilization of the ways shall be prepared and fixed in the sub-distribution board itself or any other easily accessible place. The ways of sub-distribution board shall accordingly numbered.

2.2.5 Local Control Switches (General) :

Local control switches for circuit carrying not less than 5-A shall be piano type and shall conform to relevant I.S. Standards. The switch shall be 'ON' when the knob is in the down position. All local control switches shall be connected in the phase or live conductor only and not in the neutral conductor, switch box is 1.3 mtr. from the finished floor level unless otherwise stated. All switch boxes shall be provided with 1/8" thick Perspex cover fixed to the switch box with chromium plated counter sunk screws (brass).

2.2.5A Switches (Two way) :

- (a) Two way switches shall be piano type single pole, double throw, 250V, suitable for flush mounting and of 5A capacity as per the drawings. All switches shall be recessed in an embedded metal box.
- (b) Each box shall have suitable outlet for fixing conduits directly.
- (c) Each box shall have Perspex cover painted inside with the wall colour, if required.
- (d) Each switch shall be suitable for the position in a corridor stairway wiring.

2.2.5.B Switch Boxes (General) :

Electrical circuits shall be written suitably on the cover of all switch boxes, as approved by the Engineer-in-charge (Elect). Whenever different phase are terminated in a switch box bakelite partition shall be provided. Each case shall be provided with a G. I. Earth stud nut and washers for earth connectors.

2.2.6 Ceiling Rose :

Ceiling rose shall be used on circuits having a voltage normally exceeding 200V. Only one flexible cord shall be attached to a ceiling rose. Only 3-pin 5A socket outlet shall be provided in lighting circuits. All socket outlets shall be provided with control switch and they shall be mounted in switch boxes in an approved manner.

2.2.7 Fittings :

These shall be of approved type as specified in the tender schedule. The sub circuits leads should terminate in a ceiling rose or conductor in the fitting and internal connection made there from. Wherever these fitting are suspended they shall be done so through the conduits and ball and socket joints. All fittings shall be grounded by a G. I. conductor not less than 16 S. W. G.

2.2.8 Flexible wiring :

Flexible cords of not less than 23/0076 size shall be used. The weight of suspension shall be governed by I.E.E. Regulations.

2.2.9 Ceiling Fans :

All ceiling fans shall be wired to ceiling rose and suspended from a hook shackle or clamp and insulated from the same. All joints in the suspension rod shall be screwed and secured by means of split pins. The fan clamps supplied by the Contractor shall be suitable for the ceiling or proof member as the case may be. For concrete roofs, fan hooks shall be buried in concrete during construction in an approved manner and securely bound to the reinforcement.

2.2.10 Conduits and Earthing :

All conduits feeding lighting and fan circuits shall be provided with earth continuity G.I. conductor as specified for power wiring. All conduits shall be as specified for power wiring.

2.3.1 Point wiring :

Point wiring for power shall be as defined under section 2.2.2 and shall include the switches and sockets.

2.3.2 Loading :

All distribution board for power wiring shall be not less than 15A per way. Loading per way shall not exceed normally 100 watts. The following loads may be assumed if exact figures are not known :

3-Pin 15A Outlets	1000	Watts
3-Pin 5A Outlets	100	Watts

2.3.3 Wiring for Motors :

2.3.3.1 Final sub-circuits loop in motors shall be connected to separate ways of the Distribution board even if the current in the sub-circuit is less than 15A. No looping is permissible.

2.3.3.2 All wiring shall be carried in H. G. conduit as specified in I. S. specification for gauge for different sizes of conduits. When the motor is resiliently mounted flexible conduit with approved adapters shall be used for the last few feet. Where cables are used sufficient loop shall be left.

2.3.3.3 All switch fuse units controlling circuits feeding motor shall be provided with H.R.C. fuses or as specified.

2.3.3.4 The frame of every motor and its association control gear shall be earthed by two separate and distinct connections to earth. Connector shall be capable of carrying 3 times the rating of fuse or 1.1/2 time the setting of the circuit breakers but in no case less than No. 8 S.W.G. or 7064 or equivalent cross section of copper. Where practicable, the earth connection shall be visible for periodical inspection. Gas or water pipes shall not be used for earth connections.

2.3.3.5 Socket Outlets and Control Switches 5A and 15A :

All socket outlets shall be of 3 pin type, the third pin being connected to the earth stud of nearest distribution board by separate earthing wire. The socket shall conform to I. S. : 1293/1938. single pole, piano type. Each socket outlets shall be provided with a control switch of appropriate rating and as specified. The switch and socket shall be mounted inside the iron clad box provided with 1/8" perspex cover as directed by the Engineer-in-charge or as specified in schedule of quantities. Inside switch box ample space shall be available around switches for connecting wires to switches. All socket outlets for power shall be mounted at the skirting level unless otherwise specified or as directed by the Engineer-in-charge.

The three phase plug receptacles shall have their earth terminals connected by independent earth wires to ring main earth strips on the building. In building where explosion proof fixtures are installed single phase plug receptacles as well as light points shall be connected to ring main ground bus installed in the building by separate earth wires of approved size.

Socket outlet shall have some provision not to receive the matching plug unless the grounding pin is in correct position. The grounding pin of the plug shall make the contact first and break the contact last at the time of inserting or removing the plug respectively.

The grounding terminal shall be connected to the enclosed metal body by providing G.I. stud. nut washers welded to the box

Each unit shall be suitable for flush mounting as required and indicated in the

applicable drawings.

Combination unit of socket outlet and switch shall be complete with necessary internal wiring. The switch/socket shall be mounted on M. S. bracket enclosed in a box.

2.4 Conduit Wiring :

2.4.1 Where conduit wiring is adopted the type and size of the conduit shall be as indicated in the drawing. The minimum of the conduit shall be 19 mm.

2.4.2 The Contractor shall thoroughly study the structural arrangements of the buildings and wherever necessary, shall in consultation with Department's representatives at site, make suitable adjustments in the cable routings, earthing arrangements, and location boxes, fitting etc. with a view to avoid interference with any part of the building, structure, equipment or any other work in the building or to effect any improvement in the arrangement.

2.4.3 Protection of conduit against rust :

Conduit shall be given two coats of oxide paint before they are placed in position. All exposed conduit shall be painted after installation with the colour as approved by the Engineer-in-charge. This do not apply to galvanized conduit.

2.4.3.A Protection against insects and damp :

In order to minimize condensation or sweating inside the conduit, system shall be properly drained and ventilated in such a manner as to prevent the entry of insects.

2.4.4 Conduit shall first be installed as a complete system without cables and shall be continuous from outlet to outlet from fitting to fitting and mechanically and electrically connected to all boxes and fittings.

2.5 SPECIFICATION FOR POWER CONTROL AND TELEPHONE CABLES :

1. SCOPE :

- i. The specifications cover the supply and installation of medium voltage power and control cables either in ground or trench depending on the conditions at site including accessories for the same. The work in general, consists of supplying, laying terminating and connecting all. 1.1 KV APLSTS PVC power and control cables.
- ii. The Contractor shall supply all accessories including jointing and terminating materials, compound, tapes supporting materials, cleats cables lugs, concrete stabs, bricks sand, cables

markers etc., as required to make the installation work including digging and back filling of the trenches as required.

II. SPECIFICATIONS :

- i.** All power cables to be supplied mentioned as 'APLSTS' in the Schedule should be mass impregnated non-draining, paper insulated lead sheathed, double steel tape armoured and must comply with the latest IS BS specifications.
- ii.** All cabling materials such as cable compound, cable lugs, tapes shall be of approved quality acceptable to the type recommended by the manufacturer of the cable for which it is used and approved by the Department.
- iii.** Installation of all equipment shall also conform to the applicable Codes and practice as per the IS and shall be executed to comply with the latest Indian Electricity rules as regards the surely, earthing of equipments and other essential provision specified therein.
- iv.** Only approved make of cable be used. ICC and CCI will be preferred.
- v.** The cables shall generally be laid as per IS Code of Practice.

III. GENERAL RULES FOR CABLE LAYING :

- i.** Installation shall be carried out in a neat, workmen like manner by skilled experienced and competent workmen in accordance with the standard practices.
- ii.** Cables shall be laid preferably in one piece length to avoid joints. If straight joint are found necessary, these can be introduced with prior approval of the Engineer-in-charge. The cost of the straight joint however, shall not be borne by the Department. But in no case joint shall be within the conduit G.I. pipe and duct.
- iii.** proper care should be exercised in handling the cable to avoid formation of kink etc. and should it become necessary a cable be bent to a radius not less than 20 times the overall diameter of the cable.
- iv.** Method of installation, routing of cable etc., shall in every case be subject to the Department's approval and the Contractor shall modify and or certify at no extra cost to the Department any portions of the installation which do not meet with the Department's approval. All damages to the civil and other works on this account shall be made good by the Contractor at no extra cost to the Department.
The electrical Contractor while notifying the building Contractor for such work shall furnish the proper drawings, fully explaining the work involved or indicate at site actual work to be carried out as may be required by the building Contractor. The electrical Contractor shall also notify the building contractor in wiring, for finishing up as required, of any such work as soon as the electrical work with respect to the same has been completed.
- v.** Where cables pass through Hume pipes, Contractor shall fix hard wood bushed round the cables at the ends of Hume pipes. Where the cables pass through the floors or chambers and in such other situations as the Engineer shall require, the Contractor shall seal cable holes in a manner approved by Engineer-in-charge. Where cables pass through roads nallahs, etc., cables must be protected by Class 'A' Hume pipe of diameter not less than 6" (15 cm)
- vi.** The cable route shall be the shortest and there shall be minimum interference with built up areas, lawns etc.
- vii.** Care shall be exercised for providing suitable props for supporting other service lines on earth at the time of excavation. Where cutting of a lawn become inevitable it should be with the approval of the Engineer-in-charge.
- viii.** Excavation of the trenches shall be executed with vertical sides and the trenches shall be kept as straight as possible. The exact location of each trench shall be settled by the Engineer-in-charge on the site when the contractor is in a position to commence each portion of the work. The trench shall be not less than 1/2 meter wide and 90 cms deep. If more cables are to be laid, the width should be suitably increased.
- ix.** After the cables are laid, the trench shall be filled in layers, the earth in each layer being well rammed by spraying water and consolidated and sufficient allowance made for settlement. The extra earth over the trench should be removed from the place of trench to a place as decided by the Engineer-in-charge at site.
- x.** Ends of cables shall be properly sealed to prevent entry of moisture prior to installation.
- xi.** Where it is as specified as 1/2 core in multicore cables, the 1/2 core shall be a neutral conductor having reduced section.
- xii.** For all multicore cables each core and tails shall be brought out, marked and or coloured in an approved manner.
- xiii.** Cables termination shall be done with suitable compression brass glands in the case of PVC cables and cast iron trifurcating boxes in the case APLSTS cables. The armour should be connected to the right main earth in building with duplicate earth wires as per the relevant IS/BS specifications.

The core isolation over each conductor shall however be retained throughout the run of the conductor up to the end where lugs shall be fitted thereon for connections. The lugs shall be fitted by means of approved solder and flux as a lead, and Eyre No. 7 liberally used.

The joint shall be mechanically strong and pressure tested.

2.6 DISTRIBUTION BOARDS AND PANELS :

General Requirements :

- 2.6.1** All distribution panels shall comply with I.E.E. Rules 60-61. A clear distance of 0.91b meter in front of the switch board shall be kept. Where bare connections or attachments are provided at the back of the switch board the space behind the panel shall be either less than 0.299 meter or more than 0.762 main width. There shall be a passage way from the furthers outstanding part of any attachment or conductor. If the space behind the switch board exceeds 0.76 main width there shall be a passage way from either end of the switch board clear to height of 1.928 m width 0.299 m. All wiring connection shall be made neatly and securely.
- 2.6.2** For circuits carrying more than 10 Amps. tinned cable sockets shall be used. All connections shall be so made as to form their own diagram. Circuit shall be clearly numbered to correspond to wiring diagram. Names of the distribution boards shall be painted as directed by the Engineer-in-charge. All the switch fuse units and isolators D.Bs. shall be complete with earthing lugs neutral bar link. H.R.C. fuses and of approved make.
- 2.6.3** Skeleton type panels shall have rigid framework adequately braced and supported. The switch and distribution boards shall be neatly arranged in the frame. The details of the framework and the arrangement of switches shall be got approved by the Engineer-in-charge before the panel is fabricated.
- 2.6.4** All cubical type panels shall have rigid supporting frames adequately braced over which sheet metal shall be neatly secured. All switches, distribution boards etc. shall be neatly arranged on the panels and all connections made from the back of switches. The panels shall be rendered dust and vermin-proof. The interior of the panels shall not be accessible to unauthorized persons.
- 2.6.5** The recess type boards shall be embedded in wall in a cupboard with a metal hinged door with locking arrangement. In all recessed conduit work in distribution boards shall be recessed. Where recessing is not possible, free standing panel may be provided as approved by the Engineer-in-charge.
- 2.6.6** All individual components i.e. switch fuse units D. Bs. etc. shall be connected by earth continuity wire of appropriate size with the main earth bus of the panel D. B. etc. The panel switches or D.Bs. shall be earthed by not less than 2 distinctive paths to earth. Earthing of metallic parts of exposed metal shall not be effected through any structural metal work which houses the installation. Where metallic parts are not required to be earthed and are liable to become alive should the installation of the contractor become defective such metallic parts shall be separated by durable non-conducting material from any structural work.
- (a)** power panels shall be 3 phase, 4 wire, 400/230 volts for the distribution of 3 phase or single phase power loads. Lighting panels shall be 3 phase, 4 wire 400 230 volts for single phase lighting load distribution on all 3 phase.
 - (b)** All panels shall be done or protected front type with no mechanical or electrical defects.
 - (c)** Bus bars shall be of electrolytic copper or aluminium as specified and the properly tinned sizes as indicated on applicable drawings as required.
 - (d)** All knockouts for branch circuits, conduit entries shall be drilled in and files as required. For lighting panels the top and bottom cover plates shall be removable type.
 - (e)** Main disconnects device for all panel boards shall be of switches of disconnect type and of the size as indicated. It shall be mounted directly below the panel or through a short thread conduit of required size.
 - (f)** The main disconnect for all panel boards shall have an entry suitable for PVC armoured cable from bottom.
 - (g)** All panel boards shall be provided with an earthing terminal and plug for connection to the grounding system.
 - (h)** Temperature rise of all electrical parts shall not be more than 300⁰ C with full load measured at room temperature.
 - (i)** Buses shall be securely supported so that ordinary vibrations will not cause any of the parts to become loose.
 - (j)** All barriers and supports of current carrying parts shall be of moisture resistant insulating material and shall not be adversely affected by arcing.
 - (k)** The locations of panels shown in the drawings are only tentative. Panels may be located at place approved by the Engineer-in-charge.
 - (l)** All civil works connected with fixing such as grouting chasing and making good shall be the tenderer's responsibility.

- (m) Wires adequate capacity with proper size of lugs shall be used for interconnections.
- (n) Panel should be self-supported on angle channel iron framework. It should be preferably of bolted construction in case of transportation and flexibility. The frame shall be of the required size for the mounting of the equipment on it. It shall be bolted or grouted rigidly after levelling and alignment.
- (o) The cupboard and D. B. should be of such size so as to be accommodated in the existing room as per I. S. rules and I. S. codes of practice for installations of medium voltage switchgear.
- (p) Fabrication drawing showing the detailed dimensions and panels and its components indicating the frame work earthing positioning of switches, D. Bs. cable boxes, adopter chambers etc. shall be furnished to the Engineer-in-charge. Panel should be guaranteed for satisfactory operations for a period of one year after handing over.
- (q) The panel should be painted with anticorrosive paint suitable for humid and salty atmosphere on two coats of primer.

Switch Gears, Powers Panels D. B. and S. F. Us.

2.6.8 The main bus bar shall have continuous current rating as specified with neutral bar having half of full load rating of the phase bus bar. The sizes of the bus bars shall be so selected that the current density in bar does not exceed 150 amps. per sq.mm. for copper. The length of bus-bar chamber should be as suitable length to fix all the switches etc. as per prevailing standards. Clear spacing of two adjacent buses shall be 1.1/2" Minimum bar should be taped all along with colour coated 11 KV grade PVC tape. The maximum internal support for each unsupported length shall exceed 600 mm.

The bus bar shall be of copper/aluminium and fabricated to the relevant standards specification. In case aluminium bus bar is used special with high conductivity aluminium bus bar alloy E 91 C frame conforming to E. S. S. 2898 shall be used. The current density shall not exceed 800A per sq. inch. Hylam barriers will be provided over the joints to prevent any short circuit.

The bus bar enclosing shall be made out of not less than 16 gauge M. S. sheets construct on with angle iron support. All interconnections between bus bars S. F. Us. and D. Bs. shall be of adequate size and details of such interconnection shall be furnished to the Engineer-in-charge for his approval.

The bus bar shall be air insulated extensible type rectangular one. The bus bars chamber shall be dust tight by providing gaskets secured properly so as to tender it vermin proof.

The Combination Fuse-switch unit should comply with IS 4064 BS 861 and BBS 2510 wherever applicable. It should be suitable to accommodate High Reputing Capacity Cartridge Fuse links complying with IS 2208 or BS 88 and having certified returning capacity of not less than 35 MVA at 440 volts (AC5 duly). The switch gear (panels D. Bs. etc.) shall be installed generally as per IS-Part I 3072 and as specified and shown in drawings.

All fuse switch units shall be provided with non-deteriorating HRC fuse links complying with IS 2208-1962 and having rupturing capacity of 35 MVA at 415 volts or as specified.

All switches above 60 amps. rating shall be provided with suitable size adapter boxes. All switches mounted on the top of the busbars shall be provided with detachable type reverse entry adapter boxes. Suitably engraved labels shall be provided for each circuit as well as for the board.

A meter with sector switches and LMH metre shall be provided where specifically mentioned. Small wiring for the inter-connecting shall be colour coded and provided with numbered figures for easy identification of circuits.

- (a) The distribution boards should be totally enclosed metal clad complying with B. S. 214. The M. S. sheet steel enclosures for recessed D. Bs. shall be of not less than 14 gauge.
- (b) The D. B. shall be with hinged door and the locking arrangements as approved by the Engineer-in-charge.
- (c) All the components shall be enclosed in the enclosure. The mounting of D. B. shall be got approved by the Engineer-in-charge before carrying out the installation.
- (d) The D. Bs. shall have proper size cut outs for conduits entry or cable entry or cable entry as required and these shall be made on site.
- (e) Adequate spacing shall be provided inside the D. Bs. for easy removal of the fuses and carry out the interconnection.
- (f) A set of insulating barriers have to be provided between incoming breakers switches and fuses.

Switch fuse Units :

- (a) All the D.P.T.P. and T.P.N. switch fuse units shall be totally enclosed iron clad quick make, quick break type to best Indian make conforming to the I.S. or B.S. 3185 specifications. All the switch fuse units shall have mechanical interlock with a door so that the door

cannot be opened when the switches are in 'ON' position. The switches should be of double break isolation type to ensure safely.

- (b) Each T.P. & T.P.N. switch fuse unit shall be earthed with two distinct earth connections.
- (c) Suitable insulator shall be provided between phase.
- (d) There shall be suitable natural link in the fuse box.
- (e) All T. P. & T.P.N. switch fuse units shall be rated for 500 volts and D.P. (required for single phase supply) and S.P.N. switches for 250-volts.
- (f) The H.R.C. cartridge fuse shall conform to H. S. 88 (1952).

The O.C. Bs. ACB shall be suitable for 400/440 volts 3 phase 50 cycle supply capable of interrupting a fault MVA. of not less than 31. The circuit breaker shall conform to the BSS-936-1940 BSS 3659 with such tripping arrangements as may as required under special specifications for the building. Efficient and fool-proof mechanical interlocking shall be provided for the safe operation and maintenance. The rate shall be inclusive of the first filling of oil.

2.7 Instrumentation :

The instruments and meters wherever shall be housed in special sheet steel box located between switch fuses units and bus bar chambers. The instruments etc. shall be mounted on the hinged cover with their dial flushed. All instruments shall have protective H. R. C. fuse links. All interconnections and small wiring shall be neatly dressed arranged and duly coloured for easy identification of circuits.

Meters shall be provided as required in the Schedule. Meters shall be dead head and be suitable for 400/440 volt 3 phase 4 wire 50 cycles (in balanced load) supply.

Each selector switch shall be 3 point and of minimum 250 volts grade with silver tippe contacts suitable for metering circuits. Current transformer shall be of 5VA burden and 250V grade. Every unit shall be prewired and interconnected to the system for its required indicating performance. Indicating Lamps shall have independent circuit fuse.

2.8 FIXING OF LIGHTING FIXTURES :

1. Location of fixtures their manner of fixing mounting height etc. indicated in relevant drawing. Actual location and levels shall however be arrived at site in co-ordination with other services etc. and prior approval of the Engineer-on-charge regarding the actual location, manner of fixing shall be obtained before the work is taken up in hand.
2. In all cases the Contractor shall provide necessary interconnection wiring earthing painting etc. all necessary for complete installation. The Contractor shall also test and commission the fixtures during completion of the work.
3. General arrangement of fixtures layout ins indicated in drawings. Care shall be taken to see that all light fixtures are in a row in a room or particular area, are in absolute line and plump and are symmetrically disposed with respect to finished surfaces of walls columns beams etc.
4. The inter-connections wiring from the light outlet point up to the fixture shall be carried out by means of flexible copper wire of section not less than 1.5 mm².
5. All fixtures suspended by means of conduits shall be done with all and socket joints or as per approved design.

2.9 Telephone System :

1. Empty conducting shall be done, reseed or exposed to surface along with pull boxes, junction boxes and telephone outlet boxes, in areas and location as indicated in the relevant drawing as per materials and methods as described in regard to conducting under section "Wiring in Conduits" except the G. I. pull wires of gauge not less than 20 SWG shall be kept pulled through conduits in all sections so that in future telephone wires can be pulled easily.
2. Location shown on the drawing are approximate and final location shall be decided in the field by the Engineer-in-charge.

SECTION - G
SPECIFICATION FOR EARTHING

1. Installation of Earthing Plates :

All installation of earthing shall conform to Indian Electricity Rules, IS-3043 latest edition and I.E.E. The copper earth plates should be tinned before installation. The earth plates of copper 60 cm x 60 cm x 3.515 mm thick size as mentioned in the schedule should be in separate pits at least 150 cms to 300 cms. away from the building at a depth necessary to reach moist earth surface but with a minimum depth of 2.5 mtr from the finished ground level up to the top vertical edge of earth electrode. The earth plate shall be thoroughly cleaned to remove all dirt from the surface and be tinned properly for electrical contact with the main ground. Each earth pit should be provided with 38 mm. dia. G.I. pipe 2.5 Mts. long or more depending upon the depth of pit over the vertical edge of earth plate (with top end of pipe provided with a closed to coupler). Alternative layers of salt and coke shall be provided surrounding the plate. The pits shall be filled when the plates are in position and with type approval of Engineer-in-charge.

To facilitate watering the pit, a concrete compartment should be made with funnel with mesh and cover plate as per rules provided in ISI regulations. The masonry enclosures shall be 25 cm x 25 cm (deep) with C. I. lid of 23 cm x 30 cm size. After installation, the earthing resistance of each earth plate should be measured by resistance meggar in the presence of Engineer-in-charge, three days after the completion of earthing work, and the value should conform to regulations.

**Signature of
The Contractor**

**Signature of
EXECUTIVE ENGINEER
BUILDING DEPARTMENT
BHAVNAGAR MUNICIPAL CORPORATION
BHAVNAGAR**

BHAVNAGAR MUNICIPAL CORPORATION

**EXECUTIVE ENGINEER
BUILDING DEPARTMENT
BHAVNAGAR MUNICIPAL CORPORATION
BHAVNAGAR**

**CONSTRUCTION OF NEW CATTLE BOX NEAR SHRI BALA
HANUMAAN TEMPLE- AIR PORT ROAD, BHAVNAGAR**

SECTION- VI

**MATERIAL SPECIFICATIONS
&
I.S. CODES**

LIST OF I.S. CODES

Materials used shall conform to appropriate standards specified by the Bureau of Indian Standards and unless otherwise specified, these standards will form a part of these specifications. In particular, the following or latest standards should be referred to

AGGREGATE:

IS: 383-1970	Coarse And Fine Aggregate From Natural Sources For Concrete
IS: 515-1959	Natural And Manufactured Aggregates For Use In Mass Concrete
IS: 1607-1977	Methods For Test Sieving
IS: 2386	Methods of Test For Aggregates For Concrete
Part-I-1963	Particle Size And Shape
Part-II-1963	Estimation of Deleterious Materials And Organic Impurities
Part-III-1963	Specific Gravity, Density, Voids, Absorption And Bulking
Part-IV-1963	Mechanical Properties
Part-V-1963	Soundness
Part-VI-1963	Measuring Mortar Making Properties of Fine Aggregates
Part-VII-1963	Alkali Aggregate Reactivity
Part-VIII-1963	Petrographic Examination

CEMENT:

IS: 269-1989	33 Grade Ordinary Portland Cement
IS: 455-1989	Portland Slag Cement
IS: 1489-1991	Portland Pozzolana Cement
IS: 4031-1999	Methods of Physical Tests For Hydraulic Cement
IS: 4032-1985	Method of Chemical Analysis of Hydraulic Cement
IS: 4082-1996	Stacking And Storage of Construction Materials And Components At Site
IS: 8041-1990	Rapid Hardening Portland Cement
IS: 8043-1991	Hydrophobic Portland Cement
IS: 8112-1989	43 Grade Ordinary Portland Cement
IS: 9103-1979	Admixtures For Concrete
IS: 12269-1987	53 Grade Ordinary Portland Cement
IS: 12330-1988	Sulphur Resisting Portland Cement

REINFORCED CONCRETE AND PRESTRESSED CONCRETE:

IS: 432 - 1982	Mild Steel And Medium Tensile Steel Bars And Hard-Drawn Steel Wire For Concrete Reinforcement.
IS: 456-1978	Code of Practice For Plain And Reinforced Concrete
IS: 516-1959	Method of Test For Strength of Concrete
IS: 816-1969	Code of Practice For Use of Metal Arc Welding For General Construction In Mild Steel
IS: 1139-1966	Hot Rolled Mild Steel Medium Tensile Steel And High Yield Strength Steel Deformed Bars For Concrete Reinforcements
IS: 1199-1959	Methods of Sampling And Analysis of Concrete
IS: 1343-1980	Code of Practice For Prestressed Concrete
IS: 1566-1982	Hard Drawn Steel Wire Fabric For Concrete Reinforcement
IS: 1785-	Plain Hard Drawn Steel Wire For Prestressed Concrete
Part-I-1983	Cold Drawn Stress Relieved Wire
Part-II-1983	As Drawn Wire
IS: 1786-1985	High Strength Deformed Steel Bars And Wires For Concrete Reinforcement
IS: 2090-1963	High Tensile Steel Bars Used In Prestressed Concrete
IS: 2751-1979	Recommended Practice For Welding of Mild Steel Plain And Deformed Bars For Reinforced Construction

IS: 3370-1965	Code of Practice For Concrete Structures For The Storage of Liquids
IS: 4925-1968	Concrete Batching And Mixing Plant
IS: 4926-1976	Ready Mixed Concrete
IS: 5525-1969	Recommendations For Detailing of Reinforcement In Reinforced Concrete Works
IS: 5892-1970	Concrete Transit Mixers And Agitators
IS: 6006-1983	Uncoated Stress Relieved Strand For Prestressed Concrete
IS: 9077-1979	Code of Practice For Corrosion Protection of Steel Reinforcement In RB And RCC Construction
IS: 9103-1979	Admixtures For Concrete
IS: 10297-1982	Code of Practice For Design And Construction of Floors And Roofs Using Precast Reinforced / Prestressed Concrete Ribbed Or Cored Slab Unit
IS: 13620-1993	Fusion Bonded Epoxy Coated Reinforcing Bars

BRICK MASONRY:

IS: 1077-1992	Common Burnt Clay Building Bricks
IS: 1725-1982	Soil Based Blocks Used In General Building Construction
IS: 1905-1987	Code of Practice For Structural Use of Un-Reinforced Masonry
IS: 2180-1988	Heavy Duty Burnt Clay Building Bricks
IS: 2185-1979	Concrete Masonry Units: Hollow And Solid Concrete Blocks
Part-I-1983	Hollow And Solid Light Weight Concrete Blocks
Part-II-1984	Autoclaved Cellular Aerated Concrete Blocks
IS: 2212-1991	Code of Practice For Brick Work
IS: 5482-1969	Autoclaved Cellular Concrete Blocks
IS: 5751-1984	Specification For Precast Concrete Coping Blocks
IS: 10360-1982	Lime-Pozzolana Concrete Blocks For Paving

LIME AND MORTAR:

IS: 712-1984	Building Limes
IS: 1624-1986	Method of Field Testing of Building Lime
IS: 1625-1971	Code of Practice For Preparation of Lime Mortar For Use In Buildings
IS: 1635-1992	Code of Practice For Field Slaking of Building Lime And Preparation of Putty
IS: 1861-Part-I (Sect.1) 1990	Guide For Manufacture of Lime In Vertical Mixed-Feed Type Kilns: From Lime Stone
IS: 1861- Part-II-1977	Guide For Manufacture of Lime In Vertical Mixed-Feed Type Kilns: From Lime Shell
IS: 4832	Specification For Chemical Resistant Mortars
Part-I-1969	Silicate Type
Part-II-1969	Resin Type
Part-III-1968	Sulphur Type

DOORS AND WINDOWS:

IS: 1003-	Timber Panelled And Glazed Shutters
Part-I-1991	Doors Shutters
Part-II-1994	Windows And Ventilators Shutters
IS: 1081-1960	Code of Practice For Fixing And Glazing of Metal (Steel And Aluminium) Doors, Windows & Ventilators
IS: 1361-1978	Steel Windows For Industrial Buildings

IS: 1948-1961	Aluminium Doors, Windows And Ventilators
IS: 2191	Wooden Flush Door Shutters (Cellular And Hollow Core Type)
Part-I-1973	Plywood Face Panels
Part-II-1966	Steel Door Frames

FLOOR AND FLOOR FINISHING:

IS: 658-1982	Code of Practice For Magnesium Oxychloride Composition Floors
IS: 777-1988	Glazed Earthenware Wall Tiles
IS: 1196-1978	Code of Practice For Laying Bitumen Mastic Flooring
IS: 1197-1970	Code of Practice For Laying of Rubber Floors
IS: 1443-1972	Code of Practice For Laying And Finishing of Cement Concrete Flooring Tiles
IS: 2114-1984	Code of Practice For Laying- In-Situ -Terrazzo Floor Finish
IS: 2792-1964	Code of Practice For Design And Construction of Stone Slab Over Joist Floor
IS: 3365-1965	Floor Polishing Machines
IS: 4971-1968	Recommendations For Selection of Industrial Floor Finishes

ROOF AND ROOFING MATERIAL:

IS: 459-1992	Corrugated And Semi Corrugated Asbestos Cement Sheets
IS: 730-1978	Hook Bolts For Corrugated Sheets Roofing
IS: 1661-1972	Code of Practice For Application of Cement And Cement Lime Plaster Finishes
IS: 2115-1980	Code of Practice For Flat-Roof Finish: Mud Phuska
IS: 2118-1980	Code of Practice For Construction of Jack Arch Type of Building Floor Or Roof
IS: 2119-1980	Code of Practice For Construction of Brick-Cum-Concrete Composite (Madras Terrace) Floor or Roof
IS: 2204-1962	Code of Practice For Construction of Reinforced Concrete Shell Roof
IS: 2527-1984	Code of Practice For Fixing Rainwater Gutters And Down Pipes For Roof Drainage
IS: 3007	Code of Practice For Laying of Asbestos Cement Sheets
Part-I-1964	Corrugated Sheets
Part-II-1965	Semi Corrugated Sheets
IS: 3036-1992	Laying Lime Concrete For A Waterproofed Roof Finish - Code of Practice

WATER SUPPLY PIPES AND DRAINAGE:

IS: 458-1988	Precast Concrete Pipes (With And Without Reinforcement)
IS: 553-1984	Resin (Gum Resin)
IS: 651-1992	Salt Glazed Stoneware Pipes And Fittings
IS: 729-1979	Specification For Drawer Locks, Cupboard Locks And Box Locks
IS: 778-1984	Copper Alloy Gate, Globe And Check Valves For Water Works Purposes
IS: 780-1984	Sluice Valves For Water Works Purposes
IS: 781-1984	Cast Copper Alloy Screw-Down Bib Taps And Stop Valves For Water Services
IS: 782-1978	caulking Lead
IS: 783-1985	Code of Practice For Laying of Concrete Pipes
IS: 784-1978	Prestressed Concrete Pipe (Including Fittings)
IS: 1172-1993	Code of Basic Requirements For Water Supply, Drainage And Sanitation
IS: 1239-1992	Mild Steel Tubes, Tubulars And Other Wrought Steel Fittings
IS: 1536-1989	Centrifugally Cast
IS: 1537-1976	Vertically Cast Iron Pressure Pipes For Water, Gas And Sewage
IS: 1592-1989	Asbestos Cement Pressure Pipes
IS: 1626-1994	Asbestos Cement Building Pipes And Pipe Fittings, Gutters And Gutter Fittings And Roofing Fittings

IS: 1726-1991	Cast Iron Manhole Covers And Frames
IS: 1742-1983	Code of Practice For Building Drainage
IS: 1952-1963	Methods of Chemical Analysis of Nickel Anodes
IS: 2065-1983	Code of Practice For Water Supply In Buildings
IS: 2470-1985	Code of Practice For Installation of Septic Tanks
IS: 2556-1994	Vitreous Sanitary Appliances (Vitreous China)
Part-I-1994	General Requirements
Part-II-1994	Specific Requirements of Wash Down Water Closets
Part-III-1994	Specific Requirements of Squatting Pans
Part-IV-1994	Specific Requirements of Wash Basins
Part-V-1994	Specific Requirements of Laboratory Sinks
IS: 2556-1995 PART-VI	Specific Requirements of Urinals And Partition Plates
Part-VII-1995	Specific Requirements of Accessories For Sanitary Appliances
Part-VIII To XV	Wash Down Water-Closets, Bidets, Foot Rests, Shower-Rose, Xv Foot Traps For Squatting Pans, Integrated Squatting Pans, Universal Water Closets
IS: 2692-1989	Ferrules For Water Services
IS: 2963-1979	Specification For Copper Alloy Waste-Fittings For Wash Basins And Sinks
IS: 3114-1994	Code of Practice For Laying of Cast Iron Pipes
IS: 3597-1998	Concrete Pipes - Method of Test
IS:4111-1986	Code of Practice For Ancillary Structures In Sewage System
Part-I-1986	Manholes
Part-II-1967	Flushing Tanks
Part-III-1967	Inverted Siphon
Part-IV-1968	Pumping Stations And Pumping Mains (Rising Main)
IS: 4127-1983	Code of Practice For Laying of Glazed Stoneware Pipes
IS: 4984-1995	High Density Polyethylene Pipes For Water Supply
IS: 5531-1988	Cast Iron Specials For Asbestos-Cement Pressure Pipes For Water, Gas And Sewage
<u>STRUCTURAL STEEL:</u>	
IS: 226-1975	Structural Steel (Standard Quality)
IS: 412-1975	Expanded Metal Steel Sheets For General Purpose
IS: 800-1984	Code of Practice For General Construction In Steel
IS: 801-1975	Code of Practice For Use of Cold Formed Light Gauge Steel Structural Members In General Building Construction
IS: 806-1968	Code of Practice For Use of Steel Tubes In General Building Construction
IS: 807-1976	Code of Practice For Design, Manufacture Erection And Testing (Structural Portion) Cranes And Hoists
IS: 814-1991	Covered Electrodes For Manual Metal Arc Welding of Carbon And Carbon Manganese Steel
IS: 816-1969	Code of Practice For Use of Metal Arc Welding For General Construction In Mild Steel
IS: 817-1966	Code of Practice For Training And Testing of Metal Arc Welders
IS: 822-1970	Code of Procedure For Inspection of Welds
IS: 919-1993	ISO System of Limits And Fits
IS: 961-1975	Structural Steel (High Tensile)
IS: 1148-1982	Hot Rolled Steel Rivet Bars (Up To 40 Mm Dia.) For Structural Purpose

IS: 1149-1982	High Tensile Steel Rivet Bars For Structural Purposes
IS: 1161-1998	Steel Tubes For Structural Purposes
IS: 1181-1967	Qualifying Tests For Metal Arc Welders
IS: 1367-1980	Technical Supply Conditions For Threaded Steel Fasteners
IS: 1393-1961	Code of Practice For Training And Testing of Oxy-Acetylene Welders
IS: 1442-1964	Covered Electrodes for Metal Arc Welding of High Tensile Structural Steel
IS: 1608-1995	Mechanical Testing of Metals - Tensile Testing

IS: 1977-1996	Low Tensile Structural Steel
IS: 2062-1992	Steel For General Structural Purposes

MISCELLANEOUS:

IS: 1020-1963	Conversion Tables For Ordinary Use
IS: 1200(PART-I TO XXV)	Mode of Measurements of Building Works And Civil Engineering Works
IS: 1255-1983	Code of Practice For Installation And Maintenance of Power Cables up to And Including 33 KV Rating
IS: 1256-1967	Code of Practice For Building Byelaws

SPECIFICATIONS - MATERIALS

GENERAL:

The contractor under this contract commits himself to use best quality material and assume full responsibility for the quality of all material incorporated or brought for incorporation in the work. The work shall be executed in accordance with the best engineering practice and as per instructions of Engineer-in-Charge. All materials shall conform to respective Indian Standards.

Contractor shall allow in his rates for all the wastages in all the materials.

1. **WATER:**

Water shall be potable, fresh, clean, and free from impurities and chemicals injurious to the work and be from an approved source. Contractor shall provide and maintain sufficient storage accommodation for the water as and where directed by Engineer-in-charge.

2. **EARTH:**

For filling and terracing, the earth shall be free from all rubbish, organic or vegetable growth including roots, seeds, etc. and be approved by the Engineer-in-charge. All clods shall be broken down. **Black cotton clayey soil or any expansive soil shall not be used for any filling work, under any circumstances.**

3. **LIME:**

The lime shall be best hydraulic lime or of quality, approved by the Consulting Engineer / Engineer-in-charge, obtained by burning kankar properly and shall be free from unburnt pieces, ashes and other injurious impurities. It shall be brought on site in unslacked condition and shall be slacked in fresh sweet water and ground in a mortar mill at site as per the instructions of Engineer-in-charge, lumps removed and be protected against the admixture of extraneous matter such as earth, leaves and seeds. Where the particular brands of lime are required, it will be specified in the Bill of Quantities for the respective items.

After slaking, the lime should be screened through a screen of 2mm mesh; unslacked lime weighs about 1060 Kg. per Cmt. It expands on slaking and then weighs about 640 Kg. per Cmt. when fresh, increasing to about 800 Kg. per Cmt. after 10 days. This gives a test for freshness.

Lime that is more than 14 days (or shorter period as may be decided by Engineer) old after slaking shall be rejected.

All lime that has been in any way damaged by rain, moisture, dust or any other causes will be rejected, and all that has been rejected must be removed from the site of works within 24 hours of its rejection.

4. **SAND:**

Sand shall be from river or from any other source approved by the Consulting Engineer / Engineer-in-charge and shall be dry, clean, sharp, coarse and free from salt, earth and such other impurities. It shall be washed with clean water. The soluble contents shall not exceed 0.5% by weight if tested by settlement in water. For concrete work, the sand shall be coarser than for masonry work. Sand shall be used after screening as directed by the Engineer-in-charge.

The sand shall conform to IS: 383-1970, fineness modulus shall not be less than 2.5.

5. **BRICKS:**

The bricks shall be 1st class bricks and of uniform size (9" x 4 1/2" x 3"). Alternatively bricks as per IS: 1077-1976, clause 5.1, the standard size of which is (19 cm x 9 cm x 9 cm), and which shall be table moulded from approved kilns of quality approved by the Engineer-in-charge, shall be used.

It shall be well evenly burnt for getting brick which are sound, hard and with sharp edges and corners, and which shall give a ringing sound when struck with a metal. It shall be free from the grit and other impurities such as lime, iron and deleterious salts. No brick with 24 hours of immersion in water shall absorb more than 20% of its weight. Common buildings bricks shall have compressive strength of 50 Kg./Sq. Cms., unless otherwise specially permitted.

6. **SURKHI:**

Surkhi shall be prepared from 2nd class bricks as above or brickbats of the same bricks by grinding them to a fine powder with an electrical or animal driven grinding mill. The quality shall conform to IS: 1344. Surkhi shall be stored in weather proof shed and on a brick paving.

7. **NEEROO:**

Neeroo shall be made out of the best quality of hydraulic lime, slacked with fresh water and heated. The lime shall be reduced to fine powder by grinding in a mortar mill with 160 turns.

8. **STONE:**

Stone for masonry shall be the best of its kind, sharp, angular, free from flakes and cavities and of quality approved by the Architect. No discoloured, weathered or water worn stone shall be used.

Stone in foundation shall be from local quarries or from any other place as approved by the Architect,

All stones for outside stone work shall be the best of its kind, sound, durable, free from flaws, cracks, veins, crystals, minerals, salt, cavities or other defects and shall be of uniform texture. All stones shall be properly bonded in the work.

9. **COARSE AGGREGATE:**

This shall be machine crushed from hard (granite) trap stone, grading of aggregate shall be within the limits to produce a dense mix, and shall conform to IS: 383 & IS: 515; mix will work into position without segregation and without excessive quantity of water being required. It also shall be strong and durable and shall be free from any clay films and other adherent/coating. It shall be washed with clean water if required by the Engineer-in-Charge.

This shall be well graded between the limit as specified in the items of the work and the grading tests shall be carried out. Aggregates shall be screened, if required by Engineer-in-Charge to obtain proper proportion to his approval. The quality shall conform to IS: 383-1970.

10. **CEMENT:**

Portland Pozzolana Cement conforming to IS-1489-1976 and/or Ordinary Portland Cement conforming to IS: 269-1976 shall be used. Twenty bags of the cement shall be taken to weigh one tonne i.e. cement shall have unit weight of 1,440 kg/m³. It shall be stored in a dry place and on higher ground on watertight platform and shall be protected from moisture while in store. Cement, which is moist before use, will not be allowed to be used at all.

Test certificates to show that cement is fully complying with the specification shall be submitted to the Architect/Consulting Engineer and notwithstanding this, the Architect/Consulting Engineer may at his discretion, order that the cement brought on site and which he may consider damaged or of doubtful quality, for any reason whatsoever, shall be retested in approved testing laboratory and fresh certificates of its soundness shall be produced. Cement ordered for retesting shall not be used for any work, if results of such retests are pending.

Daily record of the cement brought to the site and consumed and balance in the works must be maintained properly.

11. **SCAFFOLDING:**

Scaffolding shall consist of the sal wood bullies and necessary battens and planks. All members before installation shall be checked for their strength and stiffness and tied up properly. Steel scaffolding may be used as directed by Engineer-in Charge. When necessary, during the construction, scaffolding and planks may be supported on/in the wall and these shall be fixed and tied together. In case of finishing work such as plastering, painting and distempering, no part of the scaffolding should touch the structure. Timber members shall be replaced from time to time with new timber as necessary and directed.

12. **FORM WORK:**

All props, planks, plates, braces, ties, bolts, wedges etc. shall be provided and all form work shall be sufficiently strong and sound for the purposes.

Formwork shall be thoroughly cleaned with wire brush etc. after use and oiled (with fresh and clear oil) or greased each time before use.

Wooden formwork shall be replaced from time to time with new timber as necessary and steel plates shall be got repaired from time to time.

For all exposed work, all the forms of fresh and raw steel shall be used as per pattern given by Consulting Engineers/Architects for the various members of the structure.

For wooden formwork, type of the timber as specified in the Bills of Quantities shall be provided.

All the formwork provided by the Contractor shall be approved by Engineer-in-Charge before use and the Contractor shall be allowed to use approved formwork only.

13. **REINFORCING STEEL:**

Mild Steel Reinforcing bars shall comply with the IS 432-1966. The surface of reinforcement bars shall be free from rust, oil, grease, dirt, paint or other deleterious matter. High Strength Corrosion Resistant Steel (CRS) having more elongation than CTD bars manufactured by Tata Steel or Thermo Mechanically Treated (TMT) bars manufactured by SAIL shall be used as specified / approved.

14. **STRUCTURAL STEEL:**

Structural steel shall be mild steel rolled sections and plates conforming to the latest Indian standards IS:226-1962. The steel shall be free from loose rust, mill scale, fissures etc. The steel with fissures are to be rejected.

15. **TIMBER:**

Timber shall be seasoned and of the best teak available or as specified in the Bills of Quantities and of the best description, perfectly dry, well seasoned, uniform in colour, free from sap wood and wraps, sound, straight, free from large and loose knots, cracks, shakes and other defects and any appearance of rot. It shall not be placed in position covered in the wall or ground unless Architects have approved it.

Timber shall be considered as well seasoned, if its moisture content does not exceed the following limits:

- (i) Timber for frames - 14%
- (ii) Timber for planking, shutters etc. - 12%

16. **HOLDFASTS:**

Holdfasts for Doors and Windows, with steel or timber frame, shall be of M.S. flats, 6mm thick and 30mm wide, one end fish detailed and other end turned down 75mm with two holes for screws complete with 37 mm. long screws or machine bolts.

17. **NAILS ETC:**

Nails and staples shall be of hard drawn galvanised wire.

18. **BOLTS, NUTS ETC.:**

Bolts, nuts, holdfasts, etc. shall be of mild steel painted with Bitumen based paint, as specified, before fixing. Threads of bolts, nuts and washers shall be truly fitting and shall be painted with zinc chromate before fitting the nuts.

19. **SCREWS:**

Screws shall be of make as approved and specified.

20. **PAINTS:**

Filler, primer, enamels, paints and varnishes and external finishing application to cement plaster shall be of an approved best quality, propriety brand. Distemper shall be either water bound or oil bound as stated in the Bills of Quantities. These shall be in sealed drums or the packages and shall be of approved brand.

21. **GLASS:**

Glass shall be sheet glass or plate glass having uniform refractory index and shall be of best quality. This glass shall be plain clear glass, ground glass figured glass or wired glass of approved make.

Glass shall be free from waviness, bubbles, scratches, etc.

The thickness of the glass shall be as under:

Panel up to 0.84 Smt.	4.0 mm thickness
Panels above 0.84 Smt. to 1.20 Smt.	5.5 mm thickness

Glass to be fixed with -

- (i) Teakwood beading of approved shape with screws of approved make and size.
- (ii) Aluminium beading of approved shape and size with approved make and size of screws and Neoprene rubber gaskets of approved quality.
- (iii) Putty of approved make and with approved wire clips pulley to be provided for full length of glass on all periphery.

The minimum consumption of whitening should be as follows:

Size of rebated sash	10x15mm	10x20mm to 15x15mm	15x20mm	Beading patty
Consumption in Kg. Per 10 Rmt. of sash bar	1.50	1.53	2.30	0.90

Where no glazing beads are used, 0.013 Kg. of wire clips are required as per 10 Rmt. of rebated sash.

22. **PUTTY:**

Glazier's putty should meet the following requirement. Putty, which does not meet with the following requirement, will be rejected.

- (i) It should have sufficient plasticity. A thread rolled from good quality putty will show well pronounced necking before rupture in tension while that of unsound quality putty will break without necking.

- (ii) It should be adequately soft so that it can readily be placed on rebates for glass and glazing beads and stick well to glass, wood, metal or concrete. It shall be suitable for filling all spaces between the edges of rebate and the glass.
- (iii) It should readily come off when cut with a putty knife. It shall be easy to spread and show a smooth, brilliant surface after it has been shaped with the putty knife.
- (iv) It should neither peel off the rebate during application nor crack or crumble after drying. It should retain some elasticity upon drying to allow the glass to move if sash is deformed.
- (v) It should offer substantial resistance to water, frost and heat. It should dry within three days.

23. **METAL LATHING:**

Expanded metal Hy-rib weld mesh or similar metal lathing shall be of an approved manufacture and of the quality specified in the Bills of Quantities.

24. **WIRE MESH:**

Wire mesh to vents shall be brass wire or as specified in the Bill of Quantities and have a maximum of 250 meshes to a square inch.

25. **MANHOLE COVERS:**

Manhole cover shall be light or heavy-duty pattern, with double seal as approved and as specified in the Bills of Quantities.

26. **RAIN WATER DOWNTAKE:**

C.I. PIPES:

C.I. Pipes and fittings such as Bends and Tees, "Y" junction (inspection plugs wherever required for cleaning) shall be of approved make and having specified thickness and weight with inside smooth finish and out side painted with black paint of approved make.

The joints to be filled with Omaiseal multi purpose Epoxy Sealing Compound manufactured by Om Agro Industrial Plastics Pvt. Ltd., Bombay or equivalent approved sealing compound. Wooden spacers should be fixed to keep gap between vertical surface and pipes.

PVC Pipes:

PVC pipes shall be rigid PVC pipes and fittings such as bends, Tees, "Y" etc. manufactured as per IS: 4985 and having wall thickness for specified working pressure as per IS : 4985 and shall be of approved make. PVC pipes to be fixed to vertical surface of building with clamps fabricated from GI 30 mm x 3 mm flat, fixed at centre-to-centre distance not to exceed 24 times the diameter of pipes and G.I. screws. Wooden spacers should be provided (to be fixed) to provide gap between pipe and vertical surface of the building.

PVC pipes shall be UV resistant. The joining of pipes to be done with the solvent cementing method using solvent cement of approved manufacturer.

27. **SPECIAL MATERIALS:**

If materials of a particular brand are specified in the Bills of Quantities these shall be procured accordingly from approved manufactures. These shall include materials like bitumen, bituminous compounds, waterproofing compounds, hardening compounds, special paints, acoustic and insulation boards and other finishing materials. The responsibility for the use of these materials lies with the Contractor and he should avail himself of the necessary guarantees as may be required by the Architect and give the same to the Architect.

SPECIFICATIONS - TRADEWISE

- 1.0 **EXCAVATOR:**
- 1.1 **SITE CLEANING:**
All vegetables and deleterious soil shall be removed from the entire area to be covered and carted away from site, as directed, for which contractor will not be paid any extra. Site clearance shall be done 5 meters all around the proposed construction, without any extra cost.
- However, if in the opinion of the Consultants, growth of grass, wild grass, bushes etc. is heavy and/or if the bushes are of large size and spread over a large area, the decision regarding payment towards removal thereof will be resting with Consultants and will be binding to Contractor and client.
- 1.2 **EXCAVATION:**
The excavation to be carried-out under these specification shall consists of furnishing all the tools, plants, labour and materials required in carrying out excavation of different materials. The excavation shall be done to lines and levels defined and to the correct size of foundation concrete. This shall also include, where required, temporary sheet piling or sheathing, bracing and shoring used to maintain excavation, maintenance without interruptions to service lines such as cables, wires, duct lines, water supply, and/or drainage pipes encountered within the area of excavation or within reasonable distance of excavation and also the furnishing, creating and maintaining of substantial barricades around excavation areas, 'Red' lamps (in the night) & notice boards for ensuring safety. The Contractor shall immediately after beginning of excavation, put proper fencing all around the excavated pit as directed by the Engineer-in-Charge at his own expense and shall keep the same till all plinth work is completed. Contractor should get the excavation work inspected and approved by the Engineer-in-charge before any further works in excavation areas commence.
- The Contractor must take every precaution to maintain the earth surrounding the site in perfectly safe condition for the excavation. No excavated material or any other heavy load will be allowed to be imposed on the ground adjacent to any excavation. The Contractor should carryout the excavation work to the level spaces and dimensions as shown or figured on the drawings or as required by the Architects/Consulting Engineers to receive the concrete work.
- The term excavation as herein used shall include excavations, removal and transportation of the excavated materials to the dump areas, refilling the excavated earth in trenches, in general, when shown on the drawings, specified in detail for particular items or work mentioned herein after or as directed by the Engineer and will cover lead, lift and other items pertaining to and specified for this class of work, It shall also include dumping of excavated materials in regular heaps, bounds, riprap with regular slopes as directed by the Engineer and levelled so as to provide natural drainage. As a rule, all softer materials shall be laid along the centre of the heaps, the harder and more weather resisting materials forming the casing on the sides and the top. Where consolidation is specified, it is intended that the contractor shall use heavy road rollers for consolidating with water sprinkling, as directed.
- 1.2.1 **EXCAVATION IN ROCK:**
Excavation in hard rock/soft rock either by chiselling or blasting shall be measured by deposits and 40% deduction in the measurements of the deposits will be made, for voids, for the purpose of payment.
- 1.3 **EARTH FILLING IN PLINTH:**
Filling in plinth should be started after the building is constructed up to plinth. Before starting filling, debris or grass or organic matter is to be removed from plinth area. Filling should be done to the required level in layers not to exceed 200 mm in thickness with watering to Optimum Moisture Content. Each layer should be compacted with mechanical compactors/rollers to ensure 95% to 98% of the Maximum Modified Proctor Density. If the field density tests, which have to be conducted frequently, indicate that the compaction as prescribed is not achieved, the part of the filling should be removed and refilled or compacted further, to get the specified degree of compaction.
- 1.3.1 **EARTH FILLING WITH EXCAVATED EARTH:**
In this item, the earth which is available from item of excavation and which is approved by Engineer is to be used for filling work. For measurements purpose, ground levels shall be recorded before start of the work and finished levels after completion of the work. Rate of this item includes watering and consolidating and will be paid at the rate quoted against this item per cum. In no case refilling of trenches brick wall/Concrete work will be paid in this item, as this is included in the item of excavation.
- 1.3.2 **FILLING WITH APPROVED EARTH BROUGHT FROM OUT SIDE:**
In this item, earth to be used for filling is to be brought by the contractor from out side the premises and samples are to be got approved from the Engineer before using the same. Rate of this item includes excavation, loading, transporting, unloading, consolidating, watering, royalty and taxes if any etc.
- 1.3.3 **SAND FILLING:**
The sand shall be obtained from river or any other approved source and shall be filled in plinth or in zari in 150 mm layers, each layer shall be well watered, rammed, and consolidated before putting the next layer.
- 1.4 **CLASSIFICATION OF SOILS:**

All materials to be excavated shall be classified by the Engineer into one of the following categories or classes of materials and shall be paid for at the rate tendered for that particular class of materials. No distinction shall be made whether the material is dry or wet.

- (a) **SOIL:**
This shall include all soils, soft, medium and hard murrum, soft disintegrated rock, laminated rock, stiff clay, gravel etc. which can be excavated by ordinary pick, shovel, or the phawra, rake, or other ordinary digging implements. These shall also include chalkstone and rock fragments usually rounded or semi rounded having maximum diameter of 80mm to 300mm which can be loosened with application of picks or jumpers or scarifiers to loosen.
- (b) **SOFT DISINTEGRATED ROCK:**
Rock or boulders, which do not require blasting but can be quarried or split with crowbars, such as laterite and hard conglomerate
- (c) **HARD ROCK:**
This shall include all rocks occurring in large continuous masses which cannot be removed except by blasting for loosening it and where blasting is approved by the Engineer. Hard or varieties of hard rock with or without veins and secondary minerals, which in the opinion of the Engineer require blasting shall be considered as hard rock. Boulder of hard rock larger than 1 meter in any direction laying in over burden and required to be blasted for easy and efficient removal, shall also be included in hard rock.

Where levels for different soil strata cannot be clearly marked and defined, the contractor shall stack different soils of various classifications separately for measurement purpose and then disposing off as directed.

1.5 **STRIPPING BLUFFS AND LOOSE ROCK:**

All loose boulders, semi-detached rocks (along with earthy stuff which might move there with) not directly in the excavation but so close to the area to be excavated as to be liable, in the opinion of the Engineer, to fall or otherwise endanger the workmen, equipment or the work, etc. shall be stripped off and removed away from the area of the excavation. The method used shall be such as not to shatter or render unstable or unsafe the portion which was originally sound and safe. Any material not requiring removal as contemplated in the work, but which in the opinion of the Engineer is likely, later to become loose OR UNSTABLE SHALL ALSO BE PROMPTLY AND SATISFACTORILY REMOVED as directed by Engineer.

The cost of such stripping will be paid for at the accepted unit rates for the class of material,

1.6 **EXCAVATION IN SURCHARGE SLOPES:**

The side slopes in excavation shall be as steep as will stand safely in overburden, but shall not exceed those shown on the drawing without specific permission from the Engineer. The over burden shall be excavated to the lines and slopes marked of the drawing or as approved or directed by the Engineer, in writing and volume for the payment will be calculated accordingly.

The Contractor may for facility of work or similar other reasons, excavate, and also back fill later, if so directed by the Engineer, at his own cost, outside the line shown or at slope flatter than those marked on the drawings or approved or directed by the Engineer. But at any particular location, if the contractor considers it necessary, in the interest of safety to make the slope flatter, he shall forth with bring the same to the notice of the Engineer and obtain written orders thereof. Such additional excavation shall be paid for at the rates accepted as for excavation for the particular class of material. Every precaution shall be taken to prevent slips. But should a slip occur, the slipped material shall be removed to the modified slope or as directed by the Engineer. Removal of such material shall be paid for at the rate accepted in the quotations, unless it (the slip) is due to negligence of the Contractor.

NOTE: This is to be confirmed in writing, by the Owner/Consultant's, before commencement of the excavation work. Failing this, the measurements as per the correct dimensions of foundation concrete as per the drawings will be considered for payment.

1.7 **EXCAVATION IN OPEN CUTS:**

All the excavation in open cuts shall be made true to line, slopes and grades shown on the drawings. No material shall project within the dimension of the minimum excavation marked. Boulders projecting out from the excavated faces shall be removed, if in the opinion of Engineer, they are likely to be of hindrance to other works, flow of water etc. The hollows left out in the sides as a consequence of the above shall be paid for as excavation for the particular class of material as already classified.

Suitable beams shall be left at appropriate places with necessary approach ramps for installation of dewatering pumps or other purposes, as required and directed by the Engineer. These shall be excavated later and the excavation finished to the lines and grades shown on the drawings and to the satisfaction of the Engineer. No extra payment shall be made for formation of such berms or ramps, etc. except excavation when the same all within the minimum or modified excavation line.

In case of excavation in soil and overburden, where the surface is to be left excavated, or is to be covered by pitching, formation of rain cuts and gullies shall be avoided by provision of proper drainage. Any gullies formed

shall be made good, by properly packing with excavated soil (or excavated rock spoil) at contractors cost. All holes left by removing boulders will also be filled in with excavated earth (or excavated rock spoil) at no extra cost.

1.8 **EXCAVATION IN ROCK:**

After removal of the overburden, excavation shall be continued in the rock to the depths shown in the drawings and as directed by the Engineer. At all stages of excavation, precaution shall be taken to preserve the rock below and beyond the lines required for the excavation in the soundest possible condition. The quantity and strength of explosive used, if the Engineer for excavation for foundations in various locations permits blasting, shall be such as will neither damage nor crack the rock outside the limits of excavation and endanger the foundations or the super structure of the adjoining existing buildings. All precautions, as directed by the Engineer shall be taken during the blasting operation and care shall be taken that no damage is caused to the adjoining buildings or structures. For any damage caused to the foundations or the super structure of the adjoining buildings, due to negligence, the contractor will have to pay the full cost of the same to the Owner.

As the excavation approaches its final lines, the depth of the holes and strength and amount of explosives should be progressively and suitably reduced. All excavation beyond the minimum excavation line in the surface, which has to be covered by the concrete or masonry, shall be filled back with concrete or masonry of the same quality as directed. No payment shall be made for such concrete or masonry.

Specific permission of the Engineer will have to be taken for blasting rock and the Contractor from the authorities concerned shall obtain a valid Blasting License. The quantity of explosives will have to be reduced and blasting controlled as any blasting with large quantity of explosive will endanger the operating plant and existing adjacent buildings, foundations and structures. If permission for blasting is refused by the Engineer, the rock shall be removed by the wedges, pick, barring, burning and sudden quenching or other approved means and no extra rates will be admissible for such excavation.

1.9 **LINE DRILLING:**

The Engineer may order line drilling for ensuring safety to adjoining structures and to keep the rock beyond LIMITS of excavation in the soundest possible manner.

For this purpose, one line of holes is proposed to be drilled as 'line drilling' where rock has to be blasted, in case of uniform excavation over the entire area.

The maximum spacing of holes shall be 150 mm and diameter of holes 48 mm. This line drilling will be very close to the required excavation lines. In addition to the above, the Engineer may order further line drilling at suitable location to facilitate safe excavation.

In case of uniform excavation over the entire area, layout of the interior blasting holes shall be carefully planned in such a way that no interior hole is closer than 2.5 m. to the line drilled holes. Only light blasting is permitted in the interior holes which are near the line-drilled holes. The Contractor may carry out tests to determine the amount of an explosive required to ensure an even break at the line drilled holes and that no damage occurs to adjoining buildings and rock beyond excavation limits. After the interior holes are blasted, any irregularities in the vertical face which was line drilled shall be removed and trimmed by wedging, spitting, chiselling and barring. Excavation shall proceed from the centre to the outside.

In case the excavation for columns are required to go deeper than general excavation, explosives used shall be in such quantities that, the rock, beyond the limits of excavation and nearby buildings are not damaged. The Contractor, at no cost to the Owner, shall repair any damage to adjoining structure due to blasting of rock.

Only line drilled holes shall be measured and paid for separately. Other drilling for blasting work is deemed to have been included in unit cost quoted for excavation in hard rock.

1.10 **DEPOSITION AND DISPOSAL OF SOIL:**

The unit rate quoted for excavation in different items shall include the cost of deposition and levelling of soil within a lead as specified in Bill of Quantities. Disposal of soil shall be made in a manner which will avoid rehandling or interference, with the progress. Specific instruction regarding disposal of soil should be taken from Engineer before the actual work is starts. Soil suitable for backfill, if so directed by the Engineer, shall be selected as excavation progresses and shall either be back filled or stored at location indicated by the Engineer, and in the manner specified by him. The lead shall be measured by shortest route possible.

1.11 **BAILING OUT OF WATER:**

The contractor shall make all the arrangements of the required pumps, for draining out of sub-soil water as directed during excavation, concreting etc. till the completion of foundations and keep the work free from water.

The rate includes all the necessary pumps, installation, power charges, necessary pipelines, fittings etc.

1.12 **RUBBLE STONE SOLING:**

The rubble stones to be used shall be irregular shaped (natural), but approximately cubical pieces of stones.

(a) **DRY RUBBLE SOLING:**

Ground shall first be levelled up and thoroughly consolidated by means of heavy wooden log hammer or frog rams. Rubble of specified thickness shall then be laid and set with hand. It shall be consolidated by hand roller or wooden log hammer, free use of water being made during consolidation. All hollows and interstices after consolidation shall be filled up with quarry spoils, stone chips etc. and the packing blended with stone grit and watered and consolidated by log hammer.

(b) **RUBBLE SOLING:**

The rubble stone shall be hard, tough, sound, durable with close texture and free from cracks; weathered and disintegrated stones shall be rejected. The stone for soling shall be of height equal to the thickness of the soling with a tolerance of 10 mm. and shall not have a base area of less than 550 sq. cm. nor more than 900 sq. cm. the smallest dimension of any stone shall not be less than half the largest dimension.

1.13 **MEASUREMENTS & PAYMENT:**

Cross section shall be taken normal to the centre line at as close intervals as necessary and practicable, but in any case not more than 5 m. apart prior of starting of excavation. The volume of excavation in soil shall be computed from the cross section taken after deducting the volume of hard rock.

All rock excavated shall be stacked in depots and arranged as not to obstruct development of site or building work or construction of roads. Measurements for rock payment will be by depots at least 1 m. high with 40% deduction for voids.

The contractor should carry out the excavation work to the levels, spaces, and dimensions as shown or figured on the drawing or as required by the Architect/Consulting Engineers to receive the concrete work. Should any of the excavation be taken down below the proper levels, the contractor shall fill in such excavation at his own expense with M-10 concrete well rammed in the position until it is brought up to the proper level.

If the trenches are made broader or longer than directed, the extra breadth and length shall be filled in, after the foundations are built, with earth rammed hard, by the contractor at his own expense and without extra charge. The Contractor shall make provision for all shoring, pumping, dredging or bailing out of water and keep in the trenches free from water while the masonry work is in progress. The contractor shall also, at his own costs, remove such portions of boulders, or rocks as required to make the bottom of the trenches horizontal and levelled,

The rate of this item includes the refilling excavated earth in the sides of the masonry or concrete work to the original surface of the ground in 230 mm. layers with watering and ramming. All surplus earth left over shall be either spread or deposited on the site, within a lead as specified in the Bill of Quantities and as directed by Owner/Consulting Engineers, without any extra charge.

2.0 **CONCRETOR:**

2.1 **LIME MORTAR:**

Mortar shall be composed of one part of lime and two parts of sand for (1:2) proportion. The materials shall be stacked in alternative layers of 75 mm and 150 mm thickness respectively. A top layer of 75 mm of sand 'being allowed, after at least 4 layers of lime have been laid. The stacked layer shall be watered thoroughly and allowed to stand for 24 hours. The mortar shall be ground in a mortar mill with 200 turns. The mortar shall be kept moist and protected from sun, rain and dust. Mortar more than 3 days old shall not be used. Mortar shall be laid in proper position in layers not exceeding 230mm. thick at a time and shall be thoroughly watered and kept wet,

2.2 **BRICK BAT CONCRETE:**

The brickbats shall be of new bricks, hard and well burnt and broken to sizes varying from 37 mm to 50 mm Brickbats shall be free from earth and shall be got approved before use. Sand shall be coarse, clean, sharp, dry and free from silt, organic and other impurities.

(a) **LIME CONCRETE:**

If lime concrete is to be used, brickbat concrete of specified thickness in layers not exceeding 150 mm. thick shall be composed of 2 parts of brickbats broken to regular size of 30 mm. and one part of lime mortar (1:2) proportion or as specified, well mixed together either in mixer or on brick or stone platform as per the instructions of Engineer-in-Charge of work, with sufficient water and rammed hard till consolidated and top surface of the concrete shall be roughened, in order to have proper bond with the new layer.

2.3 **CEMENT CONCRETE:**

(a) Placing of concrete shall start after the bottom of foundation is well dressed, watered and rammed by means of rammers. After laying and consolidation is completed, watering twice a day for a week from the next day shall be done.

The measurements shall be exact to length, breadth and depth as per drawing.

(b) If cement concrete is to be used, mixing shall be done either in a mixer machine or as required by Engineer-in-Charge of works in grades of M-10 / M-15 / M-20 / M-25 or as specified in the tender item. Concrete shall be laid in layer of maximum 150 mm. thickness with sufficient water and well consolidated

with rammer and shall be roughened, in order to have proper bond before the next layer is laid. Placing of concrete, by curing and measurements shall be done as per lime concrete.

(c) **DAMP PROOF COURSE:**

Damp proof course shall consist of a layer of 50 mm thick cement concrete (M-15/ M-20). Over the layer of cement concrete, a thick coat of mineral asphalt (heated to 350 degree F to 400 degree F) shall be laid. The work shall be measured in square metre of specified thickness. Rate shall include cost of all materials and labour involved in all the above operations.

All sanitary block floors shall be laid over a continuous bitumen damp proof course similar to above and to vertical faces of the wall for a height of 300 mm. and turned horizontally to a length of 150 mm. and shall be properly fused and made water tight around all plumbing work.

2.4 **MATERIALS - CEMENT AND AGGREGATES:**

2.4.1 **CEMENT:**

The Cement used shall be only of the following with prior approval of the Engineer-in-Charge.

- (a) Ordinary Portland Cement conforming to IS: 269 (For 33 Grade) IS: 8112 (For 43 Grade) and IS: 12269 (For 53 Grade)
- (b) Rapid Hardening Portland Cement conforming to IS: 8041.
- (c) Portland Pozzolana Cement conforming to IS: 1489.
- (d) Portland slag Cement conforming to IS: 455.
- (e) Hydrophobic cement conforming to IS: 8043.
- (f) Low Heat Portland Cement conforming to IS: 12600
- (g) Sulphate Resisting Portland Cement conforming to IS: 12330

The cement shall satisfy the physical requirements given in Table 2.1

2.4.2 **AGGREGATE:**

Aggregate shall conform to IS: 383. Aggregate shall consist of naturally occurring sand and gravel or stone, crushed or uncrushed or a combination thereof from source known to produce satisfactory aggregate for concrete and shall be chemically inert, strong, hard, dense, durable against weathering. It shall have limited porosity and shall be free from veins and adhering coatings, iron pyrites, coal, mica, shale or similar laminated material, sea shells, alkali, clay lumps, coal residues, clinkers, slag, organic and other impurities that may cause corrosion of the reinforcements or may impair the strength and/or durability of the concrete. The grading shall be arranged by the contractor that will produce dense concrete of the specified proportions - and consistency that will work readily into position without segregation and without the use of excessive water. The contractor shall submit to the Engineer for approval, a representative sample and sieve analysis of the aggregate at the site. Coarse and fine aggregates shall be delivered at the site separately. The size of the aggregate and sieve analysis furnished below are for the guidance only. The grading of the aggregate shall be based on the mix design and preliminary tests on concrete specified later in this Specification.

TABLE 2.1
PHYSICAL REQUIREMENTS
(TEST TO BE DONE AS PER IS: 4031)

	Ordinary Portland Cement	Low heat Portland Cement	Portland Pozzolana Cement	Hydrophobic Portland Cement
Fineness (Blaine's Air Permeability) Specific Surface cm ² /gm	Not less than 2250	Not less than 3200	Not less than 3000	Not less than 3500
Soundness (Le Chatelier method) Expansion)	Not more than 10 mm	Not more than 10 mm	--	Not more than 10 mm
Setting Time (Vicat Apparatus initial Setting Time - Not less than	30 minutes	60 minutes	30 minutes	60 minutes
Final Setting time - Not more than	600 minutes	600 minutes	600 minutes	600 minutes
Compressive Strength (Avg. of 3 Mortar Cubes (Area of Face 50 Sq.cm of 1:3 cement : Sand)	(Not less than)	(Not less than)	(Not less than)	(Not less than)
72 + 1 hour	160 kg / sq.cm.	100 kg / sq.cm.	--	160 kg / sq.cm.
168 + 2 hour	220 kg / sq.cm.	160 kg / sq.cm.	220 kg / sq.cm.	220 kg / sq.cm.
672 + 4 hours	--	350 kg / sq.cm.	310 kg / sq.cm.	310 kg / sq.cm.
Heat Hydration		Not more than		
7 days	--	66 cal/gm	--	--
28 days	--	75 cal/gm	--	--

2.4.3 **SAMPLING AND TESTING AGGREGATES:**

Samples of the aggregate for mix design and determination of suitability shall be taken under the supervision of the Engineer-in-Charge and delivered to the laboratory well in advance of the scheduled placing of concrete. Records of the tests, which have been made on proposed aggregate and on concrete, made from the source of aggregate, shall be furnished to the Engineer in advance of the work of use in determining aggregate suitability.

2.4.4 CHEMICAL REQUIREMENTS:

The chemical requirement as given in relevant codes shall be satisfied when tested in accordance with IS: 4032.

2.4.5 FINE AGGREGATE:

Fine aggregate shall consist of natural sand and/or manufactured sand. The sand shall be sharp, hard, strong, durable and free from organic materials and other deleterious substances

a) MACHINE MADE SAND:

Machine made sand will be acceptable upon approval by the Engineer, provided that the base rock composition shall be sound, hard, dense, non-organic, uncoated and durable against weathering.

b) SCREENING AND WASHING:

Sand shall be prepared for use by such screening or washing or both as necessary to remove all objectionable foreign matter while separating the sand grains to the required size fractions.

c) FOREIGN MATERIAL LIMITATIONS:

Sand shall be free from all vegetable and injurious substances, dust, clay lumps, soft or elongated or flaky particles, shale, alkali, organic matter, loam mica and other deleterious substances. The percentages of deleterious substances in sand delivered to the mixer shall not exceed the following.

	Percentage by weight
Material passing IS: 460 - 75 Micron sieve	3
Shale	1
Coal and lignite	1
Clay lumps	1
Total of all above substances	Not to exceed five percent

d) GRADATION:

The sand shall be so graded that concrete of the required quality, workability, density and strength can be produced using the specified water cement ratio. Unless otherwise directed, sand shall be graded as indicated in Table - 2.2.

TABLE -2.2
FINE AGGREGATE

IS Sieve Designation	Percentage			
	Grading Zone-I	Grading Zone-II	Grading Zone-III	Grading Zone-IV
10 mm	100	100	100	100
4.74 mm	90-100	90-100	90-100	95-100
2.36 mm	60-95	75-100	85-100	95-100
1.18 mm	30-70	55-95	75-100	90-100
600 micron	15-34	35-59	60-79	80-100
300 micron	5-20	8-30	12-40	15-50
150 micron	0-10	0-10	0-10	0-10

Note:

- (1) For crushed stone sands permissible limit on 150 micron IS Sieve is increased to 20 percent (in addition to 5 percent tolerance allowed).
- (2) Where concrete of high strength and good quality is required, fine aggregate conforming to any one of the four grading zones may be used; however the concrete mix should be properly designed. As the fine aggregate grading becomes progressively finer, that is, from grading zones I to IV, the ratio of fine aggregate to coarse aggregate should be progressively reduced. The most suitable fine aggregate to coarse aggregate ratio to be used for any particular mix will, however, depend upon the actual grading, particle shape and surface texture of both fine and coarse aggregates.
- (3) It is recommended that the fine aggregates conforming to grading zone IV should not be used in reinforced concrete unless tests have been made to ascertain the suitability of proposed mix proportions. Where the grading falls outside the limits of any particular grading zone of sieves, other than 600 micron I.S. sieve by total amount not exceeding 5 percent, it shall be regarded as falling within the grading zone. This tolerance shall not be applied to percentage passing the

600 micron IS sieve or to percentage passing any other sieve on the coarser limit of grading zone I or the finer limit of grading zone-II.

- e) **FINESS MODULUS:**
The sand shall have fineness modulus of not less than 2.8 nor more than 3.2. The fineness modulus shall be determined by adding cumulative percentages retained on the five IS : 460 sieve designations viz 2 mm, 1 mm, 500 micron, 300 micron and 150 micron and dividing it by 100. The sieve generally adopted are 4.75 mm, 2.36 mm, 1.18 mm, 600 micron, 300 micron and 150 micron.
- f) **SPECIFIC GRAVITY:**
Sand having specific gravity below 2.60 (saturated surface - dry basis) shall not be used without special permission of the Engineer.

TABLE - 2.3
GRADING LIMITS FOR COARSE AGGREGATES

IS Sieve Designation	Percentage Passing for single sized aggregate of Normal size						Percentage Passing for Graded Aggregate of Nominal Size			
	60 mm	60 mm 40 mm	40 mm 20 mm	20 mm 16 mm	16 mm 12.5 mm	10 mm	40 mm	40 mm 20 mm	15 mm	12.5 mm
80 mm	100	--	--	--	--	--	100	--	--	--
53 mm	85-100	100	--	---	--	--	--	--	--	--
40 mm	0-80	85-100	100	--	--	--	95-100	100	--	--
20 mm	0-5	0-20	85-100	100	--	--	30-70	95-100	100	100
16 mm	--	--	--	85-100	100	--	--	--	90-100	--
12.5 mm	--	--	--	--	85-100	100	--	--	--	90-100
10 mm	--	0-5	0-20	0-30	0-45	85-100	10-35	25-55	30-70	40-85
4.75 mm	--	--	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2.36 mm	--	--	--	--	--	0-5	--	--	--	--

2.4.6 **COARSE AGGREGATE STONE:**

This shall consist of broken trap, granite or any suitable rock from a source to be approved by the Engineer. It shall be machine crushed, hard, strong, durable, free from clay films or loamy admixture, vegetable or organic matter.

- a) **SCREENING & WASHING:**
Natural gravel and crushed rock shall be screened and/or washed for the removal of dirt or dust coating, if so demanded by the Engineer.

The pieces shall be regular in shape, shall have granular or crystal like shape. Friable, flaking and laminated pieces, mica, shale shall be present only in such quantities that will not, in the opinion of the Engineer, effect adversely the strength and/or durability of concrete.

The amount of fine particles occurring in the free state or as loose adherent shall not exceed 1% determined by laboratory sedimentation tests, after 24 hours immersion in water. A previously dried sample shall not have gained more than 10% of the weight.
- b) **GRADING:**
The aggregate shall be well graded., the grading limits for coarse aggregates shall be as given in Table-2.3.
- c) **SPECIFIC GRAVITY:**
No coarse aggregate of less than 2.6 specific gravity (saturated surface - dry basis) shall be used without written approval of the Engineer.
- d) **FOREIGN MATERIAL LIMITATIONS:**
The percentage of deleterious substances in the coarse aggregate delivered to the mixer shall not exceed the following:

Percentage by Weight

Materials passing IS 460-75 Micron sieve	1
Coal and lignite	1
Clay lumps	1

Total of all the above substances	3

2.4.7 **ALL - IN -AGGREGATES:**

If combined aggregates are available, they need not be separated into fine and coarse, but necessary adjustments may be made in the grading by the addition of single-sized aggregate. The grading of All in Aggregate shall be as given in Table 2.4.

TABLE - 2.4
GRADING OF ALL-IN-AGGREGATE

IS Sieve Designation	Percentage passing for All in Aggregate of	
	40 mm nominal size	20 mm nominal size
80 mm	100	--
40 mm	95-100	100
20 mm	45-75	95-100
4.75 mm	25-75	30-50
600 micron	8-30	10-35
150 micron	0-6	0-6

2.4.8 **MECHANICAL PROPERTIES OF AGGREGATES:**

The aggregates shall have flooring mechanical properties:

Aggregate Crushing Value	-	45 percent for concretes other than for wearing surfaces
	-	30 percent for concrete for wearing surface
Aggregate Abrasion Value	-	12 percent
Aggregate Impact Value	-	45 percent by weight for concretes other
(Alternative to Aggregate		than for wearing surfaces
Crushing Value)	-	30 percent by weight for concrete for
		wearing surface

2.4.9 **COARSE AGGREGATE - SLAG:**

Aggregate shall conform to the following in addition to para 2.4.2 to 2.4.8 above, which are applicable in this case also.

Approval for Use	Blast furnace slag as aggregate may be used for concrete work if such use is permitted by the Engineer
Separating and Grading	Slag shall be crushed as required and over Magnetic Separators to remove stray bits of iron and then graded as required
Sulphur Content	Sulphur contents shall be controlled as per laboratory tests and as required by the Engineer
Specific Gravity	No aggregate of less than 2.1 specific and Weight gravity shall be used. Weight of dry compact graded material (6-40 mm) shall range between 1300 - 1450 kg. Per cu.m.
Weight of slag Concrete	The weight of concrete made from slag aggregate should be 2170 to 2245 kg. per cum.

Test for approval

In addition to the tests mentioned for coarse aggregate stone, contractor shall perform tests for sulphur and iron contents and any other test required by the Engineer. The Test results shall be approved by the Engineer before the material is used for work

2.5 WATER:

Water used for mixing and curing shall be clean and free from injurious amounts of oils, acids, alkalies, salts, sugar, organic materials or other substances that may be deleterious to steel or concrete. Potable Water is generally considered satisfactory for mixing concrete. pH value of water shall generally be not less than 6. Mixing or curing of concrete with seawater is not recommended because of presence of harmful salts in seawater. Under unavoidable circumstances, seawater may be used for mixing or curing in plain concrete or such reinforced concrete constructions, which are permanently under seawater.

2.6 ADMIXTURES:

Admixtures may be used in concrete, only with the approval of the Engineer-in-Charge based upon evidence that, with the passage of time, neither the compressive strength of concrete is reduced by more than 10 percent nor are other requisite qualities of concrete and steel impaired by the use of such admixtures. Calcium chloride should not be used. Admixtures, if used shall comply with IS: 9103.

2.7 REINFORCEMENT:

2.7.1 BIS Specifications:

The Reinforcement Steel shall comply with the following Specifications:

- a) Ordinary Mild Steel and Medium Tensile Steel Bars/Reinforcement shall comply with IS: 432.
- b) High Strength Deformed Steel Bars/Reinforcement shall comply with IS: 1139 or IS: 1786.

2.7.2 FREEDOM FROM DEFECTS:

All finished bars shall be well and clearly rolled to the dimensions and weights specified. Also they should be sound and free from cracks, surface flaws, laminations, rough, jagged and imperfect edges and other defects.

2.7.3 WEIGHTS AND AREAS:

The weight of the bar shall be calculated on the basis that steel weighs 0.785 Kg./meter run/cm of the nominal cross sectional area.

The weights per meter of round bars in kilograms rounded off to three or two decimal places in Kg. and areas of cross section in Sq. Cms should be as given in Table-2.5.

TABLE - 2.5

WEIGHTS AND CROSS SECTION AREAS OF BARS

Bar dia Mm	Weight (Kg/m.)	Area of Cross Section sq.cm.
5	0.154	0.20
6	0.222	0.28
8	0.395	0.50
10	0.617	0.79
12	0.888	1.13
16	1.58	2.01
18	2.00	2.54
20	2.47	3.14
22	2.98	3.80
25	3.85	4.91
26	4.85	4.81
32	6.31	8.04
36	7.99	10.18

2.7.4 QUALITY:

All steel shall be of tested quality. No re-rolled material will be accepted. The Contractor shall submit the manufactures' test certificate for steel to the Engineer. All bars shall be free from grease, oil, dirt, mill scales, loose rust and bituminous material. All bars shall be thoroughly cleaned before being fabricated. Pitted and defective bars shall not be used. All bars shall be placed and shall be rigidly held in position before concreting.

2.7.5 PHYSICAL REQUIREMENTS:

The reinforcement shall satisfy the requirements given in Table 2.6 :

TABLE 2.6
PHYSICAL PROPERTIES OF REINFORCING STEEL

		M.S. Reinforcement		Cold twisted (Plain or Deformed) Bars			
				Fe 415		Fe 500	
		Bar Sizes	Values	Bar Sizes	Values	Bar Sizes	Values
1.	Ultimate Tensile Stress kg / sq.cm.	All sizes	4200	Under 10mm	5650	All sizes	5000
				10 mm & over	4950		
2.	Yield Stress or 0.2% Proof stress kg/sq.cm.	Upto and including 20mm	2600	Under 10mm	4950	All sizes	5000
		Over 20 mm	2400	10 mm & over	4250		
3.	Percent Elongation	Under 10mm	20	All sizes	14.5	All sizes	12.0
		10mm and over	23				
4.	Bend Test		Around a Mandrel of 3d, through 180°			Around a Mandrel of 4d, through 180 degree	
5.	Rebend Test		Around a mandrel of 6d, through 45° and average bend through 23° , around a mandrel of 6d			Around a mandrel of 7, through 45° and average bend through 23° , around a mandrel of 6d	

NOTES ON MANUFACTURE:

- All M.S. reinforcement bars shall have chemical composition in accordance with IS: 226 - OR IS: 2062. These bars if deformed shall be deformed in accordance with IS: 1139.
- All twisting shall be carried out in cold. The bars shall not be subjected to any heat treatment at any stage during the process of manufacture.
- The amount of twisting given to a bar shall be such that the pitch of one complete twist through 360° is 'N' times the nominal size of bar where N is as follows:

Type of Bar	N
Plain Twisted Bar	2 to 14
Deformed Twisted Bar	8 to 30

- Fe 415 grade steel is made from basically soft mild steel (IS: 226) with maximum 0.25% carbon and is weldable.
- Fe 500 grade steel is made from selected prime quality Steel with maximum 0.3% carbon and is also weldable.

2.7.6 TOLERANCE:

The rolling tolerance shall be as given below:

	Nominal Size	Tolerance
Bars in Straight Lengths (M.S.)	Up to and including 25 mm. bars	+ 0.5 mm.
Coiled Round (M.S.)	Above 25 mm bars.	+ 0.75 mm.
Weights (M.S. & C.T.bars)	Up to and including 12 mm bars.	+ 0.5 mm.
	Up to and including 8 mm. bars.	+ 4.0 percent
	Above 8 mm bars	+ 2.5 percent

The cutting tolerance on length shall be as given below:

When specified length is not stated to be either a maximum or a minimum.	- 25 mm + 75 mm
When a minimum length is specified	± 75 mm

When a maximum length is specified - 50 mm

2.7.7 BENDING OF REINFORCEMENT BARS:

All the bars should be bent according to the sizes and shapes shown in the detailed working drawings. They shall be bent gradually by machine or other approved means. They shall be bent cold except bars of over 25 mm. in diameter, which may be bent hot, if approved by the Engineer. Bars bent shall not be heated beyond red colour and after bending shall be allowed to cool slowly without quenching. Bars incorrectly bent shall be used only if the means used for straightening and rendering be such as shall not, in the opinion of the Engineer, effect properties of the reinforcement. No reinforcement shall be bent when in position in the work without approval, whether or not it is partially embedded in hardened concrete. Stipulations laid down in IS: 2502 for bending and fixing shall be followed unless otherwise specified herein.

Where reinforcement bars are bent aside at construction joints and afterwards bent back into original position, care should taken to ensure that at no time is the radius of the bend less than 4 bar diameter for plain mild steel or 6 bar diameters for deformed bars. Care shall also be taken when bending back the bars, to ensure that the concrete around the bar is not damaged.

2.7.8 FIXING REINFORCEMENT:

Reinforcement shall be accurately fixed and by approved means maintained in the position shown in the drawings. Bars intended to be in contact at crossing points shall be securely bound together at all such points with No. 16 gauge or 18 gauge annealed soft iron wire. The cover or concrete over the reinforcement shall be as shown on the drawings and shall be provided and maintained by means of cement mortar briquettes or other approved means.

The vertical distances required between successive layers of bars in beams or similar members shall be, maintained by the provision of mild steel spacer bars at such intervals that the main bars do not perceptibly sag between adjacent spacer bars.

Reinforcement shall be placed within the following tolerances:

- a) For effective depth 200 mm or less + 10 mm
- b) For effective depth more than 200 mm + 15 mm

The cover, shall in no case be reduced by more than one third of specified cover or 5 mm., whichever is less.

2.7.8.1 SPACING OF REINFORCEMENT:

Minimum distance between two parallel main reinforcement bars shall usually be not less than the greatest of the following:

Horizontal distance	(i)	bar diameter (of larger bar if unequal diameters are used)
	(ii)	5 mm more than nominal size of coarse aggregate
Vertical distance	(i)	Two thirds the nominal size of coarse aggregate
	(ii)	Maximum bar (size
	(iii)	15 mm.
or		

In locations where reinforcement is congested, grouping of bars by touching one another may be permitted provided the requirements of minimum horizontal distance as specified above are complied with and provided further that development length is adequately increased.

2.7.8.2 COVER:

Reinforcement shall have cover and the thickness of such cover (exclusive of plaster or other decorative finish) shall be as follows or as per instruction of Engineer-in-Charge.

- a) At each end of reinforcement bar, not less than 2.5 mm. nor less than twice the diameter of such rod or bar.
- b) For a longitudinal reinforcing bar in a column, not less than 40 mm. or less than the diameter of such rod or bar. In the case of columns of minimum dimension of 200 mm. or under, whose reinforcing bars do not exceed 12 mm. in dia.; the cover of 25 mm. may be used.
- c) For longitudinal reinforcing bar in a beam, not less than 25 mm. nor less than the diameter of such rod or bar.
- d) For tensile, compressive, shear, or other reinforcement in a slab, not less than the diameter of such reinforcement; and
- e) For any other reinforcement, not less than 13 mm nor less than the diameter of such reinforcement.
For concrete members in contact with earth, the above provisions for cover shall be increased by 15 mm.

Increased cover thickness may be provided when surfaces of concrete members are exposed to the action of harmful chemicals (as in case of concrete in contact with earth faces contaminated with such chemicals), acid, vapour, saline atmosphere, sulphurous smoke (as in case of steam operated railways) etc. and such increase of cover may be between 15 mm and 40 mm beyond the figures given above as may be specified by the Engineer-in-Charge.

For reinforced concrete members, totally or periodically immersed in sea water or subject to sea spray, the cover of concrete shall be 50 mm. more than that specified above.

Contractor shall prepare concrete cover blocks of different and necessary sizes and shall use as and when required for providing the adequate and specified cover to the reinforcement. Such cover blocks shall be made so in advance and properly cured to take the load of reinforcement. Cement mortar blocks in C.M. (1:1) shall be used for making cover blocks.

2.7.8.3 WELDING:

Welding by gas or electricity may be permitted under suitable conditions and with suitable safeguards. For guidance on welding, relevant Indian Standards for welding of mild steel bars used in reinforced concrete construction may be referred.

In case of tack welding used for fixing reinforcement in their position, no specific precaution in regard to stress need be taken.

Butt-welding between the ends of a rod in line, where stress is transferred across the section, is recommended to be allowed for mild steel bars only. In the case of rods of mild steel which have their strength increase by cold working the stress at the weld should be limited to the strength of mild steel, before cold working and the additional strength obtained by cold working should be ignored at and near the welded joints or mechanical connections in reinforcement may be used but in all cases of important connections, tests shall be made to prove that the joints are of the full strength of bars connected.

2.7.8.4 LAPS OF REINFORCEMENT:

Where laps and joints are provided in the reinforcing bars, they shall be staggered and the following requirements should generally be satisfied:

- (a) No splices of reinforcement shall be made except as shown on the design drawings or as specified by the Engineer-in-Charge. Lap length to be adopted for all reinforcing bars (for both mild steel and CTD bars) shall be for mix up to M20, 60x diameter of bars, unless otherwise specified.
- (b) Lapped splices in tension shall not be used for bars of sizes larger than 25 mm diameter; such splices shall preferably be welded.

For contact splices, spaced laterally closer than 12 times bar diameters or located closer than 150mm. or 6 times bar diameters from the outside edge, the lap shall be increased by 20 percent or stirrups or closely spaced spirals shall enclose the splice for its full length.

Where more than one times half of the bars are spliced within a length of 40 times bars diameter or where splices are made at points of maximum stress, special precautions shall be taken such as increasing the length of lap and/or using spirals or closely spaced stirrups around and for the length of the splice.

- (c) Splices in compression reinforcement:

Where lapped splices are used, the lap lengths shall be 40 times of diameter of the bars. Welded splices or other positive connections may be used instead of lapped splices. Where bar size exceeds 25 mm diameter, welded splices or other positive connections shall preferably be used in bars required for compression only, the compressive stress may be transmitted by bearing of square cut ends held in concentric contact by a suitable welded sleeve or mechanical device.

In columns where longitudinal bars are off set at a splice, the slope of the inclined portion of the bar with the axis of the column shall not exceed 1 in 6, and the portions of the bar above and below the off set shall be parallel to the axis of the column. Off set bars shall be bent before they are placed in the forms. Where column faces are off set 75mm. or more, splices of vertical bars adjacent to the off set face shall be made with separate dowels overlapped as specified above.

- (d) Approved welded splice and positive connection:

An approved welded splice is one in which the bars are butted and welded so that it will develop in tension at least 125 percent of the specified yield strength of the reinforcing bar. Approved positive connections for bars designed to carry critical tensions or compression shall be equivalent in strength to an approved welded splice.

2.7.9 PAYMENT FOR REINFORCEMENT WORK:

For purpose of payment, all the steel provided in accordance with the drawings shall be measured and paid for including hooks, laps, separations, cranks etc. However, no payment shall be made for binding wires. Chairs when shown on drawings and/or when specifically instructed at site to provide shall be paid for as per actual weight in the

reinforcement item. The dowels shown on the drawings or instructed to be provided by the Engineer shall also be measured and paid for at the unit rate quoted. The rate quoted shall include applying two coats of Bitumastic paint on dowels and wrapping them with burlap. The unit rate shall be irrespective of the level or the height at which work is done. Steel reinforcement shall be measured in Kg. based on total computed weight for the size and length of bars as shown on drawings or as instructed by Engineer. The weight of bars will be computed from theoretical weight for the respective sizes as shown in para 2.7.3 above.

The laps will be given as under:

- i) at the places shown in the drawing
- ii) at the places where lap is provided as per the instruction of Engineer.
- iii) at the places where the length of bar is more than 9 mtrs.
- iv) in case of columns at each floor height. Where floor height is more than 5.0 m, lap to be provided as per instruction of the Consultant.

2.8 STORAGE OF MATERIALS:

2.8.1 CEMENT:

Cement shall be stored in weather-tight buildings, bins, or silos, which exclude moisture and contaminants. Storage of cement at site shall be at contractor's expense and risk. In the event of any damage occurring to cement due to faulty storage in contractor's shed or on account of negligence on his part, such damages shall be the liability of Contractor.

In case cement is stored and stacked in bags, storing shall be done in weather tight and properly ventilated structures to prevent absorption of moisture. The bags shall be stacked at least 100 - 200 mm clear above the floor. A space of 600 mm all around shall be kept between exterior walls and stacks.

Cement bags shall be placed close together in the stack to reduce circulation of air as much as possible. Cement bags should not be stacked more than 10 bags high to avoid lumping under pressure.

If the stack is more than 7 bags high, arrange the bags in header and stretcher fashion, that is, alternatively length-wise and crosswise so as to tie them together and lessen the danger to toppling over. For extra safety during the monsoon or when it is expected to store the cement for an unusually long period, enclose the stack completely in polythene sheets or any other suitable water proofing materials (covering). The flap will close on the top of stack. Care should be taken that the polythene sheet is not damaged any time during use. When removing bags from storage some bags should be removed from two or three tiers back rather than all from one tier. If the rows are thus stepped back, there is less chance of over turning. When removing cement bags for use, apply "first in, first out" rule, that is, take the oldest cement out first. Each consignment of cement shall be stacked separately to permit easy access for inspection and to facilitate removal.

2.8.2 AGGREGATES:

The aggregate shall be stored in such a way as to prevent mixing of and with foreign materials. The heaps of fine and coarse aggregates shall be kept separately. When different sizes of fine or coarse aggregate are procured separately, they shall be stored in separate stockpiles sufficiently away from each other to prevent the material at the edges of the piles from getting intermixed.

2.8.3 STEEL & REINFORCEMENT:

The steel shall not be kept in direct contact with the ground but shall be stacked on top of an arrangement of timber sleepers. It is good practice to coat reinforcement with cement wash before staking to prevent scale and rust.

2.8.4 All materials shall be so stored as to prevent deterioration or intrusion of foreign matter and to ensure the presentation of their quality and fitness for the work. Any material, which has deteriorated or has been damaged or is otherwise considered defective by the Engineer-in-Charge, shall not be used for the concrete.

2.9 TESTS:

Appropriate tests, which are required by the different Indian Standards to ascertain that the materials used in construction conform to the respective standards and specifications, are to be carried out by the contractor at his own cost. Whenever there is a change of the source of supply of the materials, change in size or change in proportions of materials, such test should be carried out. For materials, such as cement which deteriorates due to passage of time such tests as are required should be carried out at suitable intervals, and all costs for testing shall be borne by the contractors. Contractor as suggested by the Architects shall keep all records. All the costs for testing of all other materials shall be borne by the contractor

2.10 WORKMANSHIP - CONCRETE:

2.10.1 GRADES OF CONCRETE:

The concrete shall be in grades designated as M10, M15, M20, M25, M30, M35, M40, M45, M50, M60, M65, M70, M75 and M80.

Note:

In the designation of a concrete mix letter M refers to the mix and the number to the specified characteristic compressive strength of 150 mm. cube at 28 days expressed in N/mm². IS: 516 and IS: 1199 shall be followed for sample sizes, sampling and testing of all samples.

2.10.2 STRENGTH REQUIREMENTS OF CONCRETE:

Where Ordinary and Low Heat Portland Cement conforming to IS: 269, Portland Pozzolana Cement conforming to IS: 1489 or Portland Blast Furnace Slag Cement conforming to IS: 455 is used, the compressive strength requirements for various grades of concrete shall be as given in Table 2.7. Where Rapid Hardening Portland Cement (IS: 8041) is used, the 28 days compressive strength requirements specified in Table 2.7 shall be met at 7 days.

The strength requirements specified in Table 2.7 shall apply to both Controlled Concrete i.e. Design Mix Concrete and Ordinary Concrete i.e. Nominal Mix Concrete.

In order to get a relatively quicker idea of the quality of concrete, optional works tests on beams for modulus of rupture at 72 + 2 hours or 7 days or compressive strength at 7 days may be carried out in addition to 28 days compressive strength test. The Engineer-in-Charge may suitably relax the frequency of 28 days compressive strength test specified in Table 2.7 of IS: 456 - 2000 provided the expected strength values at the specified early age are consistently met. For this purpose, the values given in Table 2.8 may be taken for general guidance in the case of concrete made with Ordinary Portland Cement.

Where the strength of a concrete mix, as indicated by tests lies in between the strength for any two grades specified in Table 2.7, such concrete shall be classified for all purposes as a concrete belonging to the lower of the two grades between which its strength lies.

TABLE - 2.7

STRENGTH REQUIREMENTS OF CONCRETE

Group	Grade of Concrete	Compressive Strength of 150mm cubes at 28 days after mixing, conducted in accordance with IS:516 N/sq.mm
Ordinary concrete	M - 10	10
	M - 15	15
	M - 20	20
Standard Concrete	M - 25	25
	M - 30	30
	M - 35	35
	M - 40	40
	M - 45	45
	M - 50	50
	M - 55	55
	M - 60	60
High Strength Concrete	M - 65	65
	M - 70	70
	M - 75	75
	M - 80	80

Note:

- (a) Preliminary test - A test conducted in a laboratory on the trial mix of concrete produced in the laboratory with object of:
 - (i) Designing a concrete mix before the actual concreting operation starts.
 - (ii) Determining the adjustments required in the designed mix when there is a change in the materials used during the execution of works or,
 - (iii) Verifying the strength of concrete mix.
- (b) Works Tests:

A test conducted either in the field or in laboratory, on the specimens made on the works, out of the concrete being used on works.

2.10.3 PROPORTIONING & WORKS CONTROL:

The mix proportions shall be selected to ensure that the workability of the fresh concrete suitable for the condition of handling and placing, so that after compaction it surrounds all reinforcement and completely fills the form work. When concrete is hardened, it shall have the required strength durability and surface finish. The determination of the proportions of cement, aggregate and water to attain the required strength shall as follows:

- (a) By designing the concrete mix; such concrete shall be called "Design Mix Concrete" or "Controlled Concrete"
- (b) By adopting nominal mix, such concrete shall be called. "Nominal Mix Concrete".

TABLE - 2.8
OPTIONAL WORK TEST REQUIREMENTS OF CONCRETE (All values in N/mm²)
(All tests conducted in accordance with IS : 516)

Grade of Concrete	Compressive Strength of 150mm cubes. min at 7 days	Moulds of Rupture by Beams Test Min.	
		at 72 + 2 hrs.	at 7 days
M-10	7	1.2	1.7
M-15	10	1.5	2.1
M-20	13.5	1.7	2.4
M-25	17	1.9	2.7
M-30	20	2.1	3.0
M-35	23.5	2.3	3.2
M-40	27	2.5	3.4

The concrete mix shall be designed to have an average strength corresponding to the values specified for preliminary tests in Table - 2.7. The proportions chosen should be such that the concrete is of adequate workability for the conditions prevailing on the work in question, and can be properly compacted with the means available. The maximum total quantity of aggregate by weight per 50 kg. of cement shall not exceed 450 kg. except where otherwise specially permitted by the Engineer-in-Charge.

Except where it can be shown to the satisfaction of the Engineer-in-Charge that supply of properly graded aggregate of uniform quality can be maintained over the period of work, the grading of aggregate should be controlled by obtaining the coarse aggregate in different sizes and blending them in the right portions when required, the different sizes being stocked in separate stock piles. The material should be stock piled for several hours preferably a day before use. The grading of coarse and fine aggregate should be checked as frequently as possible, the frequency for a given job being determined by the Engineer-in-Charge to ensure that the suppliers are maintaining the grading uniform with that of the samples used in the preliminary test.

In proportioning concrete, the quantity of both cement and aggregate should be determined by weight, where the weight of cement is determined by accepting the maker's weight per bag. A reasonable number of bags should be weighted separately to check the net weight. Where the cement is weighed on the site and not in bags, it should be either measured by volume in calibrated tanks or weighed. All measuring equipment should be maintained in clean serviceable conditions, and their accuracy periodically checked.

It is most important to maintain the water cement ratio constant at its correct value. To this end, determination of moisture contents in both fine and coarse aggregates should be made as frequently as possible, the frequency for a given job being determined by the Engineer-in-Charge according to weather conditions. The amount of the added water shall be justified to compensate for any observed variations in the moisture contents. For the determination of moisture content in the aggregate for concrete: Part-III specific gravity, density, voids, absorption and bulking may be referred to. To allow for the variation in weight of aggregate due to variation in their moisture content, suitable adjustments in the weights of aggregate should also be made.

No substitutions in materials used on the work or alterations in the established proportions, except as permitted in the above para shall be made without additional tests to show that the quality and strength of concrete are satisfactory.

2.10.4 WORKABILITY OF CONCRETE:

The concrete mix proportions chosen should be such that concrete is of adequate workability for the placing conditions of the concrete and can properly be compacted with the means available. The definitions of the ranges of "workability" of concrete as measured by either the slump or V-B tests (IS: 1199) and the range to be adopted for different kinds of work unless specified otherwise is given in Table - 2.9.

TABLE - 2.9

WORKABILITY OF CONCRETE

Placing conditions	Degree of Workability	Slump (mm)	Values of Workability	
			Vee-Bee	Compacting Factor
Blinking concrete; Shallow Sections' pavements using pavers	Very Low	--	20-10 secs.	0.75-0.80
Mass concrete; Lightly reinforced sections in slabs, beams, walls, columns, Floors, Hand placed, pavements, Canal ling, Strip footings	Low	25 - 75	10 - 5 secs.	0.80 - 0.85
Heavily reinforced sections in slabs, beams, walls, columns, Slip form works, Pumped concrete.	Medium	50-100 75-100	5-2 secs.	0.85- 0.92*
Trench fill, in-situ pilling Termite concrete	High Very High	100- 150 Workability to be decided by determination of flow (IS-9103)	--	Above 0.92** Above 0.92**

Note: For most of the placing conditions, internal vibrators (needle vibrators) are suitable. The diameter of the needle shall be determined based on the density and spacing of reinforcement bars and thickness of sections. For tremie concrete, vibrators are not required to be used.

A competent person should be employed whose duty will be to supervise all stages in the preparation and placing of the concrete. All works test specimens should be prepared and site tests carried out under his direct supervision.

2.10.5 **NOMINAL MIX CONCRETE:**

Nominal mix concrete may be used for concretes of grades M-5, M-7.5, M-10, M-15, M-20. The proportions of materials for nominal mix concrete shall be as specified in Table 2.10.

TABLE - 2.10**PROPORTIONS OF NOMINAL MIX CONCRETE**

Grades of Concrete	Total quantity of Dry Aggregate by Mass per 50 Kg. of Cement, Sum of Masses of Fine and Coarse Aggregates	Proportion of fine Aggregate to Coarse Aggregate (by Mas)	Quantity of Water for 50 Kg. of Cement (Max.) Lit.
M-5	800 Kg. 635 Kg.	Generally 1.2 but subject to upper limit of 1:1.5 and a lower limit of 1:2.5 Adjust from upper to lower limit as grading fine aggregates becomes finer and maximum sizes of coarse aggregate become larges.	60 45
M-10	480 Kg.		34
M-15	350 Kg.		32
M-20	250 Kg.		30

The maximum water cement ratio shall be maintained as per Table 2.12

NOTE:

The Contractor will be required to prepare his own mix design and establish from preliminary tests as per Indian Standards that the mix design is according to that specified for each concrete. The same shall be adopted only after the Consulting Engineer/Architect approves it.

Workability of the concrete should be controlled by direct measurement of water content, making allowance for any surface water in the fine and coarse aggregates. The slump test in accordance with IS: 1199 may be used as a guide. Allowances should be made for surface water present in the aggregate when computing water content. Surface water shall be determined by one of the field methods described in IS: 2386 (Part III). In the absence of exact data, the amount of surface water may be estimated from the values given in Table - 2.11.

**TABLE - 2.11
SURFACE WATER CARRIED BY AGGREGATE**

Aggregate	Percent by Mass	Approximate Qty. of Surface Water Lt/Cum
Water wet sand	7.5	120
Moderately wet sand	5.0	80
Moist sand	2.5	40
Moist gravel or crushed rock	1.25 - 2.5	20 to 40

2.10.6 REQUIREMENT FOR DURABILITY:

Minimum cement content required in cement concrete to ensure durability under specified conditions of exposure should be as given in Table 2.12 unless otherwise specified. The general environment to which the concrete will be exposed during its working life is classified into five levels of severity, that is, mild, moderate, severe, very severe and extreme as described in Table 2.13.

TABLE - 2.12

Minimum Cement Content, Maximum Water Cement Ratio And Minimum Grade Of Concrete For Different Exposures With Normal Weight Aggregates Of 20mm Nominal Maximum Size.

Sr. No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content Kg/Cu.m.	Maximum Free Water Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content Kg/Cu.m.	Maximum Free Water Cement Ratio	Minimum Grade of Concrete
1.	Mild	220	0.60	--	300	0.55	M-20
2.	Moderate	240	0.60	M-15	300	0.50	M-25
3.	Severe	250	0.50	M-20	320	0.45	M-30
4.	Very Severe	260	0.45	M-20	340	0.45	M-36
5.	Extreme	280	0.40	M-25	360	0.40	M-40

The general environment to which the concrete will be exposed during its working life is classified into five levels of severity, that is, mild moderate, severe, very severe and extreme as described in Table 2.13.

TABLE 2.13**ENVIRONMENTAL EXPOSURE CONDITIONS**

Sr.	Environment	Exposure Conditions
1.	Mild	Concrete surfaces protected against weather or aggressive conditions, except those situated in coastal area.
2.	Moderate	Concrete surfaces sheltered from severe rain or freezing whilst wet. Concrete exposed to condensation and rain Concrete continuously under water Concrete in contact or buried under non-aggressive soil/ground water Concrete surfaces sheltered from saturated salt air in coastal area
3.	Severe	Concrete surfaces exposed to severe rain, alternate wetting and drying or occasional freezing whilst wet or severe condensation. Concrete completely immersed in seawater Concrete exposed to coastal environment
4.	Very Severe	Concrete surfaces exposed to seawater spray, corrosive fumes or severe freezing conditions whilst wet. Concrete in contact with or buried under aggressive sub-soil/ground water
5.	Extreme	Surface of members in tidal zone Members in direct contact with liquid/solid aggressive chemicals

2.10.7 MIX DESIGN AND SAMPLING AND TESTING FOR CONCRETE:

Facilities required for sampling materials, shall be provided when required by the Engineer. The methods used in sampling, laying curing and testing the concrete samples, either in the field or in the laboratory, shall be in accordance with the appropriate Indian Standards. This is to investigate the grading of aggregate, water cement ratio, workability and the quantity of cement required to give works cubes of the minimum strength specified.

The mix shall be designed to produce the grade of concrete having required workability and desired characteristic strength. As long as the quality of the materials does not change, a mix design done earlier may be considered

adequate for later work. As already stated under "proportioning" the proportion of the mix shall be by weight. In case uniformity in the materials used for concrete making has been established over a period of time, the proportioning may be done by volume batching, by the use of bulk densities, provided periodic checks are made on mass/volume relationships of materials. Where weigh batching is not practicable, the quantities of fine and coarse aggregate (not cement) may be determined by volume. If aggregate is moist and volume batching is adopted, allowance shall be made for bulging in accordance with IS: 2386 (Part-III). Mix proportioning shall be carried out according to the ACI Standard ACI 631 or "Design of Concrete Mixes" Road Research Note No.4 of Department of Scientific and Industrial Research, U.K.

Whenever there is either a change in strength of concrete required, water cement ratio, workability or the source of aggregates and cement, preliminary tests shall be conducted again to determine the revised proportions of the mix to suit the later conditions. While designing mix proportions, over wet mixes should always be avoided.

2.10.8 PRELIMINARY TESTS:

The materials and proportion used in main preliminary tests shall be similar in all respects to those to be actually employed in the works as the object of this test is to determine proportion of cement, aggregates and water necessary to produce the concrete of consistency required to give the strength specified. It will be the contractor's sole responsibility to carry out these tests and he shall therefore furnish to the Engineer, statement of proportions proposed to be used for concrete mix. For preliminary tests, the following procedure shall be followed. Materials shall be brought to the room temperature and all materials shall be in a dry condition. The quantities of water, cement and aggregate for each batch shall be determined by weight to an accuracy of 1 Part in 1000.

- (a) Mixing:
Concrete shall be mixed in a mechanical mixer. The mixer should comply with IS: 1791. The cement and fine aggregate shall first be mixed dry until the mixture is in uniform colour. The coarse aggregate shall then be added, mixed and water added and mixed thoroughly for a period of not less than two minutes after all the materials are in the drum and until the resulting concrete is uniform in appearance. If there is segregation after unloading from the mixer, the concrete should be remixed.
- (b) The consistency of each batch of concrete shall be measured immediately after mixing, by the slump test in accordance with IS: 1999. In the slump test, care shall be taken to ensure that no water is lost; the material used for slump test may be remixed with the remainder of concrete for making the test specimen. The period of remixing shall be as short as possible yet sufficient to produce a homogeneous mass.

Note : In exceptional circumstances such as mechanical breakdown of mixer, work in the remote areas or when the quantity of concrete work is very small, hand mixing may be permitted, subject to adding 10% extra cement at his (contractors) cost. When hand mixing is permitted, it shall be carried out on a watertight platform and care shall be taken to ensure that mixing is continued until the concrete is uniform in colour and consistency.

2.10.9 CONCRETE CUBES:

- (a) Size of test specimen & moulds:
Test specimens cubical in shape shall be 150 x 150 x 150 mm. If the largest nominal size of the aggregate does not exceed 200mm, 100 mm cubes may be used as an alternative.

A cube mould should be of metal and stout enough to prevent distortion. It shall be constructed in such a manner as to facilitate the removal of the moulded specimen without damage, and shall be so machined that, when it is assembled ready for use, the dimensions and internal faces shall be accurate within the following limits:

Height of mould and distance between opposite faces: Specified size + 0.2 mm.
Angle between adjacent faces: 90 + 0.5 degree

Each mould shall have a plane face metal base plate of such size as to support the mould during the filling without leakage and shall be attached to the moulds; when assembled shall be positively and rigidly held together and suitable methods of ensuring this, both during filling and on subsequent handling of the filled mould, shall be provided. In assembling the mould for use, the joints between the sections of mould shall be thinly coated with mould oil and a similar coating of mould oil shall be applied between the contact surfaces-of the bottom of the mould and the base plate in order to ensure that no water escapes during filling. The interior surfaces of the assembled mould shall be thinly coated with mould oil to prevent adhesion of the concrete. The tamping bar shall be a steel bar 16 mm. in diameter, 0.6 m. long and bullet pointed at the lower end.

- (b) Compacting:
The test specimens shall be made as soon as practicable after mixing and in such a way as to produce full compaction of the concrete with neither segregation nor excessive laitance. The concrete shall be filled into the mould in layers approximately 50 mm deep. In placing each scoopful of concrete, the scoop shall be moved around the top edge of the mould as the concrete slides from it, in order to ensure a symmetrical distribution of the concrete within the mould. Each layer shall be compacted as described

below. After the top layer has been compacted, the surface of the concrete shall be finished level with the top of the mould using a trowel, and covered with a glass or metal plate to prevent evaporation.

For compacting, standard tamping bar shall be used and the strokes of the bar shall be distributed in a uniform manner over the cross section of the mould. The number of strokes per layer required to produce specified conditions will vary according to the type of concrete but in no cases shall be less than 35 strokes per layer for 150 mm cubes or 25 strokes per layer for 100 mm cubes. The strokes shall penetrate into the underlying layer and the bottom layer shall be rodded throughout its depth. Where the tamping bar leaves voids, the sides of the mould shall be tapped to close the voids.

(c) Curing:

The test specimen shall be stored on the site at a place free from vibration under damp-matting, sacks or other similar material for 24 hours + 0.5 hour from the time of adding water to the other ingredients at a temperature range of 22° C to 32° C After 24 hours, they shall be marked for later identification, removed from the moulds and stored in clean water at a temperature of 24° C to 30° C. They shall be sent to the testing laboratory well packed in damp sand, sacks or other suitable material so as to arrive there in a damp condition not less than 24 hours before the time of test. On arrival at the testing laboratory, the specimen shall be stored in water at 27° C +21° C temperature until the time of test. Records of the daily maximum and minimum temperature shall be kept both during the period the specimens remain on the site and in the laboratory.

(d) Tests for Cube Specimen:

The concrete cubes shall be tested in standard testing machines by skilled personnel. Tests shall be made at recognized ages of the test specimen, the most usual being 7 and 28 days. Tests may be made at 24 hours + 1/2 hour and 72 hours + 2 hours if early strengths are needed. The age shall be calculated from the time of the addition of water to the dry ingredients.

At least three specimens, preferably from different batches shall be made for testing at each selected age.

Specimens stored in water shall be tested immediately on removal from the water and while they are still in the wet condition. Surface water and grit shall be wiped off the specimens and any projecting fins removed.

The bearing surface of the testing machine shall be wiped clean and any loose sand or other material removed from the surfaces of the specimen, which are to be in contact with the compression platens. The specimen shall be so placed in the machine that the load shall be applied to the opposite sides of the cubes as cast, that is, not to the top and bottom. The axis of the specimen shall be carefully aligned

with the centre of thrust of the spherically seated platen. No packing plates shall be used between specimen and platens of the machine. Once the uniform seating is obtained, load shall be applied without shock and increased continuously at a rate of approximately 14.0 N / mm² /Min. until the resistance of the specimen to the increasing load breaks down and no greater load can be sustained. The maximum load applied to the specimen shall be recorded and the appearance of the concrete and any unusual features in the type of failure shall be noted.

The measured compressive strength of the specimen shall be the maximum load applied to the specimen divided by the cross sectional area of the specimen and shall be expressed to the nearest N. per sq. mm. Average of the values shall be taken as the representative of the batch provided the individual variation is not more than + 15 percent of the average. Otherwise repeat tests shall be made. Cube crushing strength shall conform to the values given in Tables 2. 7 and 2.8.

(c) Frequency of Sampling of Concrete Cubes:

A random sampling procedure should be adopted to ensure that each concrete batch shall have a reasonable chance of being tested; that is, the sampling should be spread over the entire period of concreting covering all mixing units. The minimum frequency of sampling of concrete of each grade shall be as follows:

Quantity of concrete in the work cu.m.	No.of samples
1 - 5	1
6 - 15	2
16 - 30	3
31 - 50	4
51 and above	5 plus one additional sample for each additional 50m or part thereof.

The test specimens shall be made from each sample for testing at 28 days. Additional cubes may be required for determining strength of concrete at 7 days. The test strength of the sample shall be the

average strength of three specimens. The individual variation should not be more than 15 percent of the average.

Concrete shall be assessed daily for compliance. The contractor shall keep a record at site of all such tests identifying them with the proportion of the work to which they relate. The Architects will check this record from time to time. The said record shall give the following details and shall be initiated by the Engineer-in-Charge.

- (i) Reference to specific structural member receiving the batch of concrete from which the cubes were cast.
 - (ii) Mark on cubes.
 - (iii) Mix of concrete.
 - (iv) Data and time of casting.
 - (v) Water cement ratio by weight and slump.
 - (vi) Crushing strength as obtained at the end of 7 days for 3 cubes out of a set of 6 cubes and the end of 28 days for the remaining 3 cubes.
 - (vii) Laboratory in which tested and reference to test certificates.
 - (viii) The quantity of concrete, incorporated in work, that is represented by the quantity of concrete of the set of the cubes.
 - (ix) Any other information required by Architects.
- (f) Consistency:
The consistency of each sample of concrete shall be measured immediately after remixing by the slump test. The slump shall be as directed by the Engineer, which would be based on the preliminary test result keeping in view, the workability of the concrete. The approved slump shall be maintained through the field operations unless otherwise directed by the Engineer. In order to ensure the maintenance of uniform consistency, slump tests shall be carried out as often as demanded by the Engineer and invariably with the batch of concrete from which test cubes are made.
- (g) Record of Temperature:
A record of maximum and minimum temperature at the places of storage of the cube shall be maintained, during the period they remain at site, by the Contractor.

2.10.10 OPTIONAL TESTS:

The Engineer, if he so desires, may order tests to be carried out on cement, sand, coarse aggregate in accordance with the Indian Code of Practice or any other approved code.

Tests on cement shall include:

- (i) Fineness Test,
- (ii) Test for Normal Consistency,
- (iii) Test for Setting Time,
- (iv) Test for Soundness,
- (v) Test for Tensile Strength,
- (vi) Test for Heat of Hydration (by experiment and by calculations) in accordance with BIS or any other approved standard for cements.

Test on sand shall include:

- (i) Sieve Test
- (ii) Test for Organic Impurities
- (iii) Decantation Test for Determining Clay
- (iv) Specific Gravity Test
- (v) Test for Sieve Analysis and Fineness Modulus.

Tests on coarse aggregate shall include:

- (i) Sieve Analysis
- (ii) Specific Gravity and Unit Weight of Dry Loose and Rodded Aggregate (Bulk Density Test)
- (iii) Determination of Yield of a Dry Mixture
- (iv) Petrographic Examination of Deleterious Minerals in Aggregates.
- (v) Test for Aggregate Crushing Value and 10% Fine Value Test.
- (vi) Aggregate Impact Value
- (vii) Toughness Test
- (viii) Soundness Test
- (ix) Hardness Test
- (x) Alkali Aggregate Reaction

(xi) Deleterious Material

Any or all these test would normally be ordered to be carried out, if the specified concrete strengths are not obtained, at the Contractor's cost. If the works cubes do not give the stipulated results, the Engineer reserves the right to ask the Contractor to dismantle such portions of the work, which in his opinion are unacceptable and redo the work to the standard stipulated at his (Contractors) cost. It shall be very clearly understood by the Contractor that no extra claims shall be entertained by the Owner for excess use of cement over the minimum quantity stipulated to give the works cubes of required strength. The unit rate for design and test cubes, works cubes, testing them as per specifications, optional tests etc.

Unless otherwise stipulated, the concreting, testing, etc. shall be carried out as directed by the Engineer and to the appropriate BIS Specifications.

In the event of any work being suspected of faulty materials or workmanship or both, the Engineer before requiring its removal and reconstruction, may order, or the contractor may request, that it should be load tested in accordance with the following provisions.

2.10.11 LOAD TEST ON MEMBERS OR ANY OTHER TEST:

The test load shall be 125 percent of the specified super imposed load for which the structure was designed in addition to the full dead load (self weight of structure members plus weight of finishes and walls or partitions, if any as considered in the design). Such test load shall not be applied before 28 days after the time of placing of concrete.

During the tests, struts strong enough to take the whole load shall be placed in position leaving a gap under the members. The test load shall be kept for 24 hours before removal.

If within 24 hours of the removal of the load, the structure does not show a recovery of at least 75 percent of the maximum deflection shown during the 24 hours under load, the test loading shall be repeated after a lapse of at least 72 hours. The structure shall be considered to have failed to pass the test if the recovery after the second test is not at least 80 percent of the maximum deflection shown during the second test.

If during the test, or upon removal of the load, the structure shows signs of weakness, undue deflection or faulty construction it shall be reconstructed or strengthened as necessary.

Any other test, e.g. taking out concrete cores, examination and test on such cores removed from such parts of the members in an approved manner and as directed by the Engineer shall be carried out by the Contractor at his own cost, if so directed.

2.10.12 TESTING CONCRETE OF TANKS FOR LEAKAGE:

In addition to the structural test given in clause above, structures (tanks, chests, pits, etc.) to be used for storage of liquids shall also be tested for water tightness at full storage level as described below:

- (a) In case of structure whose external faces are exposed such as elevated tanks, the requirements of the test shall be deemed to be satisfied if the external faces show no sign of leakage or sweating and remain completely dry over the period of observation of seven days after allowing a seven days period for absorption after filling with water.
- (b) In case of structure whose external faces are backfilled and are not accessible for inspection, such as underground tanks, the tanks shall be filled with water and after the expiry of seven days after the filling, the level of the surface of the water shall be recorded. The level of water shall be recorded again at subsequent intervals of 24 hours over a period of 7 days. The total drop in surface level over a period of seven days shall be taken as an indication of the water tightness of the tank. The Engineer shall decide on the actual permissible rate of this drop in the surface level, taking into consideration whether the tanks are open or closed and the corresponding effect it has on evaporation losses. Backfilling shall be withheld till the tanks are tested if directed by the Engineer.

Costs of Tests:

The entire cost of tests as specified, in clause above shall be borne by the Contractor.

Unsatisfactory Test:

If the results of any test prove unsatisfactory, the Contractor shall remove and rebuild the member or members involved or carry out such other remedial measures as may be required by the Engineer or his representative. The Contractor shall bear the cost of so doing, unless the failure of the member or members to fulfill the test condition is solely due to faulty design.

2.10.13 PLACING:

The procedure for placing of concrete shall be as follows:

- (a) Preparation before placing of concrete shall be as given below.
 - (i) Engineer's Approval of Equipment & Method:
Before any concrete is placed, the entire placing programme, consisting of equipment, layout, proposed procedure and methods shall be submitted to the Engineer for approval if so demanded by the Engineer and no concrete shall be placed until the Engineers approval has been received.
 - (ii) Hardened concrete and foreign materials should be removed from the inner surface of the conveying equipments.
 - (iii) Form work shall have been completed; snow, ice and water shall have been removed. Reinforcement shall have been secured in place, expansion joint material, anchors and other embedded items shall have been positioned and the entire preparation shall have been approved.
 - (iv) No concrete shall be placed on watered surface.
 - (v) Rain or Wash Water:
No concrete shall be placed in wet weather and any concrete that has been washed by heavy rains shall be entirely removed, if there is any sign of cement and sand having been washed away from the concrete mixtures. To guard against damage which may be caused by heavy rains, the works shall be covered with gunny bags immediately after the concrete has been placed in position on the surface of the newly placed concrete and shall be removed by approved means and no further concrete shall be placed thereon.
- (b) Time interval between mixing and placing:
Concrete shall be placed in the forms within 30 (thirty) minutes as rapidly as practicable, after addition of water to cement and aggregate, unless otherwise authorised by the Engineer.
- (c) Concrete placing by manual labour:
Except when otherwise approved by the Engineer, concrete shall be placed in the shuttering by shovels or other approved Implements and shall not be dropped from a height or handled in a manner, which will cause segregation. Accumulation of set concrete shall be avoided. Concrete shall be placed directly in its permanent position and shall not be worked along the shuttering to that position.
- (d) Avoiding segregation:
Concrete shall, in all cases, be deposited as nearly as practicable directly in its final position, and shall not be caused to flow in a manner, which will cause segregation, loss of materials and impair its strength. For locations where direct placement is not possible, and in narrow forms, the Contractor shall provide suitable drop chutes and "Elephant Trunks" to confine the concrete in movement.
- (e) Concrete placing by Mechanical Equipment:
The following specification shall apply where placing of concrete by use of mechanical equipment is specifically called for while inviting bids or is warranted considering the nature of the work involved.

The control of placing shall begin at the mixer discharge. Concrete shall be discharged by the vertical drop into the middle of the bucket or hopper and this principle of a vertical discharge of concrete shall be adhered to throughout all stages of delivery until the concrete comes to rest in the structures.
- (f) Type of Buckets:
Central bottom dump buckets of a type that provides for positive regulation of the amount and rate of deposit of concrete in all dumping positions shall be employed.
- (g) Operation of Bucket:
In placing concrete in large open areas, the bucket shall be spotted directly over the position designated and then lowered for dumping. The open bucket shall just clear the concrete already in place and the height of drop shall not exceed 1.00 M. The bucket shall be opened slowly to avoid high vertical bounce, Dumping of buckets on the swing, or in any manner which results in segregation of ingredients or disturbances of previously placed concrete will not be permitted.
- (h) Placement in Restricted Forms:

Concrete placed in restricted forms by borrows, buggies, cars, short chutes or hand shovelling shall be subject to the requirement for vertical delivery of limited height to avoid segregation and shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or falling.

(i) Chuting:

Where it is necessary to use transfer chutes between mixer, containers or hoppers, and point of deposit in the forms, specific approval of the Engineer must be obtained as regards the type, length, slopes, baffles and vertical terminals. Concrete shall not be permitted to fall from the end of the chutes or tube more than 1.00 M. Chutes, when approved for use shall have slope not flatter than 1 to 3 and not steeper than 1 to 2.

(j) Placing by Pumping:

Concrete may be conveyed and placed by mechanically operated pressure equipment only with the written permission of the Engineer. Water cement ratio may not be increased above that for the same class of concrete placed by bucket and the slump shall be held to the minimum necessary for conveying concrete by this method.

(k) Bonding Mortar:

Immediately before concrete placement begins, prepared surfaces except formwork, which will be in contact with the concrete to be placed, shall be covered with a bonding mortar as specified.

(l) Thickness of Layers:

Concrete shall be placed in successive horizontal layers ranging in thickness from 15 to 90 mm. as directed by the Engineer the bucket loads, or other units of deposit shall be potted progressively along the face of the layer with such overlap as will facilitate spreading the layer to uniform depth and texture with a minimum of shovelling. Any tendency to segregation shall be corrected by shovelling stones into mortar then mortar on the stones. Such a condition shall be corrected by redesign of mix or other means, as directed by the Engineer.

(m) Bedding of layers:

Bedding planes shall be approximately horizontal unless otherwise instructed.

(n) Compaction:

Concrete shall be compacted with approved mechanical vibrating equipment until the concrete has been consolidated to the maximum practicable density, and is free of pockets of coarse aggregate, and fits tightly against all form surfaces and embedded materials.

2.10.14 TYPE OF VIBRATORS:

- (a) Vibrators shall be the internal or immersion high frequency type, with speed of not less than 6000 revolutions per minute when immersed in the concrete. Vibrators shall be used in sufficient number of units and power of each unit shall be adequate to properly consolidate the concrete.

(b) Use of Vibrators:

Vibrators shall be inserted in a vertical position at intervals of about 600 mm depending upon the mix, the equipment used, and continued experience on the job. Vibrators shall be withdrawn slowly. In no case shall vibrators be used to transport concrete inside the forms.

(c) Successive Batches:

In placing concrete in layers, which are advancing horizontally as the work progresses, great care shall be exercised to ensure adequate vibration, blending of the concrete between the succeeding batches.

(d) Vibrator Penetration of under layer:

The vibrator shall penetrate the layer being placed and also penetrate the layer below while under layer is still plastic to ensure good bond and homogeneity between the two layers and prevent the formation of cold joints.

(e) Vibrating Against Reinforcement:

Care shall be taken to prevent contact of vibrators against reinforcement steel, Vibrators shall not be allowed to come in contact with reinforcement steel after start of initial set. Vibrators shall not be allowed to come in contact with forms of finished surface.

(f) Use of form attached Vibrators:

The use of form attached Vibrators shall be used only with specific authorization of the Engineer.

(g) Use of Surface Vibrators:

The use of surface vibrators will not be permitted under ordinary conditions. However, for thin slabs, such as highways, runways, and similar construction surface vibration by specially designed vibrators may be permitted, upon the approval of the Engineer.

(h) Stone pockets and Mortar Pondages:

The formation of stone pockets and mortar pondage in corners and against form face shall not be permitted. If these occur, they shall be dug out, reformed and refilled to sufficient depth and shape for the rough blending, as directed by Engineer.

2.10.15 CONSTRUCTION JOINTS AND KEYS:

Concrete shall be placed continuously unless otherwise specified.

If stopping of concreting becomes unavoidable anywhere, the construction joint shall be made, where the work is stopped, concrete that is in the process of setting shall not be disturbed or shaken by traffic either on the concrete itself or upon the shuttering. Horizontal and vertical construction joints and bonding keys shall be located and shall conform in details to the requirements of the plans unless and otherwise directed by the Engineer. Where not described, the joint shall be in accordance with the following:

(a) Column joint:

In a column, the joint shall be formed 75 mm. below the lowest soffit of the beams joining to it.

(b) Beam and Slab Joint :

Concrete in a beam shall be placed throughout without a joint but, if the provision of a joint is unavoidable, the joint shall be vertical and at the middle of the span. A joint in a slab shall be vertical and parallel to the principal reinforcement. Where it is unavoidable, the joint at right angles to the principal reinforcement, shall be vertical and at the middle of the span.

2.10.16 CURING, PROTECTING, REPAIRING AND FINISHING:

All concrete shall be cured by keeping it damp for the period of time required for complete hydration and hardening to take place.

Certain types of finish, or preparation for overlaying, concreting must be done at certain stages of the process and special treatment may be required for specific concrete surface finish.

(a) Curing with water:

Fresh concrete shall be kept continuously wet for a minimum period of at least 21 days since lapse of 24 hours after laying concrete. Quantity of water supplied shall be controlled so as to prevent the erosion of freshly placed concrete.

(b) Continuous Spraying:

Curing shall be assured by use of an ample water supply under pressure in pipes, with all necessary appliances of hose (sprinklers to be used), unless otherwise specified or approved by the Engineer.

(c) Alternate Curing Methods:

Whenever, in the judgment of the Engineer, it may be necessary, the continuous spray method may be omitted and a covering of sand, or other approved mulching such as wet gunny bags, which will prevent loss of moisture from the concrete, may be used. No type of covering will be approved which should strain or damage the concrete during or after curing period. Covering shall be kept continuously wet during the curing period.

(d) Curing compounds:

Surface coating type-curing compounds shall be used only by special permission of and under the direction of the Engineer. Curing compounds shall be colourless / pigmented, liquid type, conforming to approved specifications. No curing compound shall be used on surfaces where future blending with concrete or painting is specified,

(e) Ponding:

For curing of concrete in pavement, sidewalks, floors, flat roofs or other level surfaces, the ponding method of curing is preferred. The method of containing the ponded water shall be approved by the Engineer. Special attention shall be given to edges and corners of the slabs to ensure proper protection to these areas. The ponded areas shall be kept continuously filled with water.

(f) Curing Equipments:

All equipment and materials required for curing shall be on hand and ready for the use before concrete is placed.

(g) Protection of Fresh Concrete:

Fresh concrete shall be protected by leaving forms in place for an ample period as specified later in this specification. Newly placed concrete shall be protected by approved means from rain, sun and winds. Steps as approved by the Engineer shall also be taken to protect immature concrete from damage by debris, excessive loading, vibration, abrasion or other materials etc. that may impair the strength and/or durability of the concrete. Workmen shall be warned against and prevented from disturbing green concrete during its setting period. If it is necessary that workmen enter the area of freshly placed concrete, the Engineer may require that bridges be placed over the area.

(h) Repair and Replacement of Unsatisfactory Concrete:

Immediately after the shuttering is removed, the surface of concrete shall be very carefully one over and holes noticed shall be filled up and made good with mortar composed of one part of cement to one part of sand after removing any loose stones adhering to the concrete. Concrete surfaces shall be finished as described under the particular items of work. Superficial honeycombed surfaces shall be made good immediately after removal of shuttering, in presence of Architect's representative and superficial water and air holes shall be filled in. Unless otherwise instructed by the Engineer, the surface of the exposed concrete placed against shuttering shall be rubbed down immediately on removal of shuttering to remove fins or other irregularities.

Unsatisfactory concrete shall be cut out and replaced with new concrete, as soon as practicable after removal of forms. Anchors, tees, or dovetail slots shall be provided wherever necessary to attach the new material securely in place. Surface of prepared voids shall be wetted for 24 hours immediately before the patching material is placed.

Use of an epoxy for blending fresh concrete used for repairs will be permitted upon written approval of the Engineer. Epoxies shall be applied in strict accordance with the instructions of the manufacturer.

2.10.17 FINISHING -GENERAL:

The specification is intended to cover the treatment of concrete surfaces of all structures. Area requiring special finish not covered by this specification may be clearly indicated on the drawings and specifications will be furnished.

(a) Finish for Formed Surfaces:

The type of finish for formed concrete surfaces shall be as follows, unless otherwise specified by the Engineer:

(i) Cement plaster finish:

The concrete shall be properly roughened immediately after the shuttering is removed, taking care to remove the laitance completely without disturbing concrete. The roughening shall be done by hacking. Before the surface is plastered, it shall be cleaned and wetted so as to give good bond between concrete and plaster.

(ii) For surface against which backfill or concrete is to be placed. 'no' treatment is required except tie holes & repair of defective areas shall be patched with cement mortar.

(iii) For surfaces below grade, which will receive waterproofing treatment, the concrete shall be free of surface irregularities, which would interfere with proper application of the waterproofing material, which may be specified for use.

(iv) Surfaces which will be exposed when the structure is in service shall receive no special finish except repair of damaged or defective concrete, removal of fins and abrupt irregularities, filling of holes left by form ties and rods, and clean up of loose or adhering debris.

(b) Finishing:

Finishing of exposed concrete surface shall conform to the following.

Smooth form finish:

The form facing material shall produce a smooth, hard, uniform texture on the concrete, it may be plywood or other approved material capable of producing the desired finish. All ties, burns and fins are to be removed. Mix one part of Portland cement and one part fine sand with sufficient water to produce a stiff mortar. The mortar after drying shall match the rest of the surface in colour. Before application of mortar, concrete surface is to be dampened. Mortar is to be applied by firm rubber float or trowel, filling all surface voids. Compressing mortar into voids by using carborundum stone shall be continued till uniform colour and texture is produced. If the mortar surface dries too rapidly to permit proper compaction and finishing, apply a small amount of water with a sprayer. Quoted rate of exposed shuttering shall be inclusive of this treatment.

(c) Finish for Unformed Surfaces:

Surfaces which will be exposed to the weather and which would normally be a specified level, a horizontal surface or shows the slope required, the tops of narrow surfaces, such as stair treads, walls, curbs and parapets shall be sloped approximately 10mm in 300mm width, broader surfaces such as walkways,

roads, parking areas and platforms shall be sloped about 1 in 50. Surfaces that will be covered by backfill or concrete, sub-floors to be covered with concrete topping, terrazzo or quarry tile, and similar surfaces shall be smooth screened and levelled to produce even surfaces. Surfaces which will not be covered by backfill, concrete or tile toppings such as outside desks, floors of galleries and sumps, parapet, gutters, sidewalks and slabs shall be consolidated, screened and flattened. Flattening may be done with hand and started as soon as the screened has attained a stiffness to permit finishing operations, and shall be the minimum required to produce surface uniform in texture and free from screened marks or other imperfections. Joints and edges shall be tooled as called for on the drawings or as directed by the Engineer.

(d) Protection:

All concrete shall be protected against damage until final acceptance by the Architect or his representative.

2.10.18 CONCRETING IN HOT WEATHER:

Concreting in extreme hot weather shall be avoided. Special care shall be exercised and measure undertaken when temperature on site exceeds 105° F or 40° C. Such measures shall include:

- (i) Provision of a shade for coarse aggregate so that the same do not absorb heat from the directly indenting rays of sun.
- (ii) Continuously wetting coarse aggregates to keep their temperature down, fog sprays.
- (iii) Providing a shade for the mixing machine.
- (iv) Depositing the concrete from the machine as quickly as possible.
- (v) Adjusting water proportions throughout the day to account for water in the wet aggregate, giving desired strength and workability.
- (vi) Covering the deposited concrete by a membrane as soon after the placing as possible without damaging the fresh concrete.
- (vii) Wet gunny bags shall be laid immediately after two hours of concreting on the top surfaces of slab and shall be kept wet for curing period.
- (viii) Use of retarder (2% of Calcium Chloride).
- (ix) Use of Zero Heat Portland Cement or even the Portland Pozzolana Cement.
- (x) Use of higher water cement ratios.
- (xi) Keep moist, the formwork continuously for the period of 2 hours at least.

On such days of hot weather, concreting records shall be kept of the atmospheric temperature and corresponding temperatures of concrete discharged from the mixing machine.

2.11 CURING OF DIFFERENT ITEMS:

For all the time during construction, curing shall be carried out especially from 7.00 AM to 7.00 PM even on holidays with proper manpower, necessary pumps and pipe lines, connections, etc.

- 2.11.1 Exposed surfaces of concrete shall be kept continuously in a damp or wet condition by ponding or by covering with a layer of sacking, canvas, hessian or similar material and kept constantly wet for at least seven days from the date of placing concrete in case of OPC and at least 10 days where mineral admixtures or blended cements are used. The period of curing shall not be less than 10 days for concrete exposed to dry and hot weather conditions. In the case of concrete where mineral admixtures or blended cements are used it is recommended that above minimum periods may be extended to 14 days. For the concretes containing PPC or Portland Slag Cements, period of curing may be increased.

- 2.11.2 For other items the curing shall be done as follows or as directed by the Engineer-in-Charge.

- | | | |
|-----|----------------------------------|-----------------------|
| (a) | Brick work | At least for 10 days. |
| (b) | Plaster work | At least for 7 days. |
| (c) | Sand faced plaster | At least for 15 days. |
| (d) | Tiles or stone flooring and dado | At least for 10 days. |

2.12 FORM WORK:

2.12.1 General:

The form work shall conform to the shape, lines and dimensions as shown on the drawings and be so constructed as to remain sufficiently rigid during the placing and compacting of the concrete and shall be sufficiently tight to prevent loss of slurry.

- (a) All forms shall be checked frequently during the concreting operations and until removed so that they may be driven up if any settlement occurs.

The design, fabrication and erection of formwork are solely the responsibility of the Contractor. The formwork should be safe and stable to withstand dead load of concrete, men etc. Further, the form should yield security to the structure or its members.

(b) Materials:

The selection of materials suitable for formwork shall be based on economy and consistency with safety and quality required for the finished work. Formwork shall be of timber, plywood, steel or any other materials as approved by Architect/Engineer-in-Charge whose decision in this respect shall be final. Props and shores shall be of steel, timber posts, bullies or any other material as approved by Architects.

(c) Chamfer strips shall be placed in corner of forms to produce bevelled edges on permanent exposed surface, if specified.

(d) Temporary openings shall be provided at the base of column forms and wall forms and at other points where necessary to facilitate cleaning and observation immediately before concrete is placed.

(e) Mould Oil:

Care should be taken to see that the formwork is perfectly cleaned and two coats of mould oil or any other approved material is applied before placing the concrete. Such coating shall be insoluble in water, non-staining and non-injuries to the concrete. It shall not become flaky or be removed by rain or wash water. Block boards or equivalent shall be used for shuttering columns, beams, etc. and steel sheets for slab shuttering will be allowed.

(f) Chamfers and fillets:

All concrete and angles exposed in the finished structure shall be formed with mouldings to form chamfers or fillets on the finished concrete. The standard dimensions of chamfers and fillets, unless otherwise specified, shall be 20 mm. Care should be exercised to ensure accurate mouldings. The diagonal face of the moulding shall be placed or surfaced to the same textures as the forms to which it is attached.

(g) Vertical construction joint chamfers:

Vertical construction joints on faces, which will be exposed at the completion of the project, shall be chamfered as above except where not permitted by the Engineer for structural or other reasons.

(h) Reuse of Forms:

Before reuse, all forms shall be thoroughly scraped, cleaned, joints examined and when necessary, repaired and the inside retreated to prevent adhesion, to the satisfaction of the Engineer. The Contractor shall equip himself with enough shuttering to complete the job in the stipulated time.

(i) The contractor shall record on the drawing or a special register the date upon which the concrete is placed in each part of the work and the date on which the shuttering is removed there from. Striking of forms in the case of sides of beams, columns and slabs can be carried out after 24 hours of concreting. The striking of forms shall be done as para 2.12.4. Striking shall be done with utmost care without shock or vibration by gently easing the wedges. If, after removing the formwork, it is found that the timber is embedded in the concrete, it has to be cut out and made good with fine concrete. Due care shall be given to the provision of correct form work for holes and openings in the slabs, inserts, grounding cables, conduits and pipe sleeves, foundation or anchor bolts etc. as per approved drawings or as directed by the Engineer.

2.12.2 CLEANING AND TREATMENT OF FORMS:

The forms shall be carefully examined to see that they are vertical and horizontal and the joints are properly closed. If forms are to be reused, they should be carefully examined before such, reuse, properly aligned and open joints shall be repaired and coated with crude oil. The centering planks for columns shall be joined together and provided with threaded bolts and nuts.

The centering and props for the various members shall be fixed in a workman like manner to be approved by the Engineer-in-charge. They shall be of such size as the Engineer-in-Charge thinks fit and proper. The centering shall be removed only after the permission has been obtained from the Engineer-in-Charge. Props shall be supported on wedges placed on planks and the planks shall be 25 mm thick.

All rubbish, particularly chippings, shavings and saw dust shall be removed from the interior of the forms before the concrete is placed and the form work in contact with the concrete shall be cleaned and thoroughly wetted or treated with an approved composition. Care shall be taken that such approved composition is kept out of contact with the reinforcement.

(a) In columns of any forms where access to the interior is not available otherwise, a sufficient area of one side shall be left loose so that it may be removed for cleaning out all chips, dirt, sawdust and other extra materials.

- (b) Where the shoring bores on the ground, the Contractor shall spread the load from shores by suitable brick platforms in order to prevent settlement.

2.12.3 ARCHITECTURAL EXPOSED REINFORCED CEMENT CONCRETE:

- (a) General:
Generally specification for reinforced cement concrete work shall also apply to this type of work and additional specification set forth below.
- (b) Materials:
 - (i) Cement used for such work shall be of a uniform colour and obtained from one source of manufacture.
 - (ii) Aggregate:
 - a) Fine Aggregates:
Colour being an important consideration for exposed concrete, colour of sand used shall also be uniform through out the entire construction. Preferably total quantity required for the work shall be collected and well mixed together to a uniform shade.
 - b) Coarse Aggregate:
The colour of the aggregate shall be maintained the same through out. Unless otherwise specified, exposed concrete in walls, fences and parapets which are nonload bearing and are less than 120 mm. in thickness the maximum size of coarse aggregate shall be limited to 12 mm for which nothing extra shall be admissible. Flat and flaky pieces shall not be allowed.
 - (iii) Reinforcement & Cover of the Concrete:
Correct placing of the reinforcement with proper cover is important in all exposed work to avoid discolouration by rusting. The minimum cover specified in the Specification shall be maintained throughout.
Concrete blocks or spacers shall be sparingly used at exposed surfaces. When used, such blocks shall preferably be cast on vibrating tables or in some other similar manner so that it may match the concrete surface in texture and colour. Cover blocks of materials other than precast blocks shall not be allowed to be used.
- (c) Construction of shuttering:
All centring and framework shall be rigid and of robust construction. All vertical props shall be cut square at ends and shall rest on double wedges, placed on continuous horizontal runners on firm natural soil. Resting of props or runners on made up soil shall not be permitted on any account. All members of the formwork shall be closely fixed without any gap between them so as to safeguard against any settlement or displacement of shuttering at the time of concreting.
 - (i) Timber Shuttering:
Formwork for exposed work shall be of seasoned wrought hard wood timber planks free from loose knots. The planks shall be 50 mm thick, 100 to 125 mm wide with tongue and groove joints, assembled to a pattern approved by the Architect. The formwork shall be so constructed, braced, and stayed as to remain absolutely rigid and true during and after concreting. The boards shall be planed to a suitable thickness in order that the surface against the concrete shall not be broken at joints between boards. Chamfers, grooves, drips mouldings, bevelled edges etc. shall be made in the form itself to the size, profiles and details called for on the drawings.
 - (ii) Plywood Shuttering:
The contractor shall provide shuttering quality plywood not less than 12 mm thickness as per IS.4990 (type-I) of approved make or equivalent approved by the Architect in place of timber plank shuttering mentioned above for such location as called for by the Architects. The joints in plywood shuttering shall be located as directed by the Architects. Shuttering, centering and form work for all exposed concrete work like exposed columns, beams, ribs, slabs, chajjas, facias, walls etc. shall be of such finish and rigidity as to produce all faces fair and smooth, true to line level and plumb. No rendering or touching shall be permitted on these faces.
 - (iii) Steel shuttering:
Steel shuttering for exposed concrete work shall be made of shuttering plates of standard sizes and to suit the pattern of exposed concrete indicated in Architect's drawings. The shutter plates used will be made of steel sheets strengthened at the edges and in middle to prevent sagging

or any deflection and concrete deformity or dents and should fit with each other properly without any space or groove being left between adjacent plates to avoid and leakage of concrete slurry. If any concrete projects out between plates this will be neatly cut away.

The contractor shall be required to produce details of working showing the general construction of formwork and panels with details such as nail position and holes for supports that may be required; nail heads shall be positioned as instructed by the Architects. Grooves and chamfers shall be formed as shown on the drawings without any extra cost.

Any holes for the supports, which the contractor may need, shall be permitted only if approved by the Architects. All such holes shall be subsequently filled in carefully as to match with the other surface. Walls, columns etc. shall generally be cast to the full height in one operation and the formwork shall be provided accordingly. If permitted by the Architects, these may be completed in two or more heights when the formwork shall be carefully and correctly raised for further height so as to ensure a neat joint without disturbing the pattern. Any groove desired by the Architect at the joint shall be provided by the Contractor at no extra cost.

(d) Coating for shuttering:

Shuttering oil, colourless and emulsifiable in water shall be used for oiling the woodwork, when only a thin film shall be neatly applied avoiding collection at one place. Any mark left by the shuttering oil shall be washed clean.

(e) Measurements and proportioning of concrete materials:

This shall be as laid down generally for R.C.C. work. In no case extra dust or sand or additional water shall be allowed with the intention of getting better finish, which shall only be obtained by erecting centering as specified above and proper vibrating of the mix after placing. In no case, the slump limit, specified in the Specification shall be exceeded.

(f) Preparation for placing concrete:

Special care is essential to see that all saw dust, chips, nails or any foreign material is washed out or otherwise removed from the shuttering.

(g) Mechanical vibration:

All concrete for exposed concrete work shall be vibrated, using needle vibrators -30/32 mm. Surface or trough vibrators may be permitted to be used for thin slabs. External vibrators for walls may be allowed but this shall be done carefully to safeguard the displacement of the shuttering. Vibrators shall only be operated by skilled labour; over or under vibration shall not be permitted. Any spillage, or leakage, which is unavoidable and which flows down the exposed concrete surfaces, shall be immediately washed away with clean water and brush.

Exposed concrete members shall be finished to desired surface while the concrete is still green.

(h) Curing and protection of concrete:

Curing will be done with clean water, so as not to discolour the concrete. All exposed concrete work shall be properly protected by Alkathene film, gunny bags, wooden boards etc. so the surfaces and edges are not damaged or discoloured till the entire construction is handed over, at no extra cost. All such damages shall be set right or replaced by the contractor at his own cost; the contractor is deemed to have considered this in quoting his rate.

(i) Removal of shuttering:

Striking and removing of formwork for exposed concrete shall be done very carefully without damaging the surface or edges. All such damages shall be set right or replaced by the contractor at his own cost.

(j) Finishing:

Finishing of exposed concrete surface shall be as specified.

Exposed concrete surface shall on no account be permitted to any sort of repairs or patching after striking the formwork. In the event of any portion not coming up to standard, this shall be taken down by the contractor at no extra cost. Decision of the Architects as to the rejection of such work shall be final and binding on the contractor.

2.12.4 STRIPPING TIME:

In normal circumstances (generally where temperatures are above 20° C) and where Ordinary Portland Cement is used, forms may generally be removed after expiry of following periods:

Type of Form work		Minimum Period before striking Form work
(a)	Vertical formwork to columns, walls, beams.	16-24 h
(b)	Soffit formwork to slabs (Props to be refixed immediately after removal of form work)	3 days
(c)	Soffit form work to beams (props to be refixed immediately after removal of form work)	7 days
(d)	Props to slabs	
	(a) Spanning up to 4.5 m.	7 days
	(b) Spanning over 4.5 m.	14 days
(e)	Props to beams and arches	
	(a) Spanning up to 6 m.	14 days
	(b) Spanning over 6 m.	21 days

The number of props left under, their sizes, load and disposition shall be such as to be able to safely carry the full dead of the slab, beam or arch as the case may be together with live load likely to occur during curing or further construction.

However, this period may be increased or decreased at the discretion of Architects. In case when the cube strengths at seven days are found to be low or in the cases when other cements are used, the curing period and stripping time for forms and removal of props may have to be extended. This shall be decided by the Architect and the contractor shall not claim any extra costs for such increased periods of curing and stripping of forms etc. Special care shall be taken while removing the centering of cantilever slab, canopies, portal frames, folded plates construction etc. Stripping time for such special structure as shell roofs etc. shall be determined from tests of stripping cubes taken specially for the purpose. These cubes shall give strength of 75% of the 28 days strength.

For rapid hardening cement 3/7 of the above period will be sufficient in all cases except vertical sides of slabs, beams and columns, which should be retained for 24 hours.

Note:

The props left under shall mean that the form work for slabs and beams soffits at 3 days and 7 days respectively can be removed only if the same can be done without disturbing the props which are required to support the slab or beam completely. In normal cases this will mean that period for removal of formwork for slabs and beam soffits will be 7 days and 14 days respectively.

2.12.5 PROCEDURE WHEN REMOVING THE FORMWORK:

All formwork shall be removed without such shock or vibration as would damage the reinforced concrete. Before the soffit and struts are removed, the concrete surface shall be exposed, where necessary, in order to ascertain that the concrete has sufficiently hardened. Proper precautions shall be taken to allow for the decrease in the rate of hardening that occurs with all cements in the cold weather.

2.12.6 CAMBER:

It is generally desirable to give forms an upward camber to ensure that the beams do not have a sag when they have taken up their deflection, but this should not be done unless allowed for in the design calculation of the beams.

2.12.7 TOLERANCES:

The Contractor shall, before putting any concrete in any unit, check all dimensions according to the drawing governing the accuracy of the dimension of all the units and the necessary formwork shall be approved by the Engineer-in-charge and if any error is found in dimensions, the Engineer-in-charge will not allow in any case more than the tolerances specified as below and any unit which does not comply will be liable to rejection at the discretion the Engineer-in-charge.

The formwork shall be designed and constructed to the shapes, lines and dimensions shown on the drawings within the tolerances as given below. The tolerances in footings apply to concrete dimensions only and no to positioning of vertical reinforcing steel or dowels.

(a)	Deviation from specified dimensions of cross sections of columns and beams	-6 mm + 12 mm
(b)	Deviation from dimensions of footings	
i)	Dimensions in Plan	- 12 mm
ii)	Eccentricity	0.2 times the width of the footing in the direction of deviation but not more than 50mm.
iii)	Thickness	+ 0.05 times the specified thickness.

2.13 FOUNDATION BEDDING, BONDING AND JOINING:

All surfaces upon or against which concrete will be placed shall be suitably prepared by thoroughly cleaning, washing and dewatering as may be indicated in the drawing, or as the Engineer may direct to meet various situations encountered in the work.

2.13.1 SPACE OF CROSS SECTION:

No line on the cross section of unit shall deviate from its correct position by an angle exceeding one degree. Contractor shall not make any change in the cross section of the units in any case.

2.13.2 PREPARATION OF ROCK FOUNDATION:

The prescribed methods of rock excavation will be shown on the drawings or given in the general specification for excavation and foundation preparation for a particular job and not in this specification. The exact foundation configuration cannot always be predicted and the subsequent treatment thereof cannot always be shown or indicated on drawings prepared before the excavation is done. However, the following general requirements shall be observed:

- (a) Concrete shall not be deposited on large sloping rock surfaces. Where required by the Engineer or as indicated on the drawings, the rock shall be cut to form rough steps or benches, to provide roughness or a more suitable bearing surface.
- (b) Rock foundation shall be prepared by picking, barring, wedging and similar methods which will leave the rock in an entirely sound and unsheltered condition.
- (c) Shortly before concrete is placed, the rock surface shall be cleaned with the high-pressure water and air jet. even though it may have been previously cleaned in that manner.
- (d) Prior to placing concrete, the rock foundation shall be kept wet for a period of 2 to 4 hours unless otherwise directed by the Engineer.
- (e) Before placing concrete on rock foundations, all water shall be removed from depressions to permit thorough inspection and proper bonding of the concrete to the rock.

2.13.3 PREPARATION OF EARTH FOUNDATION:

All earth surfaces upon which or against which concrete is to be placed shall be well compacted and free from standing water, mud or debris. Soft yielding soil shall be removed and replaced. Where specified, lean concrete shall be provided on earth for receiving the concrete. The surface of absorbing types of soils against which concrete is to be placed shall be moistened thoroughly so that no moisture will be drawn from the freshly placed concrete.

2.13.4 PREPARATION OF CONCRETE SURFACES:

The preparation of concrete surfaces upon which additional concrete is to be placed shall preferably be done by scarifying and cleaning while the concrete is between its initial and final set. This method shall be used wherever practicable and shall consist of cutting of the surface with picks and stiff brooms and by use of an approved combination of air and water jet, as directed by the Engineer. Great care shall be taken in performing this work to avoid removal of too much of mortar and weakening of the surface by loosening of aggregate.

When it is not practicable to follow the above method, it will be necessary to employ air tools to remove laitance and roughen the surface.

The final required result shall be a pitted surface from which all dirt; unsound concrete, laitance and glazed mortar have been removed.

2.13.5 BONDING TREATMENT (MORTAR):

After rock or concrete surfaces upon which new concrete is to be placed have been scarified, cleaned and wetted as specified herein, they shall receive a bonding treatment, immediately before placement of the concrete.

The bonding medium shall be a coat of cement sand mortar. The mortar shall have the same cement-sand content as the concrete, which will be placed on it. The water-cement ratio shall be determined by conditions and as approved by the Engineer.

Bonding mortar shall be placed in sufficient quantity to completely cover the surface about 12.5 mm thick for rock surfaces. It shall be brushed or broomed over the surface and worked thoroughly into all cracks, crevices and depressions. Accumulations or puddles of mortar shall not be allowed to settle in depressions, and shall be brushed out to a satisfactory degree, as determined by the Engineer.

Mortar shall be placed at a rate that it can be brushed over the foundation just in advance of placement of concrete. Only as much area shall be covered with mortar as can be covered with concrete before initial set in the mortar take place. The amount of mortar that will be permitted to be placed at any one time, or the area which it is to cover, shall be in accordance with the Engineer's direction.

2.13.6 CLEANING AND BONDING FORMED CONSTRUCTION JOINTS:

Vertical construction joints shall be cleaned as specified above or by other methods approved by the Engineer. In placing concrete against formed construction joints, the surface shall be coated thoroughly with the specified bed joint bonding mortar immediately before they are covered with concrete or by scrubbing with wire brooms dipped into the fresh concrete. Where it is impracticable to apply such a mortar coating, special precautions shall be taken to ensure that the new concrete is brought into intimate contact with the surface of the joint by careful puddling and spacing with aid of suitable tools.

2.13.7 When reshoring is permitted or required, the operation shall be planned in advance and shall be subject to approval of Architect. When reshoring is underway, no live load shall be permitted on the construction.

- (i) In no case during reshoring shall concrete in beam, slab, column or any other structural member be subjected to combined dead and construction loads in excess of the loads permitted by Architect/Engineer for the concrete strength developed at the time of reshoring. Reshore shall be tightened to carry their required load without overstressing the construction.
- (ii) Floors supporting shores under newly placed concrete shall have their original supporting shores left in places or shall be reshored. The reshoring system shall have capacity sufficient to resist the anticipated loads and in all cases shall have a capacity equal to at least one half of the capacity of the shoring system above.

The reshores shall be located directly under a shore position above unless other location is permitted.

- (iii) In multi-storey building the reshoring shall extend over a sufficient number of storeyes to distribute the weight of newly placed concrete forms and construction live loads in such a manner that the design superimposed loads of the floors supporting shores are not exceeded.

2.13.8 EXPANSION AND CONSTRUCTION:

Provision will be made for expansion joints and construction joints in concrete by use of special types of joints located as shown on the drawings, Construction joint surfaces are to be treated as shown on the drawings or as directed by the Engineer.

2~14 ADVERSE WEATHER CONDITIONS:

When concrete is to be placed under adverse weather conditions special provisions shall be made in the handling and placing methods and in protection during the curing period to ensure that concrete of full strength and free from damage will be obtained.

2.14.1 PLACING CONCRETE UNDER WATER:

Under all ordinary conditions, all foundations shall be completed unwatered and concrete placed in the dry. However, when concrete placement under water is necessary, the procedure shall be as follows:

- (a) Concrete shall be deposited underwater by means of tremies, or cotton-dump covered buckets of approved type. As per IS: 456, clause 14.2.4 under water concreting can be done by:
 - Tremie
 - Direct Placement With Pumps
 - Drop Bottom Bucket
 - Bags
 - Grouting
- (b) All work requiring placement of concrete under water shall be designed, directed and inspected with the due regard to local circumstances and purposes. All underwater concrete shall be placed according to the drawings or Specifications and as directed and approved by the Engineer.

2.14.2 Calcium chloride shall not be used for accelerating setting of the cement for any concrete containing reinforcement, or embedded steel parts. The use of calcium chloride in mass concrete of footings and similar occasions will be permitted only upon written approval of the Engineer. When calcium chloride is used, it shall be liquefied and added to the mixing water in an amount not exceeding 2 % of the weight of the cement in each batch of concrete. If calcium chloride added is:

- (a) 1 % of weight of cement, it serves the purpose of acceleration. But if the quantity exceeds 2% it causes delay in the initial setting time; it acts as retarder.
- (b) 8% of weight of cement, it causes slash-set. Calcium Chloride should not be used in the prestressed concrete works at all and more amount of it reduces the resistance of the cement to the sulphur attacks.

2.15 OPENINGS, INSERTS ETC.

Slots, openings or holes, pockets, etc. shall be provided in the concrete work in the positions indicated in the drawings or as directed by the Engineer. Any deviation from the approved drawings shall be made good by the contractor without damaging any other work. Sleeves, bolts, inserts etc. shall also be provided in concrete work, where so specified.

2.16 RATES ALL INCLUSIVE:

2.16.1 The unit rate for concrete work under various categories shall be inclusive of and no claims for extra payment on account of such items as leaving holes, pockets, embedding inserts etc. shall be entertained. No extra claim shall also be entertained due to change in the number, position and/or dimensions of holes, slots or openings, sleeves, inserts or on account of any increased lift or scaffolding etc. All these factors should be taken into consideration while quoting the unit rates. The rates shall also include fixing inserts in all concrete work, whenever required.

2.16.2 PAYMENT FOR CONCRETE WORK:

Payments for concrete will be made on the unit rates quoted for the respective items in the Bills of Quantities. No deduction in the concrete quantity would be made for reinforcements, inserts, etc. and opening less than one twentieth of the square meter and 1/150 Cmt. where concrete is measured in cubic meters. It shall be very clearly understood that payment for "concrete work formwork" is inclusive formwork, shuttering shoring, propping, scaffolding, etc.

Rate for all concrete work shall be based on 20 mm maximum size aggregate. Contractor shall also quote the reduction offered for using 40 mm maximum size aggregate, if permitted by the Engineer.

2.17 PRECAST CONCRETE:

2.17.1 Precast concrete shall comply generally with the requirements given below.

All precast units shall be cast on a suitable bed or platform with firm foundation and free from wind. The contractor shall be responsible for the accuracy of the level or shape of the bed or platform. A suitable serial number and the date of casting shall be impressed or painted on each unit.

All precast concrete units shall be prepared and fixed as shown in the drawings and as specified in the detailed specification. Concrete mix shall be as specified or as shown in the drawings with machine mixed, machine vibrated and prepared by weigh batching with Contractor's own mix design which shall be approved by Consulting Engineers. IS: 456 Code Practice for Plain and Reinforced Concrete shall be followed as relevant Indian Standard Specification.

(a) Striking Forms:

Side shutters shall not be struck in less than 48 hours after deposition of concrete and no precast units shall be lifted in less than 21 days after the date of casting or built into position in less than 28 days.

(b) Hoisting Precast Units:

The lifting and removal of precast units shall be undertaken without causing shock, vibration or undue bending stresses to or in the units. Before lifting and removal take place, the contractor shall satisfy the Engineer or his representative that the methods he proposes to adopt for these operations will not over stress or otherwise affect seriously the strength of the precast units.

(c) Curing:

All precast work shall be protected from the direct rays of the sun for at least 21 days after casting and during that period each unit shall be kept constantly watered or preferably be completely immersed in water.

The surface i.e. the underside or upper side, which is reinforced, shall be distinctly marked.

2.17.2 MOULDS:

Moulds shall be constructed of well-seasoned timber of stout scantling, steel or concrete. They shall be constructed so as to prevent leakage of cement slurry, remain true to shape at all times during use and give a smooth finish to the unit. Moulds shall be coated with an approved nonstaining liquid prepared before each unit is cast. Precast concrete beams, purlins and similar units shall be cambered where shown on the drawings or directed by the Engineer-in-charge,

2.17.3 UNITS CAST ON FLOORS:

When units are cast directly into a concrete floor slab, the contractor shall ensure that the parts of the surface on which the units rest are sufficiently smooth and level or are made so by laying temporary screeds which must be removable without damage to the floor surface. In all cases, a membrane of a waxed paper or other approved material shall be carefully laid on the floor beneath the moulds to prevent the deposited concrete adhering to the floor.

2.17.4 DEMOULDING UNITS:

No units shall be demoulded sooner than 12 hours after casting unless cured by steam or hot water. The time of demoulding shall be related to the temperature of the ambient air.

Freshly demoulded units shall be handled with the greatest care so as to avoid cracking and damage to the surface.

2.17.5 HOLES FOR FIXING SERVICES ETC.

Holes shall be formed in the positions shown on the drawings or as directed by the Engineer-in-Charge with steel or wooden cores, cardboard tubes or other approved forms fixed in position prior to concreting.

Holes for the fixing of precast units shall be cored accurately in the positions shown on the drawings and at right angles to the surface from which they are cored unless otherwise shown Former-pins shall be well greased before concreting.

Holes which are to receive fixing bolts which bear on the surfaces of the holes shall be permanently cored with galvanized steel tube, the ends of which must be finished flush with the surface of the unit and be galvanised or dipped in approved zinc rich paint, 12 hours before fixing in the mould.

Holes must not be cut in hardened concrete without the permission of the Engineer-in-Charge.

2.17.6 CAST-IN-ITEMS:

Fittings and items of equipment which are set in position before the surrounding concrete is deposited shall be protected by painting or otherwise, as agreed with the Engineer-in-Charge against the effect of the water in chemical action of the concrete. Particular care shall be taken to ensure that concrete completely surrounds and is in intimate contact with all cast-in items and is properly compared thereabout.

2.17.7 DIMENSIONS OF PRECAST UNITS:

Accuracy of Dimensions:

The contractor shall, before commencing manufacture of present units, check all dimensions on the detailed drawings governing accuracy of fit and assembly in accordance with the general arrangement and assembly drawings. Any errors or omissions shall be reported to the Engineer-in-Charge who may agree on the adjustments to be made to the drawings and to the contract sum if extra material and/or labour are necessitated.

The dimensions of precast units must not vary from those specified by more than the tolerance given and any units which do not comply with, will be liable to rejection at the discretion of the Engineer-in-Charge.

2.17.8 TOLERANCE:

Forms for precast members shall be true to size and dimensions shown on drawings and should be constructed and protected from warping so that finished product will be within limits given below:

(a)	Overall dimensions of members	+ 1 mm per meter.
(b)	Cross sectional dimensions:	
	Section less than 150 mm	± 3 mm
	Section 150 mm to 450 mm	± 5 mm
	Section 450 mm to 900 mm	± 6 mm
	Section over 900 mm	± 10 mm
(c)	Deviation from straight line in long sections not more than 1 mm per meter	
(d)	Deviation from specified chamber	+ 0.5 mm per 1 m. of span
(e)	Maximum differential between adjacent units In erected position	6 mm.

2.17.9 ERECTION OF PRECAST UNITS:

Erection Programme:

Prior to be erection of precast reinforced concrete structural units, the contractor shall submit to the Engineer-in-Charge for his approval, detailed erection programme giving full descriptions of the methods and plant to be employed for lifting, assembling and fixing the units, and safeguarding the structure during erection. No erection shall be carried out until the Engineer-in-Charge has approved the methods to be used.

Handling, lifting, transporting. All units shall be handled, lifted and transported in a manner which does not cause damage or cracking, when units are lifted by tackle or crane, the weight shall be taken up gradually without snatch. When units are being lowered, they shall not be dropped but shall be let down gently into position without impact.

Pre cast members are not to be transferred from the manufacturing yard to the site before they are 21 days old. Lifting shall be done only at points provided for this purpose. Under no circumstances shall precast members be reversed while handling or be lifted at midspan.

The position of slings, lifting holes, or lifting eyebolts, shall be decided by the contractor with the consultation of the Consulting Engineer, and the same shall not be departed from without the permission of Consulting Engineer.

The contractor shall not introduce any holes, cavities, lifting loops, lifting eyebolts or other features for his own convenience without the permission of the Engineer-in-charge.

The Contractor is responsible for the safety of the structure and operations at all stages during the erection of precast concrete units and shall provide all necessary frames, guys, wedges and other temporary supports.

2.17.10 Storage of Units on site:

All precast units shall be stored on site in a manner and in the position, which will prevent damage or cracking of any kind and permit erection with a minimum of preliminary handling and, transporting.

In cold weather, boltholes, recesses, cable duct, and other cavities shall be plugged to prevent entry of rain or other water unless such water can freely drain away.

2.17.11 Fixing:

The Contractor is responsible for accurate setting out of the work and for ensuring that all precast concrete frame work units come together without strain and in their correct relative positions as shown on the working drawing. If due to inaccuracies in the position or level or in the dimensions of units without straining them into position, no such straining shall be done without the permission of the Engineer-in-Charge and when directed, the contractor shall dismantle the work and re-erect and make good to the satisfaction of the Engineer-in-Charge.

2.17.12 TESTS AND INSPECTIONS:

Rejection of work:

The Engineer-in-Charge reserves the right to condemn any work, which appears unsatisfactory or does not comply with the specifications or working drawings. The contractor shall at his own expense cut out the condemned work and replace it with new work to the satisfaction of the Engineer-in-Charge.

Pre-cast Factory Made Units:

Cube Tests: Cube tests shall be carried out as and when required to satisfy the Engineer-in-charge that the concrete is of the specified quality and strength.

Test cubes shall be made concrete prepared for the work and tested in accordance with the procedure laid down in relevant codes.

Inspection at Works:

Immediately after receiving the order, the manufacturer shall draw up a casting programme and submit this to the Engineer-in-Charge in order that inspections may be made to examine the moulds, reinforcement and the units during and after manufacture.

The Engineer-in-Charge shall at all reasonable times have free access to the place where the units are being manufactured or stored for the purpose of examining the materials, the method of manufacture and the finished products, and for testing and marking of units. For this purpose, the manufacturer shall stack the units with passages, between the stacks, of sufficient width for inspection of each unit to be properly and easily made.

The manufacturer shall, free of charge, provide or make arrangements for the provision of every facility and all labour required for such examination, testing and marking and if so required shall load on to a lorry at the works free of cost for dispatching to a testing laboratory, the samples as described hereafter.

Testing of Units:

The selected units shall be tested in the manner laid down by the Engineer-in-Charge. The manufacturer shall be entitled to charge at the contract rates for all units, which pass the prescribed tests but shall not be paid for units that do not pass the tests.

Should one or more test samples fail to comply with the requirement of the prescribed tests, the Engineer-in-Charge shall be entitled to take further samples for the tests and if these also prove to be unsatisfactory, the Engineer-in-Charge shall at his own discretion, reject any or all of the units of the type being tested.

Marking:

Units, which withstand the test load without damage, may themselves be passed for delivery. All units passed for delivery shall be suitably marked in the presence of the Engineer-in-Charge if so required, in which case no units not so marked shall be loaded for the delivery by the manufacturer. The Engineer-in-Charge shall be entitled to remove the mark from any units previously marked as approved, if it is subsequently found to be defective before leaving the approved works. Any unit, which has been marked as approved, but which is later damaged in the works or loading, shall not be dispatched.

Inspection and Tests on Site:

The Contractor shall provide all necessary labour and facilities for the inspection of units after delivery the site and after erection. If any unit is found to be defective by the inspection or testing, then notwithstanding any prior approval of the units before delivery, it shall be removed from the site and replaced at the Contractors expenses.

2.18 LOADING TESTS:

If required by the Engineer-in-Charge, the Contractor shall carry out a loading test on the finished structure or any part thereof as directed. If the test shows that the work is in accordance with this specification, the contractor will be reimbursed for the cost thereof but if any work is found to be not in accordance with this specification, it shall, at the discretion of the Engineer-in-Charge, be cut and replaced at the contractor's expense, and the contractor shall also bear the cost of the test.

Load tests should be carried out as soon as possible after expiry of 28 days from the time of placing of concrete. The structure should be subjected to a load equal to full dead load of the structure plus 1.25 times the imposed load for a period of 24 hours and then the imposed load shall be removed.

Note:

Dead loads include self-weight of the structural members plus weight of finishes and walls or partitions, if any, as considered in the design,

The deflection due to imposed load shall be recorded. If within 24 hours of removal of the imposed load the structure does not recover at least 75 percent of the deflection under superimposed load, the test may be repeated after a lapse of 72 hours. If the recovery is less than 80 percent, the structure shall be deemed to be unacceptable.

If the maximum deflection in mm, shown during 24 hours under load is less than 40 %, where L is effective span in meters and D, the overall depth of the section in mm, it is not necessary for the recovery to be measured and the recovery provision given above not apply.

Other Non Destructive Test methods may be adopted in which case the acceptance criteria shall be agreed upon by the Engineer-in-Charge and the tests shall be done under expert guidance.

2.19 REINFORCED CONCRETE FLOORS (WITH FLOOR HARDENER)

2.19.1 LEVELLING OF SUB-BASE:

The P.C.C. floor bedding should be in required level/slope with top surface even to get a uniform thickness of R.C.C. floor within variation of 3% to 5%,

2.19.2 CLEANING THE SUB-BASE:

Any debris/mortar/concrete above the P.C.C. floor bedding to be cleaned before fixing of side forms for laying concrete floor.

2.19.3 FORM WORK FOR PANELS:

Side forms for panels should be 15 to 20 mm less than the specified thickness of floor.

- The side form will be of IS MC or fabricated with two ISA and MS flats of required length to get required height. The side form should be in perfect alignment, slots in IS MC to be provided for passing the dowel bars to be provided at the longitudinal joints, The top level of formwork to be perfectly checked before starting concreting for floor.
- 10 mm thick expanded polyethylene foam to be fixed at junction of floor and wall and around all rigid structures such as columns and machine foundation walls for Isolation of floor from rigid structures.

2.19.4 JOINTS LOCATION AND DESIGN FOR NON-STRUCTURAL FLOOR:

(a) Isolation Joints: (From rigid Structures)

The floor must be separated structurally from other building elements to accommodate differential horizontal and vertical movement. 10 mm wide isolation joints must be provided at junctions of wall, columns, machine foundations etc. using 10 mm thick Expanded Polyethylene having height equal to thickness of floor.

(b) Control Joints: (For Controlling Shrinkage Cracks)

Differential movement in the floor is caused due to drying shrinkage, thermal changes and carbonation shrinkage. The first is usually the most important.

Some shrinkage is expected and can be tolerated. This amount will depend on the design and exposure of the particular structural elements. However when this amount approaches to un-tolerable limit, proportioning, mixing and selection of material deserves careful evaluation and alteration. In floor, shrinkage occurs more rapidly at the exposed surface and causes upward curling at the edges. If the floor is restrained from curling, cracking will occur wherever restrained portion develops stress greater than the tensile strength of RCC floor.

Differential movement must be accommodated by control joints spaced at 4.5 M to 7.50 M intervals in both directions; shorter intervals can also be used. Whenever there is reason to expect shrinkage to be high, temperature steel may be used to restrict crack width.

For transverse joints 6 mm Plain Asbestos Cement Sheet or PVC sheets having depth up to 2/3 of floor thickness to be fixed before laying concrete for floor. These are fixed simultaneously along with the fixing of form work on the previous day so that it will not be disturbed during concreting. This will help to avoid cracks due to thermal expansion / contraction and also due to drying shrinkage. After the curing work is completed these joints are to be filled with Polysulphide Epoxy mortar having proportion of one part Poly-sulphide Epoxy and two parts silica quartz.

2.19.5 TRANSPORTING AND PLACING OF CONCRETE:

The concrete shall be mixed in quantities required for immediate use and shall be deposited on the subgrade/sub-base to the required depth and width of the pavement section in successive batches and in continuous operation without the use of intermediate form between the joints. Care shall be taken to see that no segregation of materials results whilst the concrete is being transported from the mixer to the place where it is to be deposited. The spreading shall be as uniform as possible to avoid re-handling of concrete. Where, however a certain amount of redistribution is necessary, it shall be done with shovels and not with the rakes.

While being placed the concrete should be rodded with suitable tools so that formation of voids or honeycomb pockets is prevented. The concrete shall be well placed and tamped against the forms and along all joints.

2.19.6 COMPACTION OF FLOOR CONCRETE:

The concrete at the side of the forms and between the reinforcements at joints and at corners to be compacted with internal vibrator (needle vibrators) to avoid honeycombing and to get perfect compaction at these locations.

The vibrating screed shall rest on side forms and it shall be lowered vertically on the concrete surface, (evenly spread to an appropriate level above the base) to provide the required surcharge for compaction; allowed to remain in position for few seconds until compaction is completed, then lifted vertically and lowered on to the adjacent strip of un-compacted concrete. The amplitude of vibration of the screed shall not be less than 1.5 min and speed of travel not more than 0.60 m per minute. The screed shall again be taken slowly over the surface, sliding with its axis slightly fitted away from the direction of sliding and operation repeated until the required dense, close knit textured finish surface is obtained.

Notes: Precautionary measures to be taken before starting concrete floor.

(a) The working of vibrators shall be regularly checked and standbys shall always be maintained for emergency use.

(b) The segregated particles of coarse aggregates which collect in front of the tamper or screed shall be thrown outside the forms. Under no circumstances shall such segregated particles be carried forward and pushed on to the base in front of the mass.

2.19.7 CONCRETE FLOOR FINISHING:

Immediately after completing the compaction by screed vibrator and excess water has disappeared but while the concrete is still plastic, the floor top surface shall be tested for true-ness with a 3.65 M long straight edge (Aluminium Box Section).

The straight edge shall be held in successive positions parallel to the guide channels in contact with top surface of floor laid and the whole area gone over from the one side of the floor to the other. Advance along the floor shall be in successive stages of not more than one half length of straight edge. Any area of the depressions found shall be scooped to a depth of 40 to 50 mm filled immediately with freshly mixed concrete, struck, compacted and refinished. High areas shall be cut down and refinished. The straight edging and re-floating shall continue until the

entire surface is found to be free from observable departures from straight edge and top surface has the required levelled surface.

The floor top surface shall be re-tested for trueness before the concrete begins to set with the 3.60 M long master straight edge (Aluminium Box Patti). Any irregularity in surface to be rectified,

2.19.8 PREPARATION OF SURFACE AND USE OF FLOOR HARDNER (FIRST DRY SHAKE):

Following types of floor hardeners are used for increasing strength of concrete floors.

- Ironite basod
- Silica / Quartz based
- Carboranclum based

The quantity of floor hardener shall be used as specified by the Consultants (or as per manufacturers specification) and according to light / medium / heavy-duty floor as specified.

Scrap the concrete deposited, if any, on the top of side form during concreting. As soon as concrete is firm enough to support the weight of workmen and their equipment and no water is observed on surface; apply first shake of hardener evenly using 2/3 of total mix e.g. 2/3 of 7.5 Kg./Smt. Treat areas adjacent to walls and columns first, spread the materials evenly by sprinkling at right angles in two passes close to floor level. Do not broadcast (spread) the hardener from a station position but use a wooden scraper to spread the hardener. Alternatively, a mechanical spreader can be used for better application.

2.19.9 FLOATING: (With Finishing Machine Having DISC)

Power float the shake application promptly, work near wall, columns and door area first. Avoid excessive floating but ensure that the shake application is completely wetted and incorporated in to the base slab.

2.19.10 USE OF FLOOR HARDENER - SECOND DRY SHAKE:

Start immediately after first floating, spreading of balance material (1/3 quantity) of hardener and follow it up immediately with second power floating.

Third power floating if required to be carried out for getting required compaction. Do not add additional water during finishing with floating machine,

2.19.11 TROWELLING: (With Finishing Machine Having BLADES)

For the first trowelling, the trowel blade must be kept as flat against the surface as possible. If trowel blade is tilted or pitched at an angle, it is objectionable. The smoothness of the surface can be improved by timely additional trowelling. There should be laps of time between successive trowellings to permit concrete to become hardener. The purpose of additional trowelling is to increase the compaction of fines at the surface. This gives greater density and wear resistance.

2.19.12 CURING COVERING:

After completion of the finishing operations, the surface of floor shall be entirely covered with wet hessian cloth, barlap or jute mats. The coverings used shall be of such length (or width) that when laid will extend at least 500 mm beyond the edges of the floor slab and shall be so placed that entire surface and both the edges of the slab are completely covered. They shall be maintained fully wet and in position for 24 hours' after the concrete has been placed or until the concrete is sufficiently hard, to walk on without damaging the floor. To maintain the covering wet, water shall be gently sprayed so as to avoid damage to the fresh concrete. If it becomes necessary to remove the coverings for any reason, the concrete slab shall not be kept exposed for a period of more than half an hour. Final curing shall be done by preparing water on floor by preparing earthen bunds for 14 days.

2.19.13 REMOVAL OF FORMS:

Forms shall not be removed from freshly placed concrete until it has set or at least 12 hours whichever is later. They shall be carefully removed in such a manner that no damage is done to the edges of floor. Ensure that the dowels provided in floor panel are not disturbed while removing the floor channel.

3.0 BRICK LAYER:

3.1 ORDINARY BRICK WORK:

3.1.1 BRICKS:

Bricks shall conform to IS: 3102 (latest revision).

- (i) The bricks shall be local best quality and of regular & uniform size, shape & colour, uniformly well burnt through out but not over burnt. They shall have plain rectangular parallel sides & sharp, straight & right angled edges. They shall be free from cracks or other flaws. They shall have a frog of 10 mm. depth on one of the flat faces. They shall give a ringing sound when struck with each other.

- (ii) The bricks shall show a fine grained, uniform, homogeneous & dense texture on fracture and shall be free from lumps of lime, laminations, cracks, air holes, soluble salts causing efflorescence or other defects which may in any way impair their strength, durability, appearance or usefulness for the purpose intended. They shall not break when thrown, on the ground on their flat face in a saturated condition from a height of 600mm.
- (iii) The size of brick shall be 230 x 115 x 76 mm (or locally available sizes) only bricks of one standard size shall be used on one work unless specially permitted by the Architects.
- (iv) After 24 hours immersion in water, absorption by weight shall not exceed 20 percent of the dry weight of the bricks, when tested according to IS: 1077 - 1976.
- (v) Unless otherwise specified, crushing strength of brick shall not be less than 50 Kg./Sq.cm.
- (vi) Bricks rejected by the Engineer shall be removed from the site of work within 24 hours.

3.1.2 MORTAR:

The mortar, which is used, shall be mixed in proper proportion as specified in tender item. It shall be thoroughly mixed on an impervious platform by being turned over at least twice dry and twice wet; water in required quantity shall be added gradually. Mortar shall not be ground. Cement mortar shall be prepared in required quantity and not with more than one bag of cement at a time and this quantity shall be consumed within half of an hour after mixing.

3.1.3 CONSTRUCTION DETAILS:

(i) SOAKING:

All bricks shall be immersed in water for two hours before being put into works so that they will be saturated and will not absorb water from the mortar. Alternatively the bricks shall be well soaked with watering so that they will not absorb water from the mortar.

(ii) BATS:

No bats or cut bricks shall be used in the work unless absolutely necessary around irregular openings or for adjusting the dimensions of different courses and for closer in which case, full bricks shall be laid at corners, the bats being placed in the middle of courses.

(iii) LAYING:

The bricks shall be laid in mortar to line, level and shapes shown on the plans slightly pressed and thoroughly bedded in mortar and all joints shall be properly flushed and packed with mortar so that they will be completely filled with mortar and no hollows are left anywhere. Bricks shall be handled carefully so as not to damage their edge. They should not be thrown from any height to the ground; these should be put down gently.

Bricks shall be laid with frogs up and every 4th course shall be grouted. Seven courses should not exceed 600 mm. in height and in no case brick work shall be raised more than 14 courses per day.

All courses shall be laid truly horizontal and all vertical joints made truly vertical. Vertical joints in one course and the course below shall not come over one another and shall not normally be nearer than quarter of a brick length. For battered faces, bedding shall be at right angles to the face, care shall be taken during construction to see that edges of bricks at quoin, sills head etc. are not damaged. The verticality of the wall and horizontality of the courses shall be checked very often with plumb and spirit level respectively.

All uneven, irregular and bad brickwork shall be demolished, if deemed necessary by Engineer-in-charge and rebuilt at contractor's expenses.

Pipes or fitting shall be fixed during the progress of brick work or all chases or holes shall be neatly cut in the brick work later or shall be formed as the work proceeds and shall be filled with (1:2:4) P.C.C. and made good after pipes or fittings have been fixed.

Wherever possible bricks shall be bedded in sand instead of cutting and this method is to be used particularly for the fixing of lugs and holdfasts to doors and windows and to rakes of staircases. The bricks shall then be removed only when the fixings are to be made.

(iv) BOND:

Brick work shall be done in English bond unless directed otherwise by the Engineer- In-Charge.

(v) JOINT:

Joints shall not exceed 12mm in thickness and this shall be uniform through out. The joints shall be raked out not less than 12 mm deep when the mortar is green where pointing is to be done.

When the brick surface is to be plastered, the joints shall be raked to a depth of 6 mm. when the mortar is still green, so as to provide key to plaster.

(vi) SCAFFOLDING:

Scaffolding will be double or single as warranted for the particular work and as approved by the Engineer-in-Charge. Holes shall be made good by bricks to match the work when scaffolding is removed.

(vii) CURING:

All brickwork shall be kept well watered for at least 10 days.

3.2 EXPOSED BRICK WORK:

Where exposed brick work is specified, the usual specification for 'Exposed' Brick shall be applicable and in addition, selected brick shall be used for facing, ensuring regular and clean faces or uniform colour. No bricks, which are broken, chipped, wrinkled, or which have irregular edges or corners, shall be used. Depending on the quality of bricks and if instructed by Engineer-in-Charge, the exposed face of every brick shall be rubbed before laying without any extra charge. Wooden fillets 12 mm thick and 12 mm. wide shall be placed at the edge of joints so that no mortar come on the surface of the bricks and a regular thickness of joint is maintained. The surface shall be rubbed down with brushes or bricks if necessary, and thoroughly washed. No mortar shall be allowed to stick to the surface, which shall be left clean with all joints even and true to straight line. Double scaffolding shall be used in exposed brickwork.

As specified in the tender, pointing (1:1) shall be done to brick joints. Before pointing, the joints shall be raked out to a depth 15 mm. and the surface of the wall shall be cleaned, washed and well watered at least for two days.

The mortar shall be prepared by mixing cement and sand in proportions as specified in Bills of Quantities. The material shall be thoroughly mixed in dry condition before water is added to them. The mixing shall be done on a water tight platform and mortar of one cement bag only shall be prepared at a time which shall be consumed within 30 minutes after adding water. The mortar shall be placed in the joints in the best workman like manner. The extra mortar shall be removed so that the edges of bricks shall be clearly defined. The finished work shall be kept well watered at least for 10 days.

3.3 PARTITION WALLS:

Specifications shall be as per brickwork. Cement mortar proportion shall be (1:4) i.e. 1 part of cement and 4 parts of sand, by volume.

Partition brick wall shall be provided with reinforcement consisting of 2 numbers of 6 mm. diameter M.S. bars embedded in mortar 15 mm. thick at every fourth course and shall be anchored at ends. The cost of laying M.S. Bars will be included in rate for partition walls in case of Free Issue of reinforcement by Owner.

3.4 BRICK FACIA:

Bricks shall be of uniform size 16mm x 64mm x 25mm (5/8"x2.5"x1") and shall be free from cracks and shall have sharp and square edges. Brick shall be from MORVI or other place as shall be approved by Engineer-in-Charge.

Before laying brick facing, the surface shall be well watered and bricks shall be soaked well in water or shall be well watered to avoid absorption of water from the mortar.

The bedding mortar shall be prepared by mixing 1 part of cement and 3 parts of sand by volume. The cement mortar shall be prepared in required quantity of not more than one bag of cement at a time. This quantity shall be consumed within 30 minutes after adding water.

The bedding mortar shall be spread to required thickness and cement slurry then be spread, in the portion specified for facia bricks. The facia bricks shall then be laid in position and required pattern, tapped with a wooden mallet till the brick is properly bedded in line and level. The wooden fillet of required size shall be placed if necessary.

The extra mortar and slurry shall be removed from brick facia. Double scaffolding shall be used in brick facia work.

The finished surface shall be cured for seven days.

3.5 RATES TO INCLUDE:

3.5.1 ORDINARY BRICK WORK

The rate shall include the cost of materials, labour required for all the operations described above. This shall include the following:

- (i) All raking or false cutting and wastage.
- (ii) Chamfering all external angles if instructed.
- (iii) Extra culling and wastage for forming rebated, reveals or squint or birds mouth angles.

- (iv) Cutting and fitting brick work to steel.
- (v) Wedging and pinning up brick work to ceiling.
- (vi) Bedding and pointing to wood frames,
- (vii) Cuffing and pinning ends of timbers, lintels, steps etc.
- (viii) Leaving small holes as necessary for pipes, conduits etc.
- (ix) Scaffolding double or single for the brick wall, as directed.
- (x) Necessary tools, plant etc. required for this work.
- (xi) Leaving teeth or steps for proper bond with future masonry work.
- (Xii) Soaking of bricks in water and curing of work done.

3.5.2 EXPOSED BRICK WORK:

Rate includes the following, in addition to those included for ordinary brick work and all the cost of materials, labour required for all the operations described above.

- (i) Rubbing the bricks with bricks or on girder.
- (ii) Pointing the exposed brick work.
- (iii) Raking out the bricks up to 15 mm.

3.5.3 BRICK PARTITION WALL:

In addition of above items (described under the heading of 'RATE') the rate shall also include the cost of placing reinforcement as specialised.

3.5.4 BRICK FACIA WORK:

Rate includes the cleaning of mortar from the bricks in addition to those included for ordinary brickwork and all the cost of materials, labour required for all the operation above.

3.6 MEASUREMENTS:

3.6.1 ORDINARY BRICK WORK:

Unless otherwise specified, all work shall be measured in metric units, as fixed in its proper position. Any extra work done by the contractor, over the specified dimensions shall be ignored. Dimensions shall be measured correct to one cm. Cubic contents shall be worked out in cum. correct to two places of decimal.

No deduction shall be made nor any extra payment made for the following:

- (i) Ends of dis-similar materials (i.e. joists, beams, posts, girders, rafters, purlins, trusses, steps etc., up to 0.1 Smt. in section.
- (ii) Opening, each up to 0.1 sq. m. in calculating the area of the opening any separate lintels or sills shall be included along with the size of the openings but the end portion of the lintels shall be excluded and the extra width of the rebated reveals, if any, shall be excluded.

The work shall be measured separately under the following general categories; the mode of measurements however shall be as per levels/heights mentioned in Bills of Quantities.

- (a) From foundation to floor (1st level - Plinth level)
- (b) From floor (1st level) to floor (2nd level)
- (c) From floor (2nd level) to floor (3rd level) and so on.
- (d) Brick wall in parapet walls shall be measured along with the corresponding masonry in the walls of the storey just below it.
- (e) Brick masonry below A.C. Sheet (i.e. galabid) shall be measured in Rmt. and paid in their respective item. In this case only single side measurement shall be paid to cover the work for both the sides and 300mm height shall be deducted from brick masonry measurement.
- (f) Brick masonry above A.C. Sheet (i.e. load wall) shall be measured in Rmt., and paid in their respective item. The quoted rate shall include the cost of cement finish plaster/sand face plaster, concrete water, water proofing paint etc. as specified.

3.6.2 EXPOSED BRICK WORK:

The length and height of the wall shall be measured correct to one cm. The area shall be calculated in sq. m.

3.6.3 BRICK PARTITION WORK:

The length and height of the wall shall be measured correct to one cm. The area shall be calculated in sq. m. Where half brick wall is joined to the main walls of one brick or greater thickness the measurements for half wall shall be taken for its clear length from the face of the thicker wall.

3.6.4 BRICK FACIA:

The length and height of the wall shall be mealred correct to 1 cm. The area shall be calculated in sq. m.

3.7 STONE MASONRY - (UNCOURSED RUBBLE MASONRY):

Stone for this work shall be of the best quality from an approved quarry. It shall be hard, sound, closer fine grained, free from decay, weathering and effects like cavities, flaws, sand holes, patches of soft or loose materials etc. The stone shall be laid in mortar as specified in the item. The stones shall be well wetted before laying in position.

All stone masonry work shall be hammer dressed well bonded, faced with hammer dressed stones, with squared quoins at joints and corners.

No stones shall tail into the wall, either with a point up to a length less than 1.5 times its height. The thickness of the bed and vertical joints shall not exceed 25 mm.'

Spalls and pinnings shall not be allowed, to show on the face of the wall. Two bond stones for every square meter of wall face shall be provided. There shall be through stones in walls 600 mm. thick and under. In walls thicker than 600 mm., the length of the bond stones shall be 2/3 times the thickness of the wall. The face beds of quoins shall be squatted back to at least 10 mm. Stones for hearting of the wall shall not be less than 150 mm. in any direction. Chips and spalls shall be wedged in, to avoid thick mortar, and bad stone joints. The wall faces, corners and joints of openings shall be truly vertical. All joints of masonry shall be raked out as specified, and shall be cement pointed by using cement mortar in specified proportion to all exposed surfaces.

The masonry in a structure shall be carried out regularly in layers. Where the masonry of one part has to be delayed, the work shall be raked back at an angle not steeper than 45 degrees. All masonry work shall be well watered for a period of seven days.

The unit of measurement shall be cubic meters. Actual quantity of masonry shall be calculated from the dimension shown on the drawings or as executed, less the openings. If pointing is done, it shall be paid separately.

3.8 SPECIFICATION FOR PRE-CAST CONCRETE BLOCK MASONRY WORK

A pre-cast hollow concrete block is defined as a block having one or more large holes or cavities which pass through the block and has solid material between 50 and 75 percent of the total volume of block, calculated from overall dimensions.

The mix proportions for preparing concrete block is related to their method of manufacture.

	Method of Manufacture	Mix Proportion by volume
(i)	For manually operated moulds	1, part of cement +5 part of coarse graded sand
(ii)	For power operated machine	1 part of cement +6 parts of graded aggregates (including sand) (maximum size of aggregate limited to 12mm)

Table showing gradation of aggregates

B. S. Sieve	Cumulative percentage retained	Remarks
3/16 inch	25	(i) Fifteen percent retained on each of No.7/14/25/52 sieves
No.7	40	
No.14	55	(ii) Fineness modulus equals 3.7
No.25	70	
No.52	85	
No.100	95	

Note: Pre-cast concrete *blocks (solid)* shall be prepared in concrete mix (1:3 :6)

IS Specification for Pre-cast Concrete Blocks	IS 2185 Part I & 11 (Grade B 5.0)	
Compressive Strength	60 kg / cm ² and above	or as specified
Water absorption	8% max.)	
Moisture Movement	0.08%	
Drying shrinkage	0.60%	

The concrete blocks are to be made In a fully mechanized high tech plant using a process which involves compaction by high pressure and vibration. The blocks to be cured for 21 days in a water pond.

Masonry work will be done using Hollow Blocks of the sizes as specified in the drawings; wherever required solid concrete block shall be used without any extra cost. Special recessed web blocks shall be used for concealed wiring as and where required; without any extra cost.

The concrete block masonry shall be done in cement mortar 1:6.

Before starting the block work, mark the courses on columns and try to adjust the first course in a way so as to avoid any gap at the beam bottom.

The thickness of mortar joint shall be 10 mm to 15 mm and shall be uniform through out the masonry work.

Blocks are to be made with necessary holes, grooves etc. as required and/or as per detailed drawings or as instructed by engineer-in-charge.

Provide hexagonal wire mesh or a single leg 6 mm stirrup at corners and inter section of the walls as per details. This shall be repeated at every 3rd layer. The masonry rate shall include the cost of this work.

The block shall be solid or hollow as required and shall be of size as specified by engineer-in-charge/consultants.

(i)	400mm x 200mm x 200mm	}	
(ii)	400mm x 200mm x 100mm	}	or as specified
(iii)	400mm x 200mm x 300mm	}	
(iv)	400mm x 200mm x 150mm	}	

All blocks shall be sound, free from cracks, broken edges, honey combing and other defects that would interfere with the proper placing of blocks, or impair the strength or performance of construction.

Detailed specifications of masonry work shall be followed for concrete block masonry work also.

The shell thickness of hollow blocks in load bearing walls should be at least one eight of the height of each block or 25 mm whichever is greater, Out of every 10,000 blocks or less, 10 blocks shall be tested for quality parameters. The decision of engineer-in-charge for testing the blocks from each new lot will be final.

The hollow blocks should be stacked in narrow stock piles and spaced apart with the cores of hollow blocks vertical. Blocks are not normally wetted before or when laying them.

Concrete blocks adequately dried and delivered should be protected from weather until they are built into the wall.

The bottom courses of stacks, should be raised a steel platform or planks free from contact with the ground. If ordinary concrete blocks with a moisture content above 30 percent of their total absorption are built into a wall, their subsequent drying shrinkage is likely to cause cracking. Blocks should be tested for dryness before use and if their moisture content. is found to be unduly high, it may be necessary to introduce effective drying facilities.

Hollow concrete blocks are laid with a shell bedding that is kept off the cross webs, while solid blocks are given a full bedding of mortar. Before laying the first course, blocks should be aligned temporarily in position so as to check their selection for the work. A full bedding of mortar is then spread and troweled with a trowel, so as to ensure plenty of mortar along the bottom edges of the blocks. In no case concrete block masonry work shall be raised more than 1200 mm per day.

The unit of measurement shall be in cubic meters. Actual quantity of masonry shall be calculated from the dimensions shown on the drawings or as executed, less the openings.

4.0 **CARPENTER AND JOINTER:**

4.1 **TIMBER:**

All timber shall be as per relevant specification mentioned in the section of materials.

The timber for frames and shutters for doors, windows, ventilators shall be of first class, sound, well seasoned, Bulsar teak wood / C.P. teak wood or other specified and approved quality wood and shall be free from knots, shakes, fissures, flaws, sun cracks and other defects.

All timber for carpentry and joinery in contact with masonry or concrete shall be coal tarred before fixing. All exposed faces of timber shall receive a primer coat before erection. The rate shall be inclusive of one coat of primer and three coats of approved quality and shade of flat enamel paint.

Unless otherwise specified all doorframes shall have six M.S. flat holdfasts and window frames shall have four holdfasts. Holdfast shall be provided to the ventilators, if directed. When door/window frames are to be fixed to

R.C.C. column or R.C.C. wall, holdfast shall be substituted by suitable arrangements such as coach screws, rowl bolts etc. to secure frames to R.C.C. column or R.C.C. wall, as directed by Architects.

Frames and shutters shall not be painted or erected before being approved by Architect.

4.1.1 CARPENTRY WORK:

The timber shall be properly planned and wrought in a workman like manner. Joints shall be true and properly fit, assembled accurately and clamped together so as to make square, flat, and close joints. No timber shall be painted, tarred without the previous permission of the Architects/Engineer-in-Charge. No glue or wedges shall be allowed to be used and all woodwork before being erected shall be passed by Architects/Engineer-in-Charge.

In wrought timber, tolerance of 1.5 mm will be allowed for each wrought face of size specified except where described as "finished" in which case they shall have to be the full dimensions. The rate, for wood work, shall include the cost of all sawing, planning, framing, labour and materials and fixing and supply of all traps, bolts, nails, spikes, keys, wedges, pins, screws, glues, etc. necessary for the framing and fixing joints, Portions inserted in the masonry/floor shall not be allowed for the measurements.

4.1.2 JOINERY:

Doorframe shall be of such dimensions as directed by the Architects/ Consulting Engineers. They shall be properly framed and mortised and tenoned together and set in masonry by means of M.S. / wrought iron holdfasts. The parts hidden in the masonry shall be well tarred or coated with solignum-paint. The frame shall be rebated by 13 mm up to the face thickness of shutters on one side if the shutter is on one side and to be moulded as per design. The other side of the frame shall be rebated if there are shutters on both the sides.

4.1.3 T.W. DOOR OR WINDOW FRAME:

T.W. shall be of good quality as specified above. Frame size shall be of 150 x 63 mm or 127 x 76 mm as specified in Bills of Quantities. Rebate and grooves shall be made for receiving shutters, grills, plaster etc. as per drawing.

4.1.4 WOODEN FLUSH DOOR SHUTTERS (SOLID CORE TYPE):

Solid core flush shutters shall be of commercial or teak veneered type as specified in the item, of approved quality and manufactured by approved manufacturers. The finished thickness of the shutter shall be as mentioned in the tender items, Face veneer shall be of the pattern and colour approved by Architects and as per approved sample, which shall be deposited in the office of Architects for reference, The shutters will be provided with T.W. lipping.

The framework shall be measured in Smt. from outside to outside of frame and shall be priced per unit of Smt. The rate shall include fixtures and fastening as required and specified in Table -4.1.

4.1.5 PANELLED SHUTTERS:

The exact shape for frame shall be as per Architects/Consulting Engineer's details. The styles-rails and panels shall be 37 mm thick and 25 mm thick respectively. Wood panels shall be of pattern and size as specified. The panel shall be joined continuous with 40 x 6 mm thick ply, inserted into grooves and glued together. The grains of solid Panel shall run along the longer dimension of the panel and Panel shall be framed into groove to the full depth of the groove leaving an air gap, and the faces shall be closely filled to the sides of groove. The type and number of fixtures shall be as mentioned in the Table-4.1 given below. The fixtures and fastening shall be fixed rigidly to the shutter If they get loosened within defect liability period, the contractor shall have to replace the shutters with better ones at his cost.

The rate is inclusive of providing and fixing. The measurement shall be in sq. meter and dimensions measured out to out of the frame. The rate is inclusive one coat of primer and three coats of approved quality and shade of enamel paint.

4.1.6 TEAK GLAZED SHUTTERS:

These shall be similar to panelled shutter except that such parts as are directed shall be glazed with plain or ground sheet glass or plate glass or frosted glass as specified. Styles and rail in the glazed shutters shall be rebated 13 mm to receive glass. Such bars shall be mounted and rebated and mitred on side to receive the glass. Glass panels shall be fixed by means of teak beads painted with approved paint. The prices shall include supply and fixing of glazing and teak beads with screws, painting, polishing except where otherwise stated in the Bills of Quantities.

TABLE - 4.1
SCHEDULE FOR HARDWARE FITTINGS FOR WOODEN SHUTTERS

Sr. No.	Type of Shutters	S.S. Hinges		Tower Bolts Aluminium		Handles Aluminium		Wind Hook & Eye / Adjusters		Cleats		Aldrops Aluminium		Latches (For Toilet Doors)	
		No.	Size	No.	Size	No.	Size	No.	Size	No.	Size	No.	Size	No.	Size
1.	Glazed or Partly Glazed or Fully Panelled Double shutters size														
i)	1.20 m x 2.10 m x 40mm thick	6	10 cms.	3	25 cms	3	15 cms.	--	10 cms	--	15 cms	1	30 cms	--	--
ii)	(size exceeding 1.20 M x 2.10 M x 1.50 M x 2.45 M)	6	13 cms	2	45 cms	3	15 cms	-	15 cms	2	20 cms	1	30 cms	--	--
iii)	(Size exceeding 1.50 M x 2.50 M)	6	15 cms	2	60 cms	3	15 cms	--	20 cms	2	30 cms	1	45 cms	--	--
2.	Glazed or Partly Glazed or Fully Panelled Double shutter size														
i)	upto size 0.90 M x 2.0 M	3	13 cms	2	25 cms	2	15 cms	--	10 cms	1	15 cms	--	--	1	30 cms
ii)	Size exceeding 0.50 M x 2.0 M	3	15 cms	1	30 cms	2	15 cms	--	15 cms	1	20 cms	1	30 cms	--	--
3.	Doors with wire guage panels														
i)	Double shutters all sizes	4	13 cms	3	25 cms	3	20 cms	--	15 cms	1	15 cms	1	30 cms	--	--
		2	Single action spring hinges												
ii)	Single shutter of all sizes	2	13 cms	2	25 cms	2	20 cms	--	15 cms	1	15 cms	1	30 cms	--	--
4.	Windows Glaze / partly glazed & Fully panelled	4	10 cms	3	15 cms	3	15 cms	2	15 cms	2	15 cms	--	--	--	--
i)	Double shutter upto 11.50 mt. height														
ii)	-do- single shutter	2	10 cms	1	10 cms	1	15 cms	1	15 cms	1	15 cms	--	--	--	--
5.	Fan light & ventilator	2	7.5 cms	--	--	--	--	1	Spring hinges	--					
		2	Pivot Hinges												

Notes :

- The top of tower bolt in closed position should be within a reach of 1.90 M.
- Eye and hooks in places of hinged door stopper are to be used in case of window shutters when the operation cannot be done due to fixing of grills, wire mesh or expanded metal or wire netting on one side of opening.
- For shutters exceeding 40mm thickness heavy type SS butt hinges of 125 mm x 90 mm x 40 mm shall be used.
- Hardware of timber doors, windows etc. shall be as above, if not specified otherwise, and shall be of quality as approved by the Architect / Consulting Engineer.

4.1.7 TEAKWOOD LOUVERED SHUTTERS :

The specification shall be as per paneled shutter except that such part as are directed shall be louvered. In louvered shutter, the style shall have groove of 25 mm width and 15 mm depth, to receive teak wood louvers of 25 mm thickness. The louver shall be fixed at an angle as per drawing. The louver's width shall be 10 mm less than the slant groove width to finish with beading. The beading size shall be 15 mm x 15 mm and shall be fixed, as specified, with screw.

The work shall be measured in sq.meters inclusive of frames both ways. The rate includes providing and fixing, louvers, beading, fixtures and fastenings as required and specified in the Table – 4.1 or as directed.

4.1.8 FIXING GLASS LOUVERS :

Louvers shall be 6 mm thick of wired glass or frosted glass with ground/polished edges as specified and of approved quality. The work shall be measured in sq.meter inclusive of frames and shall be measured outside of frames both ways according to drawing. The rate includes providing & fixing glass, beading, paints or polishing etc.

4.2 STEEL WINDOWS:

Steel windows shall conform to IS: 1038 and shall have brass oxidized fittings. They may be of composite sizes and assembled and fixed as per the manufacturers specifications using special mastic and putty for steel windows. The size of section shall be such as to be adequate for the specific type shown on the drawing. They shall have necessary accessories such as handles, stays, lugs, etc. The members shall be assembled with electric flush butt-welded joints/welded smooth joints as directed. These items include all types of windows such as fixed partially fixed, partially hinged, side hung, bottom hung, top hung, centre hung, etc. This item also includes windows of curved shapes and all other windows as specified and detailed by the Architects/consulting Engineers. The necessary accessories such as handles, stays, stoppers, etc. shall be brass oxidized and shall be included in this item. The rate also includes glazing panels with plain or ground glass with aluminium/teak wood beads of the required size and mastic putty of the same colour, which shall be applied for full length and not at intervals. The contractor shall provide windows with threaded holes for fixing aluminium/wooden beading, with screws, required for fixing of thickness specified.

The windows shall have glazing fixed as shown in the drawing and the glass shall be float glass sheet glass of the best quality and approved by the Architect/Consulting Engineer. It shall be transparent or translucent as required by the Architect/Consulting Engineers. It shall be free from flaws, specks, and bubbles.

Thickness of glass shall be as under (costs included in this item).

- (i) 24 Oz glazing for glass size not exceeding area 600 mm x 600 mm subject to any dimension not exceeding 1.0 meter.
- (ii) 26 Oz glazing for glass size not exceeding area 750 mm x 750 mm but any dimension not exceeding 1.20 meter.
- (iii) 32 Oz glazing for glass size not exceeding area 75 mm x 750 mm and 900 mm x 900 mm but any dimension not exceeding 1.20 meter.
- (iv) 6 mm thick plate glass for glass size more than 900 mm x 900 mm and any dimension not exceeding 1.00 meter.

- 4.2.1 Typical approved samples of the glazing unit shall be kept in the office of the Architect till the satisfactory completion of work. The decision of the Architect whether a unit compares well with the approved sample shall be binding as final on the concerned parties.

The rate also includes a coat of primer (yellow zinc chromate) before erection and after erection, 3 coats of approved enamel paint of required shade to the windows. Fixed and openable window shall be paid separately. The measurement shall be square meter of over all size of the frame as per drawing.

4.2.2 HARDWARE:

Rates of doors and window include fixing of all hardwares of specified and approved quality and material.

4.2.3 SCHEDULE OF HARDWARE (UNLESS OTHERWISE SPECIFIED):

- | | | | |
|-----|---|---|--------|
| (a) | Steel windows (each shutter): | | |
| | 150 mm handle. | - | 1 No. |
| | 300 mm peg stay | - | 1 No. |
| | Project of friction hinges | - | 2 Nos. |
| (b) | Top or bottom hung ventilators: | | |
| | 300 mm peg stay arm | - | 1 No. |
| | Projection or friction hinges. | - | 2 Nos. |
| (c) | Steel doors: | | |
| | Brass mortise lock with a pair of chromium handles. | - | 1 No. |
| | 300 mm tower bolt (per leaf) | - | 1 No. |
| | Friction Hinges (per leaf) | - | 3 Nos. |

Measurement:

Width and height shall be measured outside to outside of frame and measurement shall be in Smt.

4.2.4 COLLAPSIBLE STEEL DOORS AND GATES:

Approved manufacturers shall fabricate these, from mild steel sections. The gates shall be double or single collapsible gates depending upon the size of the opening. These shall consist of vertical double channels 20 x 10 x 2 mm at 100 mm centers braced with flat iron diagonals 20 x 5 mm and with top and bottom rails of Tee section of size 40 x 40 x 6 mm with 38 mm dia pulleys or ball bearings in every 4th double channels, unless otherwise specified. Where collapsible gate is not provided within the opening and is fixed along the outer surface, Tee section at the top may be replaced by flat 40 x 10 mm. the collapsible gate shall be provided with necessary bolts and nuts, locking arrangements, stoppers and handles. Any special fittings like springs, catches and locks shall be provided as described in the Bills of quantities.

Rates include for making zari in floors and walls, holes in masonry of R.C.C and restoring the same including applying one coat of rust remover, one coat of zinc chromate and three coats of approved make and shade of flat/enamel paint or aluminium paint.

Measurement:

The gate shall be measured in sq.meters. The breadth and height shall be measured correct to a cm. The height shall be measured as the length of double channels and breadth from out side to out side of the end fixed double channels in open position of the gate.

4.3 ROLLING SHUTTERS:

Rolling shutters shall consist of 75 mm wide 18 gauge M.S. laths machine rolled and straightened with an effective bridge depth of 16 mm. The laths shall be interlocked through their entire length and jointed together at the end with end locks. These shall be mounted on specially designed pipe shaft. Each lath section shall be a continuous single strip piece without any joint. The spring shall be prepared from unbreakable high tensile spring steel wire or strip of adequate strength to balance the shutter in all positions. The spring assembly shall be supported on strong mild steel or malleable cast iron bracket shaped to fit the lintels. The shutter shall be complete with door suspension shafts, guides, locking arrangements, brackets, pulleys with ball bearings, pushing hooks, handles, top covers etc. Fixing shall be done accurately in a workman like manner such that the operation of the shutter is easy and smooth.

Rate includes applying one coat of rust remover, one coat of yellow zinc chromate primer and three coats of approved make and shade of flat/enamel paint etc.

Rolling shutters shall be measured in square meters of the clear opening to which they are fixed and in no case top drum with cover and channels shall be paid extra or shall be calculated in area.

4.4 ALUMINIUM DOORS, WINDOWS, VENTILATORS ETC:

These shall be obtained from approved and established manufacturers and shall be of aluminium alloy conforming to IS: 733 and sections shall generally conform to IS: 1948. These shall be fabricated as per the drawings.

4.4.1 GENERAL:

- (I) The unit assemblies shall be as per drawing or as directed by the Architects.
- (II) The unit assemblies shall be anodized finished. Anodising shall be minimum 20 to 25 microns thick, of matt non-directional and non-specular. Anodized surface shall be suitably protected during transportation, storage and erection.
- (III) Sub units shall be together by concealed screws, Jamb member shall be self mullioning type obtaining use of separate mullions, thus increasing clear height of each unit.
- (IV) Joints shall either be mitred or coped. All joints shall be neat, hair line, and sealed with epoxy to make them water proof.
- (V) Openable shutters shall have a single row continuous neoprene or PVC weather strip to prevent air infiltration. Weather strips shall not be interrupted by any fittings.
- (VI) All windows shall be glazed from inside with PVC rubber or approved "Shalimar" putty. Glazing beads shall snap fit and shall be fitted without use of screws. No screws other than those on some of the hardware shall be visible.

- (VII) Glazing shall be approved and specially selected quality glass of thickness as specified in the Bills of Quantities.
 - (VIII) The rate shall include supplying and fixing with fittings and fixtures including approved locking arrangements.
 - (IX) Before handing over, the aluminium work shall be washed with mild solution of non-alkali soap and water.
- 4.4.2 The glazing units, doors, windows and ventilators shall not be built into the walls but shall be fixed in the prepared opening with lugs in masonry or with screws and jute expansion plugs in holes carefully drilled in RCC work. Mastic compound shall be provided all around the frame of the glazing unit at the junction of the frame and opening to make the junction watertight.
- Composite glazing units shall be supplied loose with necessary coupling transoms or mullions with machine screws and mastic compound and shall be coupled with box mullions. The mullions shall be embedded in mastic to make the joint watertight.
- Measurement shall be in Smt. of net are fixed at site.
- 5.0 **PLASTERER:**
- 5.1 PREPARATION OF SURFACE:
- Before plastering, masonry joints are to be raked out. Mortar powder and dust shall be brushed out from joints, and the surface shall be washed with clean water and shall be watered well. Cement slurry shall be applied to R.C.C. surface before plastering. The minimum thickness of mortar to be applied shall be as specified. To ensure proper thickness, gauged patches shall be made at 1.5 to 2 m. apart. Plastering shall be started from top and worked to bottom.
- 5.2 PREPARATION OF MORTARS:
- The mortar shall be prepared in required proportion as specified in Tender. The mortar shall be thoroughly mixed on an impervious platform by turning over at least twice dry and twice wet. Water shall then be added gradually in required quantity. Mortar shall not be ground. Cement mortar shall be prepared in required quantity and not with more than one bag of cement at a time. This quantity shall be consumed within 30 minutes after adding water and mixing.
- 5.3 SCAFFOLDING:
- Scaffolding will be double or single stage as warranted for the particular work and as approved by the Engineer-in-Charge. Holes shall be made good by bricks to match the work when scaffolding is removed.
- 5.4 PLASTERING:
- 5.4.1 CEMENT FINISH CEMENT PLASTER:
- Before plastering the surface, gauge marks with cement mortar should be carried out in line level and plants at distances less than the gauge patti. These gauge marks should be prepared one day prior to commencement of plastering work. Mortar shall be uniformly applied all over the surface to a thickness of 13 mm and finished true to level, line and plumb taking special care to finish jambs of windows, doors, junction etc. A thin layer of cement paste with 5% slake lime slurry for easy application shall then be applied initially with wooden gutka and then with MS mala / trowel to avoid air bubbles and rubbed into the surface and finished by means of trowel until the surface is even and smooth. Before applying cement paste, care shall be taken that previous coat of mortar shall not be dried. All corner, angles and junctions shall be truly vertical or horizontal and finished. Any cracks which appear in the surface and portions which found hollow when tapped or found soft or otherwise defective shall be cut and redone. Curing shall be started after 24 hours and surface kept wet for seven days.
- 5.4.2 NEEROO FINISH CEMENT PLASTER:
- General specifications shall be as per cement finish plaster, except applying a thin layer of neeroo paste instead of cement paste. In neeroo paste some quantity of cement paste, shall be added. A thin layer of neeroo paste shall then be applied to the under coat and rubbed into the surface and finished by means of trowel until the surface is even and smooth. Surface shall be cure for seven days, after a laps of 24 hours.
- 5.4.3 WATER PROOFING PLASTER:
- Specifications are same as cement finish cement plaster; except that waterproofing compound shall be added in dry with cement and sand, or as per manufacturers specification. Mortar shall be mixed dry thoroughly water shall then be added gradually in required quantity. Mortar shall be uniformly applied all over surface and then thin layer of cement paste shall be finished as specified in cement finish cement plaster.

5.4.4 SAND FACE PLASTER / OR WRINKLE FINISH (GUTKA) PLASTER:

(a) Under Coat:

The surface shall be prepared as above. The coat of cement mortar in proportion (1:4) or as specified, shall be applied uniformly all over surface to a thickness of 15 to 20 mm. and finished true to level, line and plumb. The surface shall be brought to a true line, level by working a wooden straight edge reaching across the gauges. Finally the surface shall be finished true with a trowel. The surface shall then be left rough and furrowed 1.5 mm deep with a scratching tool diagonally both ways to form a key for the topcoat. The scratches shall be not more than 5 mm apart. The surface shall be kept wet till the topcoat is applied.

(b) Top Coat :

The topcoat shall be applied, after the under coat has sufficiently set but not dried at any time, within 48 hours. The proportion of mortar for finishing coat shall be one part of cement and two parts of selected, well graded and washed sand; it shall be applied in a uniform thickness of 5 mm. the surface shall be tapped to uniform grained texture by using sponge/cork sheet/wooden float as directed. Curing shall start after 24 hours and the surface kept wet for seven days.

(c) 20 to 25 mm. thick sand face plaster using white cement:

All specifications shall be as per sand face plasters except in second coat, white cement shall be added to the required proportion specified in Bills of Quantities.

5.4.5 MALA FINISH PLASTER:

Specification are same as sand face plaster, except in second coat, mortar shall be mixed in proportion as specified in Bills of Quantities and surface shall be finished with Mala only, as directed by Engineer-in-Charge.

5.4.6. ROUGH CAST PLASTER:

Under coat shall be prepared as in sand face plaster.

Finishing coat mortar shall be in proportion one part of cement and one part of specially selected and graded sand and one part of gravel of 3 to 6 mm size. It will be flung upon the first coat with large trowel to form an even and decorative cost. The thickness of the coat shall be about 12 mm. It shall be cured for seven days.

5.4.7 ROUGH PLASTER WITH COLOUR FINISH:

This finish shall be similar to 'Rough cast plaster' above except a high grade mineral pigment of approved quality shall be mixed with white cement instead of ordinary grey cement while preparing the mortar.

Note:

The rate shall also include providing the grooves as per the pattern given or suggested by of Architect.

5.4.8 ZIKI PLASTER:

Specifications for under coat shall be as per sand face plaster. The top coat shall be applied after under coat has sufficiently set. The proportion of mortar for finishing coat shall be 1 part of white Portland cement (or as specified in Bills of Quantities) and 1 part of marble powder. This shall be mixed dry, thoroughly on neat and clean surface, water shall then be added gradually in the required quantity.

Apply prepared mortar to the first coat (under coat) in uniform thickness of 5 mm and rub the surface and finish by means of trowel on surface to get mirror like finish. Curing shall be started after 24 hours and surface kept wet for seven days.

5.4.9 SILVICRETE PLASTER:

Specifications for first coat (under coat) shall be as per sand face plaster.

The second coat (top coat) shall be of about 7mm thickness. The proportion of mortar shall be of (1:2:4) i.e one part of cement (having proportion of (1:2) white and grey cement), two parts of selected sand and four parts of Chhota Udaipur white marble chips of approved size. The above material shall be thoroughly mixed dry and then water shall be added gradually in the required quantity.

Apply prepared mortar to the first coat in uniform average thickness of 7 mm in given pattern. Finishing shall have appearance of artificial malad stone or as directed by Engineer – in - Charge. Curing shall be started to the finished surface after 24 hours and surface kept wet for seven days.

The rate shall include providing grooves as per pattern. If required the contractor shall have to use coloured approved pigments for which extra payment shall not be made.

5.4.10 EXPOSED AGGREGATE PLASTER:

Under coat shall be prepared as per sand face plaster. The second coat shall be of 1:2 proportion, i.e one part of cement and two parts of selected stone chips of approved size and colour by volume. It will be flung upon the first coat and pressed, leveled and finished with wooden float. Trowelling should be kept to a minimum as excessive trowelling may cause hair cracks and crazing. Floating shall be carried out only after the final rendering has slightly dried out. The thickness of the coat shall be about 12 mm to 15 mm.

The rate also includes providing the grooves as per pattern given or suggested by Architect/Consulting Engineer to the required length and width. The Contractor shall have to prepare a sample for this and get the same approved by the Architect.

5.4.11 WATER PROOF PLASTER USING BONDEX AND METAL CRETE:

The surface to be treated shall be prepared as mentioned above.

Operation No.1 (Slush Coat):

Mix in shallow pan, two parts of Metalcrete no.2 or its equivalent, one part of fresh Portland Cement and gauge with a solution made of 1 part of Bondex Liquid or its equivalent and 8 parts of water to the consistency of thick paint and apply it with a steel bristle brush, beginning at the top and working down vigorously, mixing the same each time when brush is dipped into it. Cure the surface with water continuously for 24 hours after the above has set hard to ensure proper chemical action.

In place where the surface is likely to encounter heavy water pressure, it is recommended that the operation No. 1 is repeated before starting operation No. 2.

Where only seepage or dampness is found on the interior or exterior side of wall, 2 or 3 coats of slush coat only (operation No.1) will prevent the dampness.

Operation No.2 (Mortar for Plastering):

Composition of waterproof plaster:

- (i) One part of Portland Cement
- (ii) Two parts of clean coarse sand
- (iii) 5 kg. of Metalcrete No.2 or its equivalent per bag of cement.

Mix the above material in given proportion in dry condition to a uniform colour and add Bondex or its equivalent solution (1 part of Bondex or its equivalent added in 8 parts of water) to make mortar.

Prepared mortar shall be laid uniformly all over surface to thickness of 20 mm and finished true to level, line and plumb.

Where the plastering cannot be completed in a day, the above process shall be started from the bottom, so that it could be cured while the work is in progress.

5.4.12 RATE TO INCLUDE (All Plasters).

The rate shall include the cost of materials and labour required for all the operations, described above. This shall include the following :

- (i) Raking out joints of brickwork, stonework or raking concrete for key.
- (ii) Work done overhead or in confined spaces and in narrow widths.
- (iii) Thoroughly watering surfaces before the plastering.
- (iv) Protection of plaster until handing over.
- (v) Forming coves at Junction.
- (vi) Forming 10 mm to 30 mm and 12 mm deep grooves vertically or horizontally as required at junction of ceiling and wall, skirting, dado floors and at joints of concrete and masonry work.
- (vii) Forming drip and weathering where necessary and directed.
- (viii) Scaffolding single or double stage, as warranted for the particular work and as approved by the Architects.

- (ix) Making sample for respective item for approval if instructed by Engineer-in-Charge, without any extra charges.
- (x) Watering the brick surface and applying cement slurry to R.C.C. surface before plastering.
- (xi) Curing of work executed.
- (xii) Necessary patta as required.

5.4.13 MEASUREMENTS: (All Plasters):

All types of plaster works shall be measure in sq. meters, and shall be paid in their respective item as mentioned in Bills of Quantities.

Quoted rate for outside and inside plaster shall be average rate for all floors/heights. The chicken mesh shall be measured separately and paid in Smt. as per applicable / respective tender item.

5.4.14 DEDUCTIONS:

For jambs, soffits, sills, etc. for openings not exceeding 0.5 smt each in are, for ends of joists, beams, posts, girders, steps, etc. not exceeding 0.5 smt each in area, and for openings exceeding 0.5 smt but not exceeding 3 smt in each area, deductions and additions shall be made in the following manner:

- (a) No deduction shall be made for ends of joists, beams, posts, etc. and openings not exceeding 0.5 smt each and no addition shall be made for reveals, jambs, soffits, sills, etc. of these openings nor for finish to plaster around ends of joists, beams, posts, etc.
- (b) Deduction for openings exceeding 0.5 smt but not exceeding 3 smt 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 wall are plastered with same plaster, deduction shall be made for one face only.
 - (ii) When both faces of wall are plastered with different type of plaster or if one face is plastered and the other pointed, deduction shall be made from the plaster or pointing on the side on which width of reveals is less than that on the other side but no deduction shall be made on other side. Where widths of reveals on both faces of wall are equal, deduction of 50 percent of area of opening on each face shall be made from areas of plaster and / or pointing as the case may be.
 - (iii) When only one face is plastered and the other face is not, full deduction shall be made from plaster, if width of reveal on plastered side is less than that on unplastered side. However, if widths of reveal on both sides are equal or width of reveal on plastered side is more, no deduction shall be made.
 - (iv) When width of doorframe is equal to thickness of wall or is projecting beyond thickness of wall, full deduction for opening shall be made from each plastered face of wall.

In case of openings of area above 3 Smt. each, deduction shall be made for opening on each face but jambs, soffits and sills shall be measured.

5.5 POINTING:

5.5.1 PREPERATION OF SURFACE:

Before pointing, all the mortar joints on the face are to be raked out by a special tool to a depth of 20 mm in order to give adequate key for the fresh mortar used for pointing. All the loose mortar and dust should then be brushed out of the joints, and the joints and wall surface well washed, wetted with clean water and kept wet for few hours. After the joints are thus prepared, they should be carefully filled with cement mortar, with small trowel and mortar well pressed into the joints with trowel in order to obtain solid contact with the internal old mortar joints.

All excess mortar sticking to the sides should be carefully scraped away. The finished pointing should be kept wet for seven days.

5.5.2 FLUSH POINTING:

In flush pointing the joints shall be filled up flush (with mortar) with the face of wall and the edges shall be neatly trimmed with a trowel and straight edge.

5.5.3 RULED POINTING:

In ruled pointing, joint shall first be filled flush with mortar and then bent end of a small iron tool, called pointer or naila shall be pressed and rubbed in the middle of the joints until a uniform semi-circular notch is formed.

5.5.4 **RAISED POINTING:**

Joints shall be of raised band of mortar.

5.5.5. **RATES TO INCLUDE** (For pointing):

The rate shall include the cost of materials and labour required for all the operations, described above. This shall include the following:

- (i) Raking out the joints of brickwork to a depth of 20 mm.
- (ii) Scaffolding, single or double stage as warranted for the particular work.
- (iii) Making sample for approval if instructed by Engineer.
- (iv) Watering the brick surface, before pointing.
- (v) Curing of work executed.

5.5.6 **MEASUREMENT** (For pointing):

Length and breadth shall be measure to a cm. and its area shall be calculated in square metres up to two places of decimals.

The various types of pointing, for example, Flush, Ruled, Raised etc. shall each be measured separately and paid in their respective tender item.

DEDUCTIONS:

It shall be made as described above in the item of plaster.

6.0 **IRON MONGER AND METAL WORKER:**

6.1 **GENERAL**

In addition to these, other specifications shall be as per structural steel work.

6.2 **HARDWARE:**

Rates of Iron mongery or steel and metal works shall be inclusive of all the hardwares, screws, as specified in the bill of Quantities or specified as under :

All iron mongery and hardwares shall be secured in position with M.S. screws and each screw hole shall be properly bradawled before inserting the screw. No screw shall be driven by hammer or similar tool (all cuttings with the work shall be in required sizes and no over cutting shall be allowed).

All the fixtures and fastenings shall be obtained of the make, approved by the Consulting Engineer/Architects and shall be of the best quality.

6.3 **WROUGHT IRON AND STEEL WORK:**

All wrought iron and steel work shall comply with BIS specifications and designs. Consulting Engineers/ Architects shall approve the name of the manufacturer.

The grillwork and grill gates shall be as per Consulting Engineers/Architects detailed drawing.

All the steel work mentioned in this sections shall receive a primer coat of yellow zinc chromate paint before erection on site. All the work shall be measured in units as mentioned in Bills of Quantities. The weight of weld metal shall be allowed for the weight when any steel work is to be paid per unit Kg. The rate shall be inclusive of cutting, welding, bolting fixing, etc. applying rust remover, one coat of approved primer and three coats of best quality approved enamel paint as directed by Consulting Engineer / architects with finishing coat of approved synthetic enamel or flat paint.

7.0 **PAVING AND TILING:**

NOTE: FOR RCC FLOORS REFER PARA 2.19

7.1 **KOTAH STONE PAVING AND FLOORING:**

7.1.1 **MACHINE CUT AND MACHINE POLISHED KOTAH STONE PAVING AND FLOORING:**

The stone pavement slabs shall be machine cut and machine polished shall be of specified thickness, shall be free from cracks and flakes, shall be of uniform colours, shall have an even surface and shall be of approved quality. The stones shall be cut to required size with its edges dressed fine, true straight and at right angles to each other. The stones shall be of required sizes as specified by the Consulting Engineers/Architects and laid in the level or to slopes as directed and with very fine (almost invisible) joints. The paving shall be firmly bedded flush in lime mortar (1:2) (average 40 mm thick with no hollows in between) and cement floated. The pavement shall be washed out and cleaned after paving. The work shall be carried out as per instruction of Engineer –in – Charge. Joints shall be cement pointed using white cement in required proportion to get the shade matching the colour of stone.

The work shall be calculated/considered in square meter, correct to two decimal places. Length and breadth shall be measured from wall to wall as actually laid.

7.1.2 **ROUGH KOTAH STONE PAVING & FLOORING:**

The stone pavement slabs shall be rough kotah stone of green colour, of specified thickness, of approved quality and shall be free from cracks and flakes, shall be of uniform colour and shall have even surface. The stones shall be cut to required sizes with edges dressed fine true straight and at right angles to each other. The edges shall be sufficiently rubbed in sand and water with M.S girder or channel to make the edges smooth and straight. The stones shall be of required sizes as specified by the Consulting Engineer/Architects and laid in level or to slopes as directed and with very fine (almost invisible) joints. Other specifications are same as those for polished stone paving.

The work shall be calculated/considered in square meter, correct to two decimal places. Length and breadth shall be measured from wall to wall as those for actually laid.

7.2 **POLISHED KOTAH STONE SKIRTING AND DADOS:**

7.2.1 Specification is same as that for kotah stone flooring except that these shall be embedded in cement mortar 1:3 (1 cement 3 coarse sand) of sufficient thickness with invisible joints. After laying, the work shall be polished as directed to the satisfaction of the Architect/Consulting Engineer.

7.2.2 Measurement shall be from inside of skirting to inside of skirting and height measured at right angle to the floor from top of floor to finished level.

This shall be calculated/considered in square meter correct to two decimal places. Length and breadth shall be measured from wall to wall as actually laid.

7.3 **MARBLE STONE FLOORING:**

7.3.1 Marble stone slabs shall be of kind specified in Bills of Materials. The Marble slabs shall be of selected quality shall be hard, sound, dense and homogeneous in texture, shall be free from cracks, decay, weathering and flaw and shall be as approved by Architects. The slabs of required thickness shall be machine cut to required dimensions. All angles and edges of slabs shall be true, square and free from chipping and the surfaces shall be true and plane.

7.3.2 This shall be calculated/considered in square meter correct to two decimal places. Length and breadth shall be measured from wall to wall as actually laid.

7.3.3 **LAYING**

Sub grade concrete or R.C.C. slab on which marble is to be laid shall be cleaned, wetted and mopped. The bedding for the marble shall be lime mortar 1:2 (1 lime: 2 coarse sand) or cement mortar 1:4 (1 cement : 4 coarse sand) as mentioned in the Bills of Quantity.

The bedding mortar shall be spread to required thickness and allowed to harden a bit, cement slurry at 4.4. Kg of cement per sq. meter shall then be spread. The marble slabs shall then be placed in position and tapped with a wooden mallet till the slab is properly bedded in line and level. The joints between slabs shall be fine as directed. The pattern shall be as shown in drawing/directed by Engineer-in-Charge. The flooring shall be cured for seven days.

7.3.4 POLISHING & FINISHING:

Slight unevenness at the meeting edges of slabs shall first be removed (if necessary by removing and replacing the stones). The surface, then, shall be ground evenly with machine fitted with coarse grade grit blocks No. 60. The second grinding shall be done by a machine fitted with fine grade grit blocks No. 120. The final grinding with a machine fitted with finest grade grit block No. 320 shall be carried out on the day after the 2nd grinding is done. Oxalic acid shall then be dusted over the surface at 33 gm. Per sq. meter sprinkled with water and rubbed hard with pad of woolen rags. The floor shall be wiped with moist rag and dried with a soft cloth and finished clean on the following day.

7.4 MARBLE STONE IN RISERS AND SKIRTING:

7.4.1 MARBLE STONE SLABS:

Marble Stone Slabs shall be the same as per marble flooring of thickness as specified in the Bills of Quantities.

7.4.2 PREPERATION OF SURFACE:

Where required, the wall shall be cut uniformly to requisite depth so that the skirting face shall have uniform projection from the finished face of wall as per drawings or as directed by the Architects. The concrete wall shall be hacked and roughened with wire brushes. Masonry walls shall have joints racked at least 15 mm deep. The surface shall be thoroughly cleaned, washed, and kept wet.

7.4.3 LAYING

The risers or steps and skirting shall be set, in grey and white cement with an admixture to match the shade of stones, and with the line of slab at an average distance of 12 mm from the wall but not less than 10 mm. If necessary, the slabs shall be held in position, by temporary M.S. hooks at suitable intervals. The rear of the skirting or riser slab shall be packed with cement mortar 1:3 (1 cement: 3 coarse sand). The fixing hooks shall be removed after the backing mortar is set. The joint shall be very fine (almost invisible).

7.4.4 POLISHING AND FINISHING:

This shall be same as for marble floor, except that grinding shall be done by hand with carborandum stones, first grinding with coarse grade stone No. 60, second grinding with medium grade no. 80 and final grinding with fine grade no. 120. the face up and top of skirting shall be machine cut.

7.4.5 Measurement shall be in sq. meter correct to two decimal places. Length and height shall be measured as actually laid at site.

7.5 MOSAIC TILES (Flooring and Dado):

Mosaic tile floor bedding shall be done over the portion on which tiles can be laid within 24 hours. The tiles shall be of approved manufacture and quality and shall be got approved before use. They shall be with level surface. The size of the tiles shall be any standard size specified by the Consulting Engineer/Architect. The rate shall be inclusive of average 40 mm thick lime mortar bedding, cement floating etc. After laying, the joints between the tiles shall be well filled and the surface polished with 3 runs of machine polish. The skirting tiles shall be similarly laid. They shall be polished from factory. Finishing coat with the hand shall be applied to skirting before cleaning. Sills of doors and windows etc. shall truly be in plumb, line and level and joints should be very fine (almost invisible).

7.6 COLOURED CEMENT TILES:

Specifications shall be same as those for Mosaic Tiles.

7.7 CHEQUERED MOSAIC TILES:

The flooring if in chequered tiles, shall be carried out with the tiles provided with grooves in chequered manner. Everything else shall be same as in "Mosaic Tiles".

7.8 CAST 'IN SITU' TERRAZZO:

7.8.1 PREPARATION OF THE BASE

The base may be the sub-floor or the structural slab. Normally a screeded bed of concrete is laid on the hardened base, which is cleaned and prepared for receiving the upper layer. The terrazzo mix is then laid as the wearing coat over the screeded bed. The screeded bed should preferably be laid after the building operations are completed. The bond between the screeded bed and the base depends to a very large extent upon the conditions of the surface of the base at the time of laying the screeded bed. The surface should be absolutely free from dust or contamination from oil, grease, etc. and attempt should be made to obtain a good, mechanical key. A good bond decreases the tendency for shrinkage cracking. In case where the surface is contaminated with oil, grease etc and the area of this contamination is small, it may be cut out and made good before laying the screeded bed. Otherwise the superficial contamination may be removed by using a suitable detergent. Dilute hydrochloric acid may be used for this purpose.

The base should then be thoroughly washed clean with water. The surplus water should be removed by mopping after the surface is left wet overnight. A cement mortar grout of 1:1 proportion is then brushed onto this surface and this operation should be kept just ahead of laying the screeded bed. If this screeded bed is laid on dry slurry, it will result in poor bonding.

The surface of the base concrete (at the time of its laying) should be brushed with a stiff broom before it hardens. This operation will remove all the laitance and loose aggregate from the surface and will incidentally help to roughen the surface. It is preferable to close back the concrete surface in four different directions by using wire brushes. Where this is not possible, the hardened surface will have to be suitably chipped to give required indentations, and in this case, care should be taken not to damage the structural base.

7.8.2 MATERIALS MIXING AND LAYING OF SCREED BED:

(i) Material of Screed bed:

Cement concrete of specified mix shall be used and specification of concrete shall apply. The water cement ratio shall be kept as low as possible, as a high water cement ratio tends to produce flooring with high drying shrinkage, resulting in a tendency to crack. The slump to be aimed is about 25 mm.

(ii) Mixing of Screed Bed Concrete:

The proportion for the concrete mix of the screed bed shall be 1:2:4 by volume. The other Specifications shall be as per concrete item.

(iii) Laying of Screed bed:

The thickness of screed bed for flooring should be at least 25 mm for floors and 12 mm for walls, when laid on a set and hardened base; the thickness will depend on the conditions of the surface as regards roughness and cleanliness and it should not be less than 40 mm including the thickness of terrazzo layer.

The screed strips shall be fixed over the base concrete dividing it into suitable panels. Dividing strips shall be of glass, PVC or such other material and shall be of full depth of the screeded bed and the proposed thickness of terrazzo layer.

The mix is then spread on the prepared base, leveled with a screed board and well compacted. It should not be trowelled smooth as the rough surface left by the screed board provides a good adhesion to the terrazzo mix. This bed should be laid to the necessary predetermined slopes.

7.8.3 MOSAIC OR TERRAZZO FINISH:

The mix for terrazzo topping shall consist of cement with or without pigment, marble powder, marble chips and water. The cement and marble shall be mixed in the proportion of 3 parts of cement to one part of marble powder by weight. For every part of cement – marble powder mix, the proportion of aggregate by volume shall be as follows:

<u>Size of Aggregate</u>	<u>Proportion of Aggregates to Binder Mix by Volume</u>
00 to 5 mm	1:2
6 mm to 10 mm	1:2.5
12 mm	1:3

The marble chips 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. The minimum thickness of the top layer for various sizes of marble aggregate (chips) shall generally be as under:

Grade No.	Size of Marble Aggregate in mm	Minimum thickness of Top Layer (mm)
00	1 – 2	6
0	2 – 4	9
1	4 – 7	9
2	7 – 10	12

The thickness for the finish may be 10 mm for marble chips less than 10 mm size and 16 mm for chips of 12 mm grading.

7.8.4 LAYING OF THE FINISH:

The terrazzo mix should be laid whilst the screeded bed is still plastic (green). If this is not possible, slurry of neat cement should be brushed onto the bed immediately before laying is started. The mix should be spread and well compacted in such a manner that the maximum amount of marble chips come up and are spread uniformly over the surface. The terrazzo layer should be taken at least 10 mm under the wall plaster.

The markings of decorative design layouts are to be removed before the mix begins to harden with as little disturbance to the edges as possible, and damage, if any, should be made good by trowelling. The proportions of the mixes used for decorative designs should be the same as that of the main mix. Trowelling should be done immediately after laying and should be just enough to get a level surface. The trowelling should be with uniform pressure over a uniform period everywhere on the surface. Excessive trowelling or rolling in early stages are to be avoided, for they tend to work up to the surface a layer rich in cement and to produce a flooring liable to cracking.

7.8.5 CURING, GRINDING AND POLISHING:

As soon as the laying is completed, the floor should be covered either with damp Hessian or cloth. Precautions should be taken to prevent the floor from being subjected to extremes of temperature. The flooring should be maintained in a damp condition until ready for polishing.

About 36 hours after the top layer is laid, the surface should be watered and ground evenly with a machine fitted with special rapid cutting grit blocks of coarse grade (No.24 to 60), till the marble chips are evenly exposed and the floor is smooth. After the first grinding, the surface should be thoroughly washed to remove all grinding mud and covered with a grout of cement and colouring matter in the same mix proportion as the topping, in order to fill any pin-holes that may appear. The surface is allowed to cure for 5 to 7 days by suitable means such as covering with damp Hessian or ponding water, precautions being taken to prevent the surface being subjected to extremes of temperature. The surface is then ground with a machine fitted with fine grade grit blocks (No.220 to 350) to get even and smooth surface with a minimum of pinholes. The finished surface should show the marble chips evenly exposed.

Where the use of machine for polishing is not feasible or possible, rubbing and polishing can be done by hand, in the same manner as specified for machine polishing, except that carborandum stone of coarse grade (No. 24 to 60) should be used for the first rubbing, stone of medium grade (No.80 to 100) for the second rubbing, and stone of fine grade (No.120 to 150) for final rubbing and polishing.

After the final polish, either by machine or by hand, oxalic acid should be dusted over the surface at the rate of 33 Gms per Smt., sprinkled with water and rubbed hard with a pad of woolen rag. The following day, the floor should be wiped with a moist rag and dried with a soft cloth and finished clean.

- 7.8.6 Length and breadth shall be measure correct to a cm. before laying of skirting, dado or wall plaster. The area as laid shall be calculated in square metre correct to two decimal places.

Rate quoted shall be inclusive of fixing strips, screeded bed, and top layer of terrazzo, cost of all labour and materials involved and polishing the surface.

7.9 GLAZED TILES FLOORING:

- 7.9.1 The glazed tiles, shall be of approved make unless otherwise specified in the description of item. The tiles shall be flat, true to shape, free from cracks, crazing spot, chipped edges and corners. The glazing shall be uniform. The tiles shall be 5 mm to 6 mm thick and of size as specified in the items of work or as directed by the Consulting Engineer/Architect and the tiles shall conform to IS: 777 – 1988.

- 7.9.2 Preparation of surface and laying: The sub-grade concrete or R.C.C slab shall be cleaned, wetted and mopped. bedding for the tile shall be of 15 mm average thickness but not less than 10 mm at any place, consisting of cement mortar 1:3 (1 cement: 3 coarse sand) or as specified. Mortar shall be spread, tamped, and corrected to proper levels and allowed to harden. Over the bedding mortar, neat grey cement slurry of honey like consistency shall be spread. Approximate requirement will be 3.3 kg. of cement for a square meter. Tiles shall then be laid in the grout and gently tapped with a wooden mallet. The joints shall be as thin as possible and in straight line as to suit the required pattern. Where full size tile cannot be laid, it shall be cut (sawn) to required size and edges rubbed smooth to ensure a true and straight joint. The floor shall be checked with a straight edge to obtain a true surface.

The floor tile near wall shall enter at least 10 mm under the skirting or dado finish. Before laying, tiles shall be soaked in water.

7.9.3 Pointing and finishing:

The joints shall be cleaned of the grey cement grout and all dust and loose mortar shall be removed. The joints shall then be flush pointed with white cement and floor kept wet for 7 days. The floor shall not give hollow sound when tapped with a wooden mallet.

7.9.4 Measurements:

These shall be in square meter correct to two decimal places. Length and breadth of the actual tile area laid shall be measured correct to a cm. No extra amount shall be paid for the use of cut (sawn) tiles in the work.

7.10 GLAZED TILES IN SKIRTING AND DADO:

7.10.1 The Glazed tiles shall be the same as given above.

7.10.2 Preparation of surface:

The joints of the brickwork shall be raked out to a depth of at least 15 mm. In case of R.C.C walls, the surface shall be hacked and roughened with wire brushes. The surface shall be cleaned thoroughly washed with water and kept wet.

7.10.3 Laying:

The surface shall be plastered with cement mortar 1:3 (1 cement:3 coarse sand) or as specified to an average thickness of 12 mm and allowed to harden. The plastered surface shall be roughened with wire brushes or scratching as directed.

The back of tiles shall be buttered with grey cement slurry and edges with white cement slurry and set in the bedding mortar. The tiles shall be lightly tamped, and corrected to proper plane and lines. Tiles shall be set in required pattern with as fine as possible butt joints. Top of dados, skirting etc. shall be truly horizontal and joints truly vertical. Where full tiles cannot be used, cut (sawn) tiles of required size shall be provided as in flooring. The joints shall be cleaned and flush pointed with white cement. The surface shall be kept wet for seven days. The finished work shall not sound hollow when tapped with wooden mallet.

7.10.4 Measurement :

This shall be in square meters correct to two decimal places. Length and breadth of the actual tile area provided shall be measured correct to a cm. No extra shall be paid for the use of cut (sawn) tiles in the work.

7.11 CEMENT CONCRETE FLOORING – INDIANT PATENT STONE (IPS):

NOTE : FOR RCC FLOORS REFER PARA 2.19

Selection of materials, method of mixing and compacting shall generally conform to the specifications under Plain and Reinforced Concrete described earlier. A stiff concrete consistent with workability shall be used.

7.11.1 Preparation Surface:

Before laying floor concrete, the sub-grade shall be properly cleaned, trimmed to give required thickness of floor and neat cement slurry applied to give proper bond of floor with the sub grade. Surplus water shall be removed by mopping before the topping is laid.

7.11.2 Laying:

The cement concrete shall be laid in alternative bays, area of each bay not exceeding 5.0 smt. and each bay to be divided by 4/6 thick glass strips/6mm thick A.C.Plain sheet or required angle/channel's framing as shuttering as directed.

The cement concrete shall be finished with trowelling. Finishing operation shall start shortly after the compaction of concrete and the surface shall be trowelled three times at intervals so as to produce a uniform and hard surface. The water cement ratio shall be kept tight to the extent possible. The satisfactory resistance of floor to wear, depends, largely upon the care with which trowelling is carried out. The time interval allowed between successive trowelling is very important. Immediately after placing cement rendering, only just sufficient trowelling is very important. Immediately after placing cement rendering, only just sufficient trowelling shall be done to give a level surface. Excessive trowelling in the earlier stages shall be avoided, as this tends to bring a layer rich in cement to the surface. Sometimes, after the first trowelling, the duration depending upon the temperature, atmospheric conditions and the rate of set of cement used, the surface shall be retrowelled to close any pores in the surface to bring to surface and to scrape off any excess water in concrete or laitance. No dry cement shall be used directly on

the surface to absorb moisture or to stiffen the mix. The final trowelling shall be done well before the concrete has become too hard but at such a time that considerable pressure is required to make any impression on the surface.

If directed by the Architect, approved mineral pigment shall be added to the rendering to give desired colour and shade to the flooring, at no extra cost.

7.11.3 Ironite Topping:

Lay M-15 cement concrete and use wooden template for tamping the concrete having recess of 12 mm (for floors with 12 mm thick ironite topping). Top surface of concrete should be roughened with M.S. Wire for proper bond with Ironite topping. 12 mm thick ironite topping should be laid when the base concrete is still green. Mix the ironite and cement in proportion 1:4 (one part of ironite and four part of cement by weight) in dry state uniformly. One part of above mix to be mixed with two parts of grit (6 mm size): in concrete mixer machine within necessary amount of water added, and laid as topping above the concrete base, before initial setting starts. Ironite topping should be leveled up to within 12 mm and then entire surface should be finished with steel trowel and no dry cement shall be used directly on the surface to absorb moisture. Check the top finished surface with string, if any depression is found. It should be rectified by ironite cement immediately. Asbestos sheet, aluminium or PVC strip can be used at the construction joint, if desired.

For this approximately 2 kg. of ironite per square meter is required. Finished surface shall be cured for 10 days. The ironite shall be manufactured by Ferrosite, Heatly and Grysham (I) Ltd., or shall be of other approved quality.

7.11.4 Mixing:

The mixing shall be done in a mechanical mixer. The materials shall be measured accurately and shall be mixed on watertight brick platform. Only that much quantity will be mixed, which can be used within half an hour of mixing. Generally, only one bag mix shall be prepared at a time.

7.11.5 Protection:

Newly laid concrete shall be protected by approved means from frost, sun, storm and hot spell. Approved means shall be taken to protect immature concrete from the damage by debris, excessive loading, vibration and other influences, which may impair the strength and durability of the Concrete.

7.12 I.P.S. (Average 50 mm thick) USING WATER PROOFING CHEMICALS:

7.12.1 The bottom concrete, which is to be made waterproof, shall be clean, free from oil and shall be rough. It shall be rewetted thoroughly before the new concrete topping is placed.

Operation No.1 (Slush Coat):

Mix in a shallow pan, 2 parts of metalcrete No. 2 or its equivalent, one part of fresh Ordinary Portland Cement and gauge with solution, made of 1 part of Bondex Liquid or its equivalent and 8 parts of water to the consistency of thick paint and apply it with a steel bristle brush, beginning at the top and working down, vigorously mixing the same each time when brush is dipped into it.

Operation No.2 (Waterproof Concrete):

Immediately after applying the above slush coat, apply 50 mm, thick concrete, consisting of the following :

- One part of fresh Ordinary Portland Cement.
- Two parts of clean coarse sand.
- Three Parts of grit (12 mm)
- 5 kg. Metalcrete No.2 or its equivalent per bag of cement.

Mix the above material in given proportion in dry condition so as to distribute metalcrete No. 2 or its equivalent evenly and mix the same with a solution made of 1 part of Bondex or its equivalent, added to 8 parts of water. Prepared concrete shall be laid in uniform thickness of 38 mm and after compaction of concrete; the surface shall be trowelled with wooden template. Op surface of concrete should be roughened for proper bond to receive finishing mortar (12mm thick) made as stated in water proof plaster (Operation No.2). Fillets all around the corners shall be provided simultaneously with the bottom concrete. Finish the surface with trowel. The finished surface after 24 hours shall be kept under water for 7 days.

7.12.2 Where is high water pressure from the bottom in underground structure, reinforced concrete of the designed thickness should be provided before providing any water-proof concrete.

7.12.3 Cracks, if any, in the surface shall be filled in as follows before starting treatment.

- (i) Chisel out the cracks to a width of 25 mm and depth of 37 mm.
- (ii) Prime the surface with a slush coat as mentioned above.
- (iii) Fill in the crack with:

- (a) For small opening up to 37 mm. width
2 parts of cement
3 parts of sand
 $\frac{3}{4}$ part of Metalcrete No.2 or its equivalent, by volume.
 - (b) For larger openings
1 part of cement
2 part of sand
 $\frac{3}{16}$ part of Metalcrete No.2 or its equivalent, by volume.
- (iv) Trowel surface smooth and keep it moist for 48 hours to cure.

Notes:

Treated surfaces are colourless, tasteless and wholly inert, so that the above method can be used on walls swimming pool, water storage tanks, etc. without fear of contamination. It is recommended to fill the water retaining structures once more with water and emptied after 12 hours and then put the structure into use.

Care should be taken to remove all wooden pieces (left after the removal of forms) and nails and wires usually left in the walls and bottom of the concrete.

7.13 **BRICKS ON EDGE FLOORING:**

7.13.1 **BRICKS**

Specifications of brickwork shall apply. Broken bricks shall not be used except for closing the line. The bricks shall be laid on edge.

7.13.2 **MORTAR**

The mortar used shall be as specified. In case of dry brick flooring, fine sand shall be filled in joints.

7.13.3 **SUBGRADE:**

If the sub-grade is of lean cement concrete the flooring shall commence within 48 hours, of laying of sub-grade, failing which, the surface, of sub-grade shall be roughened with steel wire brushes without disturbing the concrete. Before laying the flooring, the sub-grade shall be wetted and smeared with a coat of cement slurry at about 2 kg. of cement spread over and are of one Smt. so as to get a good bond between sub-grade and flooring.

Where sub-grade is not provided, the earth shall be properly sloped, watered, rammed and consolidated. Before laying the flooring it shall be moistened.

7.13.4 **SOAKING OF BRICKS:**

Bricks required for flooring shall be soaked properly before use. In case, the joints are to be filled with sand, the bricks need not be soaked.

7.13.5 **LAYING:**

The bricks shall be laid on edge, in plain, diagonal, herring bone bond or other pattern as specified or directed by Engineer – in – Charge.

Brick shall be laid on edge on 12 mm thick mortar bed of specified proportion, and each brick shall be set by gentle tapping with hand trowel or wooden mallet, its inside faces shall be buttered with mortar, before the next brick is laid and pressed against it. On completion of a portion of flooring, the vertical joints shall be fully filled from the top with mortar. The surface during laying, shall be frequently checked with a straight edge at least 2 m. long, so as to obtain a true plane surface with the required slop. Finished work shall be cure for 10 days. In case of dry brick flooring, no curing shall be done.

7.13.6 **MEASUREMENT:**

Length and breadth shall be measured as laid and area shall be calculated in sq. metre correct to two places of decimal. Rate shall include cost of all material and labour including application of cement slurry on sub-grade and cleaning of sub-grade.

7.14 **ACID AND ALKALI RESISTANT REFRACTORY TILE FLOORING:**

7.14.1 Tiles shall be 230 mm x 113 mm x 37mm thick of approved make and manufacture.

7.14.2 The base shall consist of 50 mm thick cement concrete (1:2:4) mix laid over lean concrete (1:4:8) sub-grade laid to slope as required, finished smooth on top with a trowel to a uniform surface. Plastering is to be avoided.

7.14.3 Laying of Tiles:

- (i) The prepared base shall be give a coat of suitable primer.
- (ii) The primer, bedding and joining material suitable to resist the effect of spillage of deleterious materials (ACID, ALKALIS and SOLVENTS) shall be used.
- (iii) Any of the following materials can be used as per detailed specifications given by manufacturer and as per instruction of Consulting Engineer.
 - (a) Bituminous based materials for bedding.
 - (b) Silica based materials for bedding / joining
 - (c) Carbon filled sulphur for joining.
 - (d) Furane resin based materials for joining.
 - (e) Vinyl ester based materials for joining and coating.
- (iv) A typical execution details for Acid / Alkali resistant tile flooring is given below:
 - (a) The prepared base shall be given a coat of special bituminous primer at 1.4 kg. per square meter.
 - (b) Over the primer surface, 10 mm thick bituminous compound of approved manufacture shall be laid. Over these Acid Proof tiles of above-mentioned size, on 5-6 mm thick bedding of silicate base cement shall be laid. The joint in tiles shall be as fine as possible and filled with material as for bedding. The finished surface shall be neat and clean.

7.14.4 Measurements:

The length and breadth shall be correct to a cm. as actually laid at site and paid per square metre.

8.0 **STRUCTURAL STEEL WORK AND ROOFER:**

8.1 **GENERAL**

All structural steel used in general construction coming within purview of this contract shall, before fabrication, comply with the specifications of Bureau of Indian Standards, whichever is appropriate.

All rivet steel used in general building construction coming within the purview of this contract shall, before fabrication, comply with one of the following specification, whichever is appropriate.

- IS: 1148 – 1982 Rivet bars for structural purpose.
- IS 1149 – 1982 High tensile rivet bars for structural purposes.

8.2 **ELECTRODES:**

Mild Steel Electrodes shall comply with requirements of IS 814 – 1991 Specification for Covered Electrodes for Metal Welding of Mild Steel. High Tensile Steel Electrodes shall comply with the requirements of IS: 1442 – 1964 Specification for Covered Electrodes for the Metal Arc Welding of High Tensile Structural Steel.

8.3 **BOLTS AND NUTS:**

8.3.1 All bolts and nuts shall conform to IS: 1367 – 1980 Technical Supply Conditions for Threaded Fasteners.

All mild steel for bolts and nuts when tested in accordance with IS: 1608-1980 Method for Tensile Testing of Steel Products other than sheet, strip, wire and tube and IS: 1367 – 1980 Technical Supply conditions for Threaded Fasteners shall have a tensile strength of not less than 44 kg/mm² and minimum elongation of 23 percent on gauge length of 5.65/A

8.3.2 Plain washers shall be made of steel conforming to IS: 226-1975 Specification for Structural Steel (Structural Quality) or ST 44.0 of IS: 1977-1996 Specification for Structural Steel (Ordinary) or IS: 2062-1992 Specification for Structural Steel (Fusion Welding Quality). The dimensions, form, weight and tolerance of all rolled shapes and other members used in any structure shall, conform to the latest appropriate Specification of BIS.

8.4 **FABRICATIONS INSTURCTIONS:**

8.4.1 All materials shall be straight, and if not, they shall be straightened and flattened by pressure unless required of particular shape.

The erection clearance shall preferable be not greater than 2.00 mm. The holes should be drilled and not gas cut and the holes made shall not be more than 2.00 mm greater than the diameter of bolts, unless otherwise instructed by the Consultants.

8.4.2 Cutting shall be done by shearing, cropping or sawing. Gas cutting by mechanically controlled torch may be permitted for mild steel only. Except where the materials are subsequently joined by welding, gas cutting may be used.

8.4.3 WELDING:

Welding shall be in accordance with any of the following Standards as appropriate.

- IS: 816 – 1969 Code of Practice for use of Metal Arc Welding for General Construction in Mild Steel.
- IS: 817-1966 Code of Practice for training and testing of metal welders. IS: 1393 – 1961 code of Practice for training and testing Oxy Acetylene Welders.
- IS: 822 – 1970 Code of practice for Inspection of welds. For welding of any particular type of joint, welders shall give evidence for acceptance to the purchaser of having satisfactorily completed appropriate tests as described in any of the following standard as relevant.
- IS: 1181 – 1967 quality tests for Metal Arc Welders (Engaged in Welding Structures other than pipes)
- Welding, wherever indicated on the drawings, shall conform to IS: 814 – 1991. Unless otherwise specified, all welds shall be 6 mm thick single fillet welds.

Welds should be made in the flat position, wherever possible.

Adequate steps shall be taken to maintain the correct arc length, rate of travel, current and polarity for the type of electrode and nature of work.

Structural steel shall not be painted or oiled on any areas, where welding, is to be performed and shall be well cleaned to remove any paint, scale, or rust immediately before welding for a distance of at least 200 mm on either side of the weld location.

The work shall be securely held in position by means of tack welds, service bolts, clamps or jigs before commencing welding so as to prevent any relative movement due to distortion, wind or other causes. When welding is liable to cause distortion, the work shall be securely held in approved frames or jigs.

Freedom of movement of one member of the joint shall be allowed, wherever possible. No butt joint shall be welded without allowing one component a freedom of movement of the order of 2mm.

The sequence of welding shall be such that when possible the members, which offer the greatest resistance to compression, are welded first.

The welding of a joint shall be arranged so that the resulting tensile and compressive stress produced by one portion of the weld tends to balance the stress produced by the other. The step back method of welding shall be adopted for continuous runs.

Fusion face may be cut by shearing, chipping or machine gas cutting. Hand cutting by gas may be substituted for machine gas cutting; only if the latter is impracticable. The cutter shall be guided so that the full edge is clean and uniform. If the fusion face is rough, it shall be dressed by chipping, filling, or grinding in a satisfactory manner.

Welds showing slag inclusion, porosity or lack of proper penetration shall be cut and re-welded. Overlap of the toe of the weld and under-cutting of the parent metal should be avoided and where present to serious extent, shall be rectified.

All slag shall be removed from each run before another run is super imposed and also from the final run. When cold, the final run shall be protected with clean boiled linseed oil and shall not be painted until approved by the Architects or his representative at site.

Grinding of finished welds is permitted provided the weld is not reduced below the prescribed section. All exposed welds shall be ground smooth.

All welds which have not been ground, shall be scrubbed, with a 10% solution of hydrochloric acid, which shall be washed off with water before paint is applied, unless alkali resisting paint is used.

The Contractor shall employ a competent Welding Supervision or In Charge – Hand to ensure that the standard of workmanship and the quality of the materials comply with the general requirements. The Architect and his representative shall have free access to work being carried out by the contractor at all reasonable times, and facilities shall be provided so that during the course of welding, he may be able to inspect any layer of weld metal. He shall be at liberty to reject any defective welds to be cut and rewelded.

Parts to be fillet welded shall be brought in, as close contact as practicable and in no event shall be separated more than 4 mm. If the separation is 2mm or greater, the size of the fillet welds shall be increased by the amount of the separation.

The separation between facing surfaces of lap joints shall not exceed 2 mm. The fit of joints at contact surfaces which are not completely sealed by welds, shall be close enough to exclude water after painting.

Abutting parts to be butt-welded shall be carefully aligned. Mis-alignments greater than 3 mm shall be corrected and in making the correction, the parts shall not be drawn into a sharper slope than two degree (1 in 30)

8.5 PROCEDURE FOR HOLES MAKING:

Holes through more than one thickness of materials for members, such as compound stanchion and girder flanges shall, where possible, be drilled after the members are assembled and tightly clamped or bolted together. Punching may be permitted before assembly, provided the holes are punched 3 mm, less in diameter than the required size and reamed after assembly to the full diameter. The thickness of material punched shall be, not greater than 16 mm.

When holes are drilled in one operation through two or more separable parts, these parts, when so specified by the Engineer, shall be separated after drilling and the burrs removed.

Matching holes for rivets and black bolts shall register with each other so that a gauge of 1.5 mm or 2.0 mm (as the case may be, depending on whether the diameter of the rivet or bolt is less than or more than 255 mm) less in diameter than the diameter of the hole will pass freely through the assembled members in the direction of right angle to such members. Finished holes shall not be more than 1.5 mm or 2.00 mm (as the case may be) in diameter larger than the diameter of the rivet or black bolt passing through, unless otherwise specified by the Engineer.

Holes for turned and fitted bolts shall be drilled to a diameter equal to the nominal diameter of the shank or barrel subject to tolerance specified in IS: 919 – 1993. Preferably, parts to be connected with close tolerance of barrel bolts shall be firmly held together by tacking bolts or clamps and the holes drilled through all the thicknesses at one operation and subsequently reamed to size. All holes not drilled through all thicknesses at one operation shall be drilled and reamed separately through hare bushed steel jigs.

Holes for rivets or bolts shall not be formed by a gas cutting process.

8.6 ASSEMBLY:

The component parts shall be assembled in such a manner that they are neither twisted nor otherwise damaged, and shall be so prepared that the specified cambers, if any, are provided.

8.7 BOLTING:

Where necessary, washers shall be tapered or otherwise suitably shaped to give the heads and nuts of bolts a satisfactory bearing.

The threaded portion of each bolt shall project through the nut at least one thread.

In all cases, where the full bearing area of the bolt is to be developed, the bolt shall be provided with a washer of sufficient thickness under the nut to avoid any threaded portion of the bolt being within the thickness of the parts bolted.

8.8 MACHINING FOR BOLTS, CAPS AND BASES:

Column splices and butt joints of struts and compression members depending on contact for stress transmission shall be accurately machined and close butted over the whole section with a clearance not exceeding 0.1 mm locally at any place. In column caps and bases, the ends of shafts together with the attached gussets, angles, channels, etc. after riveting together should be accurately machined so that the parts connected butt over the entire surface of contact. Care should be taken that those connecting angles or channels are fixed with such accuracy that they are not reduced in thickness by machining by more than 1.0 mm.

Ends of all bearing stiffeners shall be machined or ground to fit tightly at both top and bottom.

8.9 SLAB BASES AND CAPS

Slab bases and slab caps, except when cut from material with true surfaces, shall be accurately machined over the bearing surfaces and shall be in effective contact with the end of the stanchion. A bearing face, which is to be grouted direct to a foundation, need not be machined if such face is true and parallel to the upper face.

To facilitate grouting, walls shall be provided where necessary in stanchion bases for the escape of air.

8.10 BEDDING OF STANCHION BASES, GRILLAGE ETC.:

Bedding of Stanchion Bases and Bearings of Beams and Girders on stone, brick or concrete (Plain or Reinforced) Shall be carried out with Ordinary Portland Cement, grout or mortar, as described in the drawings or as instructed by Consulting Engineer.

8.11 PAINTING:

All surfaces, which are to be painted, oiled or otherwise treated shall be dry and thoroughly cleaned to remove all scale and loose rust. Shop contact surfaces need not be painted unless so specified. If so specified, they shall be brought together while the paint is still wet.

Surface not in contact, but inaccessible after shop assembly, shall receive the full specified protective treatment before assembly. This does not apply to the interior of sealed hollow sections.

In the case of surfaces to be welded, the steel shall not be painted or metal coated within a suitable distance of any edges to be welded, If the paint specified or the metal coating is likely to be harmful to welders or impair the quality of the welds.

Welds and adjacent parent metal shall not be painted prior to deslagging, inspection and approval. Parts to be encased shall not be painted or oiled.

8.12 SHOP DRAWINGS:

The contractor shall submit shop drawings to the Architects for approval.

These shall show full size sections of all joints and connections, thickness of materials used and details of welds, bolts, rivets etc. Shop drawings shall clearly distinguish between shop and field rivets, bolts and welds. Shop drawings shall be made in conformity with BIS. Code for shop drawings and with due regard to speed and economy in fabrication and erection. A marking diagram allotting distinct identification mark to each separate piece of steel work shall be prepared. The diagram shall be sufficient to ensure convenient assembly and erection at site. All shop drawings shall show temporary bracings and connections required during fabrication and erection. All shop drawings shall be prepared in advance of the actual fabrication.

8.13 MARKING:

Each piece of steel work shall be distinctly marked before delivery, in accordance with a marking diagram, and shall bear such other marks to facilitate erection.

8.14 SHOP ERECTION:

The steel work shall be temporarily shop erected complete or as arranged with the Engineer so that accuracy of fit may be checked before dispatch. The parts shall be shop assembled with a sufficient number of parallel drifts to bring and keep the parts in place.

In the case of parts drilled or punched, through steel jigs with bushes resulting in all similar parts being interchangeable, the steel work may be shop erected in such position as arranged with the Engineer.

8.15 PACKING OF FABRICATED MATERIALS DURING TRANSIT:

All projecting places of bars and all ends of members at joints shall be stiffened, all straight bars and plates shall be bundled; all rivets, bolts, nuts, washers and small loose parts shall be packed separately in cases so as to prevent damage or distortion during transit.

8.16 INSPECTION AND TESTING:

The engineer shall have free access at all reasonable time to those parts of the manufacturer's work which are concerned with the fabrication of the steel work and shall be afforded all reasonable facilities for satisfying himself that the fabrication is being undertaken in accordance with the provisions of the Standards mentioned in the Specification.

Unless specified otherwise, inspections shall be made at the place of manufacture prior to dispatch and shall be conducted so as not to interfere unnecessarily with the operation of the work.

The manufacture shall guarantee compliance with the provision these Specifications. Should any structure or part of a structure be found not to comply with any of the provisions of these Specification it shall be liable to rejection. No structure or part of the structure once reject shall be resubmitted for test, except in cases where the Owner or his authorized representative considers the defect as rectifiable.

Defects which may appear during fabrication, shall be made good with the consent of and according to the procedure laid down by the Engineer.

The Manufacturer shall supply all gauges and templates necessary to satisfy the engineer. The Engineer may, at his discretion check the test result obtained at the manufacturer's work by independent test at the Government Test

House or elsewhere, and if the material so tested is found to be unsatisfactory, the costs of such tests shall be borne by the manufacturer, and if found satisfactory, the costs shall be borne by the Owner.

8.17 ERECTION

8.17.1 PLANT & EQUIPMENT

The suitability and capacity of all plant and equipment used for erection shall be to the satisfaction of the Engineer.

8.17.2 STORING AND HANDLING:

All structural steel should be so stored and handled at the site that the members are not subject to excessive stresses and damages.

8.17.3 SETTING OUT:

The positioning and leveling of all steel work, the plumbing of stanchions and the placing of every part of the structure with accuracy shall be in accordance with the approved drawings and to the satisfaction of the Engineer.

8.17.4 SECURITY DURING ERECTION:

During erection, the steel work shall be securely bolted or otherwise fastened and, when necessary, temporarily braced to provide for all loads to be carried by the structure during erection including those due to erection equipment and its operations.

No riveting, permanent bolting or welding should be done until proper alignment has been obtained.

8.17.5 FIELD CONNECTIONS:

Field riveting-rivets driven at the site shall be heated and driven with the same care as those driven in the shop.

Field Welding – All field assembly and welding shall be expected in accordance with the requirements for shop fabrications, excepting such as manifestly apply to shop fabrications only. Where the steel has been delivered painted, the paint shall be removed before field welding, for a distance of at least 50 mm on either side of the joints.

8.17.6 PAINTING AFTER ERECTION:

Before painting of steel, which is delivered unpainted, is commenced all surfaces to be painted shall be dry and thoroughly cleaned from loose scale and rust.

8.18 ASBESTOS CEMENT SHEETS-CORRUGATED:

8.18.1 The quality of A.C. Sheets shall comply with IS: 459 – 1992 and laying shall comply with IS 3007 Part – I for corrugated A.C.Sheets and Part – II for semi-corrugated A.C.Sheets and manufacturers specifications and instructions.

8.18.2 LAYING OF A.C.SHEETS:

The purlin spacing shall be as per drawing. Free over hang at eaves shall in no case be more than 380 mm.

In laying the sheets shall have not less than 150 mm end laps and side laps of 0.5 corrugations, unless otherwise specified. The sheets shall be laid from left to right and from bottom upward on the slopes with their smoother side towards the weather. Sheets shall be mitered where four corners meet.

Sheet shall be fixed with 8 mm diameter or as specified 'J' or 'L' G.I. Hook bolts inserted through a 10 mm diameter hole drilled in the crown of corrugation. Holes shall be drilled not less than 40 mm away from the edge of the sheet. The hooks before tightening shall be provided with G.I. washers and bitumen washers. All fixing accessories shall conform to IS: 730.

8.19 ALUMINIUM SHEETS:

8.19.1 The quality of Aluminium Alloy for aluminium Sheets shall comply with IS: 737-1974 and 3100 H(AA3003H4) or 40800 H4 (AA 8011H4) and profile shall conform with IS: 1254 – 1991. The acceptable tolerance in width and length will be ± 6 mm, as per IS: 2676-1981. The density of Aluminium Alloy Sheets shall be 2.70 grams/cm³. The aluminium sheets should have thickness, profile and width as described in the Bills of Quantities.

8.19.2 LAYING OF ALUMINIUM SHEETS:

Purlin spacing shall be as shown in the drawing and free over hang at eaves shall in no case be more than 225 mm.

The end laps shall not be less than 150 mm and side laps 1 ½ corrugation for circular corrugated sheets and one corrugation for industrial trough sheets. The sheets shall be laid from left to right and from bottom to upward on slopes.

Sheets shall be fixed with 8 mm dia. 'J' or 'L' bolts as specified. Holes shall be drilled and shall not be less than 40 mm away from the edge of the sheet. The hooks before tightening shall be provided with GI washers, PVC washers and nuts with PVC cap to avoid leakage through holes. In transverse direction, these hook bolts shall be provided at a maximum spacing of three pitches / corrugations.

6.00 mm dia galvanized seam bolts with nuts and PVC washers shall be provided at 300 mm to 380 mm c/c at the side laps.

Filter blocks of expanded polyethylene of required thickness and profile are to be provided for sealing the joints at the ridge between ridge sheet and roof sheeting and at the eaves between flashing and roofing sheets.

8.20 PRECOATED METAL SHEETS:

SUBSTATE MATERIAL shall be M.S. cold rolled sheets as per IS 513 and galvanizing as per IS: 277. The galvanizing (Zinc Coating) material consumption will be 200/275 gms per Smt. The minimum thickness of primer and polyester coating on topside shall be as follows :

Epoxy primer	5 to 7 Microns
Alkyd Back Coat	5 to 7 Microns
Polyester Top Coat	12 to 16 Microns (For better resistance against detergents and Acid Fumes)
Nominal minimum coating	22 to 30 Microns.

The backside of sheet shall be having polyester back coat of 5 microns over and above the primer coats. The sheets shall have trapezoidal profile and thickness as specified in the Bills of Quantities. Sheets are available in thicknesses of 25/50/60 mm.

LAYING OF SHEETS:

The sheets shall be laid from left to right and from bottom to upwards on the slopes with rib up and with overlapping (female) facing towards starting edge. To commence fixing, place the first sheet in position with female rib in line with other building elements and fasten the sheets. Lap the female rib (with turned down free edge) of the second sheet over the male rib (with turned out bottom edge) of the first sheet and insert side lap fasteners to hold lap firmly in place before fastening second sheet to support.

For fixing the sheets with purlins 8 mm dia. PVC coated G.I 'J' or 'L' bolts of suitable length with PVC washer and nut with PVC caps are to be used and holes are to be drilled and not punched. The end laps should not be less than 150mm and side lap half / full corrugation depending on the profile of the sheets. Self tapping screws / stitch bolts / pop rivets to be fixed at the side laps at centres not exceeding 350 mm.

The over hang at the ends should not exceed 250 mm. The expanded polythene foam filler block of appropriated shape to be used at joint of ridge and roofing sheet and where there is vertical sheet cladding as wall.

8.21 A.C RAIN WATER PIPES:

- (a) A.C pipes shall be of asbestos cement conforming to IS: 1626 and diameter as specified in drawing.
- (b) A.C Pipes shall be fixed by M.S. brackets/clamps to brick / concrete work, and steel work as per drawings and directions of Engineer – in –charge. All clamps and brackets etc. shall be painted with two coats of approved enamel paint.
- (c) The pipes shall be jointed with gaskets of hemp or jute yarn dipped in coal tar and grouted with 1:2 cement mortar. Care shall be taken to ensure that no joining material projects inside the bore of the pipe.
- (d) The erection of pipes shall start from the bottom upwards.
- (e) Payment shall be made on running metre basis inclusive of all specials, bends, cowls, shoes, clamps, brackets, fixing embedding in concrete or brick work if necessary etc..

9.0 **Plumber & Drain Layer**

9.1 PLUMBER - GENERAL

It shall comply with IS: 1239-1990 (Part-I) and US: 1239-1992 (Part-II) or otherwise specified.

9.1.1 All water supply work shall be in accordance with the requirements of the local authority and detailed drawings as supplied by the Consulting Engineer/Architect and water meters shall be installed as demanded.

9.1.2 PIPES:

All pipes shall be of approved equality B Class galvanized iron of TATA or equivalent approved manufacturer. While fixing main delivery pipes, the ends shall have long screw or tee, complete with plug to give straight direct

access to the pipe for cleaning purpose as necessary. A drainage cap shall also be provided at the lowest point in each main supply.

9.1.3 FITTINGS:

Elbows, tees, bends, long screws unions etc of "R" brand or equivalent shall be as per pipes and shall have proper and true threads for screwing.

9.1.4 JOINING:

Joining of all pipes shall be absolutely water tight and as per BIS Standards, unless otherwise specified.

9.1.5 VALVES:

All valves shall conform to IS: 778 & IS: 780. They shall be screwed down heavy type of brass castings of approved quality and manufacture.

The same shall be absolutely water tight when closed and shall precede and follow with unions.

9.1.6 FLOATING VALVE:

Ball shall be of copper/PVC Ball and brass cock shall be of approved quality and manufacturer.

9.2 DRAIN LAYER - GENERAL

All drainage work and sewage disposal shall be in accordance with the requirements of the local authority.

Drainage shall be laid to the true falls and levels commencing at the point of the outfall.

9.2.1 STONE WARE PIPES:

These shall comply with IS: 651 -1992, unless otherwise specified. Pipes shall be of good quality, glazed stoneware, spigot and socket end, joined in cement mortar 1:2 with a water proofing compound added. Joints should be carefully cleaned from inside after joining.

9.2.2 CAST IRON PIPES:

These shall comply with IS: 1537-1976, unless otherwise specified.

9.2.3 CAST (SPUN) IRON PRESSURE

It shall comply with IS: 1536-1989.

9.2.4 SANITARY ENGINEERING

All sanitary work shall be done in conformity with the requirements of the local authority.

9.2.5 VENTS ETC.:

All vent pipes shall be fitted at the top with proper and suitable cowls, Fresh air inlets shall be fitted with a box cap with grating, mica flap valves.

9.2.6 SOIL AND WASTE PIPES:

Pipes and fittings shall be spigot and socket type of cast iron 4.5 mm, minimum thickness of approved manufacture and shall conform to IS: 1537-1976 and IS: 729-1979. Joints shall be provided with cement mortar and spun yarn or lead as directed by Engineer – in – Charge. Plug bends, junctions etc. shall be provided at convenient locations or as considered necessary to give easy access for cleaning.

Horizontal pipes shall be laid with adequate fall.

Joints shall be properly made with shaped end to pipe with brass ferrules and wiped joints.

Connection of sink shall be of C.P. waste coupling of 37 mm dia.

All channel and pipes shall have floor traps at the discharge ends. Floor traps shall be of cast iron, with grating, set at a level, which will permit the floor to be drained to the grating. All built in soil and wastes shall be tested against the water head to check water tightness of pipes and fittings before the work is covered up.

9.2.7 SANITARY AND PLUMBING FITTINGS:

All sanitary fittings shall be of approved pattern and manufacture. Eastern (India) closets shall be grouted with 1:2 cement and sand mortar or with necessary concrete.

Shower roses shall be of approved type and quality.

All bib cocks, stop valves, etc. which are exposed to view shall be chromium plated and those projecting from walls shall have a chromium plated flange to cover the holes in the wall facing materials, and shall be of approved make.

9.3 EXTERNAL DRAINAGE AND WATER SUPPLY:

9.3.1 EXCAVATION AND REFILLING THE TRENCHES FOR LAYING PIPE LINES:

The trench shall be excavated to the grade and depth on the line shown in the approved drawings. Sight rails shall be erected every 30 m. and at the changes in direction and gradient. The centre line of pipe line shall be clearly marked on each sight rail by nails or by an edge of an upright cleat. The same edge of the cleat shall be used to indicate centre line when latter is used. As chord shall be stretched between each mark and the line shall be transferred from the chord line to the bottom of the trench. The depth of excavation and the level of pipe invert shall be checked by means of boning rods of appropriate length.

The bed of the trench shall be watered and well rammed before laying the pipes. Before lowering the pipes into trench, hollows shall be cut in the bed and in a narrow width of the trench and the width of the excavation shall be increased locally if required to receive the socket of the pipe and give adequate room for working.

The width of the trench throughout at the bottom shall be at least 300 mm wider than the socket of the pipe, so as to allow room for ramming the refilled material under and at the sides of the pipe. In no case the trench width shall be less than 750 mm (2.5 ft. approx) for depth exceeding 900 mm (3 ft. approx.). The excavated stuff shall be stacked in regular fashion and at distance from the edge of the trench as directed by the Consulting Engineer/Architect. The contractor in general shall follow the Specification of "Excavation".

Open cut trenches shall be sheeted and braced as required by any governing state laws or municipal regulations and as may be necessary to protect life, property or the work. When close sheeting is required, it shall be so driven as to prevent adjacent soils from entering the trench either from below or through such sheeting. Sheetting shall be driven to the full depth of the trench or to such additional depths as may be required to protect the work according to local conditions of soil. Trench bracing shall be removed when the backfilling has reached the respective level of such bracing.

To protect persons or animals from injury and to avoid damage to the property, adequate barricades, construction signs, torches, red lanterns and guards as required shall be placed and maintained during the progress of the construction work and until it is safe for pedestrian and vehicular traffic to use the road way. All materials, piles, equipment and pipe which may serve as obstructions to traffic shall be enclosed by fences and barricades and shall be protected by proper lights when the visibility is poor. The rules and regulations of the local authorities regarding safety provisions shall be observed.

The work shall be carried out in such a manner, which causes least interruption to the traffic, and the road or street may be closed in such a manner that it causes the least interruption to the traffic. Where it is necessary for traffic to cross open trenches, suitable signs indicating that a street is closed shall be placed and the contractor shall provide necessary detour signs for proper maintenance of traffic during the time when work is in progress. Contractor shall provide temporary supports, adequate protection and maintenance of all underground and surface structures, drains, sewers and other obstructions encountered in the progress of the work as per the direction of the Consulting Engineer/Architect. The contractor shall restore the structures, which may have been disturbed, upon the completion without claiming extra cost.

Trees, shrubs, shrubby fences, poles and other property and surface structures shall be protected unless their removal is shown on the drawings or directed by the Consulting Engineer/Architect. No valve or other control of the existing services shall be operated without permission of the administrative authority in-charge of such services.

9.3.2 REFILLING:

Refilling the trenches shall start in the section of sewer line after the section is cured, tested and approved by the Consulting Engineer/Architect or their representatives.

The backfilling material shall be free from cinders, ashes, slag, refuse, rubbish, vegetable or organic material, lumps boulders, rock or stone fragments which are min the opinion of the Consulting Engineer/Architect deleterious.

Backfilling up to 300 mm (12 inches approximately) on the top of the pipe shall be done by placing the excavated stuff or any other material, approved by the Consulting Engineer/Architect, in case the excavated stuff is not suitable in their opinion. It shall be laid in layers of 200 mm and shall be compacted by tamping in such a manner as to avoid any damage to sewer, fittings and appurtenances. Refilling with black cotton soil shall be avoided in this zone. The layer shall be compacted well to give dense soil around the pipe. The remaining portion shall be filled

with excavated material or any other material approved by the Consulting Engineer/Architect, if the excavated material is not suitable in their opinion for refilling.

9.4 STONE WARE PIPES:

9.4.1 MATERIALS:

The pipes shall be of best quality stone-ware of fire clay, salt-glazed, thoroughly burnt together throughout the whole thickness, of a close and even texture, free from air blows, fire blisters, cracks and other imperfections and the surfaces, external and internal shall be smooth and perfectly glazed.

A piece of stone ware pipe about 50 mm x 50 mm from any part of the pipe, shall not absorb water after 48 hours of immersion, more than 4 per cent of its own dry weight. The stoneware pipe shall be capable of resisting a burst pressure of 2.11 kg./Sq.cm (30.0 lbs/Sq.in.) without showing signs of leakage.

The crushing strength of the stoneware pipe shall be as specified in IS: 651 – 1992 (Specification of Salt Glazed Stoneware Pipes and fittings).

The thickness of barrel, depth and internal diameter of the socket, weight of the pipe, internal diameter of pipes, etc. shall be as per IS: 651-1992. Caulking and joining materials shall be Spun Yarn, cement stand.

9.4.2 LAYING THE STONEWARE PIPES:

The bottom of the trench shall be properly trimmed of to a present a plane surface and also irregularities shall be leveled. Where rock and large stone or boulders are encountered, the trench shall be trimmed to a depth of at least 150 mm (6") below the level at which the bottom of the barrel of the pipe is to be laid, and filled to a like depth with stones, broken to pass through a sieve of 12 mm, opening size, sand or selected earth as directed by the Consulting Engineer/Architect and well rammed to form a firm bed for pipes.

Wherever necessary or desired by the Consulting Engineer/Architect, the pipes shall be laid over a bed of B.B.C.C. 1:4:8, 100 mm thick, having equal off sets of 150 mm from the edges of socket and shall be completely encased in (1:2:4) concrete, 10 mm thick surrounding the pipe. The pipes shall be handled carefully so as to avoid any kind of damage by either free fall or bumping against another pipe or hard material. The pipes shall not be dragged along concrete or any hard material. The pipe and fittings shall be inspected for defects before laying. All lumps, blisters and excess coating materials shall be removed gently from the socket and spigot end of each pipe and the inside of the socket shall be wiped clean before the pipe is laid. The cutting of the pipe for inserting, fitting or closure pieces shall be done in a neat and workman like manner without damage to the pipe or cement lining so as to leave a smooth surface of cut at right angles to the axis of the pipe.

9.4.3 JOINING THE S.W. PIPES:

The stoneware pipes shall be cement jointed. In each joint, spun yarn soaked in neat cement slurry shall be passed around the joint and inserted into the socket by means of caulking tool. The yarn shall be closely packed into the socket of each joint and shall not occupy more than one fourth of the depth of the socket. Cement mortar (1:1) (one part of cement to one part of sand) shall be slightly moistened and carefully inserted into the remaining space of the joint after caulking the spun yarn. The mortar shall then be caulked with a caulking tool and more mortar shall be applied to fill up the entire space of the joint with tightly caulked mortar. The joint shall, then, be neatly finished with cement mortar (1:1) outside the socket at an angle of 45 degrees to the socket. The cement mortar so prepared shall be cured for seven days. Where the trenches are deep, the pipes shall be lowered into the trench by means of ropes. While lowering, care shall be taken to prevent free fall of the pipe. The pipe shall be placed in the trench with socket end in the up-stream direction. When the pipe runs in up-hill direction, the socket ends shall face the up grade. The centre line of the pipes shall be obtained from the sight rails already established.

After placing the pipe in the trench, the spigot end shall be centered in the socket and aligned to the gradient. The pipe shall be secured in place with approved back fill material or concrete tamped under it where directed, except at the socket.

Pipe and fittings, which do not allow a sufficient and uniform space for joints, shall be removed and replaced with pipe and fittings of proper dimensions to ensure such uniform space. Enough precautions shall be taken to prevent foreign materials from entering the pipe when it is being placed in the line. When the pipe laying is not in progress, open end of the pipe shall be closed by a watertight plug or canvass.

The quantity of cement and spun yarn shall be as per IS: 4127 – 1983.

9.4.4 TESTING:

After seven days of curing, the contractor in the presence of Consulting Engineer or their representative shall conduct hydraulic test. All equipment, necessary for the test shall be provided and fitted in place and operated by the Contractor. No refilling of the trenches shall be done unless the section has been tested and passed by the Consulting Engineer/Architect or their representative in – charge of the work.

The pipeline shall be subject to a 2.5 m of water head and at the end, which is at higher elevation in the section. There shall not be any leakage at joint or in the pipe. Any joint found leaking or sweating shall be rectified or embedded into 150 mm layer of M-15 grade cement concrete, 300 mm (12") in length and section shall be retested until found satisfactory. Contractor shall not claim extra payments for such rectification works or for testing.

9.4.5 MODE OF MEASUREMENT:

Measurement shall be taken along the centre line over the top of the pipeline and all joints and specials.

9.4.6 RATES TO INCLUDE:

The rates for items of laying and joining the stoneware pipes shall include:

- Supplying of stoneware pipes of specified type, diameter and specials or fittings.
- Excavating trench including laying out, setting up sight rails, ramming, murrum or sand cushioning in rocky bed, shoring and strutting, sloping, dewatering if required, protection measures for men, animals, vehicles, providing lanterns, fencing sign boards, etc.
- Laying pipes including cutting, where necessary and including wastage.
- Joint with cement mortar (1:1) at the joints, spun yarn, including curing the joint, caulking etc.
- Testing the pipeline and making good any defect in the line.
- All necessary labour, material, equipment tools necessary for carrying out the work.

The measurement shall be per Rmt. Of pipeline laid, joined and tested.

9.5 MANHOLES, INSPECTION CHAMBERS AND CHAMBERS FOR VALVES, GULLEY TRAPS ETC.

9.5.1 MANHOLES:

Each manhole shall have at least 150 mm thick bedding of cement concrete (1:4:8) consisting of cement, sand and brickbats below invert, projecting at least 150 mm beyond the outer face of the masonry with necessary haunches, channels, bends etc. in concrete.

Masonry wall shall be at least 230 mm thick in cement mortar (1:6) proportion, giving a uniform finished internal diameter of specified size or internal dimensions of 1.2 m x 1.0 m or 1.2 m diameter up to required depth from top i.e ground level, corbelled and tapered up to 560 mm diameter at top with 80 x 230 mm thick reinforced concrete coping in M-15 mix. Where depth of manhole exceeds 2.5 m. from top of cover to the invert, the thickness of the masonry shall be 350 mm. cast iron frame and cover shall be of size and weight as specified in the Bills of Quantities or as directed. Masonry shall be plastered internally and externally in 12 mm thick (1:4) with the top most step commencing 450 mm from the cover top and each subsequent step at 300 mm interval and the bottom most step shall not be more than 300 mm above the benching or bedding top. The work shall be carried out as per drawings. Rate shall be inclusive of 100 mm thick RCC slab with M-20 concrete, necessary excavation, back filling etc.

9.5.2 RECTANGULAR INSPECTION CHAMBERS:

Each chamber shall have at least 150 mm. thick bedding of cement concrete (1:4:8) of cement sand and brick bats mix below invert, projecting at least 150 mm beyond the outer face of the masonry with necessary haunches, channels, bends, etc. in concrete. Masonry wall shall be 230 mm thick in cement mortar (1:6) giving uniform finished internal dimensions of 600 mm x 750 mm. A cement concrete coping of 80 mm thick shall be provided over masonry. A cast iron frame with cover of 580 mm diameter or (610 x 455 mm size) and 50 kg. weight shall be grouted in the slab. The chamber shall be plastered internally and externally on the exposed faces in (1:4) cement mortar 12 mm thick and the internal faces finished neat with cement. The work shall be carried out as per the drawings. Rate shall be inclusive of 100 mm thick RCC slab with M-20 concrete, necessary excavation, back filling etc.

9.5.3 CHAMBERS FOR VALVES

Each chamber shall have at least 150 mm thick (1:4:8) cement concrete bedding which shall project 150 mm beyond the outer face of masonry. The masonry thickness shall be 230 mm for chamber up to 600 mm to 1500 mm and the masonry shall be in 1:6 cement sand mortar. Inside surface shall have water proof plaster (1:4) and outside surface shall have cement finish cement plaster. An angle frame fabricated from M.S. angle 50 x 50 x 6 tees and 5 mm thick M.S. plate with locking arrangement shall be as per drawing or as directed.

9.5.4 CHAMBER FOR GULLEY TRAPS:

Each chamber shall be with 112 mm thick brick masonry in cement mortar (1:3) over a bed of 100 mm thick brickbat concrete (1:4:8).

Approximate dimensions of chamber shall be 225mm x 225 mm. the stoneware gully trap (150 x 150 mm) shall be housed in the masonry chamber and the space around shall be finished with plaster (1:4). It shall have cast iron standard heavy cover of 230 mm diameter with frame.

9.5.5 NAHNI TRAPS:

The nahni traps shall be sound and free from surface and other defects; filling shall be such that they may be cut, drilled or machined. It shall give ringing sound when struck with a light hand hammer. The nahni traps shall be of 'Atta' brand or approved make, with at least 65 mm of water seal and shall have heavy grating of type as specified in the Tender. Nahni trap shall be embedded in concrete floors.

9.5.6 RATES TO INCLUDE:

Rate shall be per number. It shall include excavations in all types of soils and hard murrum with necessary shoring, bailing and/or pumping of water, necessary refilling and spreading surplus soil.

The rate shall also include all labour and material, required for concrete bedding, masonry with cement plaster, RCC ring beam, CI/MS cover with frames, cast iron steps and all connections.

9.6 HUME PIP – SEPTIC TANK:

9.6.1 MATERIALS:

Materials shall be precast units and fixtures as per manufacturers Specifications.

- One hume pipe of required diameter, 2.5 m in length, with openings for two vent pipes, manholes and groove on the inside surface for fixing the end slabs and other slabs.
- Two RCC partition slab with a slot for fixing the siphon pipe.
- One RCC slab for baffle wall.
- Two RCC tees for inlet and outlet connections.
- One RCC Siphon pipe to be fixed in the partition.
- Two covers for manholes.
- C.I vent pipe 2 m. in length with C.I cowl and C.I vent pipe 0.6 m long with semi circular bend.

9.6.2 EXCAVATION:

Excavation shall be carried out at required location along the alignment of proposed soil pipe. Excavation shall be carried out to the required depth in all sorts of soil including murrum. The width of the excavation shall be at least 600 mm more than the diameter of the pipe and length shall be at least 300 mm longer than the pipe. The bed of the trench shall be leveled and dressed properly. If rock is met with, the excavation shall be carried 150 mm below the bed level and shall be filled with sand and murrum and tamped well. If soft soil is encountered the excavation shall be carried to 300 mm below the bed level and brickbat cement concrete (1:3:6) shall be laid and tamped up to the bed level and cured.

9.6.3 When the bed is ready the pipe shall be placed in with manholes on the top side. Care shall be taken to see that the grooves provided for hanging baffles are towards the influent side. The pipes shall be laid perfectly horizontal. To prevent any lateral movement, enough supports shall be provided and partial filling of soil in layers of 300 mm with ramming shall be done.

The partition and baffle walls shall then be fixed in cement mortar (1:2) and siphon pipe shall be fixed in a slot of the partition wall in cement mortar (1:2). The baffle wall shall have a clearance between the bottom edge and the invert as per manufacturer's Specification.

The end slab and the vent pipes shall be fixed in cement mortar (1:2). The centres of the inlet and outlet holes shall be at the heights from invert of the tank as specified by the manufacturer. The tees for inlet and outlet shall be fixed in cement mortar (1:2). Soil pipe shall then be laid and connected to the septic tank. The outlet pipe shall be connected with the soak pit as directed. Curing of the cement mortar shall be done for seven days.

The tank shall then be filled with clear water and commissioned.

9.6.4 RATES TO INCLUDE:

The items on providing laying, and assembling the hume pipes – septic tank includes:

- Hume septic tank of required size with assembly, C.I. vent pipes, cement, sand etc.
- Excavation in all sorts of soils with strutting as necessary, including refilling.
- Laying and assembling the tank with cement mortar, curing, supporting the tank laterally.
- All labour, materials and tools necessary for carrying out the work.
- Construction of chambers over manholes including fixing C.I covers, plaster, finishing etc. complete.

9.6.5 MODE OF MEASUREMENT:

The measurement shall be per number of the hume septic tank.

9.7 SOAK WELL:

9.7.1 SOAKWELL MATERIALS:

Materials shall be those necessary for brick masonry and brickbats for filling in. The respective Specifications for materials shall be referred.

9.7.2 EXCAVATION:

Excavation shall be carried out for soak well, as necessary, in all sorts of soils with necessary slopes, or shoring and strutting including pumping or bailing out the water.

9.7.3 The honeycombed masonry work as per the desired width shall be done in cement mortar over a bed of cement concrete (1:3:6) of cement, sand and brickbats. Solid masonry work over the honeycombed masonry shall be done as per the Specification of brickwork. The cement mortar shall of (1:6) proportion. The work shall be carried out as per drawing or as directed.

The brickwork shall be of circular shape in plan. Necessary curing shall be done. The trench shall be filled in uniform layers of 230 mm thickness and rammed.

After the brickbats shall be filled up as directed and a brick chamber with open joints shall be constructed and the inlet pipe carrying the effluent shall be fitted into drain for the effluent.

RCC slab with C.I Manhole frame and cover (Medium duty) shall be provided over it. The Specification for concrete shall be adhere to.

9.7.4 RATES TO INCLUDE:

All items of soak well (i.e Brick masonry, RCC, Plaster, Excavation etc.) shall be paid in the respective tender items.

9.8 GALVANISED IRON PIPES:

9.8.1 MATERIALS:

(a) GALVANISED IRON PIPES:

The pipes shall be of B class and of diameter specified in the item and shall comply with IS: 1239 – 1990 (Pat-I) and IS: 1239 -1992 (Part-II) for the specified type. the specified diameter shall refer to inside diameter of the bore. Pipes and fittings, which have been damaged, shall not be used.

(b) Clamps screws and G.I. fitting and specials shall be of the standard type to match the pipes.

(c) Fine hemp and "Lock Tight" or equivalent compound shall be used for fixing the fittings.

9.8.2 EXCAVATION AND REFILLING:

The necessary excavation for laying the pipes shall be done by the Contractor and trench shall be refilled. This includes breaking or removal of any kind of pavement and making it good afterwards. Refilling shall be done by tamping the soil in layers and adding water.

9.8.3 LAYING AND FIXING:

The plumbing contractor shall get the layout of the plumbing and drainage system approved by the competent authorities as may be required by the byelaws. Should any changes in the layout be necessary, the contractor shall get the approval of Consulting Engineer/Architect and make necessary changes to comply with by laws. The pipes shall be laid in straight lines and plumb as far as possible. All pipes shall be kept open/concealed in walls or floor as specified. They shall be used in standard lengths. Cut lengths being used where necessary to make up the exact length.

The pipe shall be laid in the trench and screwed with sockets, elbows, bends, reducers, tees etc. as necessary, in making the joints, a few turns of fine hemp dipped in joining compound shall be wound over the threaded end of the pipes and the socket screwed over the pipe with the help of wrench. Pipes connected shall touch each other and the socket shall be covering each end about equally. Any branch connection shall not protrude in the bore of the parent pipe. No joint shall be located in the thickness of the wall or floor.

If pipe is required to be cut and the end threaded the cut end shall be filed smooth and any obstruction in the bore shall be entirely eliminated.

When pipe is to be fixed to the walls, it shall be fixed with standard brackets, clamps or holder bats, keeping the pipe 12 mm clear of the wall. The pipe shall be fixed to the wall horizontally and vertically and parallel to one another, when more than one pipe is laid, unless unavoidable. The supporting clips, etc. for the pipe shall be at about two meters spacing or as necessary.

When holes are not left in the masonry or concrete works, the same shall be made by the contractor to pass the pipe through them or fix the clamps etc. After fixing of the pipes, clamps, etc. the holes in masonry or concrete work shall be made good.

All the pipes laid underground shall be painted with two coats of anticorrosive paint of approved quality and shade or with one coat of approved aluminium paint, where pipes are not embedded.

9.8.4 TESTING:

The pipeline shall be tested for a pressure of 7kg/cm². If any leakage is found, the contractor shall rectify the same.

9.8.5 The rates on G.I. pipe items shall include:

- Providing G.I pipes of the specified diameter and type, G.I. fittings, specials, fine hemp, joining compound anticorrosive paint, etc.
- Excavation in all sorts of soils breaking and removal of any kind of pavement, refilling and tamping the soil in layers, making good paved surface.
- Get the layout of plumbing approved by the competent authorities, cutting the pipes and threading the ends, making holes in masonry and concrete work, fixing the pipes by means of clamps, applying anticorrosive paint, fixing any valves, taps, testing the pipeline, etc.
- All labour charges, tools, plants and equipments necessary for carrying out the work.
- All the fittings and fixtures to be provided and fixed in G.I. pipes line work shall be open/concealed type as per the respective item of the G.I. pipe line in the Bills of Quantities.

9.8.6 MEASUREMENTS:

The measurement shall be per Rmt of the pipeline laid and jointed. The measurement shall be taken on the top of the pipe also the centre line over the fittings, joints, specials, valves, etc. in the pipeline. Deduction shall be made for linear space occupied by the valve. Open/concealed pipe shall be paid in their respective items.

Note:

All pipes which are concealed in ground, floors, or masonry shall be paid under item of concealed pipe. Rate of concealed item shall include necessary excavation, chasing and restoring to original condition.

9.9 FERRULE CONNECTIONS:

9.9.1 MATERIALS:

The item pertains to provision and fixing of a ferrule for obtaining water supply from the mains.

The ferrule for connection with cast iron water main shall be of gunmetal or hard brass and shall be of the diameter specified in the wording of the item in the Bills of Quantities. The ferrule shall be fitted with screwed plug or valve, capable of completely shutting off the supply. It shall be got approved before use. One-piece C.I bell mouth cover shall be provided to protect the ferrule connection.

9.9.2 FIXING:

The contractor shall obtain necessary permission of the competent authorities, if required, for making the connection.

The ferrule shall be fixed in the water mains without protruding inside and shall include making hole in the water main, covering with cast iron bell mouth cover. The ferrule shall be fitted in such a way that the connection shall be watertight.

9.9.3 THE RATE TO INCLUDE:

- Ferrule, coupling and C.I bell mouth.
- Obtaining permission, if required, for making the connection, drilling hole in the main and fixing ferrule.
- All necessary labour, materials and use of tools required for completing the item satisfactorily.

9.9.4 MEASUREMENT:

Measurement shall be per ferrule connection of the specified diameter.

9.10 CAST IRON PIPES:

9.10.1 MATERIALS:

CAST IRON PIPES:

The diameter and type or the class of pipe shall be as per the item in Bills of Quantities. The pipes shall be, in all respect, of good casting, easily worked with a drill, free from lapse or other imperfections, neatly dressed so that no lumps or rough places are left in the barrels or sockets. They shall conform to IS: 1537 – 1976 they shall be either spigot and socket or flange pipes as per description of corresponding item in Bills of Quantities.

PACKINGS AT THE FLANGED JOINTS:

Packing shall be of rubber or leather of approved quality and appropriate thickness. Packing shall be of full diameter of the flange with proper pipe holes. The thickness of the packing shall be uniform throughout. The boltholes shall be cut through the packing as required. Such pipes may be used for valve or meter connections, vertical pipes for inlet and outlet of reservoirs, suction pipes of the pumps, pumping mains, delivery pipes, steam lines, where there are vibrations or wherever specified or desired by the Consulting Engineer/Architect.

MATERIALS FOR CAULKING THE TRENCHES:

Fine hemp rope, lead wool or caulking lead conforming to IS: 762 – 1978 or joining with spun yarn and cement mortar (1:1) as specified in item.

9.10.2 EXCAVATION AND REFILLING THE TRENCHES:

The specifications as mentioned for Galvanised Iron Pipes shall be followed.

9.10.3 LAYING THE C.I PIPES:

The pipes shall be place along the outside of the trench for pipe in its proper position for laying with an extra pipe after every 20 pipes to allow fore cutting, if necessary. Where the trench crosses a road or place where such distribution is inadmissible, the pipes shall be stacked in heaps at each end, sufficient to cover in the length. Small pieces below 100 mm, diameter may be stacked at every 30 m distance.

All pipe shall be used in standard lengths as far as possible. Cut lengths may be used only where necessary to make up exact lengths. The Consulting Engineers, for any damage and cracks shall inspect all the pipes. No damaged pipe shall be permitted to be used.

The pipe shall be thoroughly cleaned with brushes to remove any accumulated stones or soil inside socket the outside of the spigot shall also be cleaned similarly. The pipes shall be lowered in to the trench and spigot neatly placed into the sockets for full length and properly supported. When there is a gradient, the pipe laying shall proceed in the uphill direction, with the sockets facing an uphill direction, irrespective of the direction of the flow.

The pipes shall be carefully packed underneath so that they shall bear evenly / properly throughout their length.

Any deviation in plan and elevation less than 11.25 degree shall be met with by laying of the straight pipes along the curve of larger radius such that the deviation at each joint is not greater than 2.25 degrees and the minimum thickness of lead at the face of the socket is 6mm, and the opening between the socket is not increased beyond 12 mm at any joint provided that such deviations are shown in the drawing or permitted by the Consulting Engineer/Architect.

In case of rocky beds, sand or murrum bedding of 100 mm below the bottom of the pipe shall be provided, before laying the pipes.

9.10.4 MAKING LEAD JOINT:

(I) PREPARATION:

The outside of the spigot and the inside of the socket shall be thoroughly cleaned with brush. The spigot shall be carefully centered in the socket by one or more laps of spun hemp yarn twisted to ropes of uniform thickness and thoroughly soaked in hot coal tar or bitmen and dried before use.

Approximately quantity of material required for joining cast iron pipes of different diameters per 10 joints shall be as given below :

Dia. For pipe	Lead (Kg.)	Spun Yam (Kg.)
75 mm	19	1.0
100 mm	25	1.8
125 mm	30	2.0

150 mm	38	2.0
200 mm	50	3.0
225 mm	55	3.2
250 mm	63	3.5

Quantity of lead and spun yarn shall be consumed for respective diameter of pipes as indicated above.

Before leading, the alignment and gradient of the pipe shall be checked. Leading of the joint shall be done by using special leading rings or by means of rope covered with clay as directed by the Consulting Engineer/Architect. Leading shall be done by pouring molten lead. The scum from molten lead shall be removed before pouring it in to the joint.

9.10.5 CAULKING:

After a section of a convenient length has been leaded, caulking can be done. After hardening of the lead, the leading ring shall be removed and shall be caulked around the pipe several times. By means of proper caulking tools of increasing thickness and hammer 2 to 3 kg. in weight in a manner that the joint is rendered water tight and no damage is done to the spigot.

9.10.6 JOINT WITH LEAD WOOL:

Consulting Engineer/Architect may direct the contractor, wherever the work is required to be carried out in water, to make the joint with lead wool inserted in strings not less than 6 mm thick and the same shall be very thoroughly caulked.

9.10.7 JOINING FLANGED PIPES:

Flanged pipes shall be joined by providing rubber or leather packing in between, making holes in the packing for bolts and tightening up the nuts. Concrete blocks shall be provided as per the drawings or as per the directions of the Consulting Engineer/Architect and shall be paid separately.

9.10.8 TESTING THE PIPELINE:

After each section of the pipeline is completed, it shall be tested for water tightness before being covered in. Each end of the pipe shall be closed by means of valve or watertight plug or flange and pipe shall be filled with water. The pressure shall then be raised by means of hand force pump or hydraulic pressure pump till the pressure is 15% in excess of highest working pressure in line or 7kg./cm² whichever is more. The test shall be carried out in every 150 m length of pipeline or where there is change in the direction or diameter. If any leakage is found in the pipeline, the same shall be rectified till it gives satisfactory test. Unless and until the test is carried out and the length of the pipeline is passed by the Consulting Engineer/Architect, no refilling of the trench shall be done.

9.10.9 RATES TO INCLUDE:

The items on providing, laying and joining C.I pipes shall include:

- Supply of C.I pipes of specified type, diameter, fittings and specials such as flanged socket, flanged spigot, collar flanged bends, flanged duck foot bends, flanged cross, flanged taper, flanged toes, socketed bends, socket and spigot tapers, cap, plug, socketed tapers and tees, etc.
- Excavating trench including laying out, setting up sight rails, ramming, murrum or sand cushioning in rock excavation or rocky bed, shoring, sloping dewatering, if required, protection measures for men, animals, and vehicles, lantern, fencing, sign boards etc.
- Pig lead or lead wool, hemp rope or cement mortar (1:1) joints, as specified.
- Winding the rope on spigot and centering the pipe, casting molten lead or inserting lead wool and caulking the same including watering, if necessary.
- Testing and making good lead joints or cement mortar joints.
- All labour, materials, equipment, tools, necessary for executing every items.

9.10.10 MODE OF MEASUREMENT:

The rate shall be Rmt. Of pipeline laid, joined and tested as per the Specification including excavation and refilling the trench. The measurement shall be taken along the centre line at the top of the pipeline, special - valves, etc. Deduction shall be made for linear space occupied by the valves. In the case of flanged socket or flanged spigot, the measurement shall be taken along with the socket and spigot pipeline. The tapers shall be measure for the large diameter of the pipe. Open / concealed pipe shall be paid in their respective item.

9.11 ASBESTOS CEMENT PRESSURE PIPES:

9.11.1 MATERIALS

ASBESTOS CEMENT PIPES:

The pipes shall be of all the diameters and types specified in the item. The allowable tolerances in length, diameter and thickness shall be as per IS: 1952 – 1963. The pipes shall be perfectly straight, smooth, and free from cracks and with sharp edges at the ends. The ends shall be of uniform thickness perpendicular to the axis of the pipe and shall be free from damage. When any part of the pipe is found damaged, it shall be rejected and removed from the site of work.

The joint for the pipes shall consist of one centre collar and two flanges of cast iron; two rubber rings manufactured in accordance with BIS specifications and wrought iron bolts.

Specials and fittings shall be conforming to IS: 553-1977

9.11.2 EXCAVATION AND REFILLING:

The Specification for excavation and refilling the trenches for laying galvanized iron pipelines shall be followed.

9.11.3 PREPARATION OF TRENCH:

The trench bottom shall be trimmed and dressed to the required grade. Any prominent pieces of rock or other hard material, either loose or projecting from hard bed or subsoil shall be removed. In case of rocky strata, to avoid irregularities, the trench shall be excavated 150 mm below the level at which bottom of the barrel of the pipe is to be laid and shall be filled up with sand or selected earth filling or gravels less than 12 mm size, as directed by the Consulting Engineers. Any irregularities more than 12 mm shall be chiseled off. Before lowering the pipes in to the trench, hollows shall be cut in the bed and in the narrow width of trench to receive the joint and give adequate room for working.

The pipes shall be stacked along the side of the trench before being laid. Extra pipes at requisite distances shall be stacked to make up for any cutting or rejection of the pipe. Where trench crosses a road or place where such distribution is inadmissible, the pipes shall be stacked in heaps at each end of such crossing. The pipes shall be cleaned at each inside before lowering into the trench.

9.11.4 LAYING AND JOINING:

The pipes shall be lowered into the trench either by hand or by ropes. The pipes shall be handled carefully so as to avoid any kind of damage. Before making the joints, the pipe ends shall be cleaned. A tapered AC plug shall be placed at the end of the pipe to fit a rubber ring to the pipe by rolling the same over the taper until it reaches the pipe. The procedure shall be repeated on the end of the other pipe to be coupled with the former. When rubber rings are in position, collar shall be placed and the two pipes ends shall be brought together with approximately 4 mm to 5 mm clearance at the butts. The rubber rings shall be free from any twist before the joint is tightened up. The distance of the rubber ring from the pipe end shall be nearly half the width of collar. The joint shall then be carefully made by placing the bolts in the flange and tightening them.

Wherever, it is necessary, the anchoring or thrust blocks of concreted or bricks as directed by the Consulting Engineer/Architect, shall be provided. Generally they shall be provided at the tees, bends, reducers, crossings, dead ends, valves etc. The thrust blocks shall be provided as per the drawings or as directed.

9.11.5 TESTING OF PIPELINE:

Pipe shall be adequately braced at horizontal and vertical curve before testing. No test shall be carried out unless the anchoring or thrust blocks have been given enough setting time.

Before testing, selected soil or excavated stuff, free from stones and lumps shall be tamped under the pipeline.

The open end shall be carefully sealed temporarily by means of end cap. End of the pipe shall be provided with temporary thrust block. The contractor shall make the arrangement for relief of the air. For sizes less than 200 mm diameter hydrants shall be made use of for venting air.

Water and atmospheric pressure shall be retained in the pipe for 24 hours, before actual testing is done by raising the pressure. The working pressure shall be raised gradually. The test pressure shall be 1.25 to 1.5 times the normal working pressure of the pipe. There shall be no leakage in the pipeline. If any leakage is found anywhere it shall be rectified by removing the pipe or joint or any special.

No, refilling of the trench shall be done unless the pipe length is tested and passed by the Consulting Engineer/Architect.

9.11.6 RATE TO INCLUDE:

The item on providing, laying and joining the A.C. pressure pipes shall include:

- Supply of C.I pipes of specified type, diameter, fittings and specials such as flanged socket, flanged spigot, collar flanged bends, flanged duck foot bends, flanged cross, flanged taper, flanged toes, socketed bends, socket and spigot tapers, cap, plug socketed tapers and tees, etc.

- Excavating trench including laying out, setting up sight rails, ramming, murrum or sand cushioning in rock excavation or rocky bed, shoring, sloping, dewatering, if required, protection measures for men, animals and vehicles, lanterns, fencing, sign boards etc.
- Laying pipes including cutting where necessary and including wastage.
- All labour, materials, equipments, tools necessary for laying and joining of pipes, excavation etc.

9.11.7 MODE OF MEASUREMENT:

The rate shall be per Rmt. Length of pipeline laid, jointed and tested as described in Specification. The measurement shall be taken along the centre line at the top of the pipeline passing over all joints, specials valves etc. Deductions shall be made for linear dimension occupied in fitting the valves. The tapers shall be measure for the larger diameter of the pipe.

9.12 CEMENT CONCRETE PIPES (NON PRESSURE):

9.12.1 MATERIALS:

- (a) The concrete pipes of specified diameter and collars for these pipes shall conform to IS: 458 – 1988.
- (b) Cement mortar shall be in proportion 1:1

9.12.2 EXCAVATION AND REFILLING:

The Specifications for excavation and refilling the trenches for laying Galvanized Iron pipes shall be followed.

9.12.3 LAYING:

The pipes shall be laid to lines, levels, and slopes indicated in the drawings or as directed by the Consulting Engineers. The handling and laying of pipes shall conform to IS:783-1985. The joint shall be done as per IS: 83-1985.

9.12.4 RATE TO INCLUDE:

The rate shall include:

- Concrete pipes, collar, hemp yarn and cement mortar.
- Excavation, laying the pipes, joining, refilling the trenches, testing the pipelines.
- All necessary labour, materials and use of tools and equipments.

9.12.5 MEASUREMENT:

The rate shall be per Rmt. Of pipe laid. The measurement shall be net length of the pipe laid, measured along the centre line over the collars from end to end, between inside of two inspection chambers or manholes and over fittings on the centre line of the pipe line.

9.13 HDPE PIPES:

9.13.1 MATERIALS:

The diameter of the pipe and the tolerance in wall thickness shall be conforming to IS: 4984-1987 as mentioned in the item in Bills of Quantities. The pipes shall have wall thickness required to resist working pressure specified as per IS: 4984-1987. The pipes shall in all respect be with good finish surface, free from abrasions, straight and free from any swellings.

9.13.2 PACKINGS AT THE FLANGES JOINTS:

Packing shall be of asbestos (compressed) of standard make. The inside and outside diameter of the packing ring shall match the inside and outside diameter of the stub end. The thickness of the packing shall be 3mm. Such joints shall be used to provide isolating valves and to provide discontinuity in the pipe as specified.

9.13.3 METHOD OF JOINTS:

Following methods shall be used for welding and joining of HDPE pipeline installation work.

- The ends of pipes to be joined should be cut vertically at right angles with a fine toothed saw and trimmed with a file to make both ends smooth so that the pipes when pressed together do not leave any gap.
- Both the inside and outside surfaces of the ends of pipes should be scrapped (up to about 12 mm from the end) with a sharp scraper to remove the thin oxidized layer.
- To ascertain that there are no extraneous particles of dust, mud, grease, polyethylene powder etc. at the joining portions of the pipes.
- Pipes should be held firmly with the use of Mechanical Jack in horizontal position and with adjustment, perfect alignment and which is not affected when pipes are withdrawn from the HEAT MIRROR and again brought together for joining.

- A Electrical HEAT MIRROR (HOT PLATE) is to be used for heating the ends of pipes. The pipes should be pressed fresh against the flat surfaces of the HEAT MIRROR one on each side horizontally and held in position under slight pressure. The HEAT MIRROR should be maintained at a steady temperature of 200°C with the help of THERMOSTAT. After a slight rim is formed at the ends of the pipes on both inside and outside, of about 2.50 mm to 3.0 mm the pipes should be pulled apart and the HEAT MIRROR quickly withdrawn. Then the two ends of pipes should be brought together face to face so that the molten portions come in to contact with each other. Then the pipes should be drawn back very slightly (without separating the joined Molten portion) and then against the pipes should be pressed together with a moderate pressure of about 1 to 1.50 kg./cm². This ensures that the air bubbles are squeezed out. The pipes are to be held in that position until the pipe joints cools off naturally in atmospheric air. When a perfect joint is made, the rims cohere in such a way that there is only a very fine slight depression between the two rims. If the top surface of the rim is too flat, it will be because the pipe is overheated. If there is too much of depressions (groove) between rims, the pipe is under heated. The rims should not be cut off or erased from the joints. Also correct alignment of the pipes will help in joining the pipes perfectly as otherwise there will be reduction in the area of joining surface rendering the joint weak and imperfect.

9.13.4 THERMOCRAYON CHALK:

This is small pencil like rod made of some chemicals. It can be used to detect whether the HEAT MIRROR has attained the requisite proper temperature. The HEAT MIRROR is slightly touched with the Thermocrayon chalk which leaves a thin blue layer on the Teflon coated surface of the HEAT MIRROR. The blue turns in to black within one second. If it becomes black sooner, it means that the HEAT MIRROR is over heated (above 200°C). If it takes longer than one second to become black means that the HEAT MIRROR is under heated (less than 200°C). Thermocrayon chalks suitable for detecting different temperatures are available (with some chalks the impression left on the HEAT MIRROR vanishes when appropriate temperature is attained).

9.13.5 HEAT MIRROR (HOT PLATE):

The equipment (handle type) consists of two metallic plates between which Electrical resistance wires capable of attaining a minimum temperature of 200°C are sandwiched. In between the plates, there is also asbestos sheet of mic insulation enclosing the Electrical wires. The metallic plates are covered with Teflon impregnated cloth, which withstands high temperature and will not allow molten ends of the pipes to stick on hot surface. (Instead of Teflon impregnated cloth, the plate can also be Teflon Coated) A handle (non-conductor of heat and electricity) is fitted to the metallic plates. The Electrical lead wires also pass out through the hollow handle.

9.13.6 MANUALLY HEATED HEAT MIRROR:

At places where Electrical energy is not available the HEAT MIRROR (with Teflon coating) can be used and the heating is done by applying flame of gas cylinder or kerosene operated blowlamp. In this case, the two metallic plates will have a gap at about 35 mm (There will be no Electrical resistance wires in between). The flame is applied in the gap and the plates are thus heated from inside. When the plates have attained the proper temperature 200°C (which can be found with the help of Thermocrayon Chalk) butt-welding is carried out.

9.13.7 FLANGED JOINTS:

Where two pipes are required to be joined by using flanges, the following method is adopted.

The flange is slipped on one of the pipe and the PIPE-END (COLLAR) is butt-welded to that end of the pipe. The PIPE-END serves two purpose.

- It restrains the flanges, which is flush with the back surface of PIPE-END.
- The outer surface of the PIPE-END is plain, flat, serving as a base for the rubber gasket. Similarly PIPE-END and flange are fitted to the other pipe to be joined. A rubber gasket is to be used in between the two PIPE-END. The gasket should have a hole of the same size as the pipe and the surface same as that of the PIPE-END. After bringing the two PIPE-ENDS together, the flanges should be tightened by using bots and nuts. Since polyethylene flanges are liable to bend when bolts are tightened, use of metallic flanges, 6mm to 10 mm thick, in addition to polyethylene flanges is done. A metal flange is incorporated during molding stage of polyethylene flanges.

9.13.8 BENDING OF HDPE PIPES:

COLD BENDING:

Small diameter pipes can be "cold bend" for radius greater than 20 times the outside diameter of pipes. Cold bending should be done only for pipes for which the operating temperatures are ambient temperatures.

HOT BENDING:

Formation of small radius bend may easily be done by application of heat either by hot air oven or by immersion in a suitable liquid at an appropriate temperature. HDPE pipe should be heated in an inert liquid such as Glycerol (or

other suitable oil in case of an emergency) at a temperature of 130°C. electrical heating coils or plates may also be used but only by experienced technicians.

In preheating operations, the low thermal conductivity of HDPE should be kept in mind. Overheating can usually be recognized by surface discolouration and distortion. On the other hand, bending operations should not be performed at very low temperature, because of excessive stress that could result. Naked flames for heating should be used only by experienced operations.

While bending, the bore of the pipe tends to collapse and these require support during the bending operation. Internal support should be affected by packing the bore of pipe with warm fine dry sand or by inserting rubber pressure hose, rubber rod, or a flexible spring. After the pipe is uniformly heated, it should be pulled around a simple jig and held in correct position until cool.

The radius of bend up to 50 mm dia. HDPE pipes should not be less than 5 times the outside diameter of pipe.

9.13.9 LAYING OF HDPE PIPE LINE:

- When installing pipes in or on buildings, it is best to use brackets with rounded edges or with soft plastic underlay. In the case of horizontally placed pipes, the clamps should be spaced at intervals of 15 to 20 times the outer diameter of the pipe. Any bends or corners must be able to expand or contract freely with varying weather conditions, HDPE pipes shall not be installed near hot water pipes or near any other heat sources.
- While installing the pipe in trenches, the bed of trench should be level and free from sharp edged stones; while laying in rocky area suitable bed of sand or gravel should be provided. The initial backfill about 100 to 150 mm above the pipes should fine sand or screened excavated material.

HDPE pipes are lighter than water. In marshy areas therefore, the pipeline must be evenly submerged with a blunt wooden fork (not with the edge of shovel) before the water logged trenches are filled-in. Sometimes it might even be necessary to increase the weight of the pipe with cement rings so that it will not float up from the bed.

9.13.10 HYDRAULIC TESTS:

For conducting hydraulic test (testing of pipe for pressure) the length of the pipeline being tested should not be more than 500m. The pressure required for testing the pipeline is obtained with manual or power driven hydraulic presses. Centrifugal pumps are not recommended as they cause water hammer, which can damage the joints or even burst the pipes.

Control valves shall be positioned "OPEN" for the duration of the test and open ends temporarily closed with watertight fittings. The testing pressure should not be less than one and a half times the rated pressure of pipe under use. Also care should be taken that at no time the test pressure is exceeded. The system should be slowly and carefully filled with water to avoid surge pressure or water hammer. Air vents should be open at all high points so that air will escape from the system during water filling.

When system is fully charged with water and air is displaced from the pipe, air vents should be closed; pressure may then be applied until the required test pressure is reached.

Due to low modulus of elasticity, pipe will expand and will result in initial fall of pressure even though there is no leakage. The amount of extra water required to build-up a steady pressure is normally termed as make up water. The time frame to build up steady pressure is approximately twelve hours.

9.13.11 MEASUREMENTS AND RATE TO INCLUDE:

The measurements shall be in Rmt. Of pipes as laid. The rate includes cost of all materials including all fittings, accessories and including labour for fixing.

9.14 SANITARY WARES

9.14.1 WATER CLOSET – INDIAN PATTERN:

Water closets of Indian Pattern / Orissa shall be approved quality and sizes as specified in the Bills of Quantities. They shall be fitted with 'P' or 'S' trap of the same material and fixed in position and built round solid with burnt brick and cement masonry to level of the floor after all connections are made.

Masonry mortar shall be (1:6) cement mortar and concrete shall be (1:3:6) mix cement concrete of cement, sand and brick bats. Each W.C shall be provided with :

- (a) 100 mm dia. C.I pipe outlet joined to vertical solid pipe with necessary accessories having cleaning facility outside of the walls.
- (b) 63 mm dia. C.I antisiphon pipe to be provided from 1st floor and upper level floors and take up to 2 metre above terrace level. 32 mm dia. Lead / PVC connection should be provided from top of 'P' or 'S' trap of pan to antisiphon pipe.

- (c) 32 mm. dia G.I. (B class) flushing pipe from the bottom of flushing cistern shall be connected to the head of W.C pan with necessary accessories.
- (d) Flushing cistern shall be of PVC / ceramic as specified and shall be of approved make. Syphon used shall be of PVC/ceramic as specified in item. Cistern shall rest on C.I brackets with wall plugs and shall have brass/C.P Union and couplings for the 32 mm flushing pipe and with a chromium handle in the cistern.
- (e) 15 mm dia PVC/G.I feed pipe to flushing tank, length not exceeding 450 mm and 15 mm diameter PVC/G.I over flow pipe from cistern up to 150 mm above finished floor level.

9.14..2 MEASUREMENT AND RATE TO INCLUDE:

The W.Cs shall be measured by numbers and paid for accordingly. The rate shall be inclusive of every item stated above (i.e. connection of 100 mm dia. C.I. pipe outlet to junction of soil pipe and connection of PVC vent pipe up to junction of vertical antisiphon pipe)

9.14.3 WATER CLOSET – EUROPEAN PATTERN:

The water closet of the European pattern shall be of white / colour glazed ware of approved make and floor mounted / wall mounted type as specified in Bills of Quantities and wash down pedestal type fixed on the flooring material. They shall be provided with plastic seat solid (hygienic type) and solid plastic lid with chromium plated brass bar hinge and fixed to the pan. These shall be provided with the same number of 100 mm. dia C.I outlet pipe, 63 mm C.I antisiphon, feed and over flow pipe as the W.Cs of the Indian pattern to the flushing cistern, which shall be low dons and shall be white/colored and PVC/ceramic type as specified in Bills of Quantities.

Cistern shall be of approved make and having capacity of 12 or 15 lit. with symphonic operated fittings including C.I bracket with three coats of enamel paint to match the walls.

9.14.4 MEASUREMENT AND RATE TO INCLUDE

These shall be measured and paid for in a similar manner as Indian W.Cs and the rate shall be for the water closets fixed complete on the inside up to the junction with vertical antisiphon and soil pipes.

9.14.5 WASH BASINS:

They shall be white/colour glazed of best and approved make of approved quality and of the size specified in the Bills of Quantities complete with 15 mm C.P. hot and cold approved make pillar cocks unless otherwise stated with at least 75 mm nose, 32 mm dia. C.P. brass waste coupling with rubber plug, C.P. brass bottle trap with extension piece, C.P. brass chain, C.I. white painted cantilever brackets, and 32 mm dia G.I pipe (waste pipe) up to trap and 15 mm dia. PVC feed pipe and 15 mm brass stop cock complete. The rate shall include cost of all materials and accessories as mentioned above including fixing and shall be paid per unit/number.

9.14.6 SINKS

They shall be of best and approved Indian make of approved quality and of the size specified in the Bills of Quantities and of fire clay, porcelain/stainless steel having over flow arrangement complete with C.I cantilever bracket; 15 mm C.P bib cock, 38 mm C.P. waste plug and chain including 38 mm vertical portion of lead/PVC waste pipe and 'P' and 'S' trap. The rate shall include cost of all materials and accessories as mentioned above including fixing and shall be paid per unit/number.

9.14.7 UNRINALS:

It shall be white/colour glazed ware of approved make and type as specified in tender item, with auto cistern of specified capacity complete with 15 mm dia. PVC inlet pipe with brass union for cistern, 25 mm dia. C.P.brass main and 15 mm dia distributor for water inlet and 32 mm. dia. External C.P brass pipe work for waste pipe, C.I brackets for cistern, C.P. brass screw etc. complete. The rate shall include cost of all materials and accessories as mentioned above including fixing and shall be paid per unit/number.

10.0 **MISCELLANEOUS:**

10.1 ANTI-TERMITE TREATMENT:

10.1.1 GENERAL:

This Specification covers the anti-termite treatment to foundations and woodwork.

10.1.2 SCOPE OF WORK:

The contractor shall treat the foundation trenches, soil for back filling the trenches, rammed earth surface under plinth and all wood work coming in contact with wall or flooring as per drawing and Specifications.

10.1.3 SPECIFICATIONS:

The contractor shall use the following chemicals as insecticides for the treatment; the chemical emulsion shall be prepared as under using water :

<u>Chemicals</u>	<u>Concentration.</u>
Aldrin	0.5% by weight
Chlordane	1.0 by weight.
Haptachlor.	0.5% by weight.
Chloropyrifos.	As per manufacturers Specification

10.1.4 METHOD OF APPLICATION:

Stages of treatment shall be as under:

A	-	Bottom and sides of trenches (up to ht. of 300 mm from the bottom)
B	-	Backfill in immediate contact with masonry foundations.
C	-	Junction of floor and wall.
D	-	Top surface of plinth filling
E	-	External perimeter of building.
F	-	Soil below apron.

Quantity of Chemical solution to be used (one litre of chemical to be mixed in 19 litres of water).

Stage – A	5 litres. Per Smt. of surface are to be treated.
Stage – B	7.5 litres. Per Smt. of the vertical surface of the sub structure for each sid.
Stage – C	A small channel of 30 mm x 30 mm shall be made at the junction of wall and columns with floor holes are made in channel by iron rods 150 mm apart and chemical emulsion poured along the channel at a rate of 7.5 litres. Per Smt. of the vertical wall or columns surface so as to soak the soil right to the bottom.
Stage – D	5 litres per Smt. of the surface before the sand bed or sub-grade is laid. This is required to treat the top surface of the consolidated earth within plinth wall.
Stage – E	After the building is complete, the earth along the external perimeter of the building should be rodded at intervals of 150 mm and to a depth of 300 mm (or full depth of filling). The chemical emulsion to be poured along the wall at a rate of 7.5 litres per Smt. of the vertical surface.
Stage – F	5 litres per smt. of the vertical surface before the apron is laid. The top surface of the consolidated earth over which the apron is to be laid shall be treated with the chemical solution at a rate of 5 litres per Smt.

10.1.6 ANTITERMISTE TREATMENT FOR BASEMENT WALLS, RETAINING WALLS ABOVE FLOOR LEVEL:

The soil retained by the walls shall be treated at a rate of 7.5 litres per sq. mtrs. Of the vertical surface so as to effect a continuous outer chemical barrier.

10.1.7 ANTI-TERMITE TGREATMENT AT EXPANSION JOINTS:

The expansion joint shall be treated at a rate of 2 litres of solution per linear metre. This treatment should be supplemented by treating through the expansion joint after the sub-grade has been laid.

10.1.8 SPRAYING EQUIPMENT:

A pressure pump shall be used to carry out spraying operations to facilitate proper penetration of chemicals into the earth.

10.1.9 RATE TO INCLUDE:

Payment for anti-termite treatment shall be on the basis of sq.m. of the area of plinth.

10.2 PAINTING:

10.2.1 GENERAL:

The surface shall be thoroughly rubbed with sand paper to make it free from mortar and foreign matters. All steel work shall be cleaned of loose rust, mill-scale etc. so as to expose the original surface. All broken edges, cracks, loose plaster and wavy surface shall be brought up either by patch plaster work or Plaster of Paris.

All material viz dry distemper, oil bound distemper, oil paint, flat oil paint, synthetic enamel paint, plastic emulsion paint, acrylic emulsion, cement primer, yellow zinc chromate, red lead and other primers and metallic paints shall conform to respective Specifications of BIS and shall be obtained from approved manufactures. All paints shall be brought on site in sealed tins in ready mixed form and shall be applied direct with the addition of thinner, if recommended by the manufacturers.

Note : For all types of painting work, if the smooth and uniform finish is not obtained by applying a number of coats mentioned in the Bills of Quantities, contractor has to apply additional coats to achieve smooth and uniform finish without any extra cost.

10.2.2 PAINTING –OIL/ENAMEL/PLASTIC EMULSION:

Ready mixed oil paint, flat oil paint, plastic emulsion paint, synthetic enamel paint, aluminium paint, etc. shall be brought in original containers and in sealed tins. If for any reason thinner is necessary, the brand and quantity of thinner recommended by the manufacturer or as instructed by the Architect shall be used.

The surface shall be prepared as specified above and a coat of approved primer shall be applied. After 24 hours of drying, approved or specified quality paint shall be applied evenly and smoothly. A filler putty coating may be given to give a smooth finish. Each coat shall be allowed to dry out thoroughly and then lightly rubbed down with sand paper and dust cleaned off before the next coat is applied. Number of coats shall be as specified in the item and if the finish of the surface is not uniform, additional coats are required shall be applied to get good and uniform finish at no extra cost. After completion, no hair marks from the brush or clogging of paint, puddles in the corners of panels, angles mouldings, etc. shall be left on the work. The glass panels, floor etc. shall be cleaned of stains.

When the final coat is applied, if directed, the surface shall be rolled with a roller, or if directed, it shall be stippled with a stippling brush.

10.2.3 RATE TO INCLUDE:

Payment shall be made on square meter basis. Rate shall include cost of all materials and labour involved in all the above operations. Deductions for voids shall be measured as per clause give under Specification for plastering.

The rate quoted shall include cost of all materials, spray pump, tools, tackles and accessories, all labour, storing facilities of paints as approved by Owner/competent authorities, license if required etc. complete.

10.2.4 DRY DISTEMPER:

Shade shall be got approved from the Architects before application of distemper.

The surface shall be prepared as specified above. The prepared surface shall receive 4 coats of dry distemper wash; at first whit wash shall be evenly applied and scrapped off when dry.

A primer coat using approved primer or sizing shall be applied. Distemper prepared as per manufacturers direction shall be applied in 3 coats, each coat shall be allowed to dry before subsequent coat is applied. The finished surface shall be even, uniform when rubbed and shall show no brush marks. If additional coats are necessary to get even and uniform surface, they shall be given at no extra cost.

Measurement shall be taken and paid as specified in painting item.

10.2.5 OIL BOUND DISTEMPER:

The surface shall be prepared as specified above and shall receive 4 coats as specified below.

A primer coat of either cement primer or and approved distemper primer shall be applied. After the primer coat has dried, the surface shall be lightly sand papered and dusted to make it smooth to receive distemper.

Distemper shall be prepared as per the direction of manufacturer and conforming shade approved. It shall be applied in 3 coats, taking care to allow for drying of each coat before subsequent coats are applied. Measurement shall be taken and paid as specified in painting item.

10.2.6 WATER PROOF CEMENT PAINT:

The surface shall be prepared as specified above and thoroughly wetted with clean water before water proof cement paint is applied.

The paint shall be prepared strictly as per manufacturers Specifications and in such quantities as can be used up in an hour of its mixing, as otherwise the mixture will set and thicken, adversely affecting glow and finish.

The paint thus prepared shall be applied on clean and wetted surface with brush or spraying machine. The solution shall be kept stirred during the period of application. It shall be applied on the surface which is on the shady side of the building so that the direct heat of the sun on the surface is avoided. The completed surface shall be watered after the day's work, for seven days. Number of coats shall be as specified in the item.

10.2.7 ANTI – CORROSIVE BITUMINOUS PAINTS:

Anti corrosive Bituminous Paints shall conform to IS: 158-1968.

TANK MASTIC:

Usage : Tank Mastic is an anti-corrosive non-contaminating black bituminous paint, for protecting the internal surfaces of Fresh Water Tanks, Pipes, Fluid containers, concrete surface etc. against severe corrosive conditions.

It shall be used particularly, where periodic inspection and recoating present no undue difficulties.

PREPARATION OF SURFACE:

The surface shall be prepared as described earlier.

APPLICATION OF PAINT:

Tank Mastic, of a paint like consistency shall be applied on surface by brush or spray which dries rapidly with glossy black finish. It shall be applied strictly in accordance with instructions to get resultant film tough and elastic and to impart neither taste nor taint to contents of tank. The surface to be coated shall be clean and free from moisture.

The solution shall be stirred well before applying and clean brushes shall be used. While applying, adequate ventilation shall be allowed. The first coat shall be thoroughly set before applying a second coat. When the final coat has dried out, the surfaces shall be flush down with clean cold water before putting into commission.

Brushes shall be kept clean and free from oil and grease. They shall be immersed in clean cold water to keep them soft during intervals in application.

Notes : Drying time and covering capacity vary according to nature of surfaces, ventilation etc.

10.2.8 CHLORINATED RUBBER PAINTS:

These shall be of approved quality and make.

USAGE:

The chlorinated rubber paint is used to protect steel structures against the corrosive action of smoke and fumes.

SURFACE PREPARATION: It shall be as described earlier.

APPLICATION

Three coats of paint shall be applied by brush and spraying shall not be done. Brushing shall be done fairly quick and over brushing shall not be done. A minimum of 24 hours shall be allowed between coats, although it dries to touch within one hour. The final coat should be allowed to dry 72 hours before painted object is brought into use.

10.2.9 HEAT RESISTING PAINTS:

It shall be of approved quality and make.

USAGE :

The paint is applied on combustible materials like wood particleboard etc. and it retards the spread of flame. It is not a decorative paint. It shall be used where decorative effect is not required.

APPLICATION

Two coats of the paint shall be applied to soft wood by brush keeping inter coat interval of 24 hours between successive coats. If for any reason thinner is necessary the brand and quantity of thinner recommended by the manufacturers or as instructed by Consulting Engineer shall be used. It shall be applied to bare wood.

10.2.10 EPOXY PAINT :

USAGE:

The epoxy paints are recommended for painting steel fabric, plant and equipment subjected to chemical environments or handling chemical agents, particularly where contact with chemicals is envisaged. They are also suitable for coating steel plant and equipment handling solvents, oil, grease or weak acids and plaster, concrete and facia brickwork where regularly clean surface is required.

SURFACE PREPARATION: It shall be as described earlier.

APPLICATION:

Immediately before use the base and accelerator shall be mixed in the recommended proportion and allowed to stand for one hour, restirred and then got ready for use. The mixed paint shall be used within about six hours of the initial mixing and this time is known as the pot life. For this reason it is essential that only sufficient paint which is sure to be used up within the above period shall be mixed at a time.

After mixing the components in the recommended proportion, any thinning which is considered necessary shall be done with the recommended Epoxy thinner.

Epoxy paints, actually dry in 4-6 hours but over coating shall be done only after 24 hours of drying.

Curing of epoxy coating to show optimum results, and this being a chemical reaction, depends of the environment temperature.

SPECIFICATIONS FOR DIFFERENT SURFACES :

(i) New Steel :

Shot blast to clean original base, prime immediately with epoxy two pack red oxide zinc chromate primer and finish with 2 or 3 coats of epoxy two pack enamel depending on the anticipated service condition.

Where shot blasting is not feasible, preparation of surface by use of pneumatic tools, and scraping and wire brushing, though not ideal, is recommended. Low standard cleaning affects durability of epoxy coats.

(ii) New Galvanized steel and aluminium:

Degrease solvent and clean the surface free of contaminants.

Prime with etching primer preferably after a simple pre-treatment with wipe off pre-treatment solution.

(iii) Aluminium Alloy, Copper, Brass, Gunmetal and Lead:

Degrease with solvent, and clean the surface free of contaminants. The surface shall be rubbed down with abrasive paper and coated with etching primer to be followed by a coat of Epoxy two-pack red oxide zinc chromate primer. Then the surface shall be finished with 2 coats of epoxy two- pack enamel.

10.2.11 All painting work shall be measured in square metre. Net area of the surface painted shall be measured. No deduction will be made for unpainted surface of ends of joints, beams, posts, etc. and openings not exceeding 0.5 sq.mts each and no addition shall be made for reveals, joints, soffits, sills, etc. of these openings. The multiplying factors for obtaining equivalent areas shall be as per IS:1200 – Parts XIII & XV.

10.2.12 Corrugated Sheet surfaces shall be included with plain surfaces after increasing their areas by the following percentages :

(a)	G.I. Corrugated Sheets	14%
(b)	Asbestos Cement Sheets – Corrugated	20%
(c)	Asbestos Cement Sheets – Semi – Corrugated	10%

10.3 POLISHING & VARNISHING:

10.3.1 FRENCH POLISHING:

French spirit polish shall be of an approved make conforming to IS: 348. If it has to be prepared on site, the polish shall be made by dissolving 0.7g of best Shellac in 4.5 litres of methylated spirit without heating. To obtain required shade, pigment may be added and mixed.

Surface shall be cleaned. All unevenness shall be rubbed down smooth with sand paper and well dusted, Knots, if visible, shall be covered with a preparation of red lead and glue. Resinous or loose knots and gaps shall be filled with seasoned timber pieces and made level with rest of the surface. Holes and indentations on surface shall be filled with putty made of whiting and linseed oil. Surface shall be given a coat of filler made of 2.25 kg. of whiting in

1.5 litres of methylated spirit. When it dries, surface shall again be rubbed down perfectly smooth with sand paper and wiped clean.

Piece of clean fine cotton cloth and cotton wool made into shape of pad shall be used to apply polish. The pad shall be moistened with polish and rubbed hard on the surface applying the polish sparingly but uniformly and completely over the entire surface. It shall be allowed to dry and another coat applied in the same way. To give finishing coat, the pad shall be covered with a fresh piece of clean fine cotton cloth, slightly dampened with methylated spirit and rubbed lightly and quickly with a circular motion, till the finished surface attains uniform texture and high gloss.

10.3.2 WAX POLISHING:

Wax polish shall either be prepared on site or obtained readymade from market. Polishmade on the site shall be prepared, from a mixture of pure (bees) wax, linseed oil, turpentine oil and varnish in the ration of 2:1 ½ :1:1/2 by weight. The bee's wax and the boiled linseed oils shall be heated over slow fire. When the wax is completely dissolved, the mixture shall be cooled till it is just warm, and turpentine oil and varnish added to it in the required proportion and the entire mixture is well stirred.

Surface shall be prepared as described under 'French Polishing' except that the final rubbing shall be done with sand paper, which has been slightly moistened with linseed oil.

Mixture or polish shall be applied evenly, with a clean cloth pad in such a way that no blank patches are left and rubbed continuously for half an hour. When the surface is quite dry a second coat shall be applied in the same manner and rubbed continuously for an hour or until the surface is dry. Final coat shall then be applied and rubbed for two hours or more if necessary, until the surface has assumed a uniform gloss and is quite dry showing no sign of stickiness when touched. Gloss of the polish depends on the amount of rubbing, therefore, rubbing must be continuous and with uniform pressure and frequent change in direction.

10.3.3 VARNISHING

Surface shall be prepared as described above. After preparation of surface, two coats of clean boiled linseed oil shall be applied at sufficient interval of time. After the linseed oil has dried, two coats of varnish obtained from approved manufacturer shall be applied at sufficient interval of time. If the surface fails to produce the required gloss, and additional coat shall be applied without any extra cost.

10.4 WHITE WASH

White wash shall be prepared from lime slaked on spot, mixed and stirred with sufficient water to make a thin cream. This shall be allowed to stand for 24 hours and shall be screened through clean cloth. The approximate quantity of water to be added in making cream shall be five litres per kg. of lime; 125 gm Fevicol DDL shall be dissolved in 10 litres of lime slurry. Blue shall be added to give required whiteness. White wash shall be applied in specified coats by using flat brushes or spray pumps. Each coat shall be allowed to dry before next coat is applied. If additional coats, more than what have been specified, are necessary to obtain uniform and smooth finish, the same shall be provided at no extra cost.

The finished surface shall not show any signs of cracking and peeling nor shall it come off readily on the hand when rubbed.

10.4.1 COLOUR WASH:

Colour wash shall be prepared by adding mineral colour to lime slurry. No colour work shall be done until samples of the colour wash to the required tint or shade have been got approved from the Architect.

Colour wash shall be applied as specified under white wash item.

10.5 GLAZING:

- (I) All glass shall be cut to size accurately and neatly to suit all openings to be glazed with a slight margin of about 2 to 4 mm on all sides as directed.
- (II) All glass shall be back putted and externally putted up the line of the casement and filling the rebate.
- (III) Glazing to steel doors and windows shall be done in compliance with the supplier's instructions, using the clips and the bends supplied.
- (IV) Glass in wooden doors and casements shall be sprung in position after fixing with back putty.
- (V) Broken glass shall be neatly removed and replaced at the contractors expenses.
- (VI) Where indicated in the Bills of Quantities, glass shall be beaded with approved beading, properly fixed and primed.
- (VII) Edges of glass louvers shall be grounded and left free from any sharp edges.
- (VIII) In the case of T.W beading or other specified beading, the putty shall be applied full in line all around the windows in back, in between beading and glass and shall be of same colour as that of the windows of beading.

Notes: The work mentioned in this section shall be measured separately only in cases where it is distinctly specified in the Bills of Quantities

10.6 EXPANSIONS JOINT:

- 10.6.1 Expansion joints to be provided shall be of 24 gauge G.I. sheet strips of 400 mm width at location shown on drawing or as approved by the Engineer. The G.I. Strip shall be bent to the shape indicated on drawing and embedded properly in concrete. The joint width shall be uniform throughout and special care shall be taken to ensure proper concreting at expansion joints. Expansion joints shall be continuous and where two or more G.I sheets meet, they shall be lapped to the extent of 75 mm and joints properly soldered. The expansion joints shall be filled with pre-moulded joint fillers and sealed with mastic compound. For the purpose of measurement, the laps provided shall be neglected.

Metal or tarfelt flashings shall be fixed as directed by the Engineer. Metal flashings provided shall be welded to obtain continuity. Pre-mould joint fillers shall be of Shalitex sealing compound.

- 10.6.2 Expansion joints in flooring, foundations and all structures shall be formed in the positions and to the shapes shown in the relevant drawings. When joints are to be filled with joint filling materials as stipulated in the drawings the permanently exposed edges of joints shall be sealed with an approved sealing compound.

Joint filling material shall consist of 25 mm thick impregnated fibre board of the approved make with expansion joint fillers and its equivalent approved quality sealing compound shall be used.

Payment shall be made on SMT basis of the board as laid finally. The rate shall include the cost of preparing the surfaces, fixing and finishing with sealing compound.

10.7 WATER PROOFING (ROOF):

10.7.1 WITH BITUMEN FELT:

(i) MATERIAL

- (a) Bitumen primer of approved quality and make shall be used in work and shall conform to IS: 3384-1965.
- (b) Special roofing asphalt blown grade shall conform to IS:702 – 1955 and shall be of approved make.
- (c) A fibre base water proofing felt and Hessian base felt type 3, grade 1 shall conform to IS: 1322-1970.

(ii) PREPARATION OF SURFACES:

The surfaces shall be dry, free from dust, dirt, oil and other foreign material.

- (a) Five layer treatment consisting of the following:
 - A layer of cold bituminous primer at a rate of 400 gms per smt.
 - A layer of special roofing asphalt (Hot) at a rate of 1.2 Kg. per square metre.
 - A layer of bitumen felt Hessian base self finished type 3, grade 1 of approved makes. Minimum lap at the ends and sides of felt shall be 100 mm and 75 mm respectively and joints shall be sealed properly with bitumen.
 - A layer of special roofing asphalt (Hot) at a rate of 1.2 Kg. per square metre.
 - A layer of pea size gravel of 6 mm down size at a rate of 0.0006 cms per square metre.

- (b) Seven layer treatment consisting of the following :

The first four layers shall be same as the first four layers stated above in five layers treatment. The other layers shall be :

- Apply second layer of Hessian based self finished tarfelt, with minimum 100 mm and 75 mm lap at end and sides of strips.
- A layer of special roofing asphalt (Hot) at a rate of 1.2 Kg. per square metre.
- Apply final layer of pea gravel of 6 mm down size at a rate of 0.0006 Cmt./Smt.

The contractor shall give guarantee against any leakage, and rectify any defectg in water proofing, as mentioned in Bills of Quantities.

(iii) RATES TO INCLUDE:

Rates for water proofing shall include following:

- (a) Preparatory work shall be as per IS: 3067.
- (b) Treatment of gutters and drain mouths.
- (c) Treatment of main roof, flat or sloping.

- (d) Treatment of flashings and projecting pipes.
- (e) Cost of fuel required for heating bitumen up to required temperature and transporting all materials at site of work.
- (f) All water proofing work to be carried out as per IS; 1346.
- (g) Making Zari in walls if required for flashin.

(iv) MEASUREMENTS:

Only superficial area will be measured and paid and n extra claim for laps, gutters, drain mouth, flashings and projecting pipes etc. will be considered for payment.

10.7.2 WITH FIBREGLASS TISSUE:

(i) MATERIAL:

- (a) Bitumen primer and Bitumen (special roofing asphalt) shall be as specified in waterproofing roof with Bitumen felt item.
- (b) Fibre glass R.P.Tissue shall be of M/s Fibre Glass Pilkington Ltd. Or approved make with the flowing properties.

Weight	50 gm/smt
Thickness	0.5 mm
Tensile strength in longitudinal	3.2kg/cm ²
Direction	

- (c) The tissue shall not fail in hot bitumen at 300 degree C temperature for one minute.
- (d) Pea size gravel/coarse sands.
- (e) The tissue shall not fail in hot bitumen at 300 degree C temperature for one minute.
- (f) Pea size gravel/coarse sands.

(ii) PREPARATION OF SURFACE:

The surface shall be dry, free from dust, dirt oil and other foreign material.

(iii) Specification of two layers of fiberglass Tissue shall consist of the following :

- (a) A layer of cold bituminous primer at a rate of 400 Gms. Per Smt.
- (b) Apply first coat of hot bitumen at the rate of 1.8 Kg./Smt.
- (c) Embed first layer of Fibreglass Tissue. The minimum over lapping joints at the ends and sides of the strip of tissue shall be 100 mm and 75 mm respectively. All the laps shall be firmly bonded with hot bitumen.
- (d) Apply second coat of hot bitumen at the rate of 1.8 Kg/Square metre.
- (e) Embed second layer of fiberglass Tissue with minimum over laps as stated in 1st layer.
- (f) Apply third coat of hot bitumen at the rate of 1.8 kg/smt.
- (g) A layer of pea size gravel of 6 mm thickj or coarse sand shall be embedded at the rate of .006 m³/m² into the hot bitumen while it is being poured by applying minimum pressure.

(iv) Specification of three layer of fiberglass tissue:

Three layers of Fibreglass Tissue consisting of the following (a) to (f) shall be same as in 10.7.2(iii).

- (g) Embed third layer of Fibreglass Tissue.
- (h) Apply fourth coat of hot bitumen at the rate of 1.8 kg/smt.
- (i) A layer of pea size gravel or coarse sand shall be embedded at the rate of 0.006 m²/smt into the hot bitumen, while it is being pured by applying minimum pressure.

(v) Specification for four layer of fiberglass tissue:

Four layers of Fibreglass Tissue consisting of the following:

Layers (a) to (h) shall be are same as in 10.7.2 (iv)

- (i) Embedded fourth layer of fiberglass and Bitumen at the rate of 1.8 kg/smt.
- (j) Apply pea size gravel as per (i) of 7.2 (iv)

(vi) FOLLOWING CARE SHALL BE TAKEN:

- (a) The joints in Fibreglass Tissue between successive layers shall be staggered midway.
- (b) Required length of Fibreglass Tissue shall be cut and rolled before commencing the work.

- (c) In case of A.C Sheets/G.I sheets all nuts and bolts shall be properly tightened and wherever necessary the old sheet should be replaced. The sheet overlaps shall be first caulked with a suitable bituminous sealing compound.

10.7.3 WITH CHINA MOSAIC:

The surface to be water proofed shall be cleaned thoroughly and shall be free from oil and other foreign materials. Prepared surface shall receive the following treatment.

- (i) The first four layers shall be same as stated above for five layers treatment in Para 10.7.1 (ii)
- (ii) A layer of B.B.L.C (Brick Bat Lime Concrete) of specified thickness shall be laid over tarfelt to the required slope as shown in drawing. Proportion of B.B.L.C shall be 2 parts of brickbat and one part of lime mortar (1:2) i.e 1 part of lime and 2 parts of sand). After 48 hours of laying of B.B.L.C., a bedding of loime mortar (1:2), 18 to 25 mm thick shall be provided and on top of this layer, 10 mm thick neat cement grout shall be provided, immediately on application of cement grout, assorted pieces of coloured glazed china previously soaked in water shall be set closely on the fresh surface and properly tamped to get the required top surface. The surface after completion of work shall be cleaned with sawdust or with diluted acid, if directed by Engineer-in-Charge. The finished surface shall be cured for 10 days. If so directed by the Engineer, a border colour of white mosaic shall be provided, without any extra cost. Tarfelt, brickbat coba and china mosaic shall be taken up the parapet walls to a height of 100 – 150 mm. Necessary vatas shall be provided towards drain as directed.
- (iv) Measurement shall be in square metres correct to two decimal places. Length and breadth of the actual laid area shall be measured and paid. No extra shall be paid for vatas and work carried over parapet.

10.7.4 CEMENT BASED WATER-PROOFING FOR TERRACES:

The work shall be executed by an experienced agency and shall be guaranteed for the period as mentioned in the Bills of Quantities. Waterproofing material used shall be of approved manufacturers and shall be used according to the manufacturers Specification.

- (i) Area shall be cleaned of all loose materials and shall be treated with neat cement slurry and mixed with water proofing compound to seal the cracks, pores, etc. appearing on the surface.
- (ii) After the slurry coat a layer of new well burnt brick bats shall be laid in cement mortar (1:3) admixed with water proofing compound. This shall be laid in a proper slope. The brickbat joints shall be filled up to half the depth. Coving shall be done at all joints of slab and brick walls, inverted beams etc. Minimum high to coving shall be 300 mm. Brick Bat layers shall be cured for 3 days.
- (iv) A coat of cement slurry admixed with water proofing compound shall be applied to the brick bat layer.
- (v) A layer of cement mortar (1:3) with water proofing compound shall be applied on the second slurry coat and joints of brick bat layer shall be filled up completely to give a finished plain surface.
- (vi) Finally a top layer 20 mm thick of cement mortar (1:3) admixed with water proofing compound shall be laid and finished smooth with cement slurry, admixed with water proofing compound. The finished surface shall be marked with boarder and chequered marks 300 mm x 300 mm to give good appearance.
- (vii) The finished surface shall be cured for 10 days by ponding water over it. The drain openings shall be closed during curing period and shall be opened out as soon as the curing period is over.
- (viii) The average thickness of this treatment shall be 115 mm.
- (ix) The measurement shall be in square meters correct to two decimal places. Length and breadth of the actual laid area shall be measured and paid. Coving shall also be paid in Smt. basis.

10.7.5 TAPECRETE WATER PROOFING TREATMENT:

The surface shall be cleaned of loose materials, dust oil, grease etc. The surface shall be cleaned by grinding, water blasting, sand blasting, and acid washing, if required.

- (i) Mixing should be carried out with puddle type mixers operating at low rates of rotation. Rotations should not exceed 360 RPM to prevent aeration of mixes.
- (ii) All concrete surfaces shall be thoroughly pre-wetted for at least one hour prior to the application of Tapecrete coatings. When placing Tapecrete coating, all water shall be removed so that surface is only damp. In no case there shall be standing water or a shiny wet surface. Tapecrete polymer is mixed with neat cement in the ratio of 100 kg. of cement to 52 kg. of Tapecrete. The mix has to be applied by brush on prepared surface. Two or more coats are to be done. First coat should be allowed to dry for 5-6 hours.
- (iii) Tapecrete system is cured by air-drying. It must be protected from rain during the first 12 hours of curing. No foot traffic is allowed on any tapecrete work within 12 hours of application and no vehicular traffic is allowed within 48 hours.

APPLICABLE CODES, STANDARDS & RULES

The following Codes, Standards, Rules and Specifications of Bureau of Indian Standards amended as on date will apply to the best of their meaning to the equipments and the contract.

SR. NO.	DESCRIPTION	CODE
1.	Switch Fuse Units On Cubical Switch Boards	IS 4047 - 1967
2.	Switchgear Busbars	IS 375-1963
3.	H.R.C. Fuse Links	IS 2208 - 1962
4.	Distribution Fuse Boards	IS 2675 - 1966
5.	Enclosures For Low Voltage Switch Gears	IS 2147 - 1962
6.	P.V.C. Cables Insulated Electrical Cable (Wire) For Working Voltage Up To 1. 1 kv	IS 1554 - 1988
7.	Tubular Fluorescent Lamps	IS 2418 - 1963
8.	Ceiling Fans	IS 374-1966
9.	Industrial Luminaries With Metal Reflector	IS 1777-1978
10.	Luminaries General Requirement	IS 10322-1982(part-1 &2)
11.	Water Tight Electrical Light Fitting	IS 3553 - 1966
12.	Steel Boxes For Enclosure of Electrical Accessories	IS 5133 - 1969 (Part - 1)
13.	Rigid Plain Conduit For Insulating Material	IS 9537-1983(part-3)
14.	Fittings For Rigid Steel Conduits	IS 2667 - 1964
15.	Rigid Steel Conduit For Electrical Wiring	IS 1653 - 1972
16.	Accessories For Rigid Steel Conduits For Electrical Wiring	IS 3837 - 1966
17.	Switch Sockets Outlets	IS 4615 - 1968/IS3854-1966
18.	Three Pin Plug And Sockets Outlets	IS 1293 - 1967
19.	Switches For Domestic And Similar Purpose	IS 3854 - 1966
20.	PVC Insulated Cable For Working Voltage Up To & Including 1.1kv	IS 694 - 1977 (Part - 11)
21.	Call Bell And Buzzers	IS 2268 - 1966
22.	Earthing	IS 3043
23.	Switchgear	IS 3072 - 1965
24.	Lightning Protection	IS 2309 - 1969
25.	Current Transformer	IS 2705 - 1964
26.	Metal Enclosed Switchgear And Control Gear For Voltage Above 1000 Volts But Not Exceeding 11000 Volts.	IS 3427 - 1969
27.	Insulation Co-Ordination	IS 2165 - 1962
28.	Danger Notice Plate	IS225-1963
29.	Factory Built Assemblies of Switchgear And Control Gear	IS 8623 AND IEC - 439
30.	General Requirement For Switchgear And Control Gear For Voltage Not Exceeding 1000 Volts.	IS 4237
31.	Air Break Switches And Fuses Combination Units For Voltage Not Exceeding 1000 Volts	IS 13947(PART-3)/IEC 947-3

SR. NO.	DESCRIPTION	CODE
32	Direct Acting Electrical Indicating	IS 1248 instruments
33	Voltage Transformer	IS 3156
34	Classification Of Insulating Material	IS 3639 - 1958
35	Installation Of Transformer	IS 1896 - 1967
36	Indian Electricity Rules 1956 Amended Upto Date.	
37	Indian Electricity Act.(1910).	
38	Code Of Practice For Electrical Wiring Installation (System Voltage Exceeding 650 Volts)	IS 2274 - 1963
39	Code Of Practice For Electrical Wiring Installation (System Voltage Not Exceeding 650 Volts)	IS 732 - 1982. Part 1,11 & III
40	Rules And Regulations of Bombay Regional Council of Fire Insurance And Accessories Of India For Electrical Wiring.	
41	Rules And Regulations of Local Authorities Such As Ahmedabad Electricity Co. Ltd., Gujarat Electricity Board And Electrical Inspector.	
42.	National Electric Code, 1986	
43.	Indian Electricity Supply Act, 1948	
44.	Regulation For Electricity Equipment In Building By I.E.F. London.	
45.	The Factory Act, 1948 And Its Amendments	
46.	Electrical Installation In Buildings. Method of Measurements of.	IS 5908 - 1970
47.	Rigid Steel Conduits For Electrical Installation (First Revision)	IS 2509 - 1973
48.	Bayonet Lamp Holders (First Revision)	IS 1258 - 1967
49.	Tungsten-Filament General Service Electric Lamps (Third	IS 418-1957
50.	Fitting For Rigid Non-Metallic Conduits	IS 3419 - 1967

SPECIFICATIONS - ELECTRICAL WORKS

1.0 LIGHT POINT WIRING:

(A) SYSTEM OF WIRING:

The system of wiring shall consist of single core PVC insulated copper conductor wires in metallic or non-metallic conduits as called for. All conduits shall be concealed unless otherwise called for in the drawings and bills of quantities.

(B) GENERAL:

Prior to the laying of conduits, the contractor shall submit the shop drawings for conduit layout indicating the route of the conduit, number & size of conduits, location of junction /inspection /pull boxes, size & location of the switch boxes, point outlet boxes and other details. These shop drawings shall be got approved by the Architect/Consultants before the laying of the conduits.

(C) MATERIALS:

(i) PVC CONDUITS:

PVC conduits shall be rigid unplasticized; heavy gauge ISI approved having 1.5 mm wall thickness upto 25 mm diameter and 2.0 mm wall thickness for all sizes above 25 mm diameter.

(ii) M.S. CONDUITS:

M.S. Conduits shall be solid drawn lap-welded conduits, stove enameled inside & outside with minimum wall thickness of 1.5 mm for conduits up to 25 mm diameter and 2.0 mm wall thickness for conduits above 25 mm diameter. The conduits shall be delivered at site of construction in original bundles of each length with the original labels of the manufacturer. The number of insulated copper wires may be drawn into the conduits of various sizes is given below and the fill shall not exceed 40

(D) MAXIMUM PERMISSIBLE NUMBER OF WIRES FOR CONDUITS:

(660/1100 Volts grade either single/multi core PVC insulated wires that may be drawn in rigid nonmetallic or metallic conduits).

Size of wire (Nominal cross section area of conductor - sq.mm.)	Size of Conduits (mm)				
	19	25	30	40	50
1.5	6	10	18	--	--
2.5	5	8	14	--	--
4.0	3	6	10	14	--
6.0	2	5	8	11	--
10.0	--	2	6	9	--
16.0	--	4	3	4	7
25.0	--	--	3	4	5
35.0	--	--	2	3	6

(E) PVC CONDUIT CONNECTION:

PVC conduits shall be joined by means of screwed or plain couplers depending on whether the conduits are screwed or plain, where there are long runs of straight conduits, inspection boxes with top covers provided at intervals approved by the Consultants/Architects. The threads of the pipes and the sockets shall be free from grease and oil and shall be thoroughly cleaned before making the screwed/plain joints. Proper jointing materials as recommended by the manufacturers shall be used for jointing of the PVC pipes, wherever required. PVC couplers and connectors shall be used for pipe connections and terminations in the boxes. All the joints shall be made fully watertight. Junction boxes and running boxes shall be provided at suitable places to allow for subsequent extensions, if any, without undue dismantling of the conduits. As far as possible, diagonal run of the conduits shall be avoided., Junction between conduit and adaptable boxes, back outlet boxes, switch boxes and the R6 shall be provided with entry spouts and smooth PVC bushes. Joints between conduits and iron clad distribution boards and control shall be affected by means of the conduit couplers into each of will be coupled smooth PVC bush from the inside the box or case. Conduit system shall be erect and straight as far as possible. Traps where water may accumulate from condensation may be avoided and if unavoidable, suitable provision to drain the water shall be made. All joining method shall be subject to the approval of the Consultant/Engineer in charge. Entirely separate conduits shall be provided for following systems:

- (i) 15/ 20 amps power plug,
- (ii) 24 volts A.C. supply system,
- (iii) D.C. power supply system,
- (iv) Fire alarm system,
- (v) Telephone system,
- (vi) Sound system.
- (vii) Computer LAN system

Caution should be exercised in using the PVC conduits in locations where ambient temperature is 50 degree C or above. Use of PVC conduit in places where ambient temperature is 60 degree C or above is prohibited. PVC conduits shall not be used in outdoor exposed system; G.I. pipes or G.I. conduits shall be used for outdoor system.

(F) M.S. CONDUIT CONNECTION:

Conduit connections for M.S. conduits shall be screwed metal to metal and be painted with one coat of self etching zinc chromate primer and two coats of enamel paint. The threads and sockets shall be free from grease and oil. Connections between screwed conduit and sheet metal boxes shall be by means of a non metallic smooth bore bush, fixed inside the box, checknuted inside and outside the box and connected through a coupler to the conduit or as directed by the Architect/Consultants. The joints In conduits shall be free of burrs to avoid damage to insulation of conductors while pulling them through the conduits. Connections between PVC and MS conduits shall be through a junction box. Direct connections between PVC and MS conduits are not allowed.

(G) BENDS IN CONDUIT:

Where necessary, bend or diversions may be achieved by means of bend or circular inspection boxes with adequate and suitable inlet and outlet screwed joints. In case of recessed system, each junction box shall be provided with cover, properly secured and flush with the finished wall surface, so that the conductors inside the conduits are easily accessible. No bends shall have radius less than 2.5 times the outside diameter of the conduit. Heat may be used to soften the PVC conduit for bending.

(H) FIXING OF CONDUITS:

Conduits and junction boxes shall be kept in position while the wall, slabs and floors are under construction and proper holdfasts shall be provided. Conduits shall be so arranged

as to facilitate easy drawing of wires through them. Adequate junction boxes of approved shape and size shall be provided. Where conduits cross expansion joints in the building, adequate expansion fitting or other approved devices shall be used to take care of any relative movement. All conduits shall be installed such so as to avoid steam and hot water pipes. Conduits shall not come in contact with any wooden members unless otherwise stated. Conduits in floor/slabs shall be kept as short as possible above the finished floor level in order to avoid any damage to them. After the conduits, junction boxes, outlet boxes and switch boxes are installed in position, their outlets shall be properly plugged or covered so that water, mortar, insects or any other foreign matter does not enter into the conduit system. Exposed conduits shall be fixed by means of space bar, saddles at intervals not more than 1000 mm in normal run and 500 mm from both sides of fitting or accessories. The saddles shall be of 3mm x 19mm galvanized mild steel flat, properly treated with primer and painted and fixed to support by means of nuts and bolts/rawl bolts and brass machined screws, as required.

Conduits shall be laid in a neat and organized manner as directed and approved by the Architect/Consultants. Conduit runs shall be planned so as not conflict with any other service pipe lines/ducts.

Where exposed conduits are suspended from the structure, they shall be clamped firmly and rigidly to hangers of design to be approved by the architect. Where hangers are to be anchored to reinforced concrete appropriate inserts and necessary devices for their fixing shall be left in position at the time of concreting. Making holes or opening in the concrete will generally not be allowed. In case it is unavoidable prior permission of the Architect/Consultants shall be obtained.

(I) PROTECTION:

To minimize condensation or sweating inside the conduit pipes, all outlets of conduit system shall be adequately ventilated as directed and approved by the Architect/Consultants. All screwed and socketed connections shall be adequately made fully watertight by the use of proper jointing materials i.e. Tropolin for PVC conduits and white lead for metal conduits.

(J) SWITCH OUTLET BOXES AND JUNCTION BOXES:

All outlet boxes for switches, sockets and other receptacles shall be fabricated from 2.0 mm thick mild steel sheets duly painted with rust proof paint as called for. Junction boxes and outlet boxes in contact with earth or installed in areas exposed to the weather shall be of 2 mm thick mild steel and hot-dip galvanized after fabrication. Where called for, outlet boxes for receiving switches, telephone outlets power plugs etc., they shall be fabricated to the approved shape and size to suit the cover plates of specified make for different utilities. The cover plates shall be of best perplex sheet cut to shape and size wherever regular piano switches are asked for in the bills of quantities. Where in the bills of quantities ask for brass toggle switches, the cover plates of the switches shall be of 3 mm thick powder coated aluminum sheet as approved by the Architect/Consultants. Proper supports shall be provided in the outlet boxes to fix the cover plates of switches as required. Wherever the specified make of switch and its other connected utilities is MK make, the switch boxes shall be suited to receive MK make switches, plugs etc. only and the cover plate of the boxes housing the switches shall be of MK make suitable for receiving MK make logic modular kind of design of switches and its other utilities. Separate screwed earth terminal shall be provided inside the box for earthing purposes. All boxes shall have adequate number of knock-out holes of required diameter for entry of the conduits. Where called for, outlet boxes for receiving switches and fan regulators in one box, the boxes shall be fabricated to approved shape and size so as to accommodate fan regulators, switches. All junction boxes, pull boxes and outlet boxes shall be provided with 3 mm thick perplex sheet cover. The box cover shall be secured to

the box with adequate number of round head brass screws of approved make. Outlets exposed to the weather shall be fully weather tight, complete with rubber gasketed covers; glass where used shall be fully heat resistant for its duty. The outlet boxes shall be painted with two coats of bituminastic paint before they are fixed in position. Outlet boxes fixed in concrete shall be in position and shall be of a minimum depth of 65 mm.

(K) INSPECTION BOXES :

Rust proof inspection boxes shall be of 1.5 mm thick mild steel sheet and of required size, having smooth external and internal finish and shall be provided to permit periodical inspection and to facilitate removal and replacement of wires when required. Inspection boxes shall be mounted flush with ceiling/walls finished surface and shall be provided with screwed covers of 3 mm thick perlex sheet cover secured to the box with brass screws. Adequate holes shall be provided for ventilation in the inspection box covers.

(L) CONDUCTORS:

All PVC insulated conductor wires shall conform in all respects of the relevant BIS codes and they shall bear an ISI mark.

(M) BUNCHING OF WIRES:

Wires carrying current shall be so bunched in the conduit that the outgoing and return wires are drawn into the same conduit. Wires originating from two different phases shall not be run in the same conduit.

(N) DRAWING OF CONDUCTORS:

The drawing and jointing of insulated conductor wires shall be executed with due regard and precautions. Care shall be taken so as to avoid scratches and kinks which may cause damage to insulation and also breakage of conductors. There shall be no sharp bend.

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 aluminum/copper conductor wire ends before connection shall be properly crimped (at least 15 mm length) by means of standard solder less crimping method. Strands of wires shall not be cut for connecting to the terminals. All strands of wires shall be properly crimped at the end before connection. The connecting brass-screws shall have flat ends. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less. At all bolted terminals, brass flats washer of large area and approved steel spring washers shall be used. Brass nuts and bolts shall be used for all connections.

Only certified wiremen and cable jointers shall be employed to do jointing work. All wire shall bear the manufacturer's label and shall be brought to site in new and original packages.

For all internal wiring, PVC insulated wires of 660/1100 volts grade shall be used. The sub-circuit wiring for points shall be carried out in looping system and no joint shall be allowed in the length of conductors. No wire shall be drawn into 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. The minimum size of PVC insulated copper conductor wires for all sub circuit wiring i.e. from switch boards to point outlet for light, exhaust fan and ceiling fan points shall be 1.5 sq.mm. In case of power circuit not more than one 20/15 amp power outlets shall be in

one circuit, wiring for the power outlet shall be carried out with 4/2.5 sq.mm. PVC insulated copper wires. All 20/15 amp power outlets shall be connected with 2.5/1.5 sq.mm copper wire to the earth terminal of outlet. Separate circuit shall run with 4 sq.mm. PVC insulated copper conductor wires for each water heaters, kitchen equipment, window air conditioners and similar outlets at locations as shown on drawings.

The minimum size of copper conductor PVC insulated wire from final distribution board to first tapping point in the circuit shall be 2.5 sq.mm. Maximum lighting points to be connected in a circuit shall be 10 (800 Watts maximum).

(O) JOINTS:

All joints shall be made at main switches, distribution boards, socket outlets, lighting outlets and switch boxes only. No joint shall be made inside conduits and junction boxes. Conductors shall be continuous from outlet to outlet. Joints where unavoidable, due to any specified reasons, prior permission in writing shall be obtained from the Architect/Consultants before making such connections.

(P) MAINS AND SUB-MAINS:

Mains and sub-mains wires where called for shall be of the rated capacity and approved make. Every main and sub-main shall be drawn into an independent adequate size conduit. Adequate size draw boxes shall be provided at convenient locations to facilitate easy drawings of the mains and sub-mains. An independent earth wire of proper rating shall be, provided. The earth wires shall run along the entire length of the mains. For current measuring more than 60 amps, each phase shall be provided with separate current transformer of accuracy Class I and suitable V.A Burden for operation of associated metering. Current transformers shall be in accordance with IS: 2705-1964 as amended up to date.

(Q) MINIATURE CIRCUIT BREAKER DISTRIBUTION BOARD:

(i) The contractor has to use ready made MCBDBs of approved make only. Fabricated MCBDBs will not be permitted. The contractor can use the fabricated MCBDBs only after getting written confirmation from the Architect/ Consultant/ Engineer-In-Charge.

(ii) PAINTING :

In case of fabricated MCBDBs, all sheet steel work shall undergo a process of degreasing, pickling in acid, cold rinsing, phosphating, passivating and then sprayed with a high corrosion resistant primer. The primer shall be baked in an oven. The finishing treatment shall be by application of two coats of synthetic enamel paint of approved color and shade.

(iii) LABELS:

Engraved PVC labels shall be riveted/screwed on all incoming and outgoing feeder switches. Circuit diagram showing the arrangements of the circuit inside the distribution board shall be pasted on inside of the panel door and covered with transparent laminated plastic sheet.

(iv) EARTHING :

Copper/G.I.earthing strips of adequate size shall be connected to the MCBDBs at minimum two earth terminals from the main earthing grid.

(v) SHOP DRAWINGS:

In case of fabricated MCBDBs, the contractor has to submit shop drawings showing general arrangement diagrams for all the switch boards to the Architect/Consultant to get the approval from the Architect/Consultant.

(vi) **INSPECTION:**

All the time during production and prior to shipment of equipment, the contractor shall provide and secure for Architect/Consultant/Owner's representative every reasonable source and facility at their plant for inspection.

(vii) **TEST CERTIFICATE:**

Testing of distribution boards shall be carried out at factory or at site as specified in the Indian Standards. The test certificates for the tests carried out at factory or at site shall be submitted in duplicate.

2.0 **TELEPHONE AND TELEVISION WIRING:**

(A) **SCOPE:**

This section relates to supply, installation, testing and commissioning of internal and external telephone wiring installation i.e. from main automatic branch exchange to various telephone junction boxes and various telephone junction boxes to various telephone sets provided in the working area of all the buildings. It also includes the wiring for the television points to be provided in all the buildings.

(B) **SYSTEM:**

An EPABX of adequate capacity shall be installed by a local telephone exchange/private agency at the location decided by the Architect/Consultant/Owner.

At every telephone extensions, the contractor will provide an approved 3-pin telephone socket outlet other than power socket outlet for portable connection of telephone and the same shall be approved by the telephone authority.

To provide this facility it is suggested to lay M.S./PVC conduit with required pairs of wire from respective junction box to telephone outlet and it is suggested to lay telephone cable of required pair from exchange to respective junction box.

(C) **MATERIALS:**

- (i) All conduit shall be M.S./PVC conforming to the Specifications of Bureau of Indian Standards.
- (ii) All conduit accessories such as conduit bends, couplings etc. shall be conforming to the relevant Specifications of Bureau of Indian Standards.
- (iii) Telephone junction boxes, 3 pin socket outlet etc. shall be of reputed manufacturer as approved by local telephone exchange authority or by the Engineer-In-Charge.
- (iv) Telephone multicore cables/wires & T.V coaxial cable/wire shall be of tinned copper conductor of minimum 0.6 mm diameter, PVC insulated, PVC sheathed of Delton Finolex / Nicco / Havell's or approved make only.
- (v) Outlet boxes for housing 3 pin socket outlet shall be fabricated out 16 SWG M.S. sheet and shall be painted with two coats of red oxide and two coats of approved shade of enamel paints.

- (vi) Cover of the outlet box shall be flat made out of 3 mm thick white acrylic/PVC sheet and shall be fixed with the box using brass chromium plated machine screws.

(D) INSTALLATION:

- (i) Conduits, junction boxes, draw boxes, outlet boxes and covers for boxes for telephone system and T.V. system shall be as described under relevant clauses elsewhere in these specifications. In general, conduits for telephone system and TV system shall be at least approximately 150 mm away from the electrical conduits wherever possible. The conduits for telephone and TV wiring shall be of specified size and shall be terminated at outlets as indicated on the drawings. Telephone system conduits shall have 1.5 mm diameter galvanized steel pull wires installed in them.
- (ii) Wiring for telephones and television shall be carried out in entirely separate PVC or M.S. conduit.
- (iii) Installation of conduit, conduit accessories, outlet boxes etc. shall be done as mentioned in the Specifications.
- (iv) End terminations of telephone cables shall be done as per cable manufacture's instructions and shall be approved by local telephone exchange authority.

MUNICIPAL CORPORATION BHAVNAGAR

VENDOR LIST

(A)LIST OF APPROVED VENDORS FOR CIVIL WORKS

Sr. No.	ITEMS	Approved Brands / Quality
1	CEMENT PPC 53 Grade & SULPHATE RESISTANT CEMENT,S.R.C.	Ambuja, Hathi, Ultra Tech, Sanghi, Siddhi,Hi-bond, Kamal (Kamal Cement, shree Digvijay cement co. ltd.) ,
2	BRICKS	MBM, Arjun, PBM, 555, Kisan, ABM, TRD, Pares, Dhara, B.R.C., Kiran, BMB, Kirit, Sonal
3	Steel TMT, CRS	TISCO, SAIL, VIZAG, Kamdhenu, NATIONAL, Electrotherm, JSW, Welspun steel, Pollad Steel, DIAMOUND TMT, M. G. Steel, Friends Steel, Crown next TMT, Briskon TMT , GERMAN TMX,
4	VITRIFIED TILES	Asian, Kajaria, Jonson, Varmora, Simpolo, OASIS
5	CERAMIC TILES	Asian,Kajaria, Johnson, Varmora, Simpolo, OASIS
6	GLAZED TILES	Asian,Kajaria, Johnson, Varmora, Simpolo
7	ACRYLIC PAINT	ICI,Asian,Nerolac, Burger
8	OIL BOUND DISTEMPER	ICI,Asian,Nerolac, Burger
9	EXTERIOR WEATHER PROOF EMULSION PAINT	ICI,Asian,Nerolac, Burger
10	Oil Paint	ICI,Asian,Nerolac, Burger
11	SANITARY WARE	Cera, Hindware,Parryware
12	CAST IRON PIPES AND FITTINGS.	NECO, Swayarhoo, Bengal, Oriental Castings, Electro steel Castings
13	P.V.C. PIPES AND FITTING (UPVC/CPVC)	Finolex, Supreme, Jain, Kisan, Astral, Dutron, Prince
14	CHROMIUM PLATED WATER SUPPLY FITTINGS	Jaquar, Ess Ess, Plumber ,ESSCO, Crown, Metro, Prince
15	GALVANIZED PIPE	Tata, Essco, Jaquar, Ess Ess, Plumber
16	GALVANIZED FITTINGS	'R' Brand, 'RV' Brand, Kranti
17	C.I. MANHOLE COVER	Manish, Sil, NECO
18	PLUMBING FIXTURES	Jaguar, Plumber,Essco
19	PVC WATER TANK (100% VIRGIN PVC)	Sintex, Aqua

Sr. No.	ITEMS	Approved Brands / Quality
20	ALUMINIUM SHEETS AND ACCESSORIES	Nalco, Jindal, Hindalco, Banko
21	ALUMINIUM EXTRUDED DOOR/ WINDOW SECTION	Jindal, Hindalco, Banko, Ajin India, Aldowin, Alumilite
22	ALUMINIUM HARDWARE	Rajdoot, Belu, Diamond, Glider, Ajin India, Aldowin, Alumilite
23	WATER PROOFING MATERIALS	Zycosil, Dr.Fixit,Kerakoll, Pidilite, Roff
24	DOOR CLOSER	Efficient Gadget, Everite, Hardwin, Aldowin, Ozone
25	DOOR FITTINGS	Godrej, Efficient Gadgets (E.G.) Dunex, Doorset, Suzu, Coral
26	HINGES	Suzu, Yama, E.P.P.W.
27	SCREW AND BOLTS	Nettle Folds, GKW, Stud
28	BOLTS & FASTENERS	Hilti, Fisher
29	LIFT	Top, Express, Omega, OTIS, Schander, TRIO, Aegis Elevator, Mitsubishi, Aditya, Siemens slider
30	ROOFING MATERIAL – Galvalume sheets	TATA, Essar, Jindal
31	Slag Cement	SANGHI CEMENT Sanghipuram
32	CPVC PIPES FOR AUTOMATIC SPRINKLER FIRE EXTINGUISHING SYSTEM	ASTRAL POLY TECHNIK LIMITED પાર્કિંગ એરિયા, બેઈઝમેન્ટ એરિયા જેવા વિસ્તારો સિવાય માત્ર કન્સીલ્ડ પાઈપિંગ માટે આ કંપનીના CPVC pipe નો ઉપયોગ fire sprinkler piping માટે કરવાની મંજૂરી આપવામાં આવે છે.
33	AAC Blocks	NXTBLOC
34	Jointing Mortar	NXTFIX Block
35	Ready Mix Plaster	NXTPLAST
36	Block joining Masonry Mortar	Unifix
37	Tile adhesive	Unifix
38	RCC bench	Sardar Pre cast
39	Rubber mould garden curbin	Sardar Pre cast

Sr. No.	ITEMS	Approved Brands / Quality
40	Rubber mould Paver block	Sardar Pre cast
41	Fencing Pole	Sardar Pre cast
42	RCC Masonry block	Sardar Pre cast
43	Pre cast wall	Sardar Pre cast

(B) LIST OF APPROVED VENDORS FOR MECHANICAL & ELECTRICAL WORKS

Sr. No.	Description	Name of Manufacturer
1	HSCF Pump	Crompton Greaves Ltd
		Kirloskar Brothers Limited (KBL)
		JASCO
		Mather & Platt Pumps Ltd.
		Jyoti Ltd.
2	Electric Motor	Lubi Industries LLP
		Bharat Bijlee Ltd.
		Jyoti Ltd.
		JSL Industries Ltd.
		Jeumont Electrical India Pvt. Ltd.
3	Electrical Panel	LHP
		Crompton Greaves Ltd
		Bhagyashree Power Control
		Dynamic Control System
		Elembica Services
4	Kinetic Air Valve	JSL Industries Ltd.
		Nutral Power Tech
		Kirloskar Brothers Limited (KBL)
		FOURESS Engineering (India) Limited.
		Durga Valves Pvt.Ltd
5	Expansion Bellows	Orbinox
		શ્રી કિશોર ઇન્ડસ્ટ્રીઝ
		Precise Engineers
6	Dewatering (Drain) Pump(Submersible/ Horizontal)	KSB Pumps
		Kirloskar Brothers Limited (KBL)
		JASCO
		Crompton Greaves Ltd
		La Gajjar Machinery Pvt Ltd.
		Pullen Pumps Industries Pvt. Ltd.
		MBH
7	Sluice Valves and Sluice Gate	Kirloskar Brothers Limited (KBL)
		DURGA Valves Pvt.Ltd
		L & T Valves
		Jupiter
		SACHDEVA
8	UPVC Pipe	Supreme Industries Ltd.,Mumbai
		Dutron Polymers Ltd
		Parixit Industries Ltd., A'bad
		Jain Irrigation Systems Ltd., Jalgaon
9	HDPE Pipe	Parixit Industries Ltd., A'bad
		Jain Irrigation Systems Ltd., Jalgaon
		Dutron Polymers Ltd
		Jindal
10	C.I. Pipe	Essar Steel
		Electro Steel, Kejriwal, Oriental Castings, BIC, Jindal, Lanco Industries Ltd.,Chennai, Kesins
13	EOT Crane	Grip Engineering Pvt. Ltd., JAPS Project, Brady & Morris Engineering Co. Ltd.,Techno Industries

Sr. No.	Description	Name of Manufacturer
14	Cable & Wires	KEI Industries Ltd.
		Polycab Wires Pvt. Ltd.
		Aerolex Cables Pvt. Ltd.
		Allwin Industries
		Finolex Cables
		L&T Cables
		ULTRA CAB (India) Limited
15	Transformer	Atlanta Electricals Pvt. Ltd.
		Powerlite Electricals
		Voltamp Transformers Ltd.
		SKP Transformers
		Arya Electronics
16	Components for MCC :	
	Switch	L&T, Siemens
	HRC Fuse	L&T, Siemens
	Timer	L&T, Siemens
	Relay	L&T, Siemens
	Push Button Stations	L&T, Siemens
	Indicating Lamp	L&T, Siemens
	Cable Jointing Kit	CCI, M. Seal
	MCB/DB's	MDS, Siemens, Indokupp
17	Capacitors	L&T, Crompton, Khatau Note: Capacitors shall be oil fill type
18	KWH Meter	Simco, Jaipur, GEC
19	Light Fittings: (Indoor & Outdoor Luminaries)	Philips, Crompton, Bajaj, NESSA Illumination
20	Exhaust Fans	Crompton, Bajaj,
21	Ceiling Fans	Crompton, Bajaj, Havells
22	Air Blowers	Everest Ltd.
		Swan Pneumatics (P) Ltd
23	Alum Dosing Pumps	Asia LMI
		VK Pumps
		Swelore
24	Pressure Gauges	General Instruments
		Bells Control
		H. Guru Marketing
25	Level Gauge / Indicator	R K Dutt
		Levecon
		S. B. Electromec
26	Clarifier Equipment	Enviro Control Associates
		Voltas Ltd
		Hindustan Dorr-Oliver
		Geomiller/Triveni
27	Chlorination System	Industrial Device (I) Pvt. Ltd
		Metito
		Chloroequip
		Pennwalt
28	Gear Box	Greaves
		Radicon
		Elecon
		Shanti

Sr. No.	Description	Name of Manufacturer
29	Level Switches	Level-Tech
		Revathi Electronics
		Levec
30	Refrigerator	LG, Samsung, Kelvinator
31	PVC Pipes for Fluid	Finolex, Jain Irrigation
32	PVC Conduits for Electricals	Precision, Shakti
33	Butterfly Valve	KIRLOSKAR Brothers Limited(KBL), DURGA valves Pvt Ltd, L & T valves, R&D MULTIPLE, Jupiter, ಶ್ರೀ ಕ್ರಿಷ್ಣಾ ವ್ಯವಸ್ಥೆಗಳು IVC, IVI, Audco, R & D multiple, Jupiter, Cair, Orbit Engineers
34	Check Valve (Dual Plate check Valve)	KIRLOSKAR Brothers Limited(KBL), DURGA valves Pvt Ltd, Orbinox, R&D MULTIPLE, Orbit Engineers
35	Metallic Expansion Bellow	Beloflex(B.D. Engineers), Stanfab Engineering Pvt. Ltd., D. Wren Engineering Pvt. Ltd., Sur Industries,
36	Centrifugal / Centrifugal Non Clog Pumps	Beacon Weir, KSB, Mather & Platt (Wilo), Worthington, WPIL, Xylem pumps , Grundfos Pumps Pvt. Ltd., MBH, JASCO
37	Submersible non Clog Pumps / Submersible Centrifugal Pumps	Kirlosker, KSB, ABS, ITT- Flyght, Xylem pumps, Grundfos Pumps Pvt. Ltd. , MBH, JASCO, AQUA, Jyoti, PULLEN PUMPS, Alpha, Het Pump
38	Screw Pump	Roto, Netzsch, Tushaco, Seepex
39	Metering / Dosing Pumps	Swelore, V.K. Pumps, Shapotools
40	Non Return Valves (Single / multi door) / Dual Plate Check Valves	Kirlosker, IVC, IVI, R& D multiple, Durga, Jupiter, Cair, Orbit Engineers
41	Knife Gate valves	Jash, Fouess, Vass (Dezurick), Vag, Orbinox, Orbit Engineers
42	Sluice gates / open Chanel Gates	Jash Engineering, IVC, R & D Multiple, Jupiter
43	Mechanical Fine Screens – Step (Mat) Type / Drum Type	Jash, Huber, Johnson, Savi, Italy, Apollo Screens
44	Mechanical Course bar Screen	Jash, Huber, Johnson, HDO, Triveni, Savi, Italy
45	Manual Bar Screen	Jash, Japs, HDO, Triveni, Auric
46	Grit mechanism	EIMCO – KCP, Hindustan Dorr – Oliver, Jash-Shivpad, Triveni, Voltas
47	Diffused Aeration System	EDI, OTT, Rehau
48	Air Blower	Kay, Swam, Everest, Usha Compressors, Gardner Denver
49	Agitator / mixer	Remi, Schurtek, Fibre & Fibre, Milton Roy
50	Gear Boxes	Greaves, Elecon, CPEC, PEPL, Bonfiglioli
51	Centrifuge	Humboldt, Alpha Laval, Hiller

Sr. No.	Description	Name of Manufacturer
52	HDPE Pipes	Astral,Dutron,Duraline, Narmada, RIL (PIL), Penwalt,Anjney,jain irrigation,Sangir
53	Air Compressor	Ingersoll – Rand,khosla,Kirlosker, CPE, Alpha
54	Bearing For All Equipments	SKF, FAG, Tata
55	Fasteners	Precision,Durakhanawala,Echjay, Tata, Sundaram
56	Mechanical Seals	Eagle Seals (Sealol),Durametallic, Burgman
57	Electric Actuator	Auma ,Rotork, Emerson, Pentair
58	(1) CATEGORY III Indoor LED fittings, LED Panel light, LED down light, outdoor LED ligh (street light, LED flood light, LED Post top lantern, LED bollard) (2) Solar LED Light	NESSA ILLUMINATION TECHNOLOGIES PVT.LTD., Litsun, Nextray
59	STREET LIGHT POLES	AMBICA POLES (for octogonalpoles,swagepoles,streetloght poles, high mast poles,decorative poles, conical poles, JETCOTECH Engineering LLP
60	Resilient Seated Slice Valve	Cair
61	Air Vale	Cair, Orbit Engineers
62	Flow Control valve	Cair
63	Altitude Control valve	Cair, Orbit Engineers
64	Pressure reducing valve	Orbit Engineers
65	Pressure relief valve	Orbit Engineers
66	Ball valve	Orbit Engineers
67	Mast pole	JETCOTECH Engineering LLP
68	Earthing material	JETCOTECH Engineering LLP
69	Hot dip galvanizing	JETCOTECH Engineering LLP
70	LED Highbay	Litsun
71	LED LIGHTS	DG CREE (All types of indoor and outdoor light) , company name : YUG INNOVATION

(C) LIST OF APPROVED VENDOR FOR INSTRUMENTATION SYSTEM

SR NO	DESCRIPTION	Name Of Manufacturer
1	Electromagnetic Flow Meter	E+H, Siemens, Abb, Fuji, Yokogawa, Krohne-Marshall, AAROH Embedded System Pvt Ltd., Emerson, SBEM
2	Pressure Gauges	Wika, H.Guru, General Instruments Consortium Manometer (India) P. Ltd., Baumer, Waaree
3	Pressure Switch	Danfoss, Indfoss, Switzer
4	Process Analyzers (pH, DO, Free / Residual Chlorine, BOD / COD)	E+H, Emerson, Hach, Chemitech, Polymetron, Wtw (Forbes Marshall), Yokogawa
5	Ultrasonic transmitter level / diff. level / flow	E+H, Siemens – Milltronics, Krohne, Vega
6	Hydraulic level transmitter	E+H, Siemens, ABB, Forbes- Marshall, Emerson, SBEM
7	Displacer/Float Switches	Levcon, Nivo, Toshbro, Pune Techtrol, SBEM
8	PP Float / Buoyancy switch	Peppri + Fuchs, Baumer, Waaree, E+H, Pune Techtrol, SBEM
9	Float & Board Type Level Gauge	Levcon, Nivo, Toshbro, Pune Techtrol, SBEM
10	Electromagnetic Flow Meter	E+H, Siemens, ABB, Fuji, Yokogawa, Krohne-Marshall
11	Field Transmitter (P, DP, F, L, T)	ABB, Fuji, Yokogawa, Honeywell, Emerson
12	Pressure Gauges	Wika, H.Guru, General Instruments Consortium Manometer (India) P. Ltd., Baumer, Waaree
13	Panel Mounted Process Indicator & Flow Integrator	Masibus, Nishko, Nivam, Selectron, Radix, Yokogawa, ABB
14	Pressure Switch	Danfoss, Indfoss, Switzer
15	Programmable Logic Controllers	Rockwell (Allen Bradeley), Siemens, Schneider, Fuji, ABB, GE Fanuc
16	Control Panel Enclosure	Rittal, Enklotek, Bartakke, BCH, Eldon
16.1	Street light Control Panel	MEMIGHTY
17	Alarm Annunciator	Aplab Ltd., Minilec, IIC

18	Solenoid valves	Asco, Rotex, Schrader
19	Tube Fitting	Excel Hydropneumatic, Multimet, Placka
20	Instrument Valves , Manifolds	Aptek, Anmol (Superlok), Excel Hydropneumatic, General
21	Fitting	Instrument Consortium ,Multimet, Technomatic, Placka
22	Pneum , Brass Fitting	Swagelok, Multimet Industries, SMC, Festo
23	Control Panel Accessories / Components	
a.	Miniature Relay	Wago, Omron, Phoenix, Rockwell
b.	Indication Pilot Lamps (LED Type)	Teknic, Schneider, Siemens
c.	Push Button / Selector Switch (with NO/NC Elements)	Teknic, Schneider, Siemens
d.	DC Power Supplies (DIN Rail mounted)	Phoenix, Omron, Schneider, Rockwell
e.	Terminals	Elmex, Phoenix, Wago, Connectwell
f.	Panel Wires	Finolex , Havell's , R R Kabel
g.	Panel Illumination	Philips , Crompton , GE
24	Instrument Cables (Power , Signal , Control)	Associated Cables, Associated Flexible and Wires P.Ltd., Brooks Cables, Thermo Cables, Udey Pyro
25	Cable Glands	Ex- protecta, Braco, Sudhir, Comet, Connectwell
26	Junction Box	Ex- protecta, CEAG, Sudhir, Baliga, FCG
27	Cable Tray	M.M.Engineering, Globe, Jacinth, Equi. Reputed, JETCOTECH Engineering LLP
28	Computer System	HP-Compaq, Dell, IBM, Sony, Samsung
29	UPS	Hirel-Hitachi, Emerson, APC
30	1. PLC (Programmable Logic Controller) 2. SCADA (Supervisory Control and Data acquisition)	MITSUBISHI ELECTRIC INDIA PRIVATE LIMITED, Emerald House, EL-3, J Block, M.I.D.C., Bhosari, Pune 411026

	<ol style="list-style-type: none"> 3. VFD (Variable Frequency Drive Up to 500 KW) 4. ACB (Air Circuit Breaker up to 6000A) 5. MCCB (Moulded Case Circuit Breaker up to – 1600 A) 6. MCB (Miniature Circuit Breaker up to – 63 A) 7. ELCB (Earth Leakage Moulded Case Circuit Breaker up to 1600 A) 8. Contractor up to – 800 A & OLR (Over load Relay) up to 630 A 9. Multi Functional Meters 10. MPCB (Motor Protection Circuit Breaker up to 32 A) 	
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**(D) LIST OF APPROVED VENDORS FOR MATERIALS RELATED TO WATER
SUPPLY AND SEWERAGE NETWORK**

SR. NO.	ITEMS	NAME OF AGENCIES
1	A C Pressure pipe MAZZA process	Lotus, Kirti
2	A C Pressure pipe MEGHNANI process	Lotus, Kirti, Hindustan
3	Sluice Valve	Durga, kartar, Kirloskar, Jupiter, SACHDEVA (C.I. & D.I.), શ્રી કિર્તી ઇન્ડસ્ટ્રીઝ, Cair, Orbit Engineers
4	DI Pipe	Electrotherm (I) Ltd., Ahmedabad, Lanco Industries Ltd., Chennai, Electrsteel, Jindal Saw Ltd., Ahmedabad, Kesins, Welspun
5	R.C.C. PIPE (COLLAR JOINT & SOCKET SPIGOT JOINT) CLASS NP3 & NP4, & R.C.C. COLLARS	VIPUL SPUN PIPES (SIHOR & LATHIDAD, BOTAD), KATARIYA & CO. (DHASSA), OMKARESHVAR PIPES (NAVAGAAM), OMKAR PIPES (LATHIDAD, BOTAD), MARUTI PIPES (BAGODARA , AHMEDABAD), KALATHIYA PIPES (BAGODARA , AHMEDABAD), R. S. PIPES (BODELI), UMA HUME PIPES (KALOL, GANDHINAGAR), SIDHDHIVINAYAK (KARDEJ , BHAVNAGAR)
6	R.C.C. MACHINEOLE FRAME & COVER, INLET FRAME COVER 10T.(600*450 MM.) , 20T., 35T., & 50T.	SONI CEMENT PRODUCT , VIPUL SPUN PIPES, KATARIYA & CO., OMKARESHVAR PIPES, OMKAR PIPES, MARUTI PIPES, KALATHIYA PIPES , R. S. PIPES, UMA HUME PIPES, SIDHDHIVINAYAK , S.K. Corporation, Laxmi Price Industries, S.J. Corporation, Sardar pre cast
7	Stone ware Pipe Manufacturer having BIS Certificate for ISI marking	Krishna Pipe, j.K. Pipe, Taya ceramic, Burn & co., perfect Potteries, Navroji Vakil, Kashmira
8	D.I. & C.I. FITTINGS	RG BRAND, ESSEM Engineering Industries, Bikaners Engineers works
9	CID Joints	ESSEM Engineering Industries
10	Valves & Graded Castings	ESSEM Engineering Industries
11	Pipe Fittings	ESSEM Engineering Industries, Bikaners Engineers works
12	CI/DI/MS graded castings	Bikaners Engineers works
13	Scaper machine hole	Sardar Pre cast

BHAVNAGAR MUNICIPAL CORPORATION

**EXECUTIVE ENGINEER
BUILDING DEPARTMENT
BHAVNAGAR MUNICIPAL CORPORATION
BHAVNAGAR**

**CONSTRUCTION OF NEW CATTLE BOX NEAR SHRI BALA
HANUMAAN TEMPLE- AIR PORT ROAD, BHAVNAGAR**

**VOLUME 1
SECTION- 7**

**GENERAL TECHNICAL SPECIFICATIONS
FOR BUILDING WORKS.**

GENERAL TECHNICAL SPECIFICATIONS FOR BUILDING WORKS

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GENERAL TECHNICAL SPECIFICATIONS FOR BUILDING WORKS

GENERAL:

1. In the specifications "as directed" / "approved" shall be taken to mean "as directed" / "approved by the Engineer-in-Charge".
2. Wherever a reference to any Indian Standard appears in the specifications, it shall be taken to mean as a reference to the latest edition of the same in force on the date of agreement.
3. In "Mode of Measurement" in the specifications wherever a dispute arises in the absence of specific mention of a particular point of aspect the provisions on these particular points, or aspects in the relevant Indian Standards shall be referred to
4. All measurements and computations, unless otherwise specified, shall be carried out nearest to the following limits:
 - (i) Length, width and depth (height) 0.01 meter
 - (ii) Areas 0.01 Sq.Mt.
 - (iii) Cubic Contents 0.01 Cu.Mt.In recording dimensions of work the sequence of length, width and height (depth) or thickness shall be followed.
5. The distance which constitutes lead shall be determined along the shortest practical route and note necessarily the route actually taken The decision of the Engineer-in-charge in this regard shall be taken as final.
6. Where no lead is specific, it shall mean "all leads"
7. Lift shall be measured from plinth level.
8. Up to "floor two level" means actual height of floor (Maxi 4 M) up to 3 Mt. above plinth level.
9. Definite particulars covered in the items of work, though not mentioned or elucidated in its specifications shall be deemed to be included therein.
10. Reference to specifications of materials as made in the detailed specification of the items of works is in the

form of a designation containing them kuber of 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 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 6

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

7

GENERAL

STANDARD TECHNICAL SPECIFICATIONS

Sr. No. of the
item in the
Schedule 'B' of
tender

Sr. No. of
applicable
Specification

Sr. No. of the
item in the
Schedule 'B' of

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tender
Sr. No. of
applicable
Specification
Sr. No. of the
item in the
Schedule 'B' of
tender
Sr. No. of
applicable
specification
1 25 49
2 26 50
3 27 51
4 28 52
5 29 53
6 30 54
7 31 55
8 32 56
9 33 57
10 34 58
11 35 59
12 36 60
13 37 61
14 38 62
15 39 63
16 40 64
17 41 65
18 42 66
19 43 67
20 44 68
21 45 69
22 46 70
23 47 71
24 48 72
8
Sr. No. of the
item in the
Schedule 'B' of
tender
Sr. No. of
applicable
Specification
Sr. No. of the
item in the
Schedule 'B' of
tender
Sr. No. of
applicable
Specification
Sr. No. of the
item in the
Schedule 'B' of
tender
Sr. No. of
applicable
specification
73 99 125
74 100 126
75 101 127
76 102 128
77 103 129
78 104 130
79 105 131
80 106 132

81 107 133
82 108 134
83 109 135
84 110 136
85 111 137
86 112 138
87 113 139
88 114 140
89 115 141
90 116 142
91 117 143
92 118 144
93 119 145
94 120 146
95 121 147
96 122 148
97 123 149
98 124 150

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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 dampproof

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 under exposure to sunlight and weather.

5.3. The pigment shall have the property such that it is neither affected by the cement nor detrimental to it

M-6 Sand

6.1. Sand shall be natural sand, clean, well graded, hard, strong, durable and gritty particles free from injurious

amounts of dust, clay, kankar nodules, soft or flaky particles, shale, alkali salts, organic matter, loam, mica or other

deleterious substances and shall be got approved from the Engineer-in-Charge. The sand shall not contain more

than 8 percent of silt as determined by field test, if necessary the sand shall

be

washed to make it clean.

6.2. Coarse Sand : The fineness modulus of coarse sand shall not be less than 2.5 and shall not exceed

3.0. The sieve analysis of coarse sand shall be as under.

I.S. Designation Sieve passing Sieve Percentage by weight

Designation

I.S. Sieve Percentage by

weight passing Sieve

4.75 mm

2.36 mm

1.18 mm

100

90 to 100

70 to 100

600 micron

300 micron

150 micron

30 - 100

50 - 70

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 Sieve passing Sieve Percentage by weight

Sieve passing

I.S. Designation Sieve passing Sieve Percentage by weight

Sieve passing

4.75 mm

2.36 mm

1.18 mm

100

100

75 to 100

600 micron

300 micron

150 micron

40 - 85

5 - 50

0 - 10

M-7. Stone Dust

7.1. This shall be obtained from crushing hard black trap or equivalent. It shall not contain more than 8% of silt as

determined by field test using measuring cylinder. The method of determining silt contents by field test is given as under :

7.2. A sample of stone dust to be tested shall be placed without drying in 200 mm. measuring cylinder. The quantity

of the sample shall be such that it fills the cylinder up to 100 mm. mark. The clean water shall be added up to 150 mm.

mark. The mixture shall be stirred vigorously and the content allowed to settle for 3 hours.

7.3. The height of silt, visible as settled layer above the stone dust shall be expressed as percentage of the height

of the stone dust 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.

11

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

10 mm

100

86

4.75 mm

2.36 mm

70

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.

12

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 somewhat 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 456-1978 shall have to be carried out to ensure the acceptability. The aggregates shall be stored separately and handled in such a manner as to prevent the intermixing of different aggregates. If the aggregates are covered with dust, they shall be washed with water to make them clean. .

M-13. Black Trap or Equivalent Hard Stone Coarse

13.1. Aggregate For Design Mix Concrete . Coarse aggregate shall be of machine crushed stone of black trap or equivalent hard stone and be hard, strong, dense, durable, clean and free from skin and coating likely to prevent proper adhesion of mortar.

13.2. The aggregates shall generally be cubical in shape. Unless special stones of particular quarries are mentioned, aggregates shall be machine crushed, from the best, black trap or equivalent hard stones as approved, Aggregate shall have no deleterious with cement

13.3. The necessary tests indicated in I S. 383-1970 and I.S.456-1978 shall have to be carried out to ensure the acceptability of the material.

13.4. If aggregate is covered with dust it shall be washed with water to make it clean.

M-14. Brick Bats Aggregate

14.1. Brick bat aggregate shall be broken from well burnt or slightly over burnt and dense bricks. It shall be homogeneous in texture, roughly cubical in shape, clean and free from dirt of any other foreign material.

The brick bats

shall be of 40 mm - 50 mm. size unless otherwise specified in the item The under burnt or over burnt brick bats shall not be allowed.

14.2. The brick bats shall be measured by suitable boxes or as directed.

M-15. Bricks

15.1. The bricks shall be hand or machine molded and made from suitable soils and kiln burnt. They shall be free

from cracks and flaws and nodules of free lime they shall have smooth rectangular faces with sharp corners and shall be of uniform colour.

The bricks shall be- moulded with a frog of 100 mm. x 40 mm. and 10 mm. to 20 mm. deep on one of its flat sides. The

bricks shall not break when thrown on the ground from a height of 600 mm.

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

15.3. The size of the conventional bricks shall be as under :

(9" x 4.3/8" x 2,3/4") 225 x 110 x 75 mm.

15.4. Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the

conventional size adopted in a particular work.

Length + 1/8" (3.0 mm.) Width \pm 1/16" (1.50 mm.) Height + 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 than 20 percent by weight Necessary tests for crushing strength and water

13 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

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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. Manglore Pattern Roof Tiles

25.1. The mangalore pattern tiles shall conform to I S 654-1972 for Class AA or Class A type as specified in item.

Samples of the tiles to be provided shall be got approved from the Engineer-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 of bullocks 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. preformed 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 pre-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 provides 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 125 mm. width and the " U " shape in the middle.

Copper strip

shall have holdfast of 3 mm diameter copper rod fixed to the plate soldered on strip at intervals of about 30 cm or as

shown in the drawing or as directed. The width of each flange (horizontal side) of the copper plate to be embedded in

the concrete work shall be 25 mm depth of "U" to be provided in the expansion joint, in the copper plate shall be of 25

mm.

M-29. Teak wood

29.1. The teak wood shall be of good quality as required for the item to be executed. When the kind of wood is not

specifically mentioned, good Indian teak wood as approved shall be used.

29.2. Teak wood shall generally be free from large, loose dead or cluster knots, flaws, shakes, warps, twists, bends

or any other defects. It shall generally be uniform in substance and of straight fibers as far as possible. It shall be free

from rot decay, harmful fungi and other defects of harmful nature which will affect the strength, durability or its usefulness for the purpose for which it is required. The colour shall be uniform as far as possible. Any effort like painting using any adhesive materials made to hide the defects shall render the pieces liable to rejection by the Engineer-in-charge.

29.3. All scantlings, planks etc., shall be sawn in straight lines and planes in the direction of grains and of uniform thickness.

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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 from rots, decay, harmful

fungi and other defects of nature which will effect the strength, durability or its usefulness for the purpose for which it is

required. The colour of wood shall be uniform as far as possible. The scantlings planks etc. shall be saw in straight lines

and planes in the direction of grain and of uniform thickness. The department will use the Agency to produce certificate

from Forest Department in event of dispute and the decision of the Department shall be final and binding to the

contractor. The tolerance in the dimension shall be allowed at 1.5 mm. per face to be planed.

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

30.1. The solid core type flush door shutters shall be of decorative or non-decorative type as specified in the drawing.

The size and thickness of the shutter shall be as specified in drawings or as directed. The timber species for core shall

be used as per I.S.2202 (part -I) 1980. The timber shall be free from decay and insect attack Knots and knot holes less

than half the width of cross-section of the members in which they occur may be permitted. Pitch pockets, pitch streaks

and harmless pin holes shall be permissible except in the exposed edges of the core members. The commercial

plywood, cross-bands shall conform to I.S. 303-1275

30.2. The face-panel of the shutters shall be formed by gluing by the hot press process on both faces of the core with

either plywood or cross-bands and face veneers. The 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 ± 1.2 mm. In Nominal height ± 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.

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M-31. Aluminum doors, windows, ventilators

31.1. Aluminum alloy used in the manufacture of extruded window sections shall conform to I.S. designation HEAWP

of I.S. 733-1975 and also to I S. Designation WVG-WP of I.S 1285-1975 The section shall be as specified in the

drawing and design. The fabrication shall be done as directed

31.2. The hinges shall be cast or extruded aluminum hinges of same type as in window but of larger size.

31.3. The hinges shall normally be of 50 mm. projecting type. Non-projecting type of hinges may also be used if

directed. The handles of door shall be of specified design A suitable lock for the door Operable either from outside or

inside shall be provided. In double shutter door, the first closing shutter shall have concealed aluminum alloy bolt at top and bottom.

M-32. Rolling Shutters

32.1. The rolling shutters shall conform to I.S.6248-1979 Rolling shutters shall be supplied of specified type with

accessories. The size of the rolling shutters shall be specified in the drawings. The shutters shall be specified in the

drawings. The shutters shall be constructed with interlocking lath sections formed from cold rolled steel strips not less

than 0.9 mm. thick and 80 mm. wide for shutters up to 3.5 m .width not less than 1.25 mm. thick and 80 mm wide for

shutters 3.5 m. in width and above unless otherwise specified.

32.2. Guide channels shall be of mild steel deep channel section and of rolled pressed or built up (fabricated) joint

less construction The thickness of sheet used shall not be less than 3 15 mm.

32.3. Hood covers shall be made of M S. Sheets not less than 0.90 mm. thick. For shutters having width 3.5 Meter

and above, the thickness of M.S. sheet for the hood cover shall be not less than 1 25 mm.

32.4. The spring shall be of best quality and shall be manufactured from tested high tensile spring steel wire of strip

of adequate strength to balance the shutters in all position. The spring pipe shaft etc . shall be supported on strong M S

of malleable C I. brackets. The brackets shall be fixed on or under the lintel as specified with-raw! plugs and screws bolts etc.

32.5. The rolling shutters shall be of self rolling up to 8 Sq. m. clear area without ball bearing and up to 12 Sq.m.

clear area with ball bearing. If the rolling shutters are of larger, then gear operated type shutters shall be used.

32.6. The locking arrangement shall be provided at the bottom of shutter at both ends The shutters shall be opened

from outside.

32.7. The Shutters shall be completed with door suspension shafts, looking arrangements, pulling hooks, handles

and other accessories.

M-33. Collapsible Steel Gate

33.1. The collapsible steel gate shall be in one or two leaves and size as per approved drawings or as specified. The gate shall be fabricated from best quality mild steel channels, flats etc. Either steel pulleys or ball-bearings shall be provided in every double channel Unless otherwise specified the particulars of collapsible gate shall be as under.

(a) Pickets : These shall be of 20 mm. M.S. channels of heavy sections unless otherwise shown on drawings. The

distance centre to centre of pickets shall be 12 cms .with an opening or 10 Cms

(b) Pivoted M.S. flats shall be 20 mm x6 mm

(c) Top and bottom guides shall be from tee of flat iron of approved size.

(d) The fittings like stoppers fixing, locking cleats, brass handles and cast iron rollers shall be of approved design and size

M-34. Welded Steel Wire Fabric

34.1 Welded steel wire fabric for general purpose shall be manufactured from cold drawn steel wire "as drawn" or

galvanised steel conforming to I.S. 226-1975 with longitudinal and transverse wire securely connected at every

intersection by a process of electrical resistance welding and conforming to I.S.4948-1974. it shall be fabricated and

finished in workmanlike manner and shall be free from injurious defects and shall be rust proof The type of mesh shall

be oblong or square as directed The mesh sizes and sizes if wire for square 3b well as oblong welded steel wire fabric

shall be as directed The steel wire fabric in panels shall be in one whole piece in each panel as far as stock sizes

permit.

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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 + 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 thin boards or strips of wood into panels. There are always an odd number of

layers, 3,5,7,9, ply etc. The plies 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 change in

moisture content.

37.3. Usually synthetic resins are used to gluing, phenolic resins are usually cured in a hot press which compresses

and simultaneously heats the plies between hot plates which maintain a temperature of 90 degree C to 140 degree C

and a pressure of 11 to 14 Kg/ Sq. Cm on the wood. The time of heating may be anything from 2 to 60 minutes

depending upon thickness

37.4. When water glue are used the wood absorbs so much water that the finished plywood must be dried carefully.

When synthetic resins are used as adhesive the finished plywood must be exposed to an atmosphere of controlled

humidity until the proper amount of moisture has been absorbed.

37.5. According to I.S. 303-1975 the plywood for general purpose shall be of the grades namely BWR, WWR and

CWR depending up to the adhesives used for bonding the veneers and it will be further classified into six types namely

AA, AB, AC, BB, BC and CC based on the quality of the two faces each face being of three kinds namely A, Band C

After pressing, the finished plywood should be reconditioned to a moisture content not less than 8 percent and not more

than 16 percent.

37.6. Thickness of plywood Boards.

TABLE

Board Thickness Board Thickness Board Thickness Board Thickness

3 ply. 3 mm. 5 ply. 5 mm. 7 ply. 9 mm. 9 ply. 16 mm

4 mm. 6 mm. 13 mm. 19 mm.

5 mm. 7 mm. 16 mm. 11 ply. 19 mm.

6 mm. 8 mm. 9 ply. 13 mm. 25 mm.

M-38. Glass

38.1. All glass shall be of the brief quality, free from specks, bubbles, smokes veins, air holes blisters and other

defects. The kind of glass to be used shall be as mentioned in the item or specification or in the special provision or as

shown in detailed drawings. Thickness of glass panes shall be uniform. The specifications for different kinds of glass

shall be as under.

38.2. Sheet Glass

38.2.1. In absence of any specified thickness or weight in the item or detailed specifications of the item of work, sheet

glass shall be weighing 7.5 Kg/Sq. m for panes up to 600 mm x 600 mm.

38.2.2. For panes larger than 600 mm x 600 mm and up to 800 mm x 800 mm the glass weighing not less than 8.75 Kg/Sq m shall be used For bigger panes up to 900 mm x 900 mm. glass weighing not less 19

than 8.75 Kg/Sq. m shall be used. For bigger panes up to 900 mm x 900 mm. glass weighting not less than 11.25

Kg/Sq. m. shall be used

38.2.3. Sheet glass shall be patent flattened glass of best quality and for glazing and framing purposes shall conform

to I.S. 1761-1960. Sheet glass of the specified colours shall be used, if so shown, on detailed drawings or so specified

For important buildings and for panes with any dimension over 900 mm plate glass of specified thickness shall be used

38.3. Plate Glass:

38.3.1. When plate glass is specified it shall be "polished patent plate glass" of best quality It shall have both the

surface ground flat and parallel and polished to obtain clear undisturbed vision and reflection The plate glass shall be of

the thickness mentioned in the item or as shown in the detailed drawing or as specified. In absence of any specified

thickness, the thickness of plate glass to be supplied shall be 6 mm. and a tolerance of 0.20 mm shall be admissible

38.4. Obscured Glass:

38.4.1. This type of glass transmits light so that vision is partially or almost completely obscured. Glass shall be plain

rolled, figured, ribbed or fluted, or frosted glass as may be specified as required. The thickness and type of glass shall

be as per details on drawings or as specified or as directed

38.5. Wired Glass:

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

M-39. Acrylic Sheets

39.1. Acrylic sheets shall be of thickness as specified in the item and of an specified shape and size as the case may be panels may be flat or curved It should be light in weight it shall be colourless or coloured or opaque as specified in the item. Colourless sheet shall be as transparent as the finest optical glass. Its light transmission rate shall be about 95% Transparency shall not be affected for the sheets of larger 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 20

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 50 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 21

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.

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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 to 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 from cement conforming to Indian Standards or coloured port land cement generally depending upon the colour of tiles to be used or as directed.

47.4. (D) Chequered Tiles :

47.4.1. Chequered tiles shall be plain cement tiles or marble mosaic tiles. The former shall have the same specification as per (A) above and the latter as per marble mosaic tiles as per (C) except as mentioned below

47.4.2. The tiles shall be of nominal size of 250 mm. x 250 mm. or as specified. The centre to centre distance of chequer shall not be less than 25 mm. and not more than 50 mm. The overall thickness of the tile shall be 22 mm

47.4.3. The grooves in the chequers shall be uniform and straight. The depth of the grooves shall not be less than 3 mm. The chequered tiles shall be plain coloured or mosaic as specified. The thickness of the upper layer measured from the top of the chequers shall not be less than 6 mm. The tiles shall be given the first grinding with machine before delivery to site

47.4.4. Tiles shall conform to relevant I.S 1237-1980. 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.

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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 + 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 Stoics

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 x 450 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 specimens 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 + 015 mm.

(b) Length or Width

(1) 300 mm. Square tiles + 0.20 mm. (3) 900 mm Square tiles + 0.60 mm.

(2) 600 mm. Square tiles + 0 40 mm. (4) Sheets and roll + 0.10 percent.

53.4. Adhesive:

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

M-54. Facing Tiles

54.1. The facing tiles (burnt clay facing bricks) shall be free from cracks, and nodules of free lime. They shall be

thoroughly burnt and shall have plane rectangular faces with parallel sides and sharp straight right angled faces. The

texture of the finished surface that will be exposed when in place shall conform to an approved sample consisting not

less than for stretcher bricks each representing the texture desired. The facing tiles shall have a pleasing appearance,

sufficient resistance to penetration by ram and greater durability than common bricks. The tiles shall conform to I.S.

2691-1972.

54.2. The standard size of facing brick tiles shall be 19 x 9 x 4 cms. The facing brick tiles shall be provided with frog

which shall conform to I.S. 11077-1976.

54.3. The permissible tolerance in dimensions specified above shall be as follows:

Size Tolerance for

1st Class Brick 2nd Class Brick

19 cm. + 6 mm. + 10 mm.

9 cm. + 3 mm. + 7 mm.

4 cm. + 1.5 mm. + 3 mm.

The tolerance for distortion or warpage of face or edges of individual brick from a plane surface and from a straight line

respectively shall be as follows:

Facing dimensions Permissible tolerance

Max. below 19 cms. Max. 2.5 mm.

-do- above 19 cms. Max. 3.0 mm.

54.5. The average compressive strength obtained as a sample of five tiles when tested in accordance with the

procedure laid as per I S 1077-1976 shall be not less than 175 Kg/Sq Cm. The average compressive strength of any

individual bricks shall be not less than 160 Kg / Sq.Cm.

54.6. The average water absorption for five bricks tiles shall not exceed 12 percent of average weight of brick before

testing. The absorption for each individual bricks shall not exceed 25 percent.

54.7. The brick tiles when tested in accordance with I.S. 1077-1976, the rate of efflorescence shall not be more than

"Slightly effloresced"

M-55. White glazed tiles

55.1. The tiles shall be of best quality as approved by the Engineer-in-charge. They shall be flat and true to shape

They shall be free from cracks, crazing spots chipper) edges and corners. The glazing shall be of uniform shade.

55.2. The tiles shall be nominal size of 150 mm x 150 mm unless otherwise, specified. The maximum

variation the stated sizes other than the thickness of tile shall be plus or minus 1.5 mm. The thickness of tile shall be 6

mm. Except as above the tiles shall conform to I.S. 1977-19/0

M-56. Galvanised iron pipes and fittings

56.1. Galvanised iron pipes shall be of the medium type and of required diameter and shall comply with I.S. 1239-

1979. The specified diameter of the pipes shall refer to the inside diameter of the bore. Clamps, screw and all

galvanised iron fittings shall be of the standard 'R' or equivalent make

M-57. Bib cock and stop cock

57.1. A bib cock is a draw off tap with a horizontal inlet and free outlet A stop cock is a valve with suitable means of

connection for insertion in a pipe line for controlling or stopping the flow

57.2. They shall be of screw down type and of 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 Bib cock Stop cock Diameter Bib 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

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also have an inlet at back and 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 white 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. The 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 rubber 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 flat 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 to 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 paint. The flushing cistern shall be fixed on two C I brackets. The C I 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 other imperfection and shall be neatly dressed and carefully fettled.

68.2. The end of pipes and fittings shall be reasonably 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.

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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.	1.5 m. long	75 mm.
2	Weight of pipe	100. mm.
	1.8 m long	5.0 mm.
	excluding ears	5.0 mm.
	2.m long	12.38 Kg.
1.		18.14 Kg.
2		16.52 Kg.
		21.67 Kg.
		18.37 Kg.
		24.15 Kg.

68.4.2. A tolerance up to minus 15 percent in thickness and 20 mm. length will be allowed For fittings
tolerance in

lengths shall be plus 25 mm. and minus 10 mm.

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

M-69. Nahni Trap

69.1. Nahni trap shall be of cast iron and shall be sound and free from porosity or other defects which affect serviceability The thickness of the base metal shall not be less than 6.5 mm The surface shall be smooth and free .form

craze, chips and other flaws or any other kind of defects which affect serviceability The size of nahni trap shall be specified and shall be of self cleaning design.

69.2. The Nahni trap shall be of-quality approved by the Engineer-in-charge and shall generally conform to the relevant Indian Standards.

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

M-70. Gully Trap

70.1. Gully trap shall conform to I.S. 651-1980. It shall be 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 dimensions 300 mm. x 300 mm. the cover and weighing not less than 4.53 Kg. and the frame not less than 2.72 Kg.

The grating cover and frame shall be of sound and good casting and shall have truly square machined seating faces.

M 71. Glazed Stone Ware pipe And Fittings

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

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

M-72. Wall Peg Rail

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

M-73. G.I. Water Spout

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

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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, cowl, 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 + 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.

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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, phawaras rakes or any such ordinary excavating implement or organic soil, gravel silt, sand turf loam, clay, peat etc., fall under this category

2.0. Clearing the site

2.1. The site on which the structure is to be built shall be cleared, and all obstructions loose stone, materials and rubbish of all kind bush wood and trees shall be removed as directed. The materials so obtained shall be property of the Government and 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 local 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 out 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 carried out for foundation up to 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 out 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 to 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

out during fixed hours of the day, preferably during the mid-day lunch hours or at the close of the work as ordered in

writing by the Engineer-in-charge. The hours of blasting shall be notified in advance to the people in the vicinity. All the

charges shall be prepared by the man in charge only.

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 from

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 stratum shall be blasted with light charge so

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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 cms, above the charge shall then be gently filled with dry clay pressed home and rest of tamping is with firmed any convenient materials gently packed with a wooden cover.

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 :

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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. 4.0.0.(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 30M 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
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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

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2.1. The relevant specification of item No. 4.0 O.(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.(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 murrum.

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.

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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 and 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 local origin. The size of murrum shall not be more than 20 mm

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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.

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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.

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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 stating concrete the bed of foundation trenches shall be cleared of all loose materials, leveled, watered and rammed as directed

2.2. Proportion of Mix:

2.2.1. The proportion of cement, sand and coarse aggregate shall be one part of cement. 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 pounding for a period of not less

then 7 days form the date of placement.

2.7. Mode of Measurement & Payment:

2.7.1. The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on

plan or as directed.

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

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.

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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.

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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-150m 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 beg 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)

M-150 (1:2:4)

M-200 (1:1.1/2:3)

M-250 (1:1:2)

300 Liters

220 Liters

100 Liters

Generally 1:2 for line aggregate

to coarse aggregate by volume

160 but subject to an upper limit

of 1:1.1/2 and lower limit

34 Liters

32 Liters

30 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 course aggregate shall be as large as possible within the limits specified but in no case

greater than one forth 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.

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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 may be used in concrete only with approval of Engineer-in-charge based upon the evidence that with the passage of time neither the compressive strength of concrete is reduced nor are other requisite qualities of concrete and steel impaired by the use of such admixtures.

3.0. 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 sand, allowances for bulkage 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 drum 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 all 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 turning over the ingredients of concrete before and after adding water. Mixing platform shall be so arranged that no foreign material gets mixed with concrete nor 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 of water shall then be added gradually through a rose can and the mass turned over till a mix of required consistency is obtained. In hand mixing quantity of cement shall be increased by 10 percent above that specified.

3.2.3. 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 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 from work shall be cleaned

and made free from standing water dust, snow or ice immediately before placing of concrete. No concrete 42

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 charges, frost and drying out process. It shall be covered with wet sacking has Sian 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 or 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

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 Cm² 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, 43

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

ties 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 stuttering 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, pots, 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.

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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 chhajjas 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

our for reinforced concrete chhajjas 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 chhajjas 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 or power to attain proper radius of bends. Bars shall not be bent or straightened in a manner that will injure the material. Bars bent during transport-or handling shall be straightened before being used 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 mixing 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 as possible, bars of full length shall be used. In case this is not possible. Overlapping of bars shall be

done as directed. When practicable, overlapping bars shall not touch each other, but be kept apart by 25 mm. Where

not feasible, overlapping bars shall be bound with annealed wires not less than 1 mm. thick

45 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 be welded so as to transmit their full stresses. Welded joints shall preferably be located at points when steel will not be subject to more than 75 percent of the maximum permissible stresses and welds so staggered that at any one section not more than 20

percent of the rods are welded. Only electric arc welding using a process which excludes air from the molten metal and

conforms to any or all other special provisions for the work shall be accepted. Suitable means shall be provided for

holding bars securely in position during welding. It shall be ensured that no voids are left in welding and when welding

is done in two or three stages, previous surface shall be cleaned properly. Ends of the bars shall be cleaned of all

loose scale, rust, stages, paint and other foreign matter before welding. Only competent welders shall be employed on

the work. The M.S. electrodes used for welding shall conform 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 of 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 strength of 150 mm. cubes of the mix expressed in Kg./Cmnt.

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./Cmnt. at

28 days, conducted in accordance with I.S. 516-1959.

Preliminary test Min.

Work test Min.

M-1 50 200 150

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 properly compacted with means available except where it can be shown to the satisfaction of the Engineer-in-charge, that supply of properly graded aggregate of uniform quality can be maintained till the completion of work, grading of aggregate shall be controlled by obtaining the coarse aggregates in different sizes and bending them in the right proportions as required. Aggregates of different sizes shall be

47 stocked in separate stock piles. The required quantity of material shall be stock piled several hours, preferably a day before use. The grading of coarse and fine aggregate shall be checked as frequently as possible, the frequency for a given job being determined by Engineer-in-charge to ensure that the suppliers are maintaining the uniform grading as approved for samples used in the preliminary tests..

3.2. In proportioning concrete, the quantity of both cement and aggregate shall be determined by weight. Where the weight of cement is determined by accepting the maker's weight per bag, a reasonable number of bags shall be weighted separately to check the net weight. Where cement is weighted from bulk stocks at site and not by bags, it shall be weighed separately from the aggregate. Water, shall either be measured by volume in calibrated tanks or weighed. All measuring equipment shall be maintained in clean, and serviceable condition. Their accuracy shall be periodically checked.

3.3. It is most important to keep the specified water cement ratio constant and at its correct value. To this end, moisture content in both fine and coarse aggregates shall be determined by the Engineer-in-charge according to the weather conditions. The amount of mixing water shall then be adjusted to compensate for variations in the moisture content. For the determination of moisture content in the aggregates. I.S. 2386 (Part-III) shall be referred to. Suitable

adjustments shall also be made in the weights of aggregates due to variation in their moisture content. Minimum

quantity of cement to be used in controlled concrete shall not be less than 220 kg./M³ in plain concrete and not less than 250 kg/M³ 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.

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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 ere., 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 stab shall he 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 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. shah be followed except that the item includes the cost form work

for exposed concrete work

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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., compete, 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. (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. 5.4.1. 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 from 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 (III) 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. (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 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. (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 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 from 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.

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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

property bedded and set home by gently tapping with handle of trowel or wooden mallet. Its inside face shall be

flushed with mortar before the next brick is laid and pressed against it. On completion of course, the vertical joints

shall be fully filled from the top with mortar.

2.3.3. The walls shall be taken up truly in plumb. All courses shall be laid truly horizontal and all vertical joint shall be

truly vertical. Vertical joints in alternate course shall generally be directly one over the other. The thickness of brick

course shall be kept uniform.

2.3.4. The brick shall be laid with frog up wards. A set of tools comprising of wooden straight edges, man son's spirit

level, square half meter rub, and pins, string and plumb shall be kept on the site of work for frequent checking during the progress of work.

2.3.5. Both the faces of walls of thickness greater than 23 cms. shall be kept in proper place. All the connected brick work shall be kept not more than one meter over the rest of the work. Where this is not possible, the work shall be raked back according to bond (and not left toothed) at an angle not steeper than 45 degrees.

2.3.6. All 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 exceed 12 mm.

The face joints shall be raked out as directed by raking tools daily during the progress of work, when the mortar is still green so as to provide key for plaster or pointing to 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.

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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.

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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 find 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.

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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 any extra payment made for embedding in masonry of marking holes in respect of following item.

(1) Ends of joints, beams, posts, girders, rafters, purlins trusses corbel, steps, etc. where cross sectional area

does not exceed 500 sq.cm.

(2) Opening not exceed in 1000 sq.cm.

(3) Wall plate sand bed plates bearing of slab, chhajjas, and like whose thickness does not exceed 10 cms. and

the bearing does not extend the full thickness of wall.

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

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

concealed wiring.

(6) Forming charges of section not exceeding 350 sq.cm. in masonry.

(7) Apparatuses for fire places, shall not be deducted nor shall extra labour required to make splaying of jumps,

throating and making trenches over the aperture be paid for separately.

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

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.

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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.

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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.

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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.

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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 un coarsed 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 coarse 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 hearting 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.

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2.9. Joints:

All the joints shall be completely filled with mortar and width shall not exceed 25 mm. when plastering of 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. 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:

(a) Ends of joints, beams, spots, girders, rafters, purloins, trusses, corbels, etc. each up to 500 sq. cm. in section.

(b) Opening each up to 0.1 sq.m.

(c) 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).

(d) Drain holes and recesses for cement concrete blocks to embed hold fasts for doors windows.

(e) Building in the masonry iron fixtures pipes up to 300 mm. dia. hole fasts of doors and windows.

(f) 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 width of 25 mm. along the four edges of the face of the stone.

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2.2. Laying:

2.2.1. All stones shall be wetted before laying. The wall 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 toothing 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 than the breadth. The breadth of a face stone shall also be not less than

150 mm. Each face stone shall be of the same height in any given course. The courses shall be not less than 150 mm.

Each face stone shall be of the same height in any given 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

plane 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 hearting

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 on 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.

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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 form 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 property in such a way as to avoid any contract with moisture at

site. They shall be stock plied on planks or other supports free from contract 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 contract between the mortar and the masonry unit arid obtained a weather tight joint.

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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 fine 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 for a period of 7 days continuously.

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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 chhajjas 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 shall 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 (I) 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 (I) shall be followed

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. (I) shall be followed.

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

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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 safeguard against any settlement of the form-work during the course of concreting and after concreting. The form work of shuttering, centering, scaffolding, bracing etc. shall be as per design.

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

64 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 from the form work of the main beam at the inter section point. No deduction shall be made from the form work of a column at inter section of beams.

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 reinforced 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 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 one sq. meter.

9.1.(B)(ii) 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 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.

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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) 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 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, posts, 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, haunching 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 haunching, 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 haunching 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 in situ reinforced and plain concrete work in edges of slabs and breaks in floor and walls.

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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.(I) 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, chhajjas, 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, chhajjas, 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.

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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.

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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 are 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 from 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 of 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 out

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.

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10.5. (A) Providing wood work in frames of false ceiling partition etc. 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. 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.

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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 glazing, 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 or 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 partly 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 but 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

wood 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)(II) Providing and fixing 35 mm. thick full glazed shutters for doors, windows and clear story

wood 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.

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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.

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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. 10.12 (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 black 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.

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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 ail 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 io hole the gauze hi 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 but! 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 74

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 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.

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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. 10.84 shall be 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 from 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 steel 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

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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.

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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 45°.

3.0. Mode of measurements and payment

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

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

3.3. The rate shall be for 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

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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 fallers, 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/permitted.

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. Ail 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 whore 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 tree 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 spaced shall have clearance of not more than 6 mm. The erection, clearance for created ends of members connecting steel shall preferably be not greater than 1.5 mm. The erection clearance at the ends of 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 flaws. The roller bearing shall be provided with adequate arrangements for 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 shall be accurately mechanized so that the parts connected butt against each other over the entire surfaces of contact connecting angles or channels shall be fabricated and placed in position with greater accuracy so that they are not unduly reduced in thickness by machining. The ends of bearing stiffeners shall be mechanized or ground to fit tightly both at the top and bottom, All holes shall generally be drilled to the required size and at required position. Sub punching shall be permitted provided it is done 3 mm. or less in diameter and reamer thereafter to the required 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 the diameter of rivets. Holes shall have their axis perpendicular to the surface bored through. The drilling or reaming shall be free from burrs, and the holes should be clean and accurate holes for counter sunk bolts shall be made in such a manner that their heads fit flush with the surface after fixing.

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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 rivets 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 fit 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 standard

weight 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.

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(i) Dimensions other than cross sections and thickness of plates shall be measured to nearest 0.001m

(j) 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.

11.4.(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 rafters 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 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.

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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 of 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 black with steel

pulleys at the top. The frame shall be riveted and /or welded and wherever riveting shall be done 3.15 mm. gussets

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, living 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 nisi 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 stopped and locking arrangement etc. complete.

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

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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, nuts 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)

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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) :

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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.

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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 6f 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.

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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 beadings 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 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

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].

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3.2. The relevant specifications of item No. i3.5 (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 01 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.

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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. Cart> 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 die terrazzo.

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2.6.2. The terrazzo topping shall be (aid 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 s 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 from 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.

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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 powder 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 powder 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 powder 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 dado 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.

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3.0. Mode of measurements & payment

3.1. The skirting and dado 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 dado 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 dado 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.

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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 dado

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 smoothened 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.

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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 be 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.

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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 dado 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 of 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 dado shall be truly horizontal. The risers of steps, skirting or dado shall rest on top of treads of flooring. Wherever required the tiles shall be cut (sawn) and thin edges smoothened before use.

2.3. Curing :

Curing shall be done for 7 days continuously.

2.4. Finishing:

Skirting and dado 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 dado, 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.

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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.

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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 two hours. Neat gray cement grout at 33 kg/Cement/Sq. mt. of honey like consistency shall be spread over the mortar bedding as directed. The edges of the

tiles shall be smeared with neat cement slurry. The tiles shall be well pressed and gently tapped with a wooden

mallet till they are properly bedded and in level with the adjoining tiles. There shall be. no hollows in bed or joints.

The joints between the tiles shall be as thin as possible in straight line or as per pattern.

2.2.2. The tiles shall not have staggered joints. The joints shall be true to centre line both ways. The Nahni trap

coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible.

Where full

size tiles cannot be fixed they shall be cut (Swan) to the required size and the edges rubbed smooth to ensure

straight and true joints. The joints shall be filled with grey cement grout with wire brush or trowel to a depth of 5 mm.

and loose material removed. White cement shall be used for pointing the joints. After fixing the tiles finally in an even

plane the flooring shall be kept wet and allowed to nature undisturbed for 7 days.

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.

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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 smoothened.

2.2.3. The joints shall be cleaned and flush pointed with white cement. The surface shall be kept wet for seven days.

After curing the surface shall be washed clean.

3.0. Mode of measurements and payment

3.1. The rate shall include the cost of all materials and labour required for various operations described above.

Risers of steps: skirting and dedo shall be measured in square meters, length and height shall be measured along

the finished face of the skirting or dedo including curves, where special such as covers. internal and external angles,

etc., used. The length and height shall be measured correct to the centimeter except in case of risers and skirting

where height shall be measured correct to 3 mm

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

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 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

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slabs shall be machine rubbed or table rubbed with coarse sand before using. All angles and edges or 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 + 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 tie laid on top

pressed and tapped gently to bring it in level with other slabs. It shall then be lifted and a side. 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 fie 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. (avage) 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

trust dressed shall have a full contract if a straight edge is laid along. The sides shall be table rubbed with coarse sand before paving. All angles and edges of the slabs shall be true square and free from chippings and giving a plane surface. The thickness shall be 25 mm. (Average) as specified in 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. If 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

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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 with 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 mortar 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 100

also be chisel-dressed to a minimum depth of 20 mm. so that the dressed edge shall at no place be more than 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 + 2 mm.

2.4. Laying :

The surface of the sub-grade concrete shall be cleaned, wetted and mopped. The bedding of specified mortar mix

shall be 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 waviness. 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 depend 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, dado or skirting shall be rounded off where so

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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. The 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 tiles 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.

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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 dedo.

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, dedo 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.

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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 dado or wall 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.

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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 tow 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 flushing 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 hooks

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.

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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.

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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 class-3 Gutter with iron brackets 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.

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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 to the sheets. The length of the 'J' bolts or crank bolts shall be 75 mm. more than the depth of 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 for 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 'L' 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.

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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.

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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. flat/ 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. and 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 110

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 fidges 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 gables 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.

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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 cut 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 latter 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 gravel 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.

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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°, slopping 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. bolder 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 mason 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 of 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

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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 clamps 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 soaked 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.

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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.

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SECTION-16

Ceiling Lining

16.3.(A) Providing and fixing wooden planks ceiling with long Lied 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.

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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 dedo heights for picture rails and cornices etc.

2.4. Planked battens 40 mm. x 20 mm. shall toe used for grounds on solid walls. The batten shall be plugged to wall as described-under. The batten snail 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 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.

16.13(1) Providing and fixing plywood lining with butt jointing and nails (frame work and cover fillets to be 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 but 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

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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.

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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 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.

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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.

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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 an 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 made 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 floors

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(1) 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.

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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.

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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.

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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 be

done on uncoarsed rubble masonry work if 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 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 be 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.

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SECTION-18

White Washing & Distempering

18.11. White washing with lime on undecorated wall surfaces (two coats) to give an even shade including thoroughly brooming the surface to remove alt 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 give)

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 stroke 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 off 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 moss, fungi, algae and lichen and patch repairs to plaster wherever done shall not be paid extra.

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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 all 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.

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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

shall 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 even tint, over the colour shall be of even 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. Materials 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.

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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 greasay, 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.

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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. Distempering 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 distempering. Where ladders are used- pieces of old gunny bags shall be tied at

top and bottom to prevent scratches to the walls and floors. \For distempering to ceiling, proper stage scaffolding

shall be erected where necessary.

2.2. Preparation of Surface.

2.2.1. The undecorated surface to be distempered shall be thoroughly brushed 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 whiting 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 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 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 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 shall be finished in one operation and no work shall be started in any room which cannot be completed, on

the same day.

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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 coat 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 walls are provided with the 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 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.

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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 distempered. A properly secured and well tied suspended platform (Joola) may be used for distempering. Where ladders are used, pieces of old gunny bags shall be tied at top and bottom to prevent scratches to the walls and floors. For distempering to ceiling, proper stage scaffolding shall be erected where necessary.

2.2. Preparation of surface :

2.2.1. The undecorated surface to be distempered shall be thoroughly brushed from dust, dirt, grease, mortar dropping and other foreign matter and sand papered smooth. New plaster surface shall be allowed to dry for at least 2 months before applications of distemper.

2.2.2. All unnecessary nails shall be removed. Pitting in plaster shall be made good with plaster again with a fine grade sand paper and made smooth. A coat of distemper shall be applied over the patches. The surface shall be allowed to dry thoroughly before the regular coat of distemper is allowed. The surface affected by moulds, moss, fungi, algae lichens, efflorescence etc. shall be treated in accordance with I.S; 2395 (Part 01) 1966. Before applying distempering, any unevenness shall be made good by applying putty made of plaster of paris mixed with water on entire surface including filling up the undulation and then sand papering the same after it is dry.

2.3. 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.

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2.3.2. Application of primer shall be done as under: The primer shall be applied with a brush on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards.

This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks. It shall be allowed to dry for at least 48 hours before oil bound distemper or paint is applied.

2.3.3. Oil bound distemper is not recommended to be applied within six months of the completion of wall plaster.

2.4. Preparation of oil bound distemper :

2.4.1. The distemper shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer only. Sufficient quantity of distemper required for a days work shall be prepared.

2.5. Application of Distemper coat:

2.5.1. For undecorated surfaces, after the primer coat is dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the distemper, taking care not to rub out priming coat. All loose particles shall be dusted off after rubbing. Minimum two coats of distemper shall be applied with brushes in horizontal strokes followed immediately by vertical strokes which together shall constitute one coat. The subsequent coats shall be applied after a time interval of at least 24 hours between consecutive coats to permit proper drying of the proceeding coat. The finished surface shall be even and free without patches, brush marks,

distemper drops etc.

2.5.2. Sufficient quantity of distemper shall be mixed to finish one room at a time. The application of a coat in each room shall be finished in one operation and no work shall be striated in any room which cannot be completed on the same day.

2.5.3. 15 cm. double bristled distemper brush shall be used. After day's work brushes shall be thoroughly washed in hot water with soap solution and hung down to dry. Old brushes which are dirty and caked with distemper shall not be used on the work.

2.6. Protective measurements : The surfaces of doors, windows, floors, articles of furniture etc. and such other parts of the buildings as are not to be distempered shall be protected from being splashed upon. Such surfaces shall be cleaned of distemper splashes if any.

3.0. Mode of measurements and payment

3.1. Priming coat of distemper primer, scraping of surface spoiled by struck roots, removal of oil and grease spots, treatment for infraction of effloresces., mould moss, fungi, algae and lichen and patch repairs to plaster shall be included in this item for which nothing extra shall be paid.

3.2. All the work shall be measured net in the decimal system as in place subject to the following limits unless otherwise stated hereinafter:

(a) Dimensions shall be measured to the nearest 0.01 m.

(b) Area in individual items shall be worked out to the nearest 0.01 sq. m. All work shall be made for ends of

joints, beams, posts etc., and openings, not exceeding 0.5 sq.mt. each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings not for finish around ends of joints, beams, posts etc.

3.3. Deductions of opening exceeding 0.5 sq.m. but not exceeding 3 sq. m. each shall be made as follows and net addition shall be made for reveals, jambs, soffits etc. of these openings :

(a) When both the faces of wall are provided with same finish, deductions shall be made for one face only.

(b) When each face of wall is provided with different finish, deduction shall be made for that side of frame for

doors, windows etc. on which width of reveals is less than that of the other side but no deduction shall be made on

the other side. Where the width of reveals on the both the faces of wall are equal, deduction of 50% of area of opening on each face shall be made from area of finish.

(c) When only one face of wall is treated and the other face is not treated, full deductions shall be made if the width of the reveal on treated side is less than that on untreated side but if the width of the reveal is equal or more

than that on untreated side neither deductions nor additions to be made for reveals, jambs, soffits, sills etc.

3.4. In case of opening of area exceeding 3 sq. m. each deduction shall be made for openings but jambs, sills and soffits shall be measured.

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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 be 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. 18.44 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 out 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.

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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°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 marks, 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.

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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

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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

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2.2. The rate shall be a unit of One sq. meter.

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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 paint shall conform to M-44 B.

2.0. Workmanship

2.1. General : The materials required for work of painting work shall be obtained directly from approved 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 or clogging of paint puddles in the corners of panels, angles of moldings etc. shall be left on the work.

2.2.4. Special care shall be taken while painting over bolts, nuts, rivets, overlaps etc. Approved best quality brushes shall be used.

3.0. Mode of measurements and payment

3.1. The relevant specifications of item No. 19.12 shall be followed for mode of measurements and payment.

The rate is excluding priming coat.

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

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.

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19.11. Painting one coats Excluding priming coat) on previously painted steel and other metal surface with enamel paint, brushing to give and 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 wall constitute one coat.

2.2.2. During painting, every time, after the priming coat has been worked out of the brush bristles or after the brush has been unloaded, the bristles of the brush shall be opened up by striking the brush against portion of the unpainted surface with the end of the bristles, held at right angles to the surface, so that bristles thereafter will

collect the correct amount of paint when dipped again in to a paint container. The prima/y coat shall be allowed to dry completely before painting is started.

2.2.3. No hair marks from the brush or clogging at pain puddles in the corner of panels angles of molding etc.

shall be left on the work

2.2.4. Special care shall be taken while painting over bolts, nuts, rivets, overlaps etc.

2.2.5. The container when not in use shall be kept close and free from air so that paint does not thickness and also shall be kept guarded from dust.

3.0. Mode of measurements & payment

3.1. The new steel and other metal surface shall be measured under this item.

3.2. All the work shall be measured net in the decimal system, as executed subject to the following limits unless otherwise stated hereinafter.

(a) Dimensions shall be measured to the nearest 0.01 meter.

(b) Areas shall be worked out to the nearest 0.01 sq. meter.

3.3. No deductions shall be made for openings not exceeding 0.5 sq. mt. each and no addition shall be made

for painting to beddings, moldings, edges, jambs, soffits, sills etc. of such opening.

3.4. In case of fabricated structural steel and iron work, priming coat of paint shall be included with 140

frabation. 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 paint.

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 paining 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.

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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 smoothened with

abrasive paper and projecting fibers shall be removed. Flat portions shall be smoothened 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 smoothened 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).

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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 dist, 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.

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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 off lightly.

Two

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.

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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 piece 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 gloss.

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 be 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 all 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 shall be chosen.

2.3. Application :

2.3.1. The polish shall be applied evenly with clean soft pad of cotton cloth in such a way 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 and shall be rubbed off with soft flannel until

the surface has assumed a uniform gloss and in dry showing no sign of Stickiness.

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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 wood 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 coal 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 oil 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 paris 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).

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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.

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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 rate 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.

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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 ail 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.

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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.

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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 barbed 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, sewer 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.I. 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.

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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 include 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.

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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. x6 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) Brunt bricks shall

conform to M-15. 95) 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 T'S 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 (I) 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.

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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. (I) 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 (I) 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 GM. (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.

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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.

Chemicals Concentration

1. Aldrin 0.50% (by weight)

2. Heptachlor 0.50% (by weight)

3. Chlordane 1.00% (by weight)

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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.

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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 backward 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.

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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 :

Chemicals Concentration

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 includes 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.

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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.

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SECTION-23

Water Supply, Plumbing and Sanitary Fittings

23.2. Providing and fixing to wall, ceiling ad 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

in offered. The ends of the tubes shall then be threaded conforming to the requirements of I.S. 554-1955 with pipe

dies and taps carefully in such a manner that it will not result in slackness of joints when the two pieces are screwed together.

2.1.2. The taps and dies shall be used only for straightening screw threads which have becoming bent or damaged

and shall not be used for turning of the threads so as to make them slack as the latter procedure may not result in the watertight joint. The screw threads for tube and fitting shall be protected form edge until they are fitted.

2.1.3. In jointing the tubes, the inside of the socket and the screwed end of the tubes shall be oiled and smeared

with white or red lead and wrapping around with a few turns of fine spun yarn round the screwed end of the tube. The

end shall then be tightly screwed in the socket, tees, etc. with a pipe wrench. Care shall be taken that all times free

from dust, and dirt during fixing. 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 fillings 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 each item shall, unless otherwise stated be held to include where necessary, conveyance, and delivery, handling, unloading, storing, fabrication, hoisting, all labour for finishing to required shape and size, setting, fitting in position straight, cutting and waste return of packing etc.

3.2. The length shall be measured on running meter basis of finished work. The length shall be taken along the centre line of the pipe and fittings. The pipes fixed to wall, ceiling, floors etc shall be measured and paid under this item.

3.3. All the work shall be measured in decimal system as fixed in its place, subject to tolerance given below unless otherwise stated.

(i) Dimension shall be measured to the nearest 0.01 meter. (ii) Area shall be worked out to the nearest 0.01 sq. meter.

3.4. All measurements of cutting shall unless otherwise stated be held to include the consequent waste

3.5. In case of fitting of unequal bore, the target bore shall be measured for the test.

3.6. Testing of pipe lines fittings, and joints include for providing all plant appliances necessary for obtaining access to the work to be tested and carrying out the tests

3.7. The rate includes 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 tube 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 and 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 the tubes shall be as 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 162

3.2. For purpose of calculating cubic content cross section shall normally be taken at suitable intervals i.e. at

manhole or 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/ Cushioning 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 than 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.

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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 of 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 off 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 stress 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 S₁ 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.I. 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) spun yarn. The joints shall be filled with cement mortar 1:2 (1 cement : 2 sand)

and spun yarn. The pipes without care shall be fixed to wall with M.S. clamps. The pipes will be secured

with 40 mm. diameter steel or iron barrel distance pieces or bolts and stout galvanised iron nails 10 cms long into wall

wool plug fixed in walls. Access doors to fittings shall be provided with 3 mm. rubber insertion packing and secured

without screws to make air and water tight

2.2. All soil pipes shall be carried up above the roof and shall have a wire ball on guard 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 window, it shall be carried up to a ridge of

the roof or at least two 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 one meter above the parapet or two meters measured vertically from the

top of any windows or opening which may 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 than three meters.

2.4. Where ventilating pipes are carried in pipe shafts, the shaft shall be of a minimum size of one meter. If the

shafts are also used to give light and air to rooms, the ventilating pipes must be carried out to a horizontal distance at

root level not less than five meters 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 on 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 or 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 walls 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.

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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 shall conform to M-11.

2.0. Workmanship

2.1. The closet shall be fixed to the floor by means of 75 mm. long 6.5 mm. diameter counter sunk bolts and nuts embedded in the floor concrete using rubber or before washers so as not to allow any lateral displacement. The joint

between the trap of W.C. and soil pipe shall be made with C.M. 1:1 (1 cement : 1 fine sand).

3.0. Mode of measurements and payment

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

3.2. The rate includes cost of all labour for fixing pans and seat and cover, inlet, connections etc. complete including testing the same. The payment of seat and cover shall be made separately.

3.3. The rate shall be for a unit of One number.

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 and 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 conform to M-62. Cement mortar shall conform to M-11.

2.0. Workmanship

2.1. The 'P' or 'S' trap shall be fixed with pan cast iron pipe with C.M. 1:1. The pan shall be provided with a 100

mm. '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.

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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 of 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 noncorrosive

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.

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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.

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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

mm dia. The rate excludes the cost of waste pipe of 32 mm. dia.

3.2. The rate 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 include 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.

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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 ply wood 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.

3.2. 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 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).

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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.
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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.

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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 trap. 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 or measurements and payment

3.1. The rate includes .cost of all materials, tools and plants and labour required for satisfactory completion of this item.

3.2. The rate shall be for a unit of One number

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.

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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 weight 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. lines 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.

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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 boulders, 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 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.

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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. Tared 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.

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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 attest 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 : (t) Water shall conform to M-1. (2) Cement mortar of proportion 1:5 shall conform to M-11. (3)

Burnt brick shall conform to M-15. (4) The S.W. Galley trap of 100 mm. x 100 mm. size shall confirm to .M-70.

2.0. Workmanship

2.1. Excavation for gully trap shall be done true to dimensions and levels as indicated on plans or as directed.

The excavation work shall generally be done as per relevant specifications of item 4.0.0.of earth work.

2.2. Fixing:

2.2.1. The gully trap shall be fixed over cement concrete 1:5:10 (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 OH; gully trap from the top of bed concrete up to ground level. The space between the chamber walls and

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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 part : 2 coarse sand : 4 graded aggregate 20 mm. nominal size) 40 mm. thick and rendered smooth. The

finished top of the cover shall be left about 40 mm. above the adjoining ground level so as to exclude the surface

water from entering the gulley trap.

3.0. Mode of measurements & payment

3.1. The rate includes cost of all labour, materials, tools and plant etc. required for satisfactory completion of this

item as described above.

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

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 be 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. 178

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 walls 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.

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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 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 24.47 (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.

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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 addition 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 confirm 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 mm. 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 181

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.

24.27(1) Extra over item 24.1 for providing salt glazed stoneware fittings : Bends of required degree (Any Radius) 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.

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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. 183

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(1) 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.

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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.

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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.

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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)

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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

CONSTRUCTION OF NEW CATTLE BOX NEAR SHRI BALA HANUMAAN TEMPLE- AIR PORT ROAD, BHAVNAGAR

measurements shall be taken for the top and bottom guide rails, rollers, fittings, etc.

1.50 (For painting all over

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 then 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

2. Hold Fast 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

13. Tower Bolts (Barrel Type) 200 x 10 1 1 1 1 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

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

25. Handles 75 - - - - -

26. Doorstopper 75 1 1 1 1 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 - - - - -

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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 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

12

--

13. ----- 8 --

14. - 1 1 1 1 1 1 ----- 6 --

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 ---- 4 -

25. ----- 1 1 2 2 1 ----- 2 4 2 -- 4 -

26. ----- 8

4

-

27. - 1 1 1 1 1 1 ----- 6 -

28. ----- 2 - 2 ----- 2

Per 75 mm. length

29. ----- 1 1 1 ----- 7

30. ----- 1 ----- 1 --- 7

31. ----- 4

32. ----- 1 -----

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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
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NOTE : PLEASE READ CAREFULLY :

- (1) Where detailed specification of an item provides for specific size of nay 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 dallied 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 extend 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 slid, 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 indicts 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 prescribe below corresponding to the material concerned

shall be taken as periodic intervals as stipulated below be taken.

The Material shall be got tested Govt. recognized Laboratory (R & B) or field Laboratory of GERI (R & 6) for which 1

% of the estimated amount 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 GERI. 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

taken

1. Kapchi - Gradation test

-

- Impact Value

- Flakiness Index of aggregate

CMT 1 to 100 – 1 test

100 to 500 – 3 tests

500 to 1500 – 5 tests

1500 to 5000 – 7 tests

2. Grit - Stripping Value

3. Sand - Special gravity

- Water absorption

- Fineness Modulus

- Silt – Content

- Soundness

4. Tiles - Dimension Test

- Transverse strength

- Water Absorption

- Abrasion Test

CONSTRUCTION OF NEW CATTLE BOX NEAR SHRI BALA HANUMAAN TEMPLE- AIR PORT ROAD, BHAVNAGAR

5. Teakwood - Anatomy Test

- Density Test
- Moisture Content Test

6. Bricks - Water absorption

- Effluence
- Size
- Comprehensive Strength

1 Test @ 50,000 Bricks

7. Cement - Consistency

- Setting Time
- Compressive Strength

1 Test @ 10.0 M.T.

As per manual of Quality

Control

8. Steel - Tensile Strength

- Yield Stress
- Elongation
- Size

9. C.C. Cube test 1:2:4 - Compressive Strength 1 to 5 Cum. 1 No.

6 to 15 Cum. 2 Nos.

16 to 20 Cum. 3 Nos.

21 to 50 Cum. 4 Nos.

51 & Above Cum. 4 +

1 for each Cum or part thereof

The contractor shall have to pay 1% of the estimate cost put to tender towards all testing of materials & same shall be

deducted from their bills for the works. The testing of various materials shall be carried out in GERI and result received

shall be binding to all. i.e. contractor and Govt.

Testing Charges of GERI shall be born by Govt. No refund be made or extra charge over 1 % shall be recoverable form the contractor.

SIGN OF CONTRACTOR

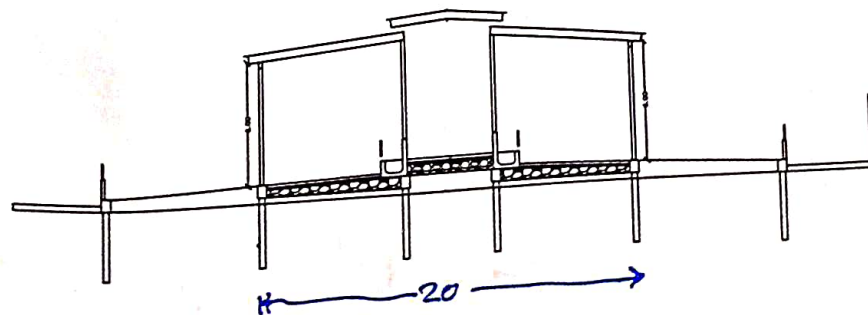
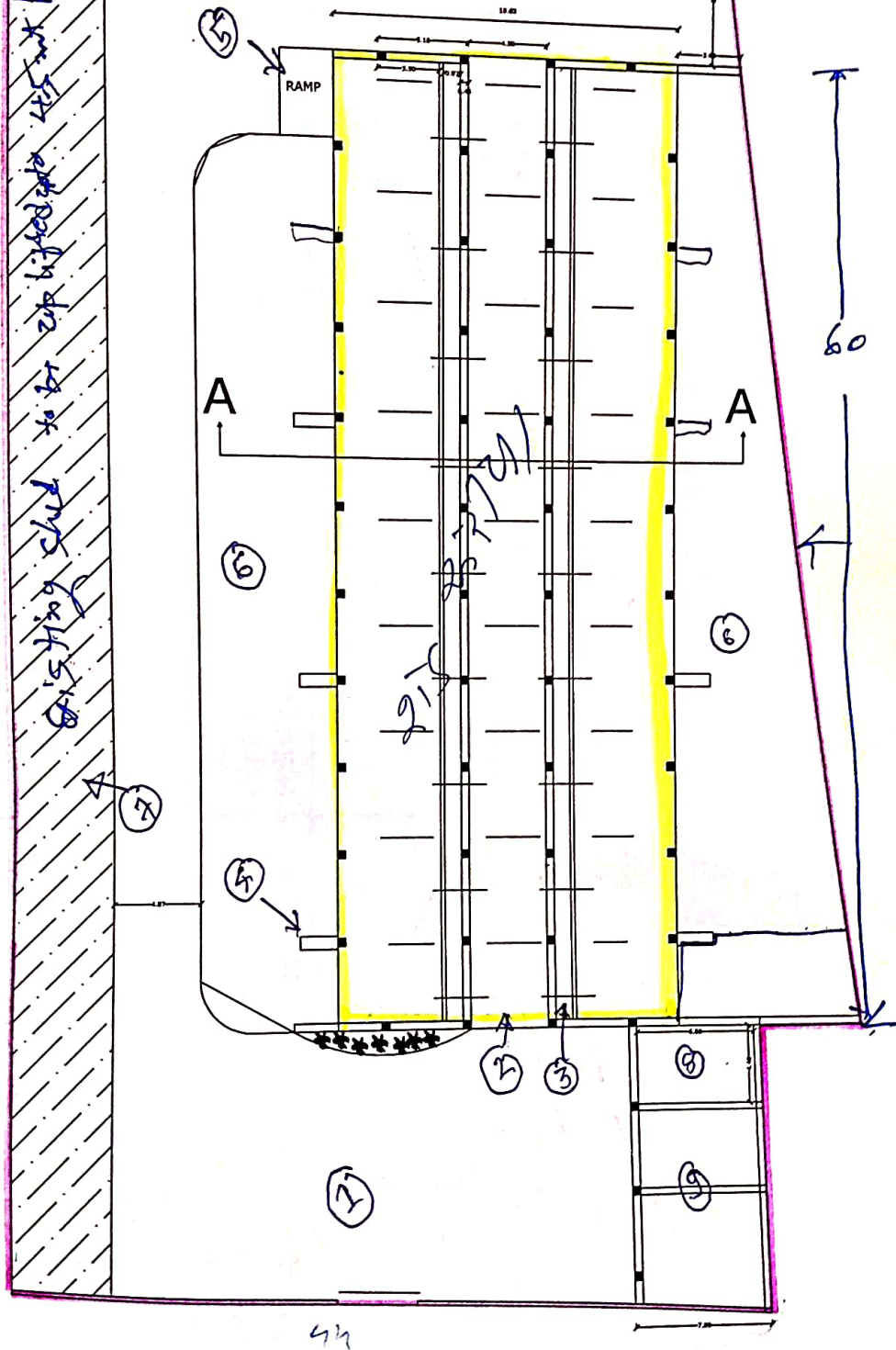
**Signature of
The Contractor**

**Signature of
EXECUTIVE ENGINEER
BUILDING DEPARTMENT
BHAVNAGAR MUNICIPAL CORPORATION
BHAVNAGAR**

AN. 45

દોરડો
શ્રીબાલકૃષ્ણ
મંદિર બાજુ માં

84.0





ભાવનગર મહાનગર પાલિકા – ભાવનગર

બિલ્ડીંગ વિભાગ

Name of Work :-

Construction of new Cattle box near Shri BALA Hanumaan Temple- Air Port road, Bhavnagar.

Abstract sheet

No	ITEM	QTY	RATE	UNIT	AMOUNT
1	Excavation for foundation upto 1.5 m depth including sorting out and stacking of useful materials and disposing off the excavated stuff upto for lead of (E) 400 to 500 Meter lead.(B) Dense or Hard soil	406.00	290.17	Cum	117809.02
	Govt. R&B / SOR - 2024-25 / Ch.no. 4 / item code - 04001B, 04005E				
2	Excavation for foundation for depth from 1.5 m to 3.0 m including sorting out and stacking of useful materials and disposing off the excavated stuff upto for lead of (E) 400 to 500 Meter lead.(B) Dense or Hard soil	14.00	303.83	Cum	4253.62
	Govt. R&B / SOR - 2024-25 / Ch.no.4 / item code - 04002B, 04005E				
3.1	Boring holes 3.5 m deep in ordinary soil (for cast in situ piles) and getting out the soil and disposal of the surplus excavated soil as directed within a lead of 50 Meter for following diameter of pipes.(iii) 300 mm	150.00	1561.18	Nos	234177.00
	Govt. R&B / SOR - 2024-25 / item code - 04010 C				
3.2	Extra for under reaming inside the bore Holes for under reamed piles of following Diameter.(iii) 300 mm	60.00	557.99	Nos	33479.40
	Govt. R&B / SOR - 2024-25 / item code - 04012C				
3.3	Extra for under reaming inside the bore Holes for under reamed piles of following Diameter.(iii) 300 mm	290.00	664.50	Nos	192705.00
	Govt. R&B / SOR - 2024-25 / item code - 04011C				
4.1	Uncoursed Rubble Masonry with hard stone of approved quality in foundations and plinth in Cement Mortar 1:5 (1-cement : 5-coarse sand) including levelling up etc. complete	955.00	2635.14	Cum	2516558.70
	Govt. R&B / SOR - 2024-25 / Ch.no.7 / item code - 07001BA				
4.2	Providing, supplying, spreading, compacting GSB for base of concrete.	1269.00	1013.03	Cum	1285535.07
	BMC Road department 2024-25 item no. 54				
5.1	Providing and laying cement concrete pavement (25mm to 50mm thick) with 1:2:4 (1-cement : 2-coarse sand : 4-stone aggregate 20mm nominal size) including finishing with floating coat of neat cement complete.	380.00	4587.96	Cum	1743424.80
	Govt. R&B / SOR - 2024-25 / Ch.no.14 / item code - 14016A				
6.1	Providing and laying controlled cement concrete M.250 and curing complete including the cost of form work but excluding the cost of reinforcement reinforced concrete work in (A) Foundations, footings, Base of columns and Mass concrete.	629.00	4692.46	Cum	2951557.34
	AS PER R.A.				
7.1	Providing and laying controlled cement concrete M.250 and curing complete but excluding the cost of form work and reinforcement reinforced concrete work in (A) Foundations, footings, Mass concrete.	48.00	3824.10	Cum	183556.80
	Govt. R&B / SOR - 2024-25 / Sr.no.19 / item code - 05010A / page no. 34				
8.1	Providing laying controlled cement concrete M-250 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in GROUND BEAMS / PLINTH BEAMS	75.00	6329.67	Cum	474725.25
	AS PER R.A.				
9.1	Providing laying controlled cement concrete M-250 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in COLUMN UP TO GROUND FLOOR	21.00	9109.19	Cum	191292.99
	AS PER R.A.				

No	ITEM	QTY	RATE	UNIT	AMOUNT
10.1	Providing laying controlled cement concrete M-250 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in COLUMN UP TO FIRST FLOOR	11.00	9142.52	Cum	100567.72
	AS PER R.A.				
11.1	Providing laying controlled cement concrete M-250 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in COPPING FOR ALL LEVEL	5.00	6523.59	Cum	32617.95
	AS PER R.A.				
12.1	Brick work using common Brunt clay building bricks having crushing strength not less than 35 Kg./Sqcm. In foundation and plinth in cement mortar 1:6 (1cement : 6 fine sand) (B) Conventional UP TO PLINTH LEVEL	187.00	4279.97	Cum	800354.39
	Govt. R&B / SOR - 2024-25 / Ch.no.6 / item code - 06002B				
13.1	Brick work using common Brunt clay building bricks having crushing strength not less than 35 Kg./Sqcm. In foundation and plinth in cement mortar 1:6 (1cement : 6 fine sand) (B) Conventional (up to 10 ton) FOR GROUND FLOOR	209.00	4670.24	Cum	976080.16
	AS PER R.A.				
14.1	Brick work using common Brunt clay building bricks having crushing strength not less than 35 Kg./Sqcm. In foundation and plinth in cement mortar 1:6 (1cement : 6 fine sand) (B) Conventional (up to 10 ton) FOR FIRST FLOOR	97.00	4713.67	Cum	457225.99
	AS PER R.A.				
15.1	Half brick masonry in common brunt clay building strength not less than 35 Kg./Sqcm. In cement mortar 1:3 (1cement : 3 coarse sand) with 2 Nos. of 6 mm. Diameter mild steel round bars after every three coarse embedded in cement mortar in foundation and plinth for up to GROUND FLOOR	16.00	704.14	Sqm	11266.24
	Govt. R&B / SOR - 2024-25 / Ch.no.6 / item code - 06009BA				
16.1	Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20 cm. in depth consolidating each disposed layer by ramming and watering.	1717.00	137.47	Cum	236035.99
	Govt. R&B / SOR - 2024-25/ Ch.no.4 / Sr.no.26 / item code - 4006				
17.1	Filling in foundation and plinth with murrum or selected soil in layers of 20cm. thickness including watering, ramming and consolidating etc. complete.	2194.00	304.59	Cum	668270.46
	Govt. R&B / SOR - 2024-25 / Ch.no.4 / Sr.no.27 / item code - 4008				
18.1	Filling in plinth with sand under floors including watering ramming, consolidating and dressing complete	675.00	489.28	Cum	330264.00
	Govt. R&B / SOR - 2024-25 / Ch.no.4 / Sr.no.27 / item code - 4007				
19.1	Providing and laying controlled cement concrete M-250 and curing etc. complete including the cost of form work but excluding the cost of reinforcement For reinforced concrete work in R.C.C. Lintel For Ground floor.	1.00	7640.65	Cum	7640.65
	AS PER R.A.				
20.1	Providing and laying controlled cement concrete M-250 for reinforced concrete chajjas not exceeding 15 cm. thickness up to floor two level including finishing the exposed surfaces with cement mortar 1:3 (1cement :3 fine sand) to give a smooth surface centring and form work and curing complete excluding cost of reinforcement for Ground Floor	4.00	7472.99	Cum	29891.96
	AS PER R.A.				
21.1	Providing and laying controlled cement concrete M-250 and curing etc. complete including the cost of form work but excluding the cost of reinforcement For reinforced concrete work in R.C.C. Beams for Ground Floor.	45.00	9109.19	Cum	409913.55
	AS PER R.A.				
22.1	Providing and laying controlled cement concrete M-250 and curing etc. complete including the cost of form work but excluding the cost of reinforcement For reinforced concrete work in R.C.C. slabs having any thickness for GROUND FLOOR	12.00	6680.14	Cum	80161.68
	AS PER R.A.				
23.1	Providing and laying controlled cement concrete M-250 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in R.C.C.WALL/Pardi FOR ARCH or all thickness and cantilever up to floor two level. FOR GROUND FLOOR UP TO FLOOR TWO LEVEL	131.00	7255.84	Cum	950515.04
	AS PER R.A.				
24.1	Providing TMT Bar FE 500D reinforcement for R.C.C. work including bending, binding and placing in position complete upto floor two level	65579.82	77.28	Kg	5068008.48
	Govt. R&B /SOR 2024-25 Ch.no.5 / Sr.no.39 / item code - 05014C/ page no.39				

No	ITEM	QTY	RATE	UNIT	AMOUNT
25.1	Providing and Fixing safety grill for windows, ventilations, doors/Railing for staircase and Ramp, front and side elevation fins of required pattern for windows/ Door/ staircase and Rempusing M.S.polished bars& C.I. MOULD PIPES size 12mm flat and rectangular / round M.S.pipes of required size at required spac in gasper design with one coat of primer and two coats of matt finished oil painting directed by architect and hold fast with coach bolts etc. complete.	7300.00	103.02	Kg	752046.00
	AS PER R.A.				
26.1	Steel work, welded in built up sections framed work including cutting, hoisting, fixing in position and applying a priming coat of red lead paint. (D) In trusses and trussed purlins, upto 20 M. span and 10 M overall height.	52000.00	129.28	Kg	6722560.00
	AS PER R.A.				
27.1	P & F MS Grill in shed area with framing of MS Angle 35x35x5 mm and infill 10 gauge welded mesh with not more than 38x38 mm gaps so as to ensure proper stiffness and stretching of mesh with proper fixing and making good as per Design and as approved by EIC etc complete Inclusive of primer coat of Neto Zinc, two coats of enamel paint of standard company as per instructions of EIC etc complete	300.00	111.10	Kg	33330.00
	AS PER R.A.				
28.1	Providing corrugated coated G.I. sheet of class-3 roofing fixed with glavanised iron J or L Hooks, Bolts and nuts 8mm diameter with bitumen and G.I. limpet washer or G.I. limpet washer. filled with white lead complete excluding the cost of purlins, Rafters and Trusses. (1) 0.80 mm thick sheet. (upto 10 ton)	1640.00	734.18	Sqm	1204055.20
	Govt. R&B / SOR - 2024-25 / Ch.no.15 / Sr.no.1 / item code 15001				
29.1	Providing ridges or hips 600 mm overall in plain G.I. sheet class-3 fixed with G.I.J. or L Hooks and nuts 8mm dia G.I. Limpet and bitumen washer complete. (1) 0.80 mm thick sheet. (upto 10 ton)	380.00	664.70	Sqm	252586.00
	Govt. R&B / SOR - 2024-25 / Ch.no.15 / Sr.no.2 / item code 15002				
30.1	Providing and fixing window having extruded aluminum Colour anodized section frame main outer size 95mm x 24mm x 1.17mm (of Jindal Section no:2459 @ wt.of 0.738 Kg/mt), horizontal Three track member size 92mm x 31.75mm x 1.30mm (of Jindal Section no:8688 @ Wt.1.07 Kg/mt), vertical member of size 92mm x 31.75mm x 1.50mm (of Jindal Section no:8933 @ Wt. 1.06 Kg/mt) with sliding shutters of horizontal member size 40 mmx18mm x1.29mm (of Jindal Section no:8947 @ wt.of 0.456 Kg/mt), vertical member of size 40mm x 18mm x 1.29 mm (of Jindal Section no:8949 @ wt.of 0.456Kg/mt/ with 5 mm thick transparent bronze colour tinted float glass with powder coated aluminum fittings and fixtures and transparent silicon sealant glass fixing to frame as per details etc	24.00	1583.95	Sqm	38014.80
	Govt. R&B /SOR 2024-25Ch.no.11 / Sr.no.26 / item code - 11027/ page no.150				
31.1	Providing 15 mm. Thick cement plaster in two coats on fair side brick / concrete wall for interior plastering consisting of 12 mm. Thick backing coat of cement mortar 1:4 (1-Cement : 4-sand) and 3 mm. Thick finishing coat of C.M. 1:1 (1-cement : 1-fine sand) etc. complete for Ground floor.	1561.00	228.26	Sqm	356313.86
	AS PER R.A.				
32.1	Providing 10 mm. thick cement plaster in single coat on fair side concrete for plastering on ceiling and soffits of stairs up to floor two level and finished even and smooth in : (I) Cement mortar 1:3 (1 cement : 3 sand) for finishing with a floating coat of neat cement slurry. Ground floor.	200.00	200.99	Sqm	40198.00
	AS PER R.A.				
33.1	20mm thick sand faced cement plaster on walls upto height 10 metres above ground level consisting of 12mm thick backing coat of C.M. 1:3 (1-cement : 3-sand) and 8mm thick finishing coat of C.M. 1:1 (1-cement : 1-sand) etc. complete	2800.00	350.57	Sqm	981596.00
	Govt. R&B /SOR 2024-25 / Ch.no.17 / Sr.no.18 / item code - 17009/ page no.206				
34.1	Finishing wall with weather proof exterior emulsion paint on wall surface (two coats) to give an required shape even shade after thoroughly brushing the surface to remove all dirt, and remains of loose powdered materials.etc complete	2792.00	122.13	Sqm	340986.96
	Govt. R&B /SOR 2024-25 / Ch.no.19 / Sr.no.34 / item code - 19031/ page no.217				
35.1	Wall painting (two coats) with plastic emulsion paint of approved brand and manufacture on wall surfaces to give an even brushing the surface free from mortar droppings and other foreign matter and sand papered smooth..	1761.00	84.81	Sqm	149350.41
	Govt. R&B /SOR 2024-25 / Ch.no. 18 / Sr.no.31 / item code - 18031/ page no.211				

No	ITEM	QTY	RATE	UNIT	AMOUNT
36.1	Applying two coats of Birla or Asian acrylic lappy (putty) and two coats of primer of approved brand and manufacture on new wall surface to give an even shade including thoroughly brushing the surface free from mortar dropping and other foreign matter and sand papared smooth.	1761.00	40.59	Sqm	71478.99
	Govt. R&B /SOR 2024-25 / Ch.no. 19 / Sr.no.35 / item code - 19032/ page no.217				
37.1	Providing and laying 24" x 24" Vitrified tiles 8mm thick flooring over 20 mm. (average thick base of cement mortar 1:3 (1 cement : 3 coarse sand) and laid over and jointed with white cement slurry with pigment match to shade of tiles etc. complete.	49.00	1120.36	Sqm	54897.64
	Govt. R&B /SOR 2024-25 / Ch.no. 14 / Sr.no.55 / item code - 14008C / page no.180				
38.1	Providing and laying Vitrified tiles 8mm. thick 24" x 24" in skirting risers of steps and dado on 10 mm. thick cement plaster 1:3 (1 cement : 3 coarse sand) and jointed with white cement slurry.	5.00	1195.02	Sqm	5975.10
	Govt. R&B /SOR 2024-25 / Ch.no. 14 / Sr.no.63 / item code - 14009C / page no.181				
39.1	Providing and laying polished kota stone slab 25mm thick in risers of steps,skirting Dedo and pillars laid on 10mm thick cement mortar 1:3 (1-Cement : 3 coarse sand) and jointed with gray cement slury mixed with pigment to match the shade of slab including rubbing and polishing etc. complete. (upto 10 ton)	72.00	1135.48	Sqm	81754.56
	Govt. R&B /SOR 2024-25 / Ch.no. 14 / Sr.no.75 / item code - 14013 / page no.184				
40.1	Providing and laying 19 to 20mm thick DHOLPUR stone flooring cement mortar1:3 (1cement:3coarsesand) laid over and jointed with grey / white cement slurry with matching color of stone including half roundnosing, rubbing and polishing etc complete.	36.00	1078.68	Sqm	38832.48
	AS PER R.A.				
41.1	Providing and laying white glazed tiles 6mm thick in skirting risers of steps and dedo on 10mm thick cement plaster 1:3 (1-cement : 3-coarse sand) and jointed with white cement slurry	23.00	921.72	Sqm	21199.56
	Govt. R&B /SOR 2024-25/ Ch.no. 14 / Sr.no.59 / item code - 14009A / page no.181				
42.1	Providing and laying white glazed tiles 6mm thick in skirting risers of steps and dedo on 10mm thick cement plaster 1:3 (1-cement : 3-coarse sand) and jointed with white cement slurry	4.00	1015.77	Sqm	4063.08
	Govt. R&B /SOR 2024-25/ Ch.no. 14 / Sr.no.53 / item code - 14008B / page no.180				
43.1	Providing and Laying Brickbat base "india type waterproofing" in required gradient in average thickness of 100 mm. Surface of slab to be well cleaned and to make free form loose mortar. brick bats to be laid on c:m (1:4) in "ridge and valley" pattern and joints to be filled with c:m (1:4) mixed with integrated water proofing compound in required proportion as per manufacturers instruction and then topping coat to be treated with c:m(1:4)roughned to recieve china mozaic. Whole work is to be carried out through specialist agency and shall also carry 10year workmanship garurantee bond for water-tightness. (The bond shall be on non judicial stamp paper.) The item is to be provided as terrace water proofing as well as fillet (vata) as directed by Engineer incharge. (To be carried out through specialist agency)	34.00	339.73	Sqm	11550.82
	{ R.A , Reference S.O.R.PageNo.118itNo8/Itemcode14003 A No.8/14.16}				
44.1	Providing and laying broken chine mosaic flooring for terrace using 12 mm to 20 mm broken pieces of glazed tiles to be laid over cement mortar 1:3 to plain or slope and to be tempered to bring mortar creme out upto surface using white cement including rounding off junctions and extending them upto 15 cm along the wall,clearing with water and oxalic acid etc. as directed.	34.00	779.69	Sqm	26509.46
	{S.O.R.PageNo.118itNo8/Itemcode14035 A No.8/14.16}				
45.1	Providing and fixing pre-cast Rubber Dye inter locking concrete block 60mm thick with grade of concrete M250 pneumatic compressed by mechanically pressed and as per approved design including 75mm Sand layer for levelling and filling the joint with sand in proper line and level etc complete.	270.00	673.67	Sqm	181890.90
	Govt. R&B /SOR 2024-25/ ch.14/Sr.no.104/ item code 14034 / page no.191				
46.1	Providing, laying and jointing in true line and level 110 diametre U.P.V.C (Type B) conforming to IS 13592-1992 with one end plain and other end socketed with rubber ring, & fittings conforming to ISI 14735-1999 of approved make for drainage system pipe line, pipe shall be jointed with each other with rubber lubricant, pipe shall be fixed on wall using of PVC clamp of the size 110 mm diametre x 149 mm length x 145 mm heigh at every 2000 mm center to center or shall be concealed in walls as directed including necessary fittings such as bends, shoes etc. including testing of pipes and joints and jointed with adhesive solvent cement including cost of all materials.	384.00	897.78	Rmt	344747.52
	Govt. R&B /SOR 2024-25 / ch.23/.sr.no.102 / item code 23067 / page no.259				

No	ITEM	QTY	RATE	UNIT	AMOUNT
47.1	Providing laying and jointing in true line and level 25mm dia. U.P.V.C. Pipe (SCH- 40) for cold water including fittings make PRINCE / SUPREME / ASTRAL / FINOLEX or equivalent as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two metre C/C or shall be cancelled as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.	200.00	91.83	Rmt	18366.00
	Govt. R&B /SOR 2024-25 / ch.23/sr.no.98 / item code 23062 / page no.259				
48.1	Providing laying and jointing in true line and level 15mm dia. U.P.V.C. Pipe (SCH- 40) for cold water including fittings make PRINCE / SUPREME / ASTRAL / FINOLEX or equivalent as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two metre C/C or shall be cancelled as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.	48.00	85.71	Rmt	4114.08
	Govt. R&B /SOR 2021-22 / ch.23/sr.no.98 / item code 23061 / page no.259				
49.1	providing and fixing water closet squatting pan (indian type w.c pan) size 580 mm (Earth work, bed concret foot rests and trap to be measured and paid for separately) (A) vitreous china (i) long pattern white colour with 100 mm size "p" or "s" trap for water closet squatting pan including joining the trap with the pan and soil in cement mortared 1:1 including pulffin cement mortar 1:3 (1 cement :3 coarse sand) A pair of white vitreous china 250 mm x 130mm x 30mm foot rest for long pattern squatting pan water closet inclu.providing fixing G.I inlet connection for flush pipe with w.c pan	2.00	900.92	Nos	1801.84
	AS PER R.A.				
50.1	Providing and fixing S.W.R. pvc pipe for soil and waste water including necessary fittings like band, door bend, Y, Tee, Cowel, in floor and wall of approved make like ASTRAL, Finolex or Supreme complete. (A) 110 mm.	60.00	381.78	Rmt	22906.80
	AS PER R.A.				
51.1	Providing and fixing S.W.R. pvc pipe for soil and waste water including necessary fittings like band, door bend, Y, Tee, Cowel, in floor and wall of approved make like ASTRAL, Finolex or Supreme complete. (A) 75 mm.	20.00	278.76	Rmt	5575.20
	AS PER R.A.				
52.1	Providing and fixing screwdowm bib taps of following size (A)Brass screw down bib tap polished bright (A) 15 mm dia.	6.00	186.82	Nos	1120.92
	Govt. R&B /SOR 2024-25/ ch.23/Sr.no.61/ item code 23028A1 / page no.253				
53.1	Providing and fixing gun metal check or non return l valve.@25 mm dia for flushing system	4.00	420.63	Nos	1682.52
	Govt. R&B /SOR 2021-22 / ch.23/Sr.no.74/ item code 23031C / page no.254				
54.1	Providing and fixing washbasin with single hole for pillar tap with C.I. or M.S. brackets painted white including sutting holes and making good the same but excluding fittings (A) Vitreous China:(ii) Flat Back washbasin 550 mm x v 400mm size. (i) In white colour (R & B sor p.67 item no 18.23.127) +Providing and fixing C.P. brass waste for washbasin or sink.(A) 32mmdia.(R & B sor p.68 item no 20.23.135) +Providing and fixing M.I. fisher union for washbasin or sink.R & B sor p.68 item no 21.23.136) with Providing and fixing 100mm sand cast iron grating for gully, floor or Nahni trap R & B sor p.68 item no 21.23.136) (A) 32mm dia.	2.00	1404.91	Nos	2809.82
	AS PER R.A.				
55.1	Supplying, and fixing PVC water tank of ISI make including delivery at site ,suply and fixing inlet, outlet ,overflow, ballcock, drainage sleeves of specific size ,with necessary neoprena gasket/packing /washer, G.I washer, and checknut etc. complet as directed on terrace,loft,bath room etc in any height .the rate shall be include for fixing additional accessories supplied by supplier accessories etc completed.	1000.00	3.94	Litr	3940.00
	Govt. R&B /SOR 2024-25 / ch.22/Sr.no.14/ item code 22014/ page no.241				
56.1	Providing and fixing S.W. gully trap with C.I. grating brick masonry chamber and water tight C.I. cover with frame of 300mm x 300mm size (inside) with standard weight.(i) Square mouth traps. (A) 100mm x 100mm size P type. (upto 10 ton)	4.00	1292.19	Nos	5168.76
	Govt. R&B /SOR 2024-25 / ch.24/Sr.no.21/ item code 24006A / page no.264				
57.1	Constructing brick masonry chamber for underground Inspection chamber and bends with bricks having croshing strength not less than 35Kg. Cm2 in C.M. 1:5 C.I. cover with frame (Light duty) 455mm x 610mm intenal dimensions total weight of cover with frame to be not less than 38Kg. (Wt. of cover 23 Kg.) and Wt. of frame 15Kg.) (R.C.C. top slabe with 1:2:4 mix (1-cement :2- coarse sand :4- graded stone aggregate 20mm size) foundation concrete 1:5:10 inside plaster 15mm thick with cement mortar 1:3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete.(i) Inside dimensions 455mmx 610mm and 450mm deep for single pipe line. (upto 10 ton)	4.00	2675.64	Nos	10702.56
	Govt. R&B /SOR 2024-25 / ch.24/Sr.no.60/ item code 24061A / page no.274				
58.1	Water conection with necessary fitting etc complete (75mm dia UPVC line and job)	1.00	1010.00	job	1010.00
	M.R				
59.1	Drainage conection with necessary fitting	1.00	1010.00	job	1010.00
	M.R				

No	ITEM	QTY	RATE	UNIT	AMOUNT
60.1	Providing and fixing PVC SWR Nahni trap IS 14735 for drain - 100 mm diameter with jail of the following nominal diameter of self cleansing design with C.I screed down or hinged grating including the cost of cutting and making good the walls..	4.00	600.23	Nos	2400.92
	Govt. R&B /SOR 2024-25/ ch.23/Sr.no.104/ item code 23068 / page no.260				
61.1	Surface dressing of the ground including removing trees, vegetation and making surface levelled and disposal of rubbish outside premises to an unobjectionable place, as directed by the Engineer in Charge.	4250.00	5.85	Sqm	24862.50
62.1	Point wiring for Light / Bell with 2-1.5 sq.mm & earthwire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of pipe to be erected concealed in/ on surface on wall/ceiling complete with 6A Modular type switch / bell push & accessories and earth continuity of following type, erected on PVC / Metallic box, single mounting base frame covered with textured/metallic front plate modules erected on / in wall / ceiling as per pipe erected, with necessary Lamp holder/ceiling rose / H.D.Connector as directed. (a) with medium class Rigid PVC pipe and accessories CATIII	82.00	424.20	Point	34784.40
63.1	Point wiring for FAN with 2-1.5 sq.mm & earthwire of 1.5 sq.mm (Green) both are of .ISI marked 1.1 KV Grade FRLS PVC insulated multistrand copper wires, in following type of pipe to be erected concealed in / flushed on wall/ceiling complete with 6A Modular type switch and hum free EME four or more step type electronic fan regulator with separately mounted and accessories with earth continuity of following type erected on PVC / Metallic box, single mounting base frame covered with textured/metallic front plate modules erected on / in wall / ceiling as per pipe erected, with necessary ceiling rose / H.D.Connector as directed. (a) with medium class Rigid PVC pipe and accessories CAT III	52.00	606.00	Point	31512.00
64.1	Point wiring for Looped Plug with 6A Modular type switch & 5 pin socket erected on PVC / Metallic box, single mounting base frame covered with textured / metallic front plate modules erected on / in wall / ceiling with following type accessories CAT III	54.00	242.40	Point	13089.60
65.1	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 Modular type switches and following type of accessories erected on PVC / Metallic box, single mounting base frame covered with textured / metallic front plate modules erected on / in wall / ceiling as per pipe erected, with necessary batten/angle holder or ceiling rose or H.D.Connector as directed. (a) with medium class Rigid PVC pipe and accessories CAT III	50.00	535.30	Point	26765.00
66.1	Point wiring for Individual Plug with & earthwire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of to be erected concealed in / on surface of wall / ceiling complete with Modular type switch & 5 pin Plug erected on PVC / Metallic box covered with appropriate front plate modules erected on / in wall / ceiling as per pipe erected with following type of accessories. [I] For 6A Plug with 2-1.5 sq.mm Cu. Wire (a) with medium class Rigid PVC pipe and accessories CAT III	50.00	449.45	Point	22472.50
67.1	Point wiring for Individual Plug with & earthwire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multistrand copper wires, in following type of to be erected concealed in / on surface of wall / ceiling complete with Modular type switch & 5 pin Plug erected on PVC / Metallic box covered with appropriate front plate modules erected on / in wall / ceiling as per pipe erected with following type of accessories. [III] For 16A Plug with 2-4 sq.mm Cu. Wire (a) with medium class Rigid PVC pipe and accessories CAT III	52.00	797.90	Point	41490.80
68.1	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 (c) with oval conduit /pvc casing capping double lock type (b) 2 wire 2.5 sq. mm	650.00	80.80	Rmt	52520.00
69.1	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	590.00	111.10	Rmt	65549.00

No	ITEM	QTY	RATE	UNIT	AMOUNT
70.1	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) (M) Three phase 8 way single door for single phase outgoing horizontal box	28.00	2121.00	Each	59388.00
71.1	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	10.00	116.15	Each	1161.50
72.1	Approved make ELCBs / RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 6 KA and suitable for operation on 3 phase and neutral 415V. having characteristic of quick action & tripping with all advance feature & do not incorporate any electronic component for following Max. rating erected as directed. (iii) 63 Amps. FP CAT III	12.00	3585.50	Each	43026.00
73.1	Providing and erecting Approved make Ceiling fan with double ball bearing ISI mark with condenser A.C. 230V.50 c/s.1200 mm. sweep complete, canopy and 30 cms. down rod erected on existing hook or clamp with 24/0.2 , 3 core flexible wire with earthing. [Make shall be approved by Engineer in charge]	6.00	1717.00	Each	10302.00
74.1	Providing & erecting fresh air fan 250 mm dia with square frame make of ABS body with louvers CAT II	4.00	1838.20	Each	7352.80
75.1	Supplying and erecting LED indoor fittings with LEDs of wattage 0.2 Watt to 0.5 Watt assembled on single MCPCB, with housing used as a heat sink shall be made of thick sheet Steel conforming to IS: 513/CRCA polyester powder coated and high U.V. & corrosion resistance with diffuser and/or Polycarbonate optics with company mark/name 120 to 300 V, Power Factor more than 0.9, THD < 10 %, CCT 4000 K to 6500K, Uniformity ratio >0.7, Luminaire efficacy> 85 lumens/watt , LED driver efficiency > 85% OSRAM / PHILIPS Lumileds / HYBEC/ HAVELS/Bridgelux(U.S.A.)/ make LED used for luminaire. (Each fitting required LM-79 & LM-80 Certificates) (A) Tube Light with integral/ non-integral driver (e) 36 Watts, Surge-4 KV, IP-20, 4 feet CAT III	30.00	1414.00	Each	42420.00
76.1	Supplying and erecting LED indoor fittings with LEDs of wattage 0.2 Watt to 0.5 Watt assembled on single MCPCB, with housing used as a heat sink shall be made of thick sheet Steel conforming to IS: 513/CRCA polyester powder coated and high U.V. & corrosion resistance with diffuser and/or Polycarbonate optics with company mark/name 120 to 300 V, Power Factor more than 0.9, THD < 10 %, CCT 4000 K to 6500K, Uniformity ratio >0.7, Luminaire efficacy> 85 lumens/watt , LED driver efficiency > 85% OSRAM / PHILIPS Lumileds / HYBEC/ SEOUL/Bridgelux(U.S.A.)/ make LED used for luminaire. (Each fitting required LM-79 & LM-80 Certificates) (B) LED Lamps integral type, cool white with PC diffuser suitable for B22 LAMP holder (b) 5 to 8 watts	4.00	303.00	Each	1212.00
77.1	Supplying and erecting LED street light / Flood light fittings with High power White LEDs wattage of 1Watt and above assembled on single MCPCB, efficiency more than 130 lm/w and corrosion free High pressure die cast aluminum housing with smooth finish powder coated and heat sink extruded aluminium with diffuser and Polycarbonate optics/ lenses with company mark/name engraved or embossed 120 to 300 V, Power Factor more than 0.95, THD < 10 %, CCT 5000 K to 5700K, Uniformity ratio >0.45, Luminaire efficacy> 85 lumens/watt . LED driver efficiency > 85 %. OSRAM / PHILIPS Lumileds / HYBEC / HAVELS/ Bridgelux (U.S.A.) make LED used for luminaire. (Each fittings required LM-79 & LM-80 certificates) (A) Street Light (IP-65), Surge -4KV © Above 24 watts to 36 watts	15.00	4999.50	Each	74992.50
78.1	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.	6.00	9059.70	Each	54358.20
79.1	Providing and erecting Annealed bare Copper wire 8 to 16 SWG.	6.00	717.10	kg	4302.60

No	ITEM	QTY	RATE	UNIT	AMOUNT
80.1	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. (B) 4 core 6 Sq. mm	360.00	494.90	Rmt	178164.00
81.1	Supplying and erecting 19 / 20 mm. nominal bore Medium Class M.S. Pipe down rod erected duly painted for fan complete with necessary 24/ O.20, 3 core flexible wire with earthing.	32.00	126.25	Rmt	4040.00
82.1	Supplying & erecting Fan Hook of 10 mm M.S. Round bar grouted in RCC slab with Making the site as original.	8.00	50.50	Rmt	404.00

No	ITEM	QTY	RATE	UNIT	AMOUNT
83.1	Providing and erecting ISI mark Medium class RIGID PVC PIPES of following size complete to be erected on/in wall or ceiling erected with necessary PVC fittings & Junction boxes fixed with adhesive solution & Clamps with following dia of pipes, in approved manner as directed (b) 25 mm	360.00	32.32	Rmt	11635.20
84	Constructing 2.5mt dia water harvesting structure as per department design for ground water recharge purpose for the plot area, Excavation, hannycorb brick masonry, RCC cover slab (perforated) , 3 grade of sand filter etc coml.	1.00	30000	Nos	30000.00
85	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	1440.00	141.40	Mtr.	203616.00
86	Providing and erecting XLPE(IS:7098)(I)-88 ISI armoured cable multistrand / Solid Copper conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe at road crossing or floor of following size of cables. (A) 4 core 2.5 Sq. mm	1440.00	317.14	Mtr.	456681.60
87	Supplying & erecting Galvanized M.S pipe post "B" class 88.9 mm O.D 4 mtr. Long duly painted with two coats of aluminium paint complete with metallic base plate of 300 mm x 300 mm x 4mm thick for using as a compound light pole with approx. weight 32 Kg.	15.00	3805.68	Each	57085.20
88	Supplying and erecting LED street light / Flood light fittings with High power White LEDs wattage of 1 Watt and above assembled on single MCPCB, efficiency more than 130 lm/w and corrosion free High pressure die cast aluminum housing with smooth finish powder coated and heat sink extruded aluminium with diffuser and Polycarbonate optics/ lenses with company mark/name engraved or embossed 120 to 300 V,Power Factor more than 0.95, THD < 10 %, CCT 5000 K to 5700K, Uniformity ratio >0.45, Luminaire efficiency> 85 lumens/watt . LED driver efficiency > 85 %. CREE / OSRAM / PHILIPS Lumileds / NICHIA / SEOUL/ BridgeLux (U.S.A.) make LED used for luminaire. (Each fittings required LM-79 & LM-80 certificates)(A) Street Light (IP-65), Surge -4KV (e) above 48 to 60 Watts Cat-III	18.00	6868.00	Each	123624.00
89	Providing and fixing all Co2 Fire extinuisher of 6 kg capacity (SAFEPRO) on each floor inclusive of on-site work (chasing, piping, fixing etc as may be required and making good) as per requirement stipulated in prevailing NBC code for said building type. Inclusive of testing and getting approval from all concerned authorities etc complete	10.00	21724.09	Each	217240.90
90	Providing and fixing all ABC powder tpe Fire extinuisher of 9 kg capacity (SAFEPRO) on each floor inclusive of on-site work (chasing, piping, fixing etc as may be required and making good) as per requirement stipulated in prevailing NBC code for said building type. Inclusive of testing and getting approval from all concerned authorities etc complete	10.00	3900.62	Nos.	39006.20
91	Providing, supplying , and fixing electric panel board of standard make, starter panel, ELCB with Volt and Ampier meter,with dry run overload voltage stabiliser unbalance riverse phase etc complete electrical items for electric panel as per PGVCL rules.	1.00		Nos	10000.00
92	Providing , supplying and fixing DC GB power controler of standard make	1.00		Nos	5000.00
93	Providing and fixing precast concrete Paver block/permeable concrete M-250 grade 60mm thickconcrete as per approved design and including excavation for fixing in proper line and level, filling the joint with stone dust or fine seleted sand etc Complete.shade and pattern as Approved & directed by Architects/engineer in charge	1080.00		Sqmtr	972000.00
94	Cattle ponds at GL as directed by EIC and 50,000 lit capacity Under ground water tank as per design, structure design should be prepared and submitted by contractor	60000.00		Ltr	900000.00

No	ITEM	QTY	RATE	UNIT	AMOUNT
95	Raising existing shed ; Fabrication labour work: Fabricating mild steel grill,door-window,railing,handrail,roofing, truss etc from the departmentally provided old fabricated scrap/Mild steel and as per design given by engineer in charge for fabrication labour work. (If procuring and providing new mild steel material by contractor then it will be measured and given in above new fabrication work item)	1650.00		Kgs	54450.00
			Total Rs.		35758944.51
		Without GST	Say Rs.		35760000.00