

**TENDER FOR  
CONSTRUCTION OF OVER HEAD WATER TANK &  
MISCELLANEOUS CIVIL WORK AT BPU, SAG, BIDAJ**



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## **TENDER NOTICE**

The Sabarmati Ashram Gaushala (SAG) Bidaj invites sealed bid from financially and technically reputed and experienced eligible contractors for furnishing the necessary labor, material, equipments including all taxes and royalties, GST and all other taxes applicable for construction and completion of the following works

1	Name and place of work	:	Civil, structural, Water Supply and Ancillary works for Over Head Water Tank and Miscellaneous civil work at Bull Production unit, SAG, Bidaj Farm, PO. Lali, Ta & Dist. Kheda-387120. Gujarat, INDIA.
2	Name of the Owner	:	Sabarmati Ashram Gaushala, Bidaj P.O. Lali, Dist: Kheda – 387120.
3	Approximate estimated cost	:	<b>Rs 25,00,000=00</b> (Rs. Twenty Five Lakh Only)
4	Earnest Money	:	<b>Rs. 25,000=00</b> (Rs. Twenty Five Thousand only) by NEFT/RTGS, Pay order / Demand Draft in favor of “Sabarmati Ashram Gaushala” payable at Bidaj  <b><u>NEFT/RTGS Detail:</u></b>  Account Name: Sabarmati Ashram Gaushala Bank Name: Union Bank of India Account Number: 522401010029001 IFSC: UBIN0552241 Ac Type: Current Branch: Bidaj Branch
5	Date and place for submitting duly filled tender forms	:	Sabarmati Ashram Gaushala, Bidaj Farm, PO Lali, Ta. & Dist. Kheda – 387120. Gujarat Up to 13.30 hrs on or before <b>07/03/2025</b> .  The envelopes may be super-scribed with " <b>Tender for Construction of Over Head Water Tank at BPU</b> ".
	Time and date of opening tender	:	<b>Date 07/03/2025</b> Time: 14.00 hrs. Sabarmati Ashram Gaushala Bidaj Farm, PO Lali, Ta. & Dist. Kheda – 387120.
8	Security Deposit	:	5.00% of the contract value
9	Time of Completion	:	05 (Five) Months from the date of award of the contract.
10	Defects liability period	:	2(Two) Year

11	Period for final measurement	:	30 days.
12	Liquidated damages	:	1/2 % of contract value Per week. Up to maximum 10% of the value of work.
13	Minimum value of work for interim certificate	:	Rs. 10,00,000=00 (Rs. Ten Lakh only).
14	Period of Honoring	:	15 (Fifteen) working days after issue of certificate
15	Refund of Security	:	Refer Clause 54 (a)
16	Retention Money	:	Refer Clause 54 (b)
17	Eligibility and Qualification Requirements	:	As under.

For the purposes of this Contract, bidders shall meet the following qualifying criteria as minimum:

(a)	The bidder shall be in business as a civil works contractor for a minimum period of five years. Turnover for last five years(each year) i.e 2023-24, 2022-23, 2021-22, 2020-21 and 2019-20 should be more than Rs. 50 lakh each. Attach copy of turnover certificate.
(b)	The bidder shall have successfully completed minimum one work of similar nature in last three years. Attach copy of certificate from relevant client. Similar nature of work may count as below but not limited to: (1) RCC frame structure work (minimum ht.12 mtr) for Residential, commercial, Industrial, institutional etc. buildings. <b>OR</b> (2) Work in which minimum 25000 ltr.capacity of RCC over head water tank OR 50000 ltr. Capacity of RCC under ground water tank is included. <b>OR</b> (3) Construction of RCC over head water tank of minimum capacity of 40000 ltr. <b>OR</b> (4) Construction of RCC under ground water tank of minimum capacity of 100000 ltr.  However, Owner\Architects keep its right reserve for consideration of similar nature of work for evaluation and can except or reject any Bid.
(c)	The bidder shall provide reference certificates from client/consultant for carrying out similar nature of works. ➤ On demand of Owner\Architects the bidder is bound to furnish certified copy of Bill/invoice including abstract & measurement sheet for the work, which bidder has mentioned for similar nature of works.
(d)	The bidder shall furnish a certified true copy of the Income tax Returns of the previous three year(s) along with Permanent Account Number of Income Tax (PAN)
(f)	Solvency certificate for at least 50% of the Estimated value in the relevant financial year.

The Owner\Architects do not bind themselves to accept the lowest tender and reserve the right to reject any or all the tenders without assigning reasons thereof.

<b>GENERAL TERMS &amp; CONDITIONS (Part - 1)</b>	
(1)	Before filling the tender, tenderer must visit the site, study the conditions of site and study the conditions of contract, specifications, Drawings and bills of quantities. If any ambiguity is found it should be Immediately brought to the notice of the architects/OWNER.
(2)	OWNER shall not be responsible for any expenditure incurred by the tenderer for visiting the site for filling the tender.
(3)	For clarification regarding tender / drawings, contact Owner/Architect's office.
(4)	Time is the essence of this contract. Time limit for completion of this work shall be as specified in the appendix
(5)	Tenderer shall sign on all the pages of the tender with stamp and date.
(6)	Tenderer shall not remove any paper from the tender document. No additions or alterations shall be done in the tender document.
(7)	<b>Rates quoted in the tender are final and no enhancement shall be given for the rise in cost of Material,labour,Equipment,Tools,Transportation etc. during the period of construction work.</b>
(8)	Architect/Owner has a right to rectify arithmetic or any other mistake in the tender.
(9)	Filled tender shall be valid for minimum period of 90 days from the Date of opening of tender.
(10)	Tender without earnest money deposit shall not be accepted. Successful tenderer has to deposit security deposit as mentioned in the appendix within 7 days from the notice of the award of contract. Earnest money deposit of successful tenderer shall be adjusted with security deposit. Earnest money of other tenderer shall be returned. No interest shall be paid on earnest money deposit.
(11)	OWNER is not bound to accept the lowest tender.
(12)	Tender drawing can be inspected at the Owner/Architect's office. After the work is awarded to the successful contractor and contract is signed, detailed construction drawing shall be issued to the contractor.
(13)	Quantities shown in the bills of quantities are approximate and can vary to any extent. The item may also be deleted or added. No claim or compensation shall be paid on this account. <b>It is in the interest of the contractor to quote balanced rates and study the site conditions.</b>
(14)	All the R.C.C. work shall be carried out using mixer machine and Vibrator.
(15)	Contractor shall carefully fill the rates and amount against each item in case of error, lowest amount shall be assumed and it shall be binding on the contractor.
(16)	Contractor shall be responsible for taking delivery of material on site and properly storing the same with minimum wastage.

(17)	Rates quoted in the tender shall not be revised under any circumstances till the completion of the project.				
(18)	Amount should be shown in figure which are clearly legible by contractor in the Schedule of Quantities, the tender without legible writing will be rejected.				
(19)	<b>Prior to start construction activity on site, contractor should take “CAR policy” (Contractor All Risk Insurance) and submit a copy to the owner. workmen compensation insurance for all the workmen engaged by them.</b> No workmen should be taken without coverage of workmen compensation insurance. If contractor fails to take the policy, client will take the policy and deduct the amount from the running bills.				
(20)	All necessary safety measures should be taken by contractor to avoid any accident. The contractor shall be responsible for the safety of all activities on the site.				
(21)	None of the permanent works, Cement works shall be carried on during the night without the permission in writing of the Architect/Owner.				
(21)	Contractor shall give list of works(As an annexure) completed in the following format. Attach copy of certificate from relevant client.				
No	Name of the client	Description of work	Amount of works	Date of commencement of work	Date of completion
(22)	Contractor shall give turnover for last five years in following format.				
	Year		Turnover (Rs. In Lakh)		
	2019-20				
	2020-21				
	2021-22				
	2022-23				
	2023-24				

(23)	Details of Technical Staff required for the project implementation are:			
No	For Project	Name of the Employee	Min. Qualification	Minimum Experience in similar works
1	Execution Engineer		BE Civil <b>OR</b> Diploma Civil	3 years 5 years
2	Supervision Engineer		Diploma Civil	3 years

<b>CONDITIONS OF CONTRACT (Part - 2)</b>	
(1)	Proposed work shall be carried out as per the specifications, Bills of quantities, Drawings prepared by the architects, and instructions given by the architects from time to time. Any item not specified in the tender but essential for construction shall be considered to be parts of this tender.  <b>Rates quoted in the tender are including carting, all taxes and royalties, GST and all other taxes which will be Applicable.</b>
(2)	Architects have the right to revise the drawings, change the quantities and Introduce new items.
(3)	In case of any discrepancy in drawings, bills of quantities, rates, specifications, decision of the architects shall be final.
(4)	Any work found unsatisfactory by the architects/Owner shall be removed by Contractor at his cost and reconstruct the same in the desired manner. Contractor has to bear the cost of material wasted.
(5)	Architects/Owner have the right to ask the contractor to remove any person from the site who is not competent for the work or who is not behave in proper manner and does not carry out the work as per the instructions of the architects/owner. Said person shall be removed from the site within 48 hours and shall not be re-employed on the work.
(6)	Contractor shall do the perfect line out of the building. If any error is found in level. Measurements, alignment etc. the same shall be corrected by the Contractor at his own cost.
(7)	If in the opinion of the architects/owner, the workmanship is not as per the specifications same shall be removed and redone to the entire satisfaction of the architect/owner without any extra charges.
(8)	Contractor shall provide all facilities to the architects/owner to see and examine the work.
(9)	One set of drawings shall be given to the contractor which shall be returned to the architects after the completion of the work. Drawings are the property of the Architects.
(10)	Contractor shall follow rules and regulations of Municipal Corporation/Local Authority, Electricity Board etc. and if there is any conflict, it shall be settled as per the instruction of the owner/architects.
(11)	Clerk of works appointed by Architects / OWNER shall supervise the work in absence of architects. Contractor shall follow his instruction and provide necessary facilities.
(12)	If the work of the contractor is not satisfactory or due to any other reason OWNER / architect may sublet the work to other contractor without vitiating the contract.
(13)	Contractor shall submit the running bills as per tender terms and same shall have to be checked by owner's engineer or their representative. Contractor shall remain present at the time of checking of bills. If contractor remains absent during bill checking, measurements taken shall be final and binding on the contractor. Mode of measurement shall be as per the bills of quantities and specifications. Engineer shall issue certificate for interim payment after checking the bill.
(14)	Quantities mentioned in the bills of quantities are approximate and may vary to any extent. In case of extra items, the rate may be derived from similar items in the tender of actual market rates. Architects decision in this regard shall be final. Contractor shall submit rates analysis for extra items. Separate bill of quantities and abstract sheet shall be submitted for tendered and non tendered items.  Any additional work which can not be measured or valued in such case contractor

	shall be paid reasonable profit on this actual expenditure incurred. For this contractor shall submit all vouchers. For additional work time limit shall not be extended without recommendation of the Architects.
(15)	Any defects noticed during defect liability period, which in the opinion on the architect/owner is due to negligence of the contractor shall be repaired by the contractor within the stipulated time. failing which the defects shall be repaired at the cost of the contractor and amount shall be adjusted from the security deposit.
(16)	Work shall not be complete till architects gives the completion certificate. Defect liability period shall begin from the date of completion certificate. Final payment to the contractor shall be made by the OWNER within one month from the date of completion certificate.
(17)	Contractor shall be allowed to work on site from the date of starting of the work as mentioned in the appendix and shall be completed before the date of completion of the work.
(18)	Under following conditions architects/OWNER may grant time extension if written request is received from the contractor.
	a. Bad weather.
	b. Dispute with individuals or statutory bodies.
	c. Due to other specialized contractor.
	d. Irregular supply of material by the OWNER
	e. As per the instruction of the architects.
	f. Labour strike.
	g. Transport strike.
(19)	OWNER shall make the payment to the contractor on the basis of certificate for interim payment. Minimum bill for interim payment shall be as specified in the appendix.
(20)	The rate quoted in the tender shall include all charges of Shuttering, Scaffolding, lift, any tools and plants, railway freight, material & labour conditions and fluctuation in the rates, excise duty, sales tax, and GST or any other taxes.
(21)	The OWNER will arrange for water and electricity for completing the Work. In case water and electricity are already available at the site the same will be provided by the OWNER and Rs. 0.5% for water charges and 0.5% for electricity will be deducted from the gross amount of work done from each Interim bill.
(22)	No escalation in rates(Material,Labour,Equipments,Tools,Transportation etc.) will be allowed under any circumstances & no Mobilization Advance shall be paid by the OWNER to contractor.
(23)	The successful tenderer is bound to carry out entire work within the period Stipulated in the appendix. The tenderer will have to pay liquidated damages for non-completion of job within stipulated period at the rate <b>1/2 % of contract value Per week</b> . After expiry of period of completion subject to maximum of 10% of the contract value.
(24)	The liquidated damages as mentioned above may not be enforced if the contractor supplies sufficiently in advance for extension the time mentioning the unavoidable reasons for extension. The Architect/Owner shall, if in opinion (which shall be final and binding the contractor) finds genuine reasons shown by the contractor for such request, grant suitable extension in time limit. Any claim for damage or compensation in relation there to by contractor is not permissible. Also other terms and conditions of the contract will remain unaltered in the extended period.
(25)	The contractor must co-operate with other contractors appointed by the OWNER so that entire work shall proceed smoothly with least possible delay and to the satisfaction of the OWNER.
(26)	The contractor shall remove all rubbish etc. out of site / premises, wash and clean floors and hand over the site in proper and tidy condition on the Completion of work.
(27)	The tenderer shall acquaint himself with the site conditions, making his own



	arrangement for storing of material at site, cartage etc.
(28)	The contractor will attend to all defect noticed during defect liability period. If the contractor fails to attend the defects within two weeks time these defects will be rectified by the OWNER and the expenditure incurred in this account will be recovered from security deposit, or any other money due / on to time.
(29)	The contractor shall make adequate arrangement for watch and ward of his material and shall ensure the safety, breakage and any the wastage of Material fixed or unfixed by him or other subcontractors.
(30)	The work executed should be get approved by the architect and contractor shall rectify any bad workmanship material pointed out at any stage and remove from site all the rejected materials immediately.
(31)	<b>The contractor shall be responsible for application of labour laws, compensation for injury/death and accident to person, whether employed by him or by his sub-contractor or any other people (Third Party).</b>
(32)	<b>The contractor shall ensure that workmen employed by him for execution of work are suitably covered against workmen's compensation Act and that all liabilities arising out of workmen's compensation Act, ESIS and other legislative amendments applicable to such works and workmen shall be to the contractor's account.</b>
(33)	The Contractor shall inform the architect/owner to check quantity Measurements of any work which is likely to be hidden before covering.
(34)	The contractor will submit running bills for the value of work done not less than interim payments (as mentioned in the appendix) mentioning full nomenclatures of items, rates, amount, measurements sheets, reasons for part rates claimed if any.
(35)	In case of non-completion or delay in completion of work or removal of defects in time, the OWNER shall be free to appoint another agency to get the job done at contractor's risk and cost.
(36)	Income-Tax at the applicable rate of the bill amount will be deducted at source from the contractor's bill and will be deposited with I.T.O. as per rules.
(37)	The OWNER may delay the progress of work without in any way, violating the contract and grant such extension of time for the commencement \ completion of the contract as it may think proper and sufficient in consequence of such delay and the contractor shall not make claim for Compensation or damage in relation there of.
(38)	The contractor will not execute any extra item without OWNER's and architects prior permission in writing.
(39)	<b>The quantities mentioned in the schedule of quantities are approximate. Payment will be made on actual work done by the contractor.</b>
(40)	The OWNER has right to terminate the contract,if the Contractor abandon the work, or fails to commence and complete the work in time, or fails to abide by the contract conditions
(41)	The OWNER has right to alter the nature of work and to add or omit any items of work or to have the option of the same carried out departmentally or otherwise and such alterations or variations shall be carried out without prejudice to this contract.
(42)	Measurement for all items shall be taken as per actual work done and no claim for any wastage in all material shall be considered.
(43)	Contractor has to prepare sample of any item at no extra cost for the approval of the OWNER/architect.
(44)	If in the opinion of the architect consultant(appointed by the OWNER) the work is not satisfactory, Consultant shall reduce the rates. Decision of the consultant for rate reduction shall be final and acceptable to the contractor.
(45)	Contractor shall construct material godown at his own cost and store the materials in proper way so that they are not spoiled. Contractor shall take the delivery of material and keeps record of material received registered for cement and steel are to

	be maintained for receipt and consumption from day to day and consumption of cement for items like PCC, RCC, plaster, brick work etc. is to be entered item wise, similarly for reinforcement bars and structural steel. Apart from this, contractor shall maintain registers/records/Joint measurement records etc., which are instructed by Architect/owner on site in prescribed format.
(46)	With final bill account of all materials supplied by the client and consumed by the contractor shall be given category wise and item wise.
(47)	All the material to be used shall confirm to IS and of best quality. All the materials to used shall have to be got approved from the architects and any materials not approved shall not be used.
(48)	The contractor shall submit program for construction month wise.
(49)	<b>Curing the works shall be total responsibility of the contractor (contractor has to arrange water storage tank,pressure pump,Jute Bags,water pipes etc. required for effective curing and as instructed by Architect/Owner) and under no circumstances any excuse or negligence tolerated.</b>
(50)	Contractor shall co-ordinate architectural and structural drawing and any ambiguity found there in shall be immediately brought to the notice of the architects.
(51)	Quantities mentioned are approximate and may vary to any extent. No Rate escalation shall be allowed on this account. <b>Contractors are advised to quote balanced rates.</b>
(52)	Since the Cement has to be supplied by the contractor, the theoretical consumption of the cement shall be calculated and in the event of any under consumption beyond 2.5 % the recovery of cement cost at the Rate of <b>Rs.800=00</b> per bag Shall be deducted from contractors bill.
(53)	Since reinforcement and structural steel has to be supplied by the contractor, the wastage etc. shall not be considered for payment.
(54)	<b><u>Financial Conditions:</u></b>
(a)	<b><u>Security Deposit :-</u></b>
	Within 10(Ten) days of the receipt of the notification of the award of the Contract from the OWNER the successful bidder shall furnish to the OWNER performance security for an amount of 5.0% of the Contract value.
	Out of this, EMD shall be converted in to 1.0(One)% security deposit and balance 4.0(Four)% amount shall be payable in the form of Bond payable to OWNER.
	No interest shall be paid by the OWNER to the Contractor for the amount with OWNER as Performance Security.
	The OWNER shall release this performance security not later than 90 days following the date of delivery of the Maintenance certificate by the Engineer after defect liability.
(b)	<b><u>Retention Money :-</u></b>
	Maximum of 5% of the total value of the work to be executed.  The retention amounting to 6% of the amount shall be deducted from every running bill payable to contractor during execution of work. till the cumulative total of such deduction shall be amount to 5% of total actual value of work to be done.
	One half of the retention money shall be paid to the Contractor within 60 days of issuing of the certificate of completion and balance amount shall be released after defect liability period. i.e. two year.
	No interest shall be paid by the OWNER to the Contractor for the amount withheld as Retention Money with the OWNER.

**APPENDIX TO THE FORM OF BID**

<b>Particulars</b>	<b>Term</b>
Validity of bid	90 days from date of opening of bids
Earnest Money Deposit	Rs. 25,000.00 (Rupees Twenty Five Thousand only) in form of NEFT/RTGS, Pay order / Demand draft of any Nationalised / Scheduled Bank in India
Amount of performance security	5.00% of contract value in form of Bank Guarantee / Demand Draft of any Nationalised / Scheduled Bank of India
Period for commencement from date of letter of acceptance	10 Days (Ten Days)
Period for completion of work	05 (Five) Months from the date of commencement of the work.
Rate for liquidated damages	1/2% of contract value per week maximum 10% of contract value
Period for defects liability	24 months from date of completion of work
Percentage of retention	6% of the bill value from the RA bill subject to 5% of the contract value

## Specifications & Performance Requirements

### TECHNICAL SPECIFICATIONS TRADE INDEX

TRADE	DESCRIPTION
01	Earth Work
02	Concrete Work
03	Masonry Work
04	Wood & Aluminium Work – Description not available
05	Finishing Work
06	Flooring Work
07	Steel Work
08	Roof Work – Description not available
09	Miscellaneous Works
10	Road Work – Description not available
11	Water Supply
12	Sanitary Work- Description not available

## **TECHNICAL SPECIFICATION**

(Detailed technical specifications)

### **1.00 - EARTH WORK**

#### **Scope:**

This section covers the works specification of earthwork in excavation in all kinds of soils including murrum, hard murrum, soft rock (without blasting), hard rock (without blasting), rock (with blasting), earth and sand filling in plinth, rubble soling, and brick on edge soling , Anti-termite treatment.

#### **Applicable Codes:**

The following Bureau of Indian Standard Codes, unless otherwise specified herein, shall be applicable. In all cases, the latest revision of the codes shall be referred to.

IS - 4081      Safety code for blasting and related drilling operations

IS - 1200      Method of measurement of building works.

IS - 3764      Safety code for excavation work.

IS - 3385      Code of practice for measurement of Civil Engineering works.

IS - 2720      Part II Determination of moisture content.

Part VIII Determination of moisture content dry density relation using light compaction.

*Part XXVIII Determination of dry density of soils, in-place by the sand replacement method.*

*Part XXIX Determination of dry density of soils, in-place, by the core cutter method.*

#### **Drawings:**

Engineer will furnish all necessary drawings showing the areas to be excavated, filled, sequence of priorities etc. Contractor shall follow strictly such drawings.

#### **General:**

Contractor shall provide all tools, plants, instruments, qualified supervisory personnel, labour, materials, and temporary works, consumables, any and everything necessary, whether or not such items are specifically stated herein, for completion of the Work.

Contractor shall carry out the survey of the site before excavation and set properly lines and establish levels for various works such as earthwork

in excavation for levelling, basement, foundations, plinth filling, roads, drains, cable trenches, pipelines etc. Such survey shall be carried out by taking accurate cross sections of the area perpendicular to establish reference/grid lines at 5 m intervals or nearer as determined by Engineer based on ground profile. These shall be checked by Engineer and thereafter properly recorded.

The area to be excavated/ filled shall be cleared of fences, trees, plants, logs, slumps, bush, vegetation's, rubbish slush etc. and other objectionable matter. If any roots or stumps of trees are found during excavation, they shall also be removed. The material so removed shall be burnt or disposed off as directed by Engineer. Where earth fill is intended, the area shall be stripped of all loose/soft patches, top soil containing deleterious matter/materials before fill commences.

**Relics, Objects of Antiquity, etc.:**

All gold, silver, oil minerals archaeological and other findings of importance, all precious stones, coins, treasures, relics, antiquities and other similar things which may be found in or upon the site shall be the property of owner and Contractor shall dully preserve the same to the satisfaction of Owner and from time to time deliver the same to such person or persons as Owner may from time to time authorise or appoint to receive the same.

**1.01 Earth Work in Excavation up to 1.50 M from Existing GL:**

a) **Classification:**

Any earthwork will be classified under any of the following categories.

i) **All kinds of soils:**

These shall include all kinds containing kankar, sand, silt, murum and / or shingle, gravel, clay, loam peat, ash, shale etc. which can generally be excavated by spade, pick-axe and shovel and which is not classified under soft and decomposed rock, and hard rock defined below. This shall also include embedded rock boulders not bigger than 1metre in any dimension and not more than 200 mm in any one of the other two dimensions.

ii) **Soft Rock:**

This shall include rock, boulders, slag, chalk, slate, hard mica schist, laterite etc. which are to be excavated with or without blasting or could be excavated with picks, hammer, crow bars, wedges. This shall also include excavation in macadam and tarred roads and pavements. This shall also include rock boulders not bigger than 1 metre in any dimension and not more than 500 mm in any one of the other two dimensions Rubble masonry to be dismantled will also be measured under this item.

iii) **Hard Rock:**

This shall include rock which cannot be easily excavated with pick-axes, hammer, crow bars and wedges but has to be either heated where blasting is prohibited or has to be blasted. They shall be stacked separately for measurement.

This shall comprise any rock or cement concrete or RCC, the excavation of which cannot be carried out by using mechanical/hydraulic excavators and where blasting is resorted. Architects opinion as to the particular rock requires blasting or not shall be final and binding. Any secondary blasting / breaking of blasted boulders is required will have to be carried out at site before stacking. After blasting, blasted rock capable of being lifted by hand together with spalls should be stacked at site for recording measurements. These stacks shall then be transported to various locations at site for reuse in masonry as directed by Engineer-in charge.

- b) The materials which are not usable for masonry shall be disposed off within the site as decided by Employer/Architect. Nothing extra shall be payable on this account.

Rock tolerance of about (-6") minus six inches is permitted while blasting the hard rock. However no measurement will be payable for this tolerance depth excavated. For any rock excavation beyond (-6") minus six inches of rock tolerance, suitable deductions will be made to makeup the same with P. C. C. 1:5:10 (one part cement:5 part coarse sand:10 part stone aggregate). It should be understood that the measurement shall be payable up to the formation level only.

- c) The earth work In excavation shall be done as per the Architect and structural consultant's drawings up to required depths and levels and alignments in all sorts of soils. The depth of the foundation will be as per the Engineer's instructions. The lining work should be done by the Contractor. Roots or trees met with during the excavation shall be cut and smeared with coal tar. Excavated earth shall be stacked at least 3 m away from the trenches or as per the Engineer's instructions, so that it may not damage the sides of the excavated trenches. The sides of the excavated trenches shall be vertical and in straight line and bottom uniformly levelled watered, consolidated and ready for termite treatment. The maximum lead for stacking the earth shall be as specified in the item description.
- d) In firm soil if the excavation is deeper than 2 m the sides of the trenches shall be made bigger by allowing steps of 50 cm on either side so as to keep the slope 0.25 to 1. In loose soft or slushy soil the width of the step shall be suitably increased or the sides sloped or shoring and strutting may be done as per the Engineer's instructions.
- e) For excavation for drain and all road works, the sides and the bottoms should be to the required slope, shape and gradient. The cutting shall be done from top to bottom. Under no circumstances shall undermining or under cutting be allowed. The final surface shall be neatly levelled and well compacted. The earth from the cutting shall be directly used for filling either in plinth or on grounds.

- f) For excavation in trenches for pipes nothing extra shall be payable for the lift irrespective of the depth unless specifically mentioned otherwise in the Schedule of Quantities.
- g) If the trenches are made deeper than specified level due to oversight or negligence of the Contractor the extra depth shall be filled up by lean concrete of mix 1:5:10(1 part cement; 5 part coarse sand and 10 part coarse aggregate of nominal size 40mm) and if the trench is made wider than shown in the drawings the Contractor has to make good at his own cost. The foundation trenches shall be free from water and muck, while the foundation work is in progress.
- h) The trenches which are ready for concreting shall be got approved by the Engineer.
- i) The excavated stacked earth shall be refilled in the trenches and sides of foundation in 150 mm layers and the balance surplus shall be first filled in layers in plinth and the remaining surplus shall be disposed off by uniform spreading within the site/outside the site as directed by the Engineer.
- j) Adequate protective measures shall be taken by the Contractor to see that the excavation for the building foundation does not affect the adjoining structure's stability and safety. Contractor will be responsible if he has not taken precaution for the safety of the people, property or neighbour's property caused by his negligence during the constructional operations.
- k) To the extent available, selected surplus spoils from excavated materials shall be used as backfill. Fill material shall be free from clods, salts, sulphates, organic & other foreign material. All clods of earth shall be broken or removed. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed with properly graded fine material consisting of murum or earth to fill up the voids and the mixture used for filling.
- l) As soon as the work in foundations has been accepted and measured, the spaces around the foundations, structures, pits, trenches etc. shall be cleared of all debris and filled with earth in layers 15 cm to 20 cm, each layer being watered, rammed and properly consolidated before the succeeding one is laid. Each layer shall be consolidated to the satisfaction of Engineer.
- m) **Mode of Measurement for Earth Work in Excavation Including Back Filling:**
  - i) **Lead:** for deposition/disposal of excavated material, shall be as specified in the respective item of work. If the lead is not specified in the respective item, a basic lead of 600 Metres shall be considered for quoting rates. Only leads beyond 600 Metres shall be considered as extra lead and the Contractor shall be compensated for the same. For the purpose of measurement of lead the area to be excavated or filled or area on which excavated material is to be deposited / disposed off shall be divided into suitable blocks and for each of the blocks, the distance between centre



lines shall be taken as the lead which shall be measured, as far as practically possible, by the shortest straight line route on the plan and not the actual route taken by Contractor. No extra compensation is admissible on the grounds that the lead including that for borrowed materials had to be transported over marshy or katcha land/route.

- ii) All excavation shall be measured net. Dimensions for purpose of payment of the excavation shall be reckoned on the horizontal area of the base of foundations of the walls, columns, footings, tanks, rafts or other foundations structure to be built, multiplied by the mean depth from the surface of the ground in accordance with the drawings. Working spaces and excavation inside slopes shall not be paid for. Contractor may make such allowances in his rates to provide for excavation in side slopes and working spaces keeping in mind the nature of the soil and safety of excavation. In soft / slushy soil or in firm soil if the excavation is deeper than 2m the sides of the trenches shall be made bigger by allowing steps of 50cm on either side so as to keep slope 0.25: 1. This shall be paid as per original tender rate. However, if concreting is proposed against the additional/ extra excavation made by the Contractor shall be made good by the Contractor with concrete of the same class as in the foundations at his own cost.
- iii) **Backfilling:** As per specification the side of foundations of columns, footings, structures, basement plinth, walls, tanks rafts, trenches etc. with excavated materials will not be paid for separately. It shall be clearly understood that the rate quoted for excavation including backfilling shall include stacking of excavated material as directed, excavation / and shifting the selected stacked material (earth), conveying it to the place of final backfill, consolidation compaction using plate compactor etc. as specified. As a rule material to be back filled shall be stacked temporarily within the basic lead of 200 metres unless otherwise specified in the item.
- iv) The rates quoted shall also include for dumping of excavated materials in regular heaps, bunds, riprap with regular slopes as directed by Engineer within the lead specified and levelling the same so as to provide natural drainage. Rock / soil excavated shall be stacked properly as directed by Engineer. As a rule, all softer material 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. Excavated soft rock or hard rock shall be stacked separately.
- (v) The **bailing out of water** shall also be executed by the Contractor at his own cost.
- (vi) The cost of shoring and strutting as demanded by the site conditions and as instructed by the Engineer is deemed to be included in quoted rate.

**1.02 Earth Work in Excavation for Depth Exceeding 1.50 M but not Exceeding 3.0 M:**

The general specification shall be same as for the item 1.01 given above.

**Mode of Measurement:** Same as Item spec. no. 1.01

**1.03 Earth Work in Excavation for Depth Exceeding 3.0 M but not Exceeding 4.5 M:**

The general specification shall be same as for the item 1.01 given above.

**Mode of Measurement:** Same as Item spec. no. 1.01

**1.04 Earth Work in Excavation in Rocks up to 1.50 M from Existing Ground Level (EGL):**

- a) Unless otherwise stated herein, IS 4081, **safety code for blasting and related drilling operations** shall be followed. After removal of overburden, if any, excavation shall be continued in rock to such widths, lengths, depths and profiles as are shown on the drawings or such other lines and grades as may be specified by Engineer. As far as possible all blasting shall be completed prior to commencement of construction. At all stages of excavation, precautions, shall be taken to preserve the rock below and beyond the lines specified for the excavating, in the soundest possible condition. The quantity and strength of explosive used shall be such as will neither damage nor crack the rock outside the limits of excavation. All precautions, as directed by Engineer shall be taken during the blasting operations and care shall be taken that no damage is caused to adjoining buildings or structure as a result of blasting operations. In case of damage to permanent or temporary structures, Contractor shall repair the same to the satisfaction of Engineer at his cost. As excavation approaches its final lines and levels, the depth of the charge holes and amount of explosives used shall be progressively and suitably reduced.
- b) Specific **permission** of Engineer will have to be taken by Contractor **for blasting rock** and he shall also obtain a valid blasting license from the authorities concerned. If permission for blasting is refused by Engineer, the rock shall be removed by wedging, pick barring, heating and quenching or other approved means. All loose/loosened rock in the sides shall be removed by barring wedging, etc. The unit rates for excavation in hard rock shall include the cost of all these operations.
- c) Contractor shall obtain **necessary license for storage of explosives** fuses and detonators issued to him from Owner's stores or from a supplier arranged by the Contractor, from the authorities dealing with explosives. The fees, if any, required for obtaining such license, shall be borne by Contractor. Contractor shall have to make necessary storage facilities, for the explosives etc. as per rules and regulations of local, State and Central Govt. authorities and statutory bodies. Explosives shall be kept dry and shall not be exposed to direct rays of sun or be stored in the vicinity of fire, stoves, steam pipes or heated metal, etc. No explosive shall be brought near the work in excess of quantity required for a particular amount of firing to be done and surplus left after filling the holes shall be removed to the magazine. The magazine shall be built as far as possible from the area to be blasted. Engineer's prior approval shall be taken for the location proposed for the magazine.

- d) In no case shall blasting be allowed closer than 30 meters to any structure or to locations where concrete has just been placed. In the latter case the concrete must be at least 7 days old.
- e) For blasting operations, the following points shall be observed:-
- i) Contractor shall employ a competent and experienced supervisor and licensed blaster In-charge for each set of operation, who shall be held personally responsible to ensure that all safety regulations are carried out.
  - ii) Before any blasting is carried out, Contractor shall intimate Engineer and obtain his approval in writing for resorting to such operations. He shall intimate the hours of firing charges, the nature of explosive to be used and the precautions taken for ensuring safety.
  - iii) Contractor shall ensure that all workmen and the personnel at site are excluded from an area within 200M radius from the firing point, at least 15 minutes before firing time by sounding warning siren. The areas shall be encircled by red flags. Clearance signal shall also be given sounding a distinguishing siren.
  - iv) The blasting of rock near any existing buildings, equipment or any other property shall be done under cover and Contractor has to make all such necessary muffling arrangements. Covering may preferably be done by MS plates with adequate dead weight over them. Blasting shall be done with small charges only and where directed by Engineer, a trench shall have to be cut by chiselling prior to the blasting operation separating the area under blasting from the existing structures.
  - v) The firing shall be supervised by a Supervisor and not more than six (6) holes at a time shall be set off successively. If the blasts do not tally with the number fired, the misfired holes shall be carefully located after half an hour and when located, shall be exploded by drilling a fresh hole along with Omisfired hole (but not nearer than 600 mm from it) and by exploding a new charge.
  - vi) A wooden tamping rod with a flat end shall be used to push cartridges home and metal rod or hammer shall not be permitted. The charges shall be placed firmly into place and not rammed or pounded. After a hole is filled to the required depth the balance of the hole shall be filed with stemming which may consist of sand or stone dust or similar inert material.
  - vii) Contractor shall preferably detonate the explosives electrically.
  - viii) The explosive shall be exploded by means of a primer which shall be fired by detonating a fuse instantaneous detonator (FID) or other approved cables. The detonators with FID shall be connected by special nippers.
  - ix) In dry weather and normal dry excavation, ordinary low explosive gunpowder may be used. In damp rock, high explosive like gelatine

with detonator and fuse wire may be used. Under water or for excavation in rock with substantial accumulated seepage electric detonation shall be used.

- x) Holes for charging explosive shall be drilled with pneumatic drills, the drilling pattern being so planned that rock pieces after blasting will be suitable for handling without secondary blasting.
- xi) When excavation has almost reached the desired level, hand trimming shall have to be done for dressing the surface to the desired level. Any rock excavation beyond an over break limit of 75mm shall be filled up as instructed by Engineer, with concrete of strength not less than M10. The cost of filling such excess depth shall be borne by Contractor and the excavation carried out beyond the limit specified above will not be paid for. Stepping in rock excavation shall be done by hand trimming.
- xii) Contractor shall be responsible for any accident to workmen, public or owners property due to blasting operations. Contractor shall also be responsible for strict observance of rules, laid by Inspector of explosives, or any other Authority duly constituted under the State and/or Union Government.
- xiii) **Mode of Measurement:** It shall be measured in CuM.

Volume of rock excavated shall be calculated on the basis of length, breadth and depth of excavation indicated on the drawings. No payment will be made for excavations/over break beyond payment line specified, wherever such measurement is not possible, as in case of strata intermixed with soil, excavated rock shall be properly stacked as directed by Engineer and the volume of rock shall be calculated on the basis of stack measurements after making 40% allowance for voids. The measurement of the earth work shall be paid as per the drawing or the requirements of the site as approved by the Engineer.

- xiv) The rate quoted for excavation shall include the following jobs:
  - a) Refilling of the trenches and consolidating and spreading as per the Engineer's directions.
  - b) Shoring and strutting as demanded by the site conditions and as instructed by the Engineer.

**1.05 Earth Work in Excavation in Rocks Depth Exceeding 1.50 M but not Exceeding 3.0 M:**

The general specification is same as Item spec. no. 1.04

**Mode of Measurement:** Same as Item spec. no. 1.04

**1.06 Filling in Plinth with Selected Excavated Earth:**

- a) Filling in plinth above existing grade, in layers of 15-30 cm, watered and compacted with mechanical compaction machines and by hand. The base

surface shall be cleared of vegetation by up-rooting or any organic matter, prior to commencement of filling operation. When filling reaches the required finished level, the surface shall be flooded with water, if directed by the Engineer, for 24 hours, allowed to dry and then the surface is again compacted as specified above to avoid settlements at a later stage. The finished level of the filling shall be dressed, trimmed to the required level/slopes specified.

- b) Where specified in the item description given in the Schedule of Quantities that the compaction of the plinth fill shall be carried out by means of 10/12 tonnes rollers smooth wheeled or mechanical vibro-roller, as rolling proceeds water sprinkling shall be done to assist consolidation.

Payment for filling in plinth with selected excavated material will be made as specified/directed. Payment for this work will be made based on measurement of plinth/dimensions filled. The plinth/ ground levels shall be surveyed beforehand for this purpose. The lead shall be as specified.

- c) **Mode of Measurement:** It shall be measured in Cu.M.

#### **1.07 Filling Excavated Earth in Ground for Land Development:**

- a) No earth fill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with as directed by Engineer.
- b) Filling shall be carried out at the required level/slopes, as indicated in the drawings and as directed by Engineer. If no compaction is called for, the fill may be deposited to the full height in one operation and levelled to required level/slopes. If the fill has to be compacted, it shall be placed in layers not exceeding 600 mm and levelled uniformly and compacted before the next layer is deposited.
- c) Field compaction is called for; test shall be carried out at different stages of filling and also after the fill to the entire height has been completed. This shall hold good for embankments as well.
- d) Contractor shall protect the earth fill from being washed away by rain or damaged in any other way. Should any slip occur, Contractor shall remove the affected material and make good the slip at his own cost.
- e) The fill shall be carried out to such dimension and levels as indicated on the drawings after the stipulated compaction. The fill shall be considered as incomplete if the desired compaction has not been obtained. The rates shall include all operations such as lead and transport, filling, watering and consolidating as directed.

**Mode of Measurement:** It shall be measured in CuM.

#### **1.08 Filling in Plinth and Ground with Earth Brought from Outside:**

- a) Filling shall be carried out with approved material as described in 1.01 (j). The material and source shall be subject to prior approval of Engineer.

The approved area, from where the fill material is to be dug, shall be cleared of all bushes, roots plants, rubbish etc. top soil containing salts, sulphate and other foreign material shall be removed. The materials so removed shall be burnt or disposed off as directed by Engineer. The Contractor shall make necessary access roads to those areas and maintain the same, if the road does not exist, at his cost.

- b) If any material is rejected by Engineer, Contractor shall remove the same forthwith from the site at no extra cost to the owner. Surplus fill material shall be disposed off by uniform spreading within the site as instructed by the Engineer.
- c) The filling and compaction shall be carried out as specified in the Item spec. no. 1.06 for filling in plinth and as per Item spec. no. 1.08 for filling in ground for land development. Backfilling, plinth filling etc. with borrowed earth will be paid for under specified items.

The quoted rate shall include all operations such as clearing, excavation, lead and transport, fill, compaction etc. as specified. Actual quantity of consolidated filling or actual quantity of excavation in the borrow pits (less such top soil which has been excavated and not used for filling) whichever is less shall be measured and paid **for in cubic metre**. The lead, lift etc. shall be as indicated in the schedule of quantities.

- d) **Mode of Measurement:** It shall be measured in CuM.

**1.09 Providing and Filling Local Sand in Trenches, Plinth and Surrounding Areas:**

- a) At places backfilling shall be carried out with local sand if directed by Engineer. The sand used shall be kept flooded with water for 24 hours to ensure maximum consolidation. Any temporary work required to contain sand under flooded condition shall be to Contractor's account. The surface of the consolidated sand shall be dressed to require level or slope. Construction of floors or other structures on sand fill shall not be started until Engineer has inspected and approved the fill.

**Mode of measurement:** Actual quantity of consolidated sand filling shall be measured and paid in **CuM**.

**1.10 Providing and Laying Rubble/Metal Soling:**

- a) Rubble/metal used for packing under floors, foundations etc. shall be hard, durable rock, free from veins, flaws and other defects. The size of the rubble/metal shall be 60 to 80 mm or 100 mm to 150mm unless otherwise specified in the item description in the Schedule of Quantities and the quality shall be got approved by the Engineer.
- b) Rubble/metal shall be laid closely in position on the sub-grade. All interstices between the stones shall be wedged in with smaller stones of suitable size well driven to ensure tight packing and complete filling of interstices. Such filling shall be carried out simultaneously with the placing in position of rubble/metal stone and shall not lag behind.

- c) Small interstices shall be filled with murrum, well watered and rammed.

**Mode of Measurement:** The unit of measurement shall be SqM/ CuM of the work done as per the drawings and/or as specified in the Schedule of Quantities. No deductions for voids.

**1.11 Providing & Laying Brick Soling:**

- a) Bricks shall be laid on edge or flat as per the item specification. The bricks shall be placed as close as possible over a well compacted bed with a layer of sand. Broken bricks shall not be used except for closing the line. Bricks should not show any efflorescence on drying.
- b) The under layer be dressed/levelled in required slope/grade and compacted with mechanical compactor roller with a layer of sand as per detail. Sand fill of specified thickness as per the details shall be measured and paid under relevant item separately.
- c) The soling pattern shall be as specified in the item specification; it can be plain, diagonal or herring-bone. Suitable slope shall be maintained as specified by the Engineer.
- d) The joints shall be filled with selected non expensive granular earth or sand or with cement mortar of requisite proportion as specified in the item specification.

**Mode of Measurement:** This item shall be measured in SqM. of work done as per the drawings/ directed by the Engineer. No deduction shall be made for any opening up to 0.1 Sq. M.

**1.12 Providing and Laying Dry Stone Pitching:**

- a) Stone subject to marked deterioration by water or weather will not be accepted. The stone shall be hard, durable and fairly regular in shape and its thickness in any one direction shall not be less than the thickness of the pitching as specified in the Schedule of Quantities.
- b) Before laying the pitching the sides of the sloped surface shall be trimmed to the required slope and profiles. The depressions shall be thoroughly filled and compacted. It shall commence from the bottom. The stones shall be placed normal to the slope and the largest dimension is perpendicular to the face of the slope unless such dimension is more than the thickness of the pitching. The largest stones shall be placed at the bottom. The joints between the stones shall be filled with good earth. The earth shall be got approved by the Engineer before filling.

The **rate** shall include preparation of base, providing and laying of stones and filling up of joints with approved good earth.

**Mode of Measurement** It shall be measured in Cu.M. No deductions shall be made for voids.

**1.13 Providing and Laying Dry Stone Pitching with Cement Pointing:**

- a) The general specification shall be same as the Item spec. no. 1.12 but for the joints between the stones shall be filled with cement mortar of proportion as specified in the item description in the Schedule of Quantities.
- b) **Mode of Measurement:** Same as per item No1.12

**1.14 Providing and Filling Dry Brickbats at all Levels:**

The brickbats shall be well burnt, sound either half brick or of 40-65mm (average) thickness in size. The brickbats shall be clean and mortar free or any organic or loose matter. They should be washed off dust, segregated before it is filled. They shall be filled in places as directed by the Engineer. The brick bats for filling in soak pits or trenches shall be uniform in size without dust.

**Mode of Measurement:** The bulk volume of the filling shall be measured in Cu. m. No deduction shall be made for voids.

**1.15 Providing & Laying Single Layer Flat Brick Soling:**

Providing & laying single layer flat brick soling with approved quality well burnt (having crushing strength of 50 Kg per Sq.Cm) or over burnt bricks including laying bricks in plain/ diagonal/ herring bone pattern filling the joints with local sand as per general specifications of Item spec. no. 1.12 etc lcomplete.

**Mode of Measurement:** This item shall be measured in SqM. No deduction shall be made for any opening up to 0.1 SqM.

**1.16 Carting Away Earth out side the Site:**

Carting away the excavated surplus earth/ debris generated out of dismantling of brick work/ concrete as specified in the schedule of the quantities out side of the site including loading at site, transportation, unloading, spreading etc complete as directed.

Contractor shall maintain full record of measurement and the quantities in respect of total quantity of earth work in excavation, quantity back filled in trenches/ pits after laying concrete/ masonry foundations etc and quantity of surplus earth carted away and the same to reconciled intermittently during execution.

**Mode of measurement: Quantity** carted away shall be measured in CuM. Length, breadth and depth of the pit shall be measured where full quantity of excavated earth is carted away.

**OR**

80% fill measurement of earth/debris in truck shall be measured and paid for.

**1.17 Supplying the Chemicals and Carrying out Pre-Construction Anti-Termite Treatment:**



Supplying the chemicals and carrying out pre-construction Anti- termite treatment at the various stages of construction as per IS / and as recommended by the chemical manufacturer to safeguard the building against termite including execution and submission of guarantee for a period of 10 years against any subterranean pest infestation **Pest Control (India) Ltd** or equivalent as per their specifications.

For anti termite treatment chemicals used– CHLORO-PYRIPHOS 20 EC @ 1 % concentration in aqueous emulsion. At DPC level (if DPC is done) or over masonry course, 5 litre per SqM emulsion to be applied. The junction of wall and plinth (after completion of each filling) to be done @ 1 litre per RM including Roding for better spreading. 5 litre per SqM emulsion to be applied over filling after compaction. Finally the earth around the external perimeter of building up to depth of 30 cm shall be treated @ 5 litres per RM including making holes and forcing liquid. Critical areas such as openings around pipes, cable trench etc to be soaked with chemical emulsion.

**Mode of measurement:** Building area in plan shall be measured in SqM based on the treatment provided. (No co-efficient shall be applied).

## 2.00 - CONCRETE AND ALLIED WORKS

### Applicable Codes:

The following codes and standards are made a part of the Specifications. All standards, codes of practices referred to herein shall be the latest edition including all applicable official amendments and revisions.

In case of discrepancy between this specification and those referred to herein, this specification shall prevail.

### (a) Materials

IS 269	Specification for ordinary, rapid hardening and low heat Portland cement.
IS 455	Specification for Portland blast furnace slag.
IS 1489	Specification for Portland-Pozollana cement.
IS 4031	Methods of physical tests for hydraulic cement.
IS 650	Specification for standard sand for testing of cement.
IS 383	Specification for coarse and fine aggregates from natural sources for concrete.
IS 2386	Methods of test for aggregates for concrete. (Parts I to VIII)
IS 516	Methods of test for strength of concrete.

IS 1199	Methods of sampling and analysis of concrete.
IS 2396(I) IS 5640	Flakiness Index of aggregates
IS 3025	Methods of sampling and test (physical and chemical water used in industry).
IS 432 (Part I & II)	Specification for mild steel and medium tensile steel bars and hard drawn steel wire for concrete reinforcement.
IS 1139	Specification for hot rolled mild steel and medium tensile steel deformed bars for concrete reinforcement
IS 1566	Specification for plain hard drawn steel wire fabric for concrete reinforcement.
IS 1785 (Part I)	Specification for plain hard drawn steel wire for pre-stressed concrete.
IS 1786	Specification for cold twisted steel bars for concrete reinforcement.
IS 2090	Specification for high tensile steel bars used in pre stressed concrete
IS 4990	Specification for plywood for concrete shuttering work.
IS 2645	Specification for integral cement water-proofing compounds.

**(b) Equipment**

**S 1791      *Specification for batch type concrete mixers***

IS 2438	Specification for roller pan mixer
IS 2505	Specification for concrete vibrators immersion type
IS 2506	Specification for screed board concrete vibrators
IS 2514	Specification for concrete vibrating tables.
IS 3366	Specification for pan vibrators
IS 4656	Specification for form vibrators for concrete.
IS 2722	Specification for portable swing weigh-batchers for concrete (single and double bucket type)
IS 2750	Specification for steel scaffoldings

**Codes of Practice**

IS 456:2000 Code of practice for plain and reinforced concrete.

- IS 1343 Code of practice for pre-stressed concrete
- IS 457 Code of practice for general Construction of plain and reinforced concrete for dams and other massive structures
- IS 3370 Code of practice for concrete structures for storage of liquids.  
(Part I to V)
- IS 3935 Code of practice for composite construction
- IS 3201 Criteria for design and construction of pre cast concrete trusses.
- IS 2204 Code of practice for construction of reinforced concrete shell roof
- IS 2210 Criteria for the design of RC shell structures and folded plates.
- IS 2751 Code of practice for welding of mild steel bars used for reinforced concrete construction.
- IS 2502 Code of practice for bending and fixing of bars for concrete reinforcement.
- IS 3558 Code of practice for use of immersion vibrators for consolidating concrete.
- IS 3414 Code of practice for design and installation of joints in buildings
- IS 4014 Code of practice for steel tubular, (Part I&II) scaffolding.
- IS 2571 Code of practice for laying insitu cement concrete flooring.

**(c) Construction Safety****IS 3696 Safety code for scaffolds and ladders****(d) Measurement**

- IS 1200 Method of measurement of building works.
- IS 3385 Code of practice for measurement of civil engineering works.

The above mode of measurements shall be applicable only if it is not given specifically in the tender document.

**General**

The quality of materials, method and control of manufacture and transportation of all concrete work irrespective of mix, whether reinforced or otherwise shall conform to the applicable portions of this specification.

Engineer shall have the right to inspect the source/s of material/s, the layout and operation of procurement and storage of materials, the concrete batching and mixing equipment, and the quality control system. Such an inspection shall be arranged and engineer's approval obtained, prior to starting of concrete work.

### **Materials**

The ingredients to be used in the manufacture of standard concrete shall consist solely of standard type Portland cement, clean sand, natural coarse aggregate, clean water and admixtures.

#### **1) Cement**

- a) If the Contractor is instructed to supply cement, then the following points shall be applicable:
  - i) Unless otherwise specified the cement shall be ordinary Portland cement in 50 kg bags. The use of bulk cement will be permitted only with the approval of Engineer.
  - ii) A certified report attesting to the conformance of the cement to IS specifications by the cement manufacturer's chemist shall be furnished to engineer if demanded.
  - iii) Cement held in storage for a period of Ninety (90) days or longer shall be tested. Should at any time Engineer have reasons to consider that any cement is defective, then irrespective of its origin, and/or manufacturers test certificate, such cement shall be tested immediately at contractor's cost at a National Test Laboratory / approved laboratory and until the results of such tests are found satisfactory, it shall not be used in any work. Contractor shall not be entitled to any claim of any nature on this account.
  - iv) A cement stores shall be constructed and maintained as detailed under (b) (i) here under for storing specified quantity of cement for the project.
- b) If the cement is supplied by the GAUSHALA
  - i) Contractor will have to make his own arrangements for the storage of minimum 50MT of cement or the capacity as directed by Engineer-in-charge. If supplies are arranged by GAUSHALA, cement will be issued in quantities to cover work requirements of one month or more, as deemed fit by Engineer and it will be the responsibility of contractor to ensure adequate and proper storage. Cement in bulk may be stored in bins or silos, which will provide complete protection from dampness contamination and minimize taking and false set. Cement bags shall be stored in a dry enclosed shed (storage under tarpaulins will not be permitted), well away from the outer walls and insulated from the floor to

avoid contact with moisture from ground and so arranged as to provide ready access damaged or reclaimed or partly set cement will not be permitted to be used and shall be removed from the site. The storage bins and storage arrangements shall be such that there is no dead storage. Not more than 12 bags shall be stacked in any tier. The storage arrangement shall be approved by Engineer. Consignments of cement shall be stored as received and shall be consumed in the order of their delivery.

## 2) **Aggregates**

- a) Aggregate in general designates both fine and coarse inert materials used in the manufacture of concrete. Fine aggregate is aggregate all of which passes through 4.75 mm IS sieve. Coarse aggregate is aggregate most of which is retained on 4.75 mm sieve
- b) All fine and coarse aggregates proposed for use in the work shall be subject to Engineer's approval and after specific materials have been accepted, the source of supply of such materials should not be changed without prior approval of Engineer.
- c) Aggregates shall, except as noted above, consist of natural sands, crushed stone and gravel from a source known to produce satisfactory aggregate for concrete and shall be chemically inert, strong, hard, durable against weathering, of limited porosity and free from deleterious materials that may cause corrosion of the reinforcement or may impair the strength and/or durability of concrete. The grading of aggregates shall be such as to produce dense concrete of specified strength and consistency that will work readily into position without segregation and shall be based on the mix design and preliminary tests on concrete specified later.

### d) **Sampling and testing**

Samples of the aggregates for mix design and determination of suitability shall be taken under the supervision of Engineer and delivered to the laboratory, well in advance of the scheduled placing of concrete. Records of tests, which have been made on proposed aggregates and on concrete made from this source of aggregates, shall be furnished to Engineer in advance of the work for use in determining aggregate suitability. The costs of all such tests, sampling etc. shall be borne by contractor.

### e) **Storage of Aggregates**

All coarse and fine aggregates shall be stacked in stock separately in stock piles in the material yard near the work site in bins properly constructed to avoid inter mixing of different aggregates. Contamination with foreign materials and with earth during storage and while heaping the materials shall be avoided. The aggregate must be of specified quality not only at the time of receiving at site but more so at the time of loading into mixer. Rackers shall be used for lifting the coarse aggregates from bins or stockpiles. Coarse aggregate shall be piled in layers not exceeding 1.20 meters in height to prevent coning or segregation. Each

layer shall cover the entire area of the stockpile before succeeding layers are started. Aggregates that have become segregated shall be rejected.

f) **Specific Gravity**

Aggregate except as noted above and for other than lightweight concrete shall consist of natural or crushed sand shall conform to IS 383. The sand shall be clean sharp, hard, strong and durable and shall be free from dust, vegetable substances, adherent coating, clay, alkali, organic matter, mica, salt or other deleterious substances, which can be injurious to the setting qualities/strength/ durability of concrete.

3) **Machine made Sand**

Machine made sand will be acceptable, provided the constituent rock / gravel composition shall be sound, hard dense, non-organic uncoated and durable against weathering.

a) **Screening and Washing**

Sand shall be prepared for use for such screening or washing, or both, as necessary, to remove all objectionable foreign matter while separating the sand grains to the required size fractions.

b) **Foreign Material Limitations**

The percentages of deleterious substances in sand delivered to the mixer shall not exceed the following:

	<b>Uncrushed</b>	<b>Crushed</b>
i) Material finer than 75Micron IS sieve	3.00	15.0
ii) Shale	1.00	-
iii) Coal and lignite	1.00	1.00
iv) Clay lumps	1.00	1.00
v) Total of all above substances including items (i) to (iv) for uncrushed sand and items iii) and (iv) for crushed sand	5.00	2.00

c) **Gradation**

Unless otherwise directed or approved, the grading of sand shall be within the limits indicated hereunder:

IS Sieve Designation	<b>Percentage passing for</b>			
	Grading Zone I	Grading Zone II	Grading Zone III	Grading Zone IV
10 mm	100	100	100	100

IS Sieve	Percentage passing for			
4.75 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	55-90	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	0-15

Where the grading falls outside the limits of any particular grading zone of sieves other than 600 micron IS sieve, by total amount not exceeding 5 percent, it shall be regarded as falling within that 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 IV.

d) **Fineness Modulus**

The sand shall have a fineness modulus of not less than 2.2 or more than 3.2. The fineness modulus is determined by adding the Cumulative percentages retained on the following IS sieves sizes 4.75mm, 2.36 mm, 1.18 mm 600 micron, 300 micron and 150 micron and dividing the sum by 100.

**4) Coarse Aggregate**

- a) Coarse aggregate for concrete, except as noted above and for other than lightweight concrete shall conform to IS 383. This shall consist of natural or crushed stone and gravel and shall be clean and free from elongated, flaky or laminated pieces adhering coatings, clay lumps, coal residue, clinkers slag, alkali, mica, organic matter or other deleterious matter.

b) **Screening and Washing**

Natural gravel and crushed rock shall be screened and/or washed for the removal of dirt or dust coating, if so demanded by Engineer.

c) **Grading**

Coarse aggregate shall be graded in both cases the grading shall be within the following limits.

IS Sieve Designation	% passing for single sized aggregate of nominal size (mm)					% passing for graded aggregate of nominal size (mm)			
	40	20	16	12.5	10	40	20	16	12.5
63mm	100	-	-	-	-	100	-	-	-
40mm	85 - 100	100	-	-	-	95 - 100	100	-	-
20mm	0-20	85-100	100	-	-	30-70	95-100	100	-
16mm	-	-	85-100	100	-	-	-	90-100	-
12.5mm	-	-	-	85-100	100	-	-	-	90-100
10mm	0.5	0-20	0-30	0-45	85-100	10-35	25-55	30-70	40-85
4.75mm	-	0-5	0-5	0-10	0-20	0-5	0-10	0-10	0-10
2.36mm	-	-	-	-	0-5	-	-	-	-

The pieces shall be angular in shape and shall have granular or crystalline surfaces, Friable, flaky and laminated pieces, mica and shale, if present, shall be only in such quantities that will not, in the opinion of Engineer affect adversely the strength and/or durability of concrete. The maximum size of coarse aggregate shall be 75 mm for class concrete 40-mm for class B concrete and 20mm for class C concrete. The maximum size of coarse aggregate shall be the maximum size specified above, but in no case greater than 1/4 of the minimum thickness of the member, provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and fill the corners of the form. Plums above 150 mm and up to any reasonable size can be used in plain very concrete work of large dimensions up to a maximum limit of 20% of volume of concrete when specifically approved by Engineer. For heavily reinforced concrete members the nominal maximum size of the aggregate shall be 5 mm less than the minimum clear distance between the reinforcing main bars or 5mm less than the minimum cover to the reinforcement whichever is smaller. The amount of fine particles occurring in the free state or as loose adherent shall not exceed 1% when determined by laboratory sedimentation tests as per IS 2386. After 24 hours immersion in water, a previously dried sample shall not have gained more than 10% of its oven dry weight in air, as determined by IS 2386.

d) **Foreign Materials Limitations**

The percentages of deleterious substance in the coarse aggregate delivered to the mixer shall not exceed the following:

Percent by weight

**Uncrushed Crushed**

i)	Material finer than 75 micron IS sieve	3.00	3.00
ii)	Coal and lignite	1.00	1.00
iii)	Clay lumps	1.00	1.00
iv)	Soft fragments	3.00	-
v)	Total of all the above substances	5.00	5.00

5) **Water**



- a) Water used for both mixing and curing shall be free from injurious amounts of deleterious materials. Potable waters are generally satisfactory for mixing and curing concrete.
- b) In case of doubt, the suitability of water for making concrete shall be ascertained by the compressive strength and initial setting time test specified in IS-456 -2000. The sample of water taken for testing shall be typical of the water proposed to be used for concreting, due account being paid to seasonal variation. The sample shall not receive any treatment before testing other than that envisaged in the regular supply of water proposed for use in concrete. The sample shall be stored in a clean container previously rinsed out with similar water.
- c) Average 28 days compressive strength of at least three 15 cm concrete cubes prepared with water proposed to be used shall not be less than 90% of the average strength of three similar concrete cubes prepared with distilled water.
- d) The initial setting time or test block made with the appropriate set cement and the water proposed to be used shall not be less than 30 minutes and shall not differ by more than plus minus 30 seconds from the initial setting time of control test block prepared with the appropriate test cement and distilled water. The test blocks shall be prepared and tested in accordance with the requirements of IS 4031.
- e) Where water can be shown to contain an excess of acid, alkali sugar or salt, engineer may refuse to permit its use. As a guide, the following concentrations represent the maximum permissible values:
- i) To neutralize 100 ml sample of water, using phenolphthalein as indicator, it should not require more than 5 ml of 0.2 normal NaOH. The details of test shall be as given in IS 3025 (part 22).
- ii) To neutralise 100 ml sample of water using Mix Indicator as an indicator, it should not require more than 25 ml of 0.02 normal H<sub>2</sub>SO<sub>4</sub>. The details of test shall be given in IS 3025 (part 23).
- ii) Percentage of solids when tested in accordance with the method indicated below shall not exceed the following:

	Percent	Test as per
Organic	200 mg/L	IS 3025-1964 ( part 18 )
Inorganic	3000mg/L	- Do --
Sulphate (as SO <sub>4</sub> Alkali)	400 mg/L	IS 3025-1964 ( part 24 )
Chlorides (as Cl)	2000 mg/L	IS 3025-1964 ( part 32 )
Suspended matter	2000 mg/L	IS 3025-1964 ( part 17 )

**6) Brick aggregates**

The brickbats shall be of new bricks well burnt, hard, durable and broken to sizes, well graded. It shall be free from dust; the size shall be of 37mm and down. It shall be free from earth and other impurities.

**7) Reinforcement Steel**

- a) Reinforcement bars, if supplies are arranged by contractor, shall be either plain round mild steel bars grade I as per IS 432 (part I) or medium tensile steel bar as per IS 432 (Part I) or hot rolled mild steel and medium tensile steel deformed bars as per IS 1139 or cold twisted steel bars as per IS 1786, as shown and specified on the drawings. Wire mesh or fabric shall be in accordance with IS 1566. Substitution of reinforcement will not be permitted except upon written approval from Engineer.
- b) Plain round mild steel bars grade II as per IS:432(part I) may be used with prior approval of Engineer in writing and with 10% increase in the reinforcement area but its use shall not be permitted in structures located in earthquake zones subjected to severe damage (as per IS:1895) and for structures subject to dynamic loading (other than wind loading), such as frames supporting rotary or reciprocating machinery etc.
- c) All reinforcement shall be clean, free from grease, oil, paint, loose mill scale, loose rust, dust, bituminous material or any other substances that will destroy or reduce the bond. All rods shall be thoroughly cleaned before being fabricated. Pitted and defective rods shall not be used.

**2.01 Providing and laying Brickbat Cement Concrete 1:4:8 (1part cement: 4 part coarse sand: 8 part brickbats of size 37mm and down).**

The brickbats, sand and cement shall be of quality as described in the materials section above. The materials shall be mixed in volumetric proportions in concrete mixer only. The concrete shall be laid in layers of 150mm thick or as specified and well consolidated with rammer of weight 4.5 to 5.5 kg steel rammers of base area 300 Sq. cm till slurry comes on top before the next layer is laid. Curing shall be done for 7 days. For joints the edge of the concrete shall be finished off with a slope not steeper than 2:1 and well roughened. The **rate** shall include cost the shuttering to be provided

**Mode of Measurement:** This shall be measured in CuM. The bed concrete provided for flooring / below foundation or as specified shall be paid for under this item.

**2.02 Providing and laying Brickbat Cement Concrete 1:5:10 (1part cement: 5 part coarse sand: 10 part brickbats of size 37mm and down).**

The general specification is same as for Item spec. no. 2.01 but for the volumetric proportion of the sand and brickbats is 5 and 10 instead of 4 and 8 respectively.

**Mode of measurement:** Same as per Item spec. no. 2.01

**2.03 Providing and laying plain cement concrete 1:4:8 (1 part cement: 4 part coarse sand: 8 part graded stone aggregate of nominal size 37 mm and down.**

The coarse aggregate, cement and coarse sand shall be of quality as specified in the materials section 2.01 and the other procedures are same as that specified in Item spec. no. 2.01.

**Mode of measurement:** Same as per Item spec. no. 2.01

**2.04 Providing and laying plain cement concrete 1:3:6(1 part cement: 3 part coarse sand: 6 parts graded stone aggregate of nominal size 37 mm and down.**

The general specifications shall be same as per Item spec. no. 2.03 but for the volumetric proportions of the coarse sand and the stone aggregate which shall be 3:6 instead of 4:8 and stone aggregate size 20mm & down.

**Mode of measurement:** Same as per Item spec. no. 2.01

**2.05 Providing and laying RCC of mix M20 for structures at all levels below and up to highest plinth level.**

**Mix Design**

- a) All concrete in the works shall be of design mix as defined in IS 456: 2000, unless it is a nominal mix concrete. Whether reinforced or otherwise, all design mix concrete works to be carried out under this specification shall be divided into the following classifications:

**b) MINIMUM COMPRESSIVE STRENGTH OF 15 CM CUBES AT 7 AND 28 DAYS AFTER MIXING, CONDUCTED IN ACCORDANCE WITH IS 516**

Class	Preliminary test (N/SqMM)		Work Test N/SqMM		Max. size of aggregate mm	Minimum Cement Content per CuM
	At 7 days	At 28 days	At 7 days	At 28 days		
M 40	35.0	54.0	27.0	46.0	20	550 Kg
M 35	31.0	45.0	23.5	39.0	20	470 Kg
M 30	28.0	42.0	20.0	33.0	40 or 20	420 Kg
M 25	23.5	35.0	17.0	28.0	40 or 20	370 Kg
M 20	19.4	29.0	13.5	22.0	40 or 20	320 Kg

M 15	14.0	17.0	10.0	16.0	40 or 20	300 Kg
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- c) It shall be very clearly understood that whenever the class of concrete such as M20 is specified it shall be the Contractor's responsibility to ensure that minimum crushing strength stipulated for the respective class of concrete is obtained at works. The maximum total quantity of aggregate per 50 Kg of cement shall not exceed 450 Kg except when otherwise specifically approved by Engineer.
- d) To fix the grading of aggregates, water cement ratio, workability and the quantity of cement required to give preliminary and works cubes of the minimum strength specified, the proportions of the mix shall be determined by weight/volume. Adjustment of aggregate proportions due to moisture present in the aggregate shall be made. Mix proportioning shall be carried out according to Indian Standard Specifications.
- e) Whenever there is a change either in required strength of concrete or water cement ratio or workability or the source of Aggregates and/or cement, preliminary tests shall be repeated to determine the revised proportions, of the mix to suit the altered conditions.
- f) While fixing the value for water cement ratio for preliminary mixes, assistance may be derived from the graph (appendix IS 456 showing the relationship between the 28 day compressive strengths of concrete mixes with different water cement ratios and the 7 days compressive strength of cement tested in accordance with IS 269).
- g) If the contractor is intending to use Ready Mixed Concrete (RMC), he should get approval of the Engineer/Owner/Architect before placing RMC into the structure/ permanent work. Ready Mixed Concrete (RMC) shall be allowed from the sources and RMC manufacturing plants belonged to/owned by the main approved cement manufacturers stipulated as per the Section V, Appendix – IV, Form of Bid. Stages of approval start from the particular grade of concrete, source of concrete and its constituents with necessary mentioned tests, No. of trial mixes, Cube test results (the test results of concrete for 7 days and 28 days strength should be reported by the supplying firm independently apart from field tests at site) etc, as per the relevant IS Codes and as per the Engineer's requirements at any stage, without any extra cost implication to the Contract in any manner either for supply, testing, placing concrete in to place with all necessary material, labour, plant and equipments, safety measures and any statutory duties, taxes, other liabilities in this regard. Contractor must ensure that the RMC should be placed in position within 2 ½ hours from loading of concrete into transit mixer. Relevant documents like trip sheet should be sent along with each mix. Contractor must ensure that the minimum cement content for particular grade shall follow as specified in technical specification. Testing of RMC (fresh/hardened) shall comply relevant IS Codes (IS 4926:1976 reaffirm 1990).

#### **Preliminary tests**

- a) Test specimens shall be prepared with at least two different water/cement ratios for each class of concrete, consistent with

workability required for the nature of the work. The materials and proportions used in making preliminary tests shall be similar in all respects to those to be actually employed in the works as the object of these tests is to determine the proportions of cement, aggregates and water necessary to produce concrete of required consistency and to give the specified strength. It will be the Contractor's sole responsibility to carry out these tests and he shall therefore furnish to Engineer a statement of proportions proposed to be used for the various concrete mixes.

- b) Materials shall be brought to the room temperature and all materials shall be in a dry condition. The quantities of water, cement and aggregates for each mix shall be determined by weight/volume to an accuracy of 1part in 1000 parts.
- c) Mixing shall be done by a mixer machine as per IS 516 in such a manner as to avoid loss of water. The cement and fine aggregate shall first be mixed dry until the mixture is uniform in colour. The coarse aggregate shall then be added, mixed and water added and mixed thoroughly for a period of not less than 3 minutes until the resulting concrete is uniform in appearance. Each mix of concrete shall be of such a quantity as to leave about 10% excess concrete after moulding the desired number of test specimens.
- d) The consistency of each mix of concrete shall be measured immediately after mixing, by the slump test in accordance with IS 1199. If in the slump test, care is taken to ensure that no water or other materials is lost, the materials used for the slump test may be remixed with the remainder of the concrete for making the specimen test cubes. The period of re-mixing shall be as short as possible yet sufficient to produce a homogeneous mass.
- e) Compression tests of concrete cubes shall be made as per IS 516 on 15 cm cubes. Each mould shall be provided with a metal base having a plane surface to support the mould during filling without leakage. The base plate shall be preferably attached to the mould by springs or screws. The parts of the mould when assembled shall be positively and rigidly held together. Before placing, concrete the mould and base plate shall be cleaned and oiled. The dimensions and internal faces of the mould shall be accurate within the following limits:
 

Height and distance between the opposite faces of the mould shall be of specified size plus minus 0.2mm. The angle between the adjacent internal faces and between internal faces and top and bottom planes of mould shall be 90 Deg. plus/minus 5 Deg. The interior faces of the mould shall be plane surfaces with a permissible variation 0.03mm.
- f) Concrete test cubes shall be moulded by placing fresh concrete in the mould and compacted as specified in IS 516.
- g) Curing shall be as specified in IS 516. The cubes shall be kept in moist air of at least 90% relative humidity at a temperature of 27 Deg. Cent. plus minus two Deg. Cent. for 24 hours plus minus half hour from the time of adding water to the dry ingredients. Thereafter they shall be

removed from the moulds, kept immersed in clean fresh water, and kept at 27 Deg. Cent. plus minus 2 Deg. Cent. Temp. Until required for test. Curing water shall be renewed every seven days. A record of maximum and minimum temperatures at the place of storage of the cubes shall be maintained during the period they remain in storage.

h) **Testing of specimens**

The strength shall be determined based on not less than five cubes test specimens for each age and each water cement ratio. All these laboratory test results shall be tabulated and furnished to Engineer. The test result shall be accepted by Engineer if the average compressive strengths of the specimens are tested subject to the condition that only one out of the five consecutive test may give a value less than the specified strength for that age. The Engineer may direct the Contractor to repeat the tests if the results are not satisfactory and to make such changes, as he considers necessary to meet the requirements specified. All these preliminary tests shall be conducted by the Contractor at his own cost in an approved laboratory.

**Proportioning consistency, batching and mixing of concrete**

**Proportioning**

a) **Aggregate**

The proportions, which shall be decided by conducting preliminary test, shall be by volume. These proportions of cement, fine and coarse aggregates shall be maintained during subsequent concrete mixing. The supply of properly graded aggregate of uniform quality shall be maintained over the period of work, the grading of aggregates shall be controlled by obtaining the coarse aggregate in different sizes and blending them in the right proportions. The different sizes shall be stocked in separate stockpiles. The grading of coarse and fine aggregate shall be checked as frequently as possible as determined by Engineer, to ensure maintaining of grading in accordance with the samples used in preliminary mix design. The material shall be stock piled well in advance of use.

b) **Cement**

The cement shall be measured by volume / weight

c) **Water**

Only such quantity of water shall be added to the cement and aggregates in the concrete mix as to ensure dense concrete, specified surface finish, satisfactory workability, consistent with the strength stipulated for each class of concrete. The water added to the mix shall be such as not to cause segregation of material or the collection of excessive free water on the surface of the concrete.

The water cement (W/C) ratio is defined as the volume of water in the mix (including the surface moisture of the aggregates) divided by the volume of cement in the mix. The actual water cement ratio to be

adopted shall be determined in each instance by the Contractor and approved by the Engineer.

d) **Proportioning by water/Cement ratio**

The W/C ratio specified for use by Engineer shall be maintained. The Contractor shall determine the water content of the aggregates as frequently as directed by Engineer as the work progress and as specified in IS 2386 (Part-III) and the amount of water added at the mixer shall be adjusted as directed by Engineer so as to maintain the specified W/C ratio. To allow for the variation in volume of aggregates due to variation in their moisture content suitable adjustments in the volume of aggregates shall also be made.

e) **Consistency and slump**

Concrete shall be of a consistency and workability suitable for the conditions of the job. After the amount of water required is determined, the consistency of the mix shall be maintained throughout the progress of the corresponding parts of the work and approved tests e.g. slump tests, compacting factor tests, in accordance with IS 1199 shall be conducted from time to time to ensure the maintenance of such consistency.

The following tabulation gives a range of slumps, which shall generally be used for various types of construction unless otherwise instructed by the Engineer.

**SLUMPS FOR VARIOUS TYPES OF CONSTRUCTION:**

Only sufficient quantity of water shall be added to concrete during mixing to produce a mix of sufficient workability to enable it to be well consolidated to be worked in to the corners of the shuttering and around the reinforcement, to give the specified surface finish, and to have the specified surface strength. The following slumps shall be adopted for different kinds of works:-

<b>Name of Work</b>	<b>When vibrator used</b>	<b>When vibrator not used</b>
Mass concrete in foundations, footings retaining walls and pavements.	10mm to 25mm	50 mm to 75 mm
Thin sections of floors of less than 75mm thick	25mm to 40mm	75 mm to 100 mm

For Reinforced cement concrete work:

<b>Name of Work</b>	<b>When vibrator used</b>	<b>When vibrator not used</b>
Mass concreting in foundations, footings retaining walls and pavements	10mm to 25mm	80 mm
Beams, slabs, columns	25mm to 40mm	100 mm to 125 mm

Thin shells, folded plates etc	40mm to 50mm	125 mm to 150 mm
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The concrete mix shall be in the proportion as arrived at as per the mix design and all the ingredients to be measured by weight (i.e. by weigh batching). All concrete work shall be carried by weigh batching only. In case if it is approved by the Engineer, the equivalent volume of coarse and fine aggregates based on the bulk density can be adopted. Contractor shall make available weigh scale of appropriate capacity at site for intermittent checking the weight of the ingredients so measured by volume during the concreting operation.

**Sampling and testing concrete in the field:**

- a) Facilities required for sampling materials and concrete in the field shall be provided by the Contractor at no extra cost. The following equipment with operator shall be made available at Engineer's request (all must be in serviceable condition):
  - i) One concrete cube testing machine machine suitable for 15 cm cubes, of 100 tonnes capacity with proving calibration ring. The machine should be powered driven type, calibrated and certification of calibration shall be produced by the contractor.
  - ii) Twelve cast iron cube moulds of 15 cm size
  - iii) One Lab. balance to weigh up to 20 kg with sensitivity of 10gm
  - iv) One set of sieves for coarse and fine aggregates & power driven Sieve shaker
  - v) One set of slump cone complete with tamping rod
  - vi) A set of measures from 5 litre to 0.1 0 litre
  - vii) One electric oven with thermostat up to 120 Deg. Cent.
  - viii) One flakiness gauge
  - ix) One elongation index gauge
  - x) One sedimentation pipette
  - xi) One Pycnometer
  - xii) Two calibrated glass jar of 1 litre capacity.
  - xiii) One Modified proctor mould
  - xiv) Five nos. core cutters

The above list of the facility is an indicative and is not limiting. The contractor shall arrange necessary laboratory equipment / glassware etc



as may be required as per relevant IS specification / code of practice or as advised by the Structural Consultants.

Arrangement can be made by the contractor to have the cubes tested in an approved laboratory in lieu of a testing machine at site at his expense, with the prior consent of the Engineer.

- b) At least six test cubes of each class of concrete shall be made for every 15.0 CuM. of concrete or part thereof. Such samples shall be drawn on each day for each type of concrete. Of each set of 6 cubes, three shall be tested at 7 days age and three at 28 days age. The laboratory test results shall be tabulated and furnished to Engineer. Engineer will pass the concrete if average strength of the specimens tested is not less than the strength specified, subject to the condition that only one out of three consecutive tests may give a value less than the specified strength but this shall not be less than 90% of the specified strength. The cubes shall be tested on 7th and 28th day from the day of casting of the cubes. The requirement of number of samples shall be determined by the Engineer and as such 1 sample for quantity of concrete up to 5 CuM 2 samples for quantity from 6 to 14 CuM to be taken.

An additional set of test cube if asked by the Engineer shall be cast and taken by the contractor which may be kept for record / verification at later date.

**Admixtures:**

- a) Admixtures may be used in concrete only with the approval of Engineer based upon evidence that, with the passage of time, neither the compressive strength nor its durability reduced. Calcium chloride shall not be used for accelerating setting of the cement for any concrete containing reinforcement, or embedded steel parts. When calcium chloride is permitted to be used, such as in mass concrete works, it shall be dissolved in water and added to the mixing water in an amount not to exceed 1.5% of the volume of the cement in concrete. When admixtures are used, the designed concrete mix shall be corrected accordingly. Admixtures shall be used as per manufacturer's instructions, in the manner, and with the control specified by Engineer.

- b) **Air entraining agents:**

Where specified and approved by Engineer, neutralised vinyl resin or any other approved air-entraining agent may be used to produce the specified amount of air in the concrete mix and these agents shall conform to the requirements of ASTM standard 6260, air entraining admixtures for concrete. The recommended total air content of the concrete is 4% plus minus 1%. The method of measuring air content shall be as per IS 1199.

- c) **Water reducing admixtures:**

Where specified and approved by Engineer water reducing Lignosulfonate mixture shall be added in quantities specified by Engineer. The admixtures shall be added in the form of a solution.

d) **Retarding admixtures:**

Where specified and approved by Engineer, retarding agents shall be added to the concrete mix in quantities specified by Engineer.

e) **Water proofing agent:**

Where specified and approved by Engineer, water proofing agent conforming to IS: 2645 shall be added in quantities specified by Engineer.

**Optional tests:**

- a) Engineer may order tests to be carried out on cement, sand, coarse aggregate and water in accordance with the relevant Indian Standards. Tests on cement shall include (i) fineness test (ii) test for normal consistency (iii) test for setting time (iv) test for sound-ness (v) test for tensile strength (vi) test for compressive strength(vii) test for heat of hydration by experiment and by calculations in accordance with IS: 269. Tests on sand shall include (i) test for organic impurities (ii) specific gravity test (iii) test for unit weight. Tests on coarse aggregate shall include (i) specific gravity and unit weight of dry loose and rodded aggregate (ii) soundness and alkali aggregate reactivity (iv) petrographic examination (v) deleterious materials and organic impurities (vi) test for aggregate crushing value. Any or all these tests would normally be ordered to be carried out only if Engineer feels the materials are not in accordance with the specifications or if the specified concrete strengths are not obtained and shall be performed by contractor at site or at an approved test laboratory. Testing fees and other all incidental charges, the Contractor shall have to pay.
- b) If the works cubes do not give the stipulated strengths Engineer reserves the right to ask contractor to dismantle such portions of the work, which in his opinion are unacceptable and re-do the work to the standard stipulated at contractor's cost.

In such case when the concrete fail to pass the routine tests the Engineer can order the contractor to undertake **non-destructive tests like Rebound Hammer test**. The field test to be carried out in accordance with procedure described in IS 13311 (Part II).When making rebound hammer test each result should be the average of at least 12 readings. The readings shall be taken and as per the procedure in the relevant IS 13311 (Part II) and calibration charts available from manufacturer to be used for interpretation. This non-destructive test shall be carried out through an approved agency at contractors cost.

c) **Load test on members or any other tests**

- i) In case of any work being suspected of faulty material or workmanship or both, Engineer requiring its removal and reconstruction may order the contractor that it should be load tested in accordance with the following provisions.

- ii) The test load shall be 125 % of the maximum superimposed load for which the structure was designed. Such test load shall not be applied before 56 days after the effective hardening of the concrete. During the test, struts strong enough to take the load shall be placed in position leaving a gap under the members. The test load shall be maintained for 24 hours before removal.
- iii) If within 24 hours of the removal of the load, the structure dose 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 75 percent of the maximum deflection shown during the second test. If the structure is certified as failed by Engineer, the cost of the load test shall be borne by the contractor.
- iv) If the maximum deflection in mm, shown during 24 hours under load is less than  $40(L \times L) / D$ , where L is the effective span in M ; and D, the overall depth of the section in mm, it is not necessary for recovery to be measure and recovery provisions of (iii) shall not apply.This will be governed by relevant IS.
- v) Any other tests e.g. taking out in approved manner concrete cores examination and tests on such cores removed from such parts of the structure as directed by Engineer, Non destructive testing etc. shall be carried out by contractor if so directed.
- vi) Should the results of any test prove unsatisfactory, or the structure shows signs of weakness, undue deflection or faulty construction the contractor shall remove and rebuild the member or members involved or carry out such other remedial measures as may be required by Owner. the Contractor shall bear the cost of so doing, unless the failure of the member or members to fulfil the test conditions is proved to be solely due to faulty design.

#### **Concrete in alkali soils and alkaline water**

Where concrete is liable to attack from alkali salts or alkaline water, special cements containing low amount of Tricalcium Aluminates shall be used, if so specified in the drawings. Such concrete shall have a minimum 28 days compressive strength of 250 kg per Sq. cm and shall contain not less than 370 kg of cement per cubic metre of concrete in place. If specified, additional protection shall be obtained by the use of a chemically resistant, stone facing or a layer of plaster of Paris covered with suitable fabric, such as jute thoroughly impregnated with tar.

#### **Preparation prior to concrete placement**

- a) Before the concrete is actually placed in position, the insides of the formwork shall be inspected to see that they have been cleaned and oiled. Temporary openings shall be provided to facilitate inspection, especially at bottom of columns and walls forms to permit removal of saw dust,

wood shavings, binding wire, rubbish dirt etc. Openings shall be placed or holes drilled so that these materials and water can be removed easily. Such openings/holes shall be later suitably plugged.

- b) The various agencies shall be permitted ample time to install drainage and plumbing lines in floor and trench drains, electrical conduits, hangers, anchors, inserts, sleeves, bolts, frames and other miscellaneous embedment to be cast in the concrete as indicated on the drawings or as is necessary for the proper execution of the work Contractor shall cooperate fully with all such agencies and shall permit the use of scaffolding form work etc. by other agencies at no extra cost.
- c) All embedded parts, inserts etc. supplied by Owner or Contractor shall be correctly positioned and securely held in the forms to prevent displacement during depositing and vibrating of concrete.
- d) Anchor bolts shall be positioned and kept in place with the help of proper manufactured templates. The use of all such templates, fixture etc. shall be deemed included in the rates.
- e) Slots, openings, holes, pockets etc. shall be provided in the concrete work in the positions indicated in the drawings or as directed by Engineer.
- f) Prior to concrete placement all work shall be inspected and approved by Engineer and if found unsatisfactory, concrete shall not be poured until after all defects have been corrected at Contractor's cost. Cat ladders shall be provided on the reinforcement to facilitate labour movement.
- g) Approval by Engineer for all materials and work as required herein shall not relieve contractor from his obligation to produce finished concrete in accordance with the drawings and specifications.
- h) No concrete shall be placed in wet weather or on water covered surface. Any concrete that has been washed by heavy rains, the work shall be entirely removed, if there is any sign of cement and sand having been washed from the concrete mixture. To guard against damage, which may be caused by rains, the works shall be covered with tarpaulins immediately after the concrete has been placed and compacted. Any water accumulating on the surface of the newly placed concrete shall be removed by approved means and no further concrete shall be placed thereon until such water is removed. To avoid flow of water over/around freshly placed concrete, suitable drains and sumps shall be provided.
- i) Immediately before concrete placement begins, proposed surfaces except framework, which will come in contact with the concrete to be placed, shall be covered with a bonding mortar.

**Transportation:**

- a) All buckets, containers or conveyors used for transporting concrete shall be mortar tight. Irrespective of the method of transportation adopted, concrete shall be delivered with the required consistency and plasticity

without segregation or loss of slump. However, chutes shall not be used for transport of concrete without the written permission of Engineer and concrete shall not be re handled before placing.

- b) Concrete must be placed in its final position before it becomes too stiff to work. On no account, water shall be added after the initial mixing concrete that has become stiff or has been contaminated with foreign materials shall be rejected and disposed off as directed by Engineer.
- c) All equipment used for mixing, transporting and placing of concrete shall be maintained in clean condition. All pans bucket. Hoppers, chutes, pipelines, transit mixers and other equipment shall be thoroughly cleaned after each period of placement.

**Procedure for placing of concrete:**

- a) Before any concrete is placed, the entire placing program, consisting of equipment, layout proposed procedures and methods shall be submitted to engineer for approval if so demanded by Engineer and no concrete shall be placed until Engineer's approval has been received. Conveyor for conveying concrete shall be of such size and design as to ensure a practically continuous flow of concrete during depositing without segregation of materials, considering the size of the job and placement location.
- b) Concrete shall be placed in its final position before the cement shall normally be compacted in its final position within fifteen minutes of leaving the mixer and once compacted it shall not be disturbed.
- c) Concrete, in all cases, be deposited as nearly as practicable directly in its final position, and shall not be re handled or caused to flow in a manner which will cause segregation, loss of materials, displacement of reinforcement, shuttering or embedded inserts or impair its strength. For locations where direct placement is not possible, and in narrow forms, contractor shall provide suitable drop and elephant trunks to confine the movement of concrete. Special care shall be taken when concrete is dropped from a height especially if reinforcement is in the way, particularly in columns and thin walls.
- d) Except when otherwise approved by Engineer, concrete shall be placed in shovels or other approved implements and shall not be dropped from a height more than 1 M or handled in a manner, which will cause segregation.
- e) The following specification shall apply when placing of concrete by use of mechanical equipment is specifically called for while inviting bids or is warranted considering the nature of work involved. The control of placing shall begin at the mixer discharge, concrete shall be discharged by a vertical drop into the middle of the bucket or hopper and this principle of a vertical discharge of concrete shall be adhered to thoroughly all stages of delivery until the concrete comes to rest in its final position.

- f) Central bottom dump buckets of a type that provides for positive regulation of the amount and rate of deposition of concrete in all dumping position shall be employed.
- g) 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 clear the concrete already in place and the height of drop shall not exceed 1 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 separation of ingredients or disturbance of previously placed concrete, will not be permitted.
- h) Concrete placed in restricted forms by wheel barrows, 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.
- i) Where it is necessary to use transfer chutes, specific approval of Engineer must be obtained to the type, length, slopes, baffles, vertical terminals and timing of operations, the discharge and without segregation. To allow for the loss of mortar against the sides of the chutes, the first mix shall have less coarse aggregate. During cleaning of chutes, the wastewater shall be kept clear of the forms. Concrete shall not be permitted to fall from the end of the chutes by more than 1 M. Chutes when approved for use shall have slopes not flatter than 1: 3 and steeper than 1: 2 chutes shall be of metal or metal lined and of rounded cross section. The slopes of all chutes sections shall be approximately the same. The discharge end of the chutes shall be maintained above the surface of the concrete in the forms.
- j) Concrete may be conveyed and placed by mechanically operated equipment e.g. pumps or pneumatic placers only with the written permission of Engineer. The slump shall be held to the minimum, necessary for conveying concrete by this method.
- k) When pumping is adopted, before pumping of concrete is started, the pipeline shall be lubricated with one or two batches of mortar composed of one part cement and two parts sand. The concrete mix shall be specially designed to suit pumping. Care shall be taken to avoid stoppages in work once pumping has started.
- l) When pneumatic placer is used, the manufacturer's advice on layout of pipeline shall be followed to avoid blockages and excessive wear. Restraint shall be provided at the discharge box to cater for the reaction at this end. Manufacturer's advice shall be followed regarding concrete quality and all other related matters when pumping or pneumatic placing equipment is used.
- m) Concreting, once started, shall be continuous until the pour is completed. Concrete shall be placed in successive horizontal layers of uniform thickness ranging from 15 to 90 mm as directed by Engineer. These shall be placed as rapidly practicable to prevent the formation of cold joints or planes of weakness between each succeeding layer within

the pour. The thickness of each layer shall be such that it can be deposited before the previous layer has stiffened. The bucket loads or other units of deposit shall be spotted progressively along the face of the layer with such overlap as well 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 rather than mortar on to stones. Such a condition shall be corrected by redesign of mix or other means, as directed by Engineer.

- n) The top surface of each pour and bedding planes shall be approximately horizontal unless otherwise instructed.
- p) **Compaction:**
  - i) Concrete shall be compacted during placing the approved vibrating equipment until the concrete has been consolidated to the maximum practicable density, is free of pockets of coarse aggregate and fits tightly against all form surfaces, reinforcement and embedded fixtures. Particular care shall be taken to ensure that all concrete placed against the forms faces and into corners of forms or against hardened concrete at joints is free from voids or cavities. The use of vibrators shall be consistent with the concrete mix and caution exercised not to over vibrate the concrete to the point those segregation results.
  - ii) Vibrators shall conform to BIS/IS specifications. Type of vibrator to be used shall depend on the structure where concrete is to be placed. Shutter vibrators to be effective, shall be firmly secured to the formwork which must be sufficiently rigid to transmit the vibration and strong enough not to be damaged by it. Immersion vibrators shall have no load frequency, amplitude and acceleration as per IS 2505 depending on the size of vibrator. Immersion vibrators in sufficient numbers and each of adequate size shall be used to properly consolidate all concrete. Tapping or external vibrating of forms by hand tools or immersion vibrators will not be permitted.
  - iii) The exact manner of application and the most suitable machines for the purpose must be carefully considered and operated by experienced men. Immersion vibrators shall be inserted vertically at points not more than 450 mm apart and withdrawn when air bubbles cease to come to the surface. Immersion vibrators shall be withdrawn very slowly. In no case shall immersion vibrators be used to transport concrete inside the forms. Particular attention shall be paid to vibration at the top of a lift e.g. in a column or wall.
  - iv) When placing concrete in layers, which are advancing horizontally as the work progresses, great care shall be exercised to ensure adequate vibration, blending and mixing of the concrete between the succeeding layers.
  - v) The immersion vibrator shall penetrate the layer being placed and also penetrate the layer below with the under layer is still plastic to ensure good bond and homogeneity between the two layers and prevent the formation of cold joints.

- vi) Care shall be taken to prevent contact of immersion vibrators against reinforcement steel. Immersion vibrators shall not be allowed to come in contact with reinforcement steel after start of initial set. They shall also not be allowed to come in contact with forms or finished surfaces.
  - vii) Form attached vibrators shall be used only with specific authorisation of Engineer.
  - viii) The surface vibrators will not be permitted under normal conditions. However, for thin slabs vibration by specially designed vibrators may be permitted upon approval of Engineer. Where as for cement concrete pavements appropriate surface vibrator shall be used in addition to immersion vibrator approved by the Engineer.
  - ix) The formation of stone pockets or mortar bondage's in corner and against faces of forms shall not be permitted. Should these occur, they shall be dug out, reformed and refilled to sufficient depth and shape for through bonding, as directed by Engineer.
  - q) **Placement interval:**  
  
Except when placing with slip forms each placement of concrete in multiple lift work, shall be allowed to set for at least 24 hours after the final set of concrete and before the start of a subsequent placement.
  - r) **Special provision in placing:**  
  
When placing concrete in walls with openings and in floors of integral slab and beam construction and other similar conditions, the placing shall stop when the concrete reaches the top of the opening in walls and bottom horizontal surface of the slab, as the case may be placing shall be resumed before the concrete in place takes initial set, but not until it has time to settle as determined by Engineer.
  - s) **Placing concrete through reinforcement steel:**  
  
While placing concrete through reinforced steel, care shall be taken to prevent segregation of the coarse aggregate. When the congestion of steel makes placing difficult, it may be necessary to temporarily move the top steel aside to get proper placement and restore reinforcing steel to design position.
  - t) **Bleeding:**  
  
Bleeding of free water, on top of concrete being deposited, in to the forms shall be caused to stop the concrete pour. The conditions causing this defect corrected before any further concreting is resumed.
- Curing, protecting, repairing and finishing**
- a) **Curing:**



- i) All concrete shall be cured by keeping it continuously damp for the period required for complete hydration and hardening to take place shall cure all concrete. Preference shall be given to the use of continuous sprays or ponded water continuously saturated covering of sacks, canvas, Hessian or other absorbent materials, or approved effective curing compounds applied with spraying equipment capable of producing a smooth, even textured coat. Extra precautions shall be exercised in curing concrete during cold and hot water as outlined hereinafter. The quality of curing water shall be the same as that used for mixing concrete.
- ii) Certain types of finish or preparation for overlaying concrete must be done at certain stage of the curing process and special treatment may be required for specific concrete surface finish.
- iii) Curing of concrete made of high alumina cement and super sulphate cement shall be carried out as directed by Engineer.
- iv) Fresh concrete shall be kept continuously wet for a minimum period of 10 days from the date of placing of concrete following a lapse of 12 to 14 hours after laying of concrete. The curing of horizontal surfaces exposed to the drying winds shall however begin immediately the concrete has hardened. Water shall be applied uniformly to concrete surfaces within 1 hour after concrete has set. Water shall be applied to formed surfaces immediately upon removal of forms quantity of water applied shall be controlled to prevent erosion of freshly placed concrete.
- v) Curing shall be assured by use of an ample water supply under pressure in pipes with all necessary appliance of hose, sprinklers and spraying devices. Continuous fine mist spraying or sprinkling shall be used, unless otherwise specified or approved by Engineer.
- vi) Whenever, by the judgment of Engineer, it may be necessary to omit the continuous spray method, a covering of clean sand or other approved means 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 would stain or damage the concrete during or after the curing period. Covering shall be kept continuously wet during the curing period.
- vii) For curing of concrete in pavements, 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 Engineer. Special attention shall be given to edges and corners of the slabs to ensure proper protection to these areas. The ponded area shall be kept continuously filled with water during the curing period.
- viii) Surface coating type compounds shall be used only by special permission of Engineer; curing compounds shall be liquid type white pigmented. Other curing compounds shall be used on surfaces where future blending with concrete, water or acid proof membrane or painting is specified.
- ix) All equipment and materials required for curing shall be on hand and ready for use before concrete is placed.

b) **Protecting fresh concrete:**

Fresh concrete shall be protected from defacements and damage due to construction operation by leaving forms in place for an ample period as specified later in this specification. Newly placed concrete shall be protected by approved means such as tarpaulins from rain, sun and winds. Steps as approved by Engineer shall also be taken to protect immature concrete from damage by debris, excessive loading, vibration, abrasion or contact with 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, Engineer may require that bridges be placed over the area.

c) **Repair and replacement of unsatisfactory concrete:**

- i) Immediately after the shuttering is removed, the surface of concrete shall be very carefully inspected and all defective areas called to the attention of Engineer who may permit patching of the defective areas or also reject the concrete unit either partially or entirely. Rejected concrete shall be removed and replaced by contractor at no additional expense to owner. Holes left by from bolts etc. Shall be filled up and made good with mortar composed of one part of cement to one and half parts of sand passing 2.36 mm IS sieve after removing any loose stones adhering to the concrete shall be finished as described under the particular items of work.
- ii) Superficial honey combed surfaces and rough patches shall be similarly made good immediately after removal of shuttering in the presence of Engineer and superficial water and air holes shall be filled in. The mortar shall be well worked into the surface with a wooden float. Excess water shall be avoided. Unless instructed otherwise by Engineer the surface of the exposed concrete placed against shuttering shall be rubbed down immediately on removal of shuttering to remove fine or other irregularities and necessary care being taken to avoid damage to the surface. Surface irregularities shall be removed by grinding.
- iii) If reinforcement is exposed or the honeycombing occurs at vulnerable positions e.g. ends of beams or columns it may be necessary to cut out the member completely or in part and reconstruct. The decision of Engineer shall be final in this regard. If only patching is necessary, the defective concrete shall be cut out till solid concrete is reached (or to a minimum depth of 25mm) the edges being cut perpendicular to the affected surface or with small under cut if possible. Anchors, tees or dovetail slots shall be provided whenever necessary to attach the new concrete securely in place an area extending several centimetres beyond the edges and the surfaces of the prepared voids shall be saturated with water for 24 hours immediately before the patching material is placed.
- iv) The use of epoxy for bonding fresh concrete used for repairs will be permitted upon written approval of Engineer. Epoxy shall be applied in strict accordance with the instructions of the manufacturer.

- v) Small size holes having surface dimensions about equal to the depth of the hole, holes left after removal of form bottom, grout insert holes and slots cut for repair of cracks shall be repaired as follows. The hole to be patched shall be roughened and thoroughly soaked with clean water until absorption stops.

A 5mm thick layer of grout of equal parts of cement and sand shall be well brushed into the surface to be patched, followed immediately by the patching concrete, which shall be well consolidated with a wooden float. The concrete patch shall be built up in 10 mm thick layers. After an hour or more, depending upon weather conditions, it shall be worked off flush with a wooden float and smooth finish obtained by wiping with Hessian; a steel trowel shall be used for this purpose. The mix for patching shall be of same material and in the same proportions as that used in the concrete being repaired, although some reduction in the maximum size of the coarse aggregates may be necessary and the mix shall be kept as dry as possible.

Mortar filling by air pressure (guniting) shall be used for repairing of areas too large and/or too shallow for patching with mortar. Patched surfaces shall be given a final treatment to match the colour and texture of the surrounding concrete. While cement shall be substituted for ordinary cement, if so directed by Engineer, to match the shade of the patch with original concrete.

- vii) The patched area shall be covered immediately with an approved non-staining water saturated material such as gunny bag which shall be kept continuously wet and protected against sun and wind for a period of 24 hours. Thereafter, the patched area shall be kept wet continuously by fine spray of sprinkling for not less than 10 days.
- viii) Any minor cavity in the element or water pass through a joint, the affected area shall be grouted with an approved means as approved by the Engineer. This will not however applicable to any defect which is in case established during testing.
- ix) All materials, procedures and operations used in the repairing of concrete and also the finished repair work shall be subject to the approval of Engineer. All fillings shall be tightly bonded to the concrete and shall be sound, free from shrinkage cracks after the fillings have been cured and finished.
- d) **Finishing:**
- i) The type of finish for formed concrete surface shall be as follows, unless, other wise specified by the Engineer.

For surfaces against which backfill or concrete is to be placed, no treatment is required except repairing of defective areas.

For surface 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 is specified for use.

Unless specified, surfaces which will be exposed when the structure is in service shall receive no special finish, except repairing of damage or defective concrete removal of fins and abrupt irregularities, fillings of holes left by form ties and rods and clean up of loose or adhering debris.

- ii) Surfaces which will be exposed to the weather and which would normally be level shall be sloped for drainage. Unless the drawing specifies such as stair treads, walls shall be sloped across the width approximately 1 in 30 broader surface 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 either concrete topping, terrazzo or quarry tile and similar surfaces shall be smoothing screeded and levelled to produce even surfaces. Surface irregularities shall not exceed 6mm. Surfaces which will not be covered by backfill, concrete or tile toppings such as outside decks, floors of galleries and sumps, parapets, gutters, sidewalks floors and slabs shall be consolidated, screeded and floated. Excess water and laitance shall be removed before finishing. Floating may be done with hand or power tools and started as the screeded surface has attained a stiffness to permit finishing operation and these shall be the minimum required to produce a surface uniform in texture and free from screed marks or other imperfections. Joints edge panels and forms linings shall be of uniform size and are as large as practicable and installed with closed joints. Upon removal of forms the joint marks shall be smoothed off and all blemishes, projections etc, removed leaving the surfaces reasonably smooth and unmarred.

- iv) **Integral cements concrete finish:**

When specified on the drawings and integral cement concrete finish of specified thickness for floors and slabs shall be applied either monolithic or bonded as specified on the drawing as per IS 2571. The surface shall be compacted and then floated with a wood float or power floating machine. The surface shall be tested with a straight edge and any high and low spots eliminated. Floating or troweling of finish shall be permitted only after all surface water has evaporated. Dry cement or a mixture of dry cement and sand shall not be sprinkled directly on the surface of the cement finish to absorb moisture or to stiffen the mix.

- v) **Exposed Concrete finish/Rendering:**

A rubbed finish shall be provided only on exposed concrete surfaces as specified on the drawings. Upon removal of forms, all fins and other projections on the surfaces shall be carefully removed, off-sets levelled and voids and damaged sections be immediately saturated with water and repaired by filling with a concrete or mortar of the same composition as was used in the surface. Then surface shall be thoroughly wetted and rubbed with carborundrum or other abrasive. Cement mortar may be used in the rubbing, but the finished surface shall be brush coated with either cement grout after rubbing. The finished surfaces shall present a uniform and smooth appearance matching with exposed concrete surface texture and style.

**Mode of Measurement:** This shall be paid in Cu. M

- i) The unit rate for concrete work under various categories shall be all inclusive and no claims for extra payment on account of such items as leaving holes, embedding inserts etc. shall be entertained unless separately provided for in the schedule of quantities. No extra claim shall also be entertained due to change in the number, position end/or dimensions of holes soils 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.
- ii) Payments of concrete will be made on the basis of unit of the respective item specified in the Schedule of Quantities. No deduction in the concrete quantity will be made for reinforcements, inserts etc. and opening less than 0.05cu.m. Where no such deduction for concrete is made, payment for shuttering work provided for such holes, pockets etc. will not be made.
- iii) Payment for beams will be made for the quantity based on the depth being reckoned from the underside of the slabs and length measured as the clear distance between supports. Payment for columns shall be made for the quantity based on height reckoned up to the underside of slabs.

**2.06 Providing and laying RCC of M 25 mix for structures below & up to highest plinth level.**

The general specification is same as per Item spec. no. 2.05 except change in the design mix proportion for M25 grade of concrete.

**Mode of Measurement:** Same as per Item spec. no. 2.05

**2.07 Providing and laying RCC of M 30 mix for structures below & up to highest plinth level.**

The general specification is same as per Item spec. no. 2.05 except change in the design mix for M30 grade of concrete.

**Mode of Measurement:** Same as per Item spec. no. 2.05

**2.08 Providing and laying M 20 mix concrete in super structures up to 6m height from highest plinth level**

The general specification is same as per Item spec. no. 2.05 except for the height.

**Mode of Measurement:** Same as per Item spec. no. 2.05

**2.09 Providing and laying M 25 mix concrete in super structures up to 6m height from highest plinth level.**

The general specification is same as per Item spec. no. 2.05 except for the height.

**Mode of Measurement:** Same as per Item spec. no. 2.05

**2.10 Providing and laying M 30 mix concrete in super structures up to 6m height from highest plinth level.**

The general specification is same as per Item spec. no. 2.05 except for the grade of concrete & height.

**Mode of Measurement:** Same as per Item spec. no. 2.05

**2.11 Providing and laying M 20 mix concrete in super structures above 6 M and up to 12 M height**

The general specification is same as per Item spec. no. 2.05 except for the change in height.

**Mode of Measurement:** Same as per Item spec. no. 2.05

**2.12 Providing and laying M 25 mix concrete in super structures above 6M and up to 12 M height**

The general specification is same as per Item spec. no. 2.05 except for the change in grade of concrete & height.

**Mode of Measurement:** Same as per Item spec. no. 2.05

**2.13 Providing and laying M 30 mix concrete in super structures above 6 M from plinth level and up to 12 M height**

The general specification is same as per Item spec. no. 2.05 except for the change in grade of concrete & height.

**Mode of Measurement:** same as per Item spec. no. 2.05

**2.14 Providing& laying RCC for equipment / machine foundation**

The general specification is same as Item spec. no. 2.05 but for the mix of the concrete, which shall be as specified in the item. The rate is exclusive of reinforcement steel but inclusive of centring and shuttering, providing number of holes, pockets (size and shape as shown in the drawings and as directed) and grouting the same after the machine/ equipment is erected with concrete of specified mix and finishing the same as self finish specified. The rates shall include grouting of base plates, anchor bolts, pipe sleeves including placing, aligning, levelling and maintaining it during the casting of cement concrete, protection of the threaded portion of bolts by acceptable means or protection of any surface from sticking of cement grout etc, welding the insert elements, handling/ placing the template etc complete as per equipment drawing / structural drawing etc complete. The cost of formwork, creating bolt pockets / grouting the bolts is included in the item.

**Mode of Measurement** Same as per Item spec. no. 2.05.

## 2.15 Pre-cast Concrete

Pre-cast concrete shall comply with relevant IS and with the following requirements:

- a) All pre-cast units shall be cast on suitable cement or steel platform which shall be adequately oiled to obtain surface finish same standard as obtained in the forms. 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.
- b) Side shutters shall not be struck in less than 24 hours after depositing concrete and no pre-cast unit shall be lifted until the concrete reaches strength of at least twice the stress to which the concrete may be subjected to at the time of lifting.
- c) The lifting and removal of pre-cast units shall be undertaken without causing shock, vibration or undue bending stresses to or in the units. Before lifting and removal takes place Contractor shall satisfy Engineer or his representative that the methods he proposes to adopt for these operations shall not over stress or otherwise affect seriously the strength of the pre-cast units. The reinforced side of the units shall be distinctly marked.
- d) All pre-cast work shall be protected from the direct rays of the sun for at least 7 days after casting and during that period each unit shall be kept constantly watered or preferably be completely immersed in water if the size of the unit so permits or curing shall be carried out as per standard practice.
- e) Slots, openings or holes, pockets etc. shall be provided in the concrete work in the drawings or as directed by Engineer. Any deviation from the approved drawings shall be made good by Contractor at his own expense, without damaging any other work sleeves, bolts, inserts, etc. shall also be provided in concrete work where so specified.
- f) The pavement slabs / trench covers top shall be appropriately finished i.e. either stripped finished or smooth finished with a smooth border including Chamfering as per details, finishing the exposed edges / corners.
- g) The unit rate for pre-cast concrete members shall include formwork, mouldings, finishing, hoisting and setting in position including mortar, provision of lifting arrangement, exposed concrete finish etc. complete. Reinforcement fixed shall be measured and paid for separately under relevant item.

### **Mode of Measurement:**

It shall be measured in Cu. M.

## 2.16 Providing & erecting Formwork for structures below ground level and up to highest plinth level

- a) The formwork shall consist of shores, bracings, sides of beams and columns, bottom of slabs etc, including ties anchors, hangers inserts etc, complete which shall be properly designed and planned for the work. False work shall be so constructed that necessary adjustment can be made to compensate for take up and settlements. Wedge may be used at the top or bottom of timber shores but not at both ends to facilitate vertical adjustment or dismantling of the formwork.
- b) **Design of formwork:**
- The design of the formwork as well as its construction shall be the responsibility of Contractor. If so instructed, the drawings and/or calculation for the design for the formwork shall be submitted to Engineer for approval before proceeding with work, at no extra cost. Engineer's approval shall not however relieve Contractor of the full responsibility for the design and construction of the formwork. The design shall take into account the entire load vertical and lateral that the forms will be carrying live and vibration loadings.
- c) **Type of formwork:**
- Formwork may be of timber, plywood metal, plastic or concrete. For special finishes the formwork may be lined with plywood, steel sheets oil tempered hard board etc. Sliding forms and slip forms may be used with the approval of Engineer.
- d) **Form work requirements:**
- i) Forms shall conform to the shapes, lines, grades and dimensions including camber of the concrete as called for on the drawings. Ample studs, braces, ties, straps, etc. shall be used to hold the forms in proper position without any distortion whatsoever until the concrete is set sufficiently to permit removal of forms. Forms shall be strong enough to permit the use of immersion vibrators. In special cases form vibrators may also be used. The shuttering shall be close boarded. Timber shall be well seasoned, free from sap, shakes, loose knots, worm holes, warps or other surface defects in contact with concrete. Faces coming in contact with the concrete shall be free from adhering grout, plaster, and paint, projecting nails, splits or other defects. Joints shall be sufficiently tight to prevent loss of water or any fine material from concrete.
- ii) Plywood shall be used for exposed concrete surfaces; where called for. Sawn and wrought timber may be used for unexposed surfaces. Inside faces of forms for concrete surfaces, these are to be rubbed finished shall be planed to remove irregularities or uneven ness in the face. Formwork with linings shall be permitted.
- iii) All new and used form timber shall be maintained in a good condition with respect to shape, strength, rigidity, water tightness, smoothness and cleanliness of surfaces. Form timber unsatisfactory in any respect shall not be used and if ejected by Engineer shall be removed from the site.
- iv) Shores supporting successive members shall be placed directly over those below or be so designed and placed that the load will be



transmitted directly to them. Trussed supports shall be provided for shores that cannot be secured on adequate foundations.

- v) Formwork, during any stage of construction showing signs of distortion or distorted to such a degree that the intended concrete work will not conform to the exact contours indicated on the drawings, shall be repositioned and strengthened. Poured concrete affected by the faulty formwork, shall be removed completely and the formwork be corrected prior to placing of new concrete.
- v) Excessive construction camber to compensate for shrinkage, settlement may impair the structural strength of members and shall not be permitted.
- vii) Forms shall be so designed that their removal will not damage the concrete. Face formwork shall provide true vertical and horizontal joints, conform to the architectural features of the structure as to location of joints and be as directed by engineer.
- viii) Where exposed smooth or rendered concrete finishes are required the forms shall be constructed with special care so that the resulting concrete surfaces require a minimum finish.
- e) **Formwork for Slope Surfaces:**
  - i) Forms for sloped surfaces shall be built so that the formwork can be placed board-by-board immediately ahead of concrete placement so as to enable ready access for placement, vibration inspection and repair of the concrete.
  - ii) The formwork shall also be built so that the boards can be removed one by one from the bottom up as soon as the concrete has attained sufficient stiffness to prevent sagging. Surfaces of construction joints and finished surfaces with slopes steeper than 4 horizontal: 1 vertical shall be formed as required herein.
- f) **Formwork for Curved Surfaces:**
  - i) The contractor shall interpolate intermediate sections as necessary and shall construct the forms so that the curvature will be continuous between sections. Where necessary to meet requirements for curvature, the form timber shall be built up of laminated splens cut to make tight, smooth form surfaces.
  - ii) After the forms have been constructed, all surface imperfections shall be corrected and all surface irregularities at matching faces of form material shall be dressed to the specified curvature.
- g) **Formwork for Exposed Concrete Surfaces:**
  - i) Where it is desired, directed or shown on the drawings to have original fair face finish of concrete surface without any rendering or plastering, formwork shall be carried out by using wood planks, plywood or steel plates of approved quality and as per direction of the Engineer.

- ii) The contractor shall use one type of material for all such exposed concrete faces and the forms shall be constructed so as to produce uniform and consistent texture and pattern on the face of the concrete. Patches or forms for these surfaces will not be permitted. The formwork shall be placed so that all horizontal formworks are continuous across the entire surface.
- iii) To achieve a finish which shall be free of board marks, the formwork shall be faced with plywood or equivalent material in large sheets. The sheets shall be arranged in an approved pattern. Wherever possible, joints between sheets shall be arranged to coincide with architectural features, sills, window heads or change in direction of the surface.

All joints between shuttering plates or panels shall be vertical or horizontal unless otherwise directed. Suitable joints shall be provided between sheets. The joints shall be arranged and fitted so that no blemish or mark is imparted to the finished surfaces.

- iv) To achieve a finish which shall give the rough appearance of concrete cast against sawn boards, formwork boards unless otherwise stated shall be of 150 mm wide, securely jointed with tongue and grooved joints if required to prevent grout loss with tie rod positions and direction of boards carefully controlled. Sawn boards shall be set horizontally, vertically or at an inclination shown in the drawings. All bolt holes shall be accurately aligned horizontal and vertically and shall be filled with matching mortar recessed 5mm back from the surrounding concrete face.
- v) Forms for exposed concrete surfaces shall be constructed with grade strips (the underside of which indicated top of pour) at horizontal construction joints, unless the use of groove strips is specified on the drawings. Such forms shall be removed and reset from lift to lift, they shall not be continuous from lift to lift. Sheeting of reset forms shall be tightened against the concrete so that the forms will not be spread and permit abrupt irregularities or loss of mortar. Supplementary form ties shall be used as necessary to hold the reset forms tight against the concrete.
- vi) For fair faced concrete, the position of through bolts will be restricted and generally indicated on the drawings.
- vii) Chamfer strips shall be placed in the corners of forms for exposed exterior corners so as to produce 20 mm levelled edges except where otherwise shown in the drawings. Interior corners and edges at formed joints shall not be levelled unless shown on the drawings. Moulding for grooves, drip courses and bands shall be made in the form itself.
- viii) The wood planks, plywood and steel plates used in formwork for obtaining exposed surfaces shall not be used for more than 3 times in case of wood planks, 6 times for plywood and 10 times for steel plates respectively. However, no forms will be allowed for reuse, if in the opinion of the Engineer it is doubtful to produce desired texture of exposed concrete.

- ix) In order to obtain exposed concrete work of uniform colour it shall be necessary to ensure that the sand used for all exposed concrete work shall be of approved uniform colour. Moreover the cement used in the concrete for any complete element shall be from single consignment.
- x) No exposed concrete surface shall be rendered or painted with cement or otherwise. Plastering of defective concrete as a means of achieving the required finish shall not be permitted, except in the case of minor porosity on the surface, the Engineer may allow a surface treatment by rubbing down with cement and sand mortar of the same richness and colour as for the concrete. This treatment shall be made immediately after removing the formwork.
- xi) The contractor shall also take all precautionary measures to prevent breaking and chipping of corners and edges of completed work until the building is handed over.

h) **Bracings struts and props:**

- i) Shuttering shall be braced, strutted, propped and so supported that it shall not deform under weight and pressure of the concrete and also due to the movement of men and other materials. Bamboos shall not be used as props or cross bearers.
- ii) The shuttering for beams and slabs shall be so erected that the shuttering on the sides of the beams and under the soffit of slabs can be removed without disturbing the beam bottoms. Re-propping of beams shall not be done except when props have to be reinstated to take care of construction loads anticipated being in excess of the design load. Vertical props shall be supported on wedges or other measures shall be taken whereby the props can be gently lowered vertically while striking the shuttering. If the shuttering for a column is erected for the full height of the column, one side shall be left open and built up in sections as placing of concrete from the sides to limit the drop of concrete to 3M or as directed by engineer.

j) **Mould Oil:**

Care shall be taken to see that the faces of form work coming in contact with concrete are perfectly cleaned and two coats of mould oil or any other approved material applied before fixing reinforcement and placing concrete. Such coating shall be insoluble in water, non-staining and not injurious to the concrete. It shall not become flaky or be removed by rain or wash water. Reinforcement and/or other items to be cast in the concrete shall not be placed until coating of the forms is complete; adjoining concrete surface shall also be protected against contamination from the coating material.

k) **Chamfers and fillets:**

All corners and angles exposed in the finished structure shall be formed with mouldings to form chamfers or fillets on the finished concrete. The standard dimension of chamfers and fillers, unless otherwise specified shall be 20 mm x 20 mm. Care shall be exercised to ensure accurate mouldings. The diagonal face of the mouldings shall be planned or surfaced to the same texture as the forms to which it is attached.

l) **Wall ties:**

Wire ties passing through the walls shall not be allowed. In their place bolts through sleeves be used.

m) **Reuse of forms:**

Before reuse, all forms shall be thoroughly scraped, cleaned, nails removed, holes that may leak suitably plugged and joints examined and when necessary, repaired and the inside retreated to prevent adhesion to the satisfaction of Engineer. Warped lumber shall be resized. Contractor shall equip himself with enough shuttering material to complete the job in the stipulated time.

n) **Removal of forms:**

i) Contractor shall record on the drawings and in 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. The Contractor shall remove the shuttering after obtaining the approval of the Engineer.

ii) In no circumstances shall forms be struck until the concrete reaches strength of at least twice the stress due to self weight and any construction/erection loading to which the concrete may be subjected at the time of striking formwork.

iii) In normal circumstances (generally where temperatures are above 20 Deg. Cent.) forms may be removed after expiry of the following periods:-

<u>Structural members</u>	<u>Ordinary Portland cement concrete</u>
a) Walls            Columns            and Vertical Sides of Beams	24 hrs. or as directed by the Engineer
b) Soffit formwork to Slabs Props to be re-fix immediately after removal of formwork	3 days
c) Beam soffits props left under	7 days
d) Removal of props to    slabs i) Spanning up to 4.5m	7 days

- |   |         |
|---|---------|
| ii) Spanning over 4.5m                  | 14days  |
| e) Removal of props to beams and arches |         |
| i) Spanning up to 6 m                   | 14 days |
| ii) Spanning over 6 m                   | 21 days |

For other cements and lower temperature, the stripping time recommended above shall be suitably modified by the Engineer in conformity with the relevant code of practice or recommendations by the manufacturer.

- iv) Striking shall be done slowly with utmost care to avoid damage to rises and projections and without shock or vibration, by gently easing the wedges. If after removing the formwork, it is found that timber has been embedded in the concrete, it shall be removed and made good as specified earlier.
- v) Reinforced temporary openings shall be provided as directed by Engineer to facilitate removal of formwork which otherwise may be inaccessible.
- vi) Tie rods, clamps, form bolts etc. which must be entirely removed from walls or similar structures shall be loosened not sooner than neither 24 hours nor later than 40 hrs. after the concrete has been deposited. Ties, except those required to hold forms in place, may be removed at the same time. Ties, withdrawn from walls and grade beams shall be pulled towards the inside face cutting ties back from the faces of walls and grade beams will not be permitted.
- vii) For liquid retaining structures no sleeves for through bolts shall be used nor shall through bolts be removed as indicated above. The bolts, in this case, shall be cut at 25 mm depth from the surface and then the hole shall be made good by polymer modified cement mortar of the same proportions as the concrete just after striking the formwork.

Necessary approach / staging for ease of the access of workmen, inspection and supervision staff, in accordance with safety requirements and as per the instructions of the Engineer to be provided for all types of framework, for all the elements at all the depth / heights the cost of such arrangements detailed here above shall be deemed to be included in the quoted unit price of the item. The rate shall include providing and erecting formwork in position as per drawings, applying oil, removal of form after the specified period.

**Mode of Measurement:**

It shall be measured in Sq. M The actually shuttered area shall be measured and paid for

**2.17 Providing and erecting Formwork for structures in super structures up to 12 M height from highest plinth level.**

The general specification is same as per Item spec. no. 2.16 except for the change in height.

**Mode of Measurement:** Same as per Item spec. no. 2.16

**2.18 Providing and erecting Formwork laying for structures in super structures above 12 M height from highest plinth level.**

The general specification is same as per Item spec. no. 2.16 except for the change in height.

**Mode of Measurement:** Same as per Item spec. no. 2.16

**2.19 Providing and erecting false staging for formwork**

The additional height for which it is required shall be as specified in the item specification.

**Mode of Measurement:** This shall be measured and paid for in Sq. m The plan area of the structure shall be measured for all members except RCC walls and gable ends. For RCC walls and gable ends the elevation area shall be measured for payment under this item.

**2.20 Extra over and above for the form work for exposed RCC work**

Extra over and above Item spec. no. 2.16 or 2.17 or 2.18 for the form work for exposed RCC work The specification for the nature of shuttering shall be as specified in the item 2.16 under the sub-head shuttering for exposed concrete works. The work shall be finished including rendering as detailed under relevant item of concrete and also as stated under Item spec. no. 2.16.

**Mode of Measurement:** Only the surfaces / face(s) of the element which are given such exposed finish shall be measured in Sq. M

**2.21 Providing and laying DPC 50mm thick**

This shall be of plain cement concrete of mix M-20 or as specified in the item specification. The top surface of the masonry shall be levelled properly before laying the concrete. The side shuttering shall be vertical and strong. There should not be any honey combing. Curing shall be done for 7 days. After the curing period is over the surface shall be cleaned with brush and kerosene shall be applied over it. Then hot bitumen of grade 80/ 100 shall be applied @ 1.7 kg/Sq. M over the concrete surface. It shall be applied uniformly without any blank space.

**Mode of Measurement:** It shall be measured in Sq. M

**2.22 Providing and laying cement concrete M- 20 at all heights below and up to highest plinth level**

Specifications as per Item spec. no. 2.05 except for change for grade of concrete.

**Mode of Measurement:** Same as per Item spec. no. 2.05

**2.23 Providing and laying cement concrete M- 20 at all heights up to 12 M from level above the highest plinth level**

Specifications as per Item spec. no. 2.05 however for providing and laying cement concrete at all heights above plinth level and up to 12 M.

**Mode of Measurement:** Same as per Item spec. no. 2.05

**2.24 Supplying and mixing water proofing compound**

The waterproofing compound of approved make shall be added to cement concrete or cement mortar as instructed by the Engineer. The proportion of the compound to be added shall be as per the Manufacturer's specifications.

**Mode of Measurement:** The quantity of compound added shall be measured and paid for. The unit shall be as specified in the item specification.

**2.25 Providing, fabricating and placing in position Reinforcement steel**

The quality of the steel shall be as mentioned in the materials section. The bars shall be fabricated as per the drawings. Laps and splices for reinforcement shall be as shown on the drawings. Engineer shall approve splices in adjacent bars. The bars shall not be lapped unless the length required exceeds the maximum available lengths of bars at site or should be provided as specified in the drawing.

**Bending**

- a) Reinforcing bars supplied bent or in coils, shall be straightened before they are cut to size. Straightening of bars shall be done in cold and without damaging the bars. This is considered as a part of reinforcement bending fabricating work.
- b) All bars shall be accurately bent according to the sizes and shapes shown on the detailed working drawings/bar bending schedules. They shall be bent gradually by machine or other approved means. Reinforcing bars shall not be straightened and bend in a manner that will injure the material, bars containing cracks or splits shall be rejected. They shall be bent cold, except bars of over 32mm in diameter that may be bent hot if specifically approved by Engineer. Bars bent hot shall not be heated beyond cherry red colour (not exceeding 845 deg. C.) 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 re-bending shall not injure the material. No reinforcement shall be bent when in position in the work without approval whether or not it is partially embedded in hardened concrete. Bars having kinks or bends other than those required by design shall not be used.

**Fixing**

- a) Reinforcement shall be accurately fixed by any approved means and maintained in the correct position shown in the drawings by the use of block, spacers and chairs as per IS 2502 to prevent displacement during placing and compaction of concrete. Bars intended to be in contact at crossing points shall be strongly bound together at all such points with two numbers 16 to 18 gauge annealed soft iron wire or GI wire as specified in the tender. The vertical distance required between successive layers of bar in beams or other members shall be maintained by providing of mild steel spacer bars at such intervals that the main bars do not perceptibly sag between adjacent spacer bars.

**Cover**

- a) Nominal cover is the design depth of concrete cover to all steel reinforcement, including links. Unless indicated otherwise on the drawings, clear concrete cover for reinforcement (exclusive of plaster or other decorative finish) shall be as follows:
- i) At each end of reinforcing bar, not less than 25 mm or not less than twice the diameter of the bar whichever is less.
  - ii) For a longitudinal reinforcing bar in a column, not less than 40mm, or less than the diameter of such bar. In case of columns of minimum dimensions of 20 cm or under, whose reinforcing bars do not exceed 12 mm, a nominal cover of 25 mm may be used.
  - iii) For longitudinal reinforcing bars in a beam 25 mm or not less than the diameter of the bar.
  - iv) For tensile, compressive, shear, or other reinforcement in a slab or wall not less than 20mm or not less than the diameter of such reinforcement.
  - vi) For footings minimum cover of shall be 50 mm. In case concrete is deposited on prepared ground surface other than PCC the cover shall be to the bottom reinforcement shall be 75 mm.
  - vii) For concrete surfaces exposed to the weather or the ground after removal of forms, such as retaining walls, footing sides and top etc. not less than 50 mm for bars larger than 16 mm diameter and not less than 40 mm for bars 16 mm diameter or smaller.
  - viii) Increased cover thickness shall be provided, as indicated on the drawings, for surfaces exposed to the action of harmful chemicals (or exposed to earth contaminated by such chemical, acid, alkali, saline atmosphere, sulphurous smoke, etc.
  - ix) For reinforced concrete members, totally or periodically immersed in sea water or subject to sea water spray, the cover of concrete shall be 50mm more than those specified in (i) to (v) above.
  - x) For liquid retaining structures the minimum cover to all steel shall be 40mm or the diameter of the main bars, whichever is greater. In the



presence of sea water and soils and waters of a corrosive character the cover shall be increased by 10 mm.

- xi) Protection to reinforcement in case of concrete exposed to harmful surroundings may also be given by providing dense impermeable concrete with approved protective coatings, as specified by the Engineer.
- xii) Concrete / Cement mortar cover blocks of same strength with MS wire grouted or PVC cover blocks of approved quality shall be provided to maintain the correct cover. Concrete / PVC cover blocks to be tied / fixed with reinforcement steel bars to ensure the bar remains in position. The use of pebbles or stones shall not be permitted.

### **Inspection**

Erected and secured reinforcement shall be inspected, jointly measured and recorded and approved by Engineer prior to placement of concrete.

### **Mode of Measurement**

Lengths of reinforcement steel including spacers & chairs shall be measured to the nearest centimetre and converted to weight using IS coefficients. The actual quantity of steel embedded in concrete as calculated and approved by Engineer, irrespective of the level or the height at which the work is done shall be taken. The unit rate for reinforcement shall include all rolling margin, wastages, binding wire, cover blocks etc. for which no separate payment shall be made. Laps as shown in drawings or as approved by Engineer and minimum number of chairs and spacer bars required to keep the reinforcement in position shall be paid for.

When steel is supplied by the owner, the cost of this quantity of steel plus wastage as specified in clause 5.0 of Section VI shall be recovered at issue rate from the Contractor. Rolling margin shall be paid as per clause 6.0 of Section VI.

No wastage and rolling margin for over weight shall however be payable when steel is supplied by the contractor whereas for under weight it should be paid at actual if allowed to use.

### **2.26 Providing, fabricating and placing in position Reinforcement steel-High Strength Deformed Bars-CTD/TMT (Thermo Mechanically Twisted/treated) bars.**

High Strength Deformed Bars (HSDB)/TMT- reinforcement steel shall be confirming to latest IS 1786 as per the specifications detailed under Item spec. no. 2.25. The HSDB/TMT shall be of minimum grade Fe 415 for concrete reinforcement. The chemical composition shall when analysed as per relevant parts of IS 228 shall conform to the provisions of IS 1786.

**Mode of measurement:** Same as per Item spec. no. 2.25

### **2.27 Providing and placing in position bitumen impregnated fibber board**

The bitumen-impregnated fibre board shall be of approved make and thickness as specified. This shall be placed in locations before concreting as per drawing / instructed by the Engineer in the expansion / construction joints. The work shall be done at all levels without any extra cost. The thickness of the board shall be as specified in the item specification.

**Mode of Measurement:** It shall be measured in Sq. M.

### **2.28 Providing and laying bituminous mastic**

This shall be of approved make and quality. The joint / grooves to be cleaned of all the dust or loose/ organic matter/ any foreign material etc. and dried before application of a primer coat of flow able bitumen painting before filling the gap / groove with bituminous mastic The top of the mastic shall be finished smooth with a camber at the centre as shown in the drawings / directed by the Engineer. The joints shall be of uniform width and care shall be taken for proper bonding of the joints.

**Mode of Measurement:** This shall be measured in RM for specified width and depth as per the item in the Schedule of Quantities.

### **2.29 Supply and filling the pockets with free flow ready mix high strength cementitious grout**

Providing and Grouting the foundation bolts/pockets, base plates with ACC Shrinkkomp grade-2/ GP2 of FOSROC or FLOWGROUT 60 of FAIRMATE **ready mixed non shrink, free flow, self levelling, cementitious grout** making holes if necessary in concrete as directed and as per the recommendations of the manufacturer. The pocket shall be cleaned off the dust or any foreign matter before grouting The work shall be measured based on the size of pockets actually grouted or size of pockets shown in the approved drawing, whichever is less. Similarly, in case of grouting below the base plate of machine / equipment, measurement shall be based on the area of grout and the thickness as per the drawing or as per actual whichever is less.

**Mode of Measurement:** The pockets shall be measured and shall paid for in CuM.

### **2.30 Providing and filling Silicon sealant**

Silicon sealant should be of approved make and grade for construction/expansion joints application for the buildings. The work should include cleaning the joints and providing primer etc. as per specifications of the manufacturer and sealing/finishing etc. for size 10 mm wide x 6 to 8mm deep, complete as directed.

**Mode of Measurement:** This shall be measured in Running Meter.

## **3.00 MASONRY WORKS**

### **Applicable codes and specifications**

The following codes, standards and specifications are made a part of this specification. All standards, tentative specifications, codes of practices referred to herein shall be the latest edition including all applicable official amendments and revisions.

- IS: 1077 Common burnt clay building bricks
- IS: 3102 Classification of burnt clay bricks
- IS: 2180 Burnt clay building bricks, heavy duty.
- IS: 3495 Method of sampling and testing clay building bricks
- IS: 2691 Burnt clay facing bricks
- IS: 2221 Code of practice for brick work
- IS: 2185 Load bearing hollow concrete blocks
- IS: 5498 Lime-cement-cinder hollow concrete blocks
- IS: 3115 Lime-cement cinder solid blocks
- IS: 1597 Code of practice for construction of stone masonry (Part I).

### **3.01 Providing and constructing brick masonry in any shape CM in foundation and up to highest plinth level**

- a) Bricks used in works shall be bricks of specified crushing strength as described in the Schedule of Quantities. They shall have the following general properties:

They shall be sound, hard, and homogenous in texture, well burnt in kiln without being vitrified, table moulded, deep red, cherry or copper coloured, of regular shape and size and shall have sharp and square edges and paralleled faces. The bricks shall be free from pores, chips, flaws or humps of any kind. Bricks containing ungrounded particles and which absorb water more than 1/5th of their weight when soaked in water for twenty-four hours shall be rejected. Over burnt or under burnt bricks shall be liable to rejection. The bricks shall give a clear ringing sound when struck.

- b) **Samples of bricks** shall be submitted before starting the brickwork to the Engineer for approval. Bricks supplied shall conform to the approved samples. Brick sample shall be got tested as per IS 3495 by Contractor at no extra cost. Bricks rejected by Engineer shall be removed from the site of works within 24 hours.
- c) **Mortar**
- i) Mix for cement mortar shall be as specified in the respective items of work. Gauge boxes for sand shall be of such dimensions that one

complete bag of cement containing 50 kgs. of cement forms one unit. The sand shall be free from clay shale, loam, alkali, and organic matter and of sound, hard, clean and durable particles. Sand shall be approved by the engineer. If so directed by the engineer sand shall be thoroughly washed till it is free of any contamination.

- ii) For preparing cement mortar the ingredients shall first be mixed thoroughly in dry condition. Water shall then be added and mixing continued to give a uniform mix of required consistency. Cement mortar shall preferably be machine **mixed**, through mixing in a thorough manner may be allowed. The mortar so mixed shall be used within 30 minutes of mixing. Mortar left unused in the specified period shall be rejected.
- iii) The Contractor shall arrange for test on mortar samples if so directed by the engineer re-tempering of mortar shall not be permitted.
- d) **Workmanship**
  - i) All bricks shall be thoroughly soaked in clean water for at least one hour immediately before being laid. The cement mortar for brick masonry work shall be as specified in the respective item of work. Brick work 230 mm thick and over shall be laid in English bond unless otherwise specified. While laying bricks shall be pressed in to the mortar and shoved into final position so as to embed the brick fully in mortar. Bricks shall be laid with frogs uppermost.
  - ii) All brickwork shall be plumb, square and true to dimensions. Vertical joints in alternate courses shall come directly one over the other and be in line. Horizontal courses shall be levelled. The thickness of brick courses shall be kept uniform. For walls of thickness greater than 230 mm both faces shall be kept in vertical planes. No broken bricks shall be used except as closures. Care shall be taken that the bricks forming the top corners and ends of the wall shall be properly radiated and keyed into position. Holes kept in masonry for scaffolding shall be closed before plastering. All interconnected brickwork shall be carried out at nearly one level (so that there is uniform distribution of pressure on the supporting structure) and no portion of the work shall be left more than one course lower than the adjacent work where this is not possible, the work shall be raked back accordingly to bond (and not saw toothed) at an angle not exceeding 45 dig.
  - iii) Bricks shall be so laid that all joints are well filled with mortar. The thickness of joints shall not be less than 6mm and not more than 10 mm. The face joint shall be raked to a minimum depth of 12mm by raking tools daily during the progress of work when the mortar is still green so as to provide a proper key for the plaster or pointing to be done. Where plastering or pointing is not required to be done the joints shall be uniform in thickness and be struck flush and finished at the time of lying. The face of brickwork shall be cleaned daily and all mortar droppings removed. The surface of each course shall be thoroughly cleaned of all dirt before another course is laid on top. If the mortar in the lower course has begun to set the joints shall be raked out to a depth of 12 mm before another course is laid.

- iv) All brickwork shall be built tightly against columns, floor slabs or other structural member.
- v) Where drawings. Indicate that structural steel columns are to be fireproofed with brickwork the brick shall be built closely against all flanges and webs with all spaces between the steel and bricks works filled solid with mortar. Steel member's partly embedded in brickwork and not indicated to be fireproofed with concrete shall be covered with not less than 12mm thick mortar unless directed otherwise by engineer.
- vi) The work shall be cured for 15 days.
- (a) Miscellaneous inserts in masonry e.g. sleeves, wall ties, anchors, conduits, structural sheet, steel lintels etc. shall be installed by the Contractor. Furnishing fixing of any of these inserts by the Contractor will be paid for separately under steelwork. Openings, arches, etc. shall be provided as shown on the drawings, chasses, pockets etc, shall be provided as shown on the drawings to receive rain water pipes etc. Wall ties and flashing shall be built into the brickwork in accordance with the drawings and specifications.

The rate includes necessary single or double scaffolding, centring, soaking of bricks, raking out joints and curing the work all complete.

(f) **Mode of Measurement:**

- i) Brick work of thickness one brick i.e. 230 mm and above shall be paid in units of CuM.

In all cases, the quantities measured shall be executed after making necessary deductions for openings etc. as given below: -

No deductions shall be done for openings up to 1000 sq. cm., ends of dissimilar materials, drainage holes, window/door holdfasts, concrete lintel bearings, landing slab bearing, beam bearing, chimney flues, cut-outs, iron fixtures, pipes up to 30cm diameter.

- ii) It shall be clearly understood that the rates quoted by the Contractor shall be valid for brickwork in all shapes including elliptical, irregular shape etc. and include leaving openings, cutting chases in brickwork as per drawings/ instructions of the Engineer.

**3.02 Providing and constructing masonry in any shape in super structure at all levels above highest plinth level.**

The general specification is same as per Item spec. no. 3.01. The item includes scaffolding, staging etc as required.

**Mode of Measurement:** Same as per Item spec. no. 3.01

### **3.03 Providing and constructing 115 mm brick masonry in partition at all levels**

The bricks shall be laid with stretchers. The proportion of the mortar shall be as specified in the item description. The quality of the bricks shall be as specified in the item 3.01. Two nos. of 6mm diameter MS bars or 25mm x 1.2 mm deep iron band kept at every fourth or third course as specified in BOQ . The rate includes necessary single or double scaffolding, centring, soaking of bricks, providing and placing of 2 nos. of 6 mm diameter MS bars or 25mm x 1.2 mm thick iron band ,raking out joints and curing the work all complete.

**Mode of Measurement:** The brick work shall be measured in sq.m. The deductions shall be as specified in the item 3.01.

### **3.04 Providing and constructing 75mm partition wall in CM**

The general specification shall be same as per item 3.03 except thickness of partition wall..

**Mode of measurement:** Same as per Item spec. no. 3.03.

### **3.05 Providing and constructing honey comb brick work**

The specification for the material and the workmanship shall be as specified in the items 3.01 or 3.03 depending on the thickness of the brick work. The proportion of the CM shall be as specified in the item description in the Schedule of Quantities.

**Mode of Measurement:** It shall be measured in Cu.M as a normal brick work. No deductions shall be made for the honeycombing.

### **3.06 Providing and constructing Facing brickwork**

The facing bricks made from suitable soils shall be free from cracks, flaws, nodules of free lime, warpage and organic matter. These shall be thoroughly burnt and shall have plane rectangular faces with parallel sides and sharp straight right angled edges of specified strength.

- a) Facing bricks of the type specified shall be laid in the positions in specified mortar or in CM 1:4 and in the pattern as indicated on the drawings and all facing brickwork shall be well bonded to the backing bricks. No facing brickwork shall at anytime be more than 600 mm above the backing brickwork.
- b) The joints shall be raked and be pointed as the work proceeds and exposed faces of the brickwork shall be pointed with neat joint to give a fair face.
- c) Faced work shall be kept clean and free from damage, discolouration etc. at all times. The Contractor shall carefully plug all holes with bricks similar to the surrounding .

- d) For facing brickwork double scaffolding shall be used and no holes in brickwork for scaffolding shall be permitted.
- e) The rate shall include pointing, double scaffolding, curing etc. all complete

**Mode of Measurement:** It shall be measured in Sq.M.

### **3.07 Providing and constructing Concrete block (solid / hollow) masonry**

- a) Concrete blocks (hollow or solid) shall generally conform to IS: 2185. Blocks shall be regular in size and shape and shall be of minimum strength 50 kg / Sq.cm or specified in the item specification. Blocks shall be properly cured before they are brought to site. Half or three quarter size blocks are to be used wherever required to make up length of wall and broken blocks shall not be used. The texture of the blocks shall be such that plaster will adhere to it. The contractor shall supply samples for approval. Blocks supplied shall conform to approved samples.

**Mortar:** - Mortar shall be similar to mortar in brickwork as given 3.01 herein before.

#### **Workmanship**

- a) The blocks need not to be wetted however the surfaces which will be jointed shall be moistened with clean water for at least one hour immediately before being laid. All block work shall be plumb, square and properly bonded. The joints shall be broken. The thickness of courses shall be uniform with courses horizontal. All connected work shall be carried out at nearly one level and no portion of the work shall be left more than one course lower than the adjacent work.
- b) Blocks shall be so laid that all joints are well filled with mortar. The thickness of joints shall be 10 mm. The face joints shall be raked to a minimum depth of 10 mm by raking tools daily during the progress of work when the mortar is still green, so as to provide a proper key for the plaster or pointing. When plastering or pointing is not required, the joints shall be struck flush. For pointed masonry without plaster, smooth textured concrete block shall be used. The face of block work shall be kept clean at all times. The laid masonry work to be cured and be kept for 15 days
- c) Where block are to be used for load bearing walls, the upper most layer of block masonry supporting slab or other structured members, shall be solid or treated as directed by the engineer. Pre-cast concrete screen blocks or Jali work may be used for decorative purposes. The contractor shall furnish samples for approval.

**Mode of Measurement:** Block work of specified thickness shall be paid in units of Cu.M. If reinforcing bars are specified in horizontal courses, it shall be measured and paid for separately under relevant tender item; in all cases, the quantities measured and paid for shall be

those actually executed after making necessary deductions for openings etc.

### **3.08 Providing and constructing Random rubble masonry un-coursed in foundation and up to plinth level**

- a) Stone: It shall be hard, sound, free from decay, weathering and defects like cavities, cracks, flaws, sand holes, veins, patches of soft or loose materials etc. It shall be obtained from an approved quarry and blasted rock obtained from site. Where required by the engineer the stone shall be got tested for water absorption determined as per IS 1124-1974. Stone with rounded surfaces shall not be used. The quoted rate for Random rubble masonry using blasted rock includes for sizing and dressing of blasted rock to suit the requirements of masonry construction.
- b) Stones for this work shall be hard, durable rock, close or fine grained and uniform in colour free from veins, flaws and other defects and shall conform to IS:1597 (Part I). The stones shall be laid in mortar proportions specified for the particular item of work. Stones shall be got approved.
- c) For all work below ground level the masonry shall be random rubble un-coursed with ordinary quarry dressed stones or hearting and faced with selected quarry dressed stones.
- d) For all work above ground level the masonry shall be random rubble faced with hammer dressed stones with squared quoins at joints and corners.
- e) No stones shall tail in to the wall, either with a point or to length less than 1 1/2 times its height. The thickness of the joints shall not exceed 12 mm.
- f) Spauls and pinnings shall not be allowed to show on the face of the wall. Two bonds stone each of minimum area of 500 Sq.cm for every 1.0 sq.m. Of each wall face shall be provided. These shall be through stones in wall 600 mm thick and under, in walls thicker than 600 mm the length of bond stones shall be 2/3 times the thickness of walls. The stones for hearting of the wall shall not be less than 150 mm in any direction. Chips and spauls shall be wedged into avoid thick mortar beds and joints. The wall faces, corners and joints or openings shall be truly vertical the quoins shall be of selected stones, neatly dressed with chisel to form the required angle and laid header and stretcher alternatively.
- g) The exposed face of the work shall be carefully and neatly pointed with mortar in all joints on the other side the joints shall be neatly struck with trowel while the mortar is fresh.

#### **Mortar**



The mortar for the work shall be as specified in the respective item of work. Curing of masonry shall continue and be kept continuously moist for a minimum of 14 days.

The item includes providing of bond through stones.

**Mode of Measurement:** The unit of measurement shall be CuM or part thereof. The actual quantity of masonry shall be calculated from dimensions as per the drawings or actual execution which ever is less deducting the openings shall be paid for.

### **3.09 Providing and constructing Random rubble masonry un-coursed in superstructure**

The specification shall be same item 3.08 except height.

**Mode of Measurement:** Same as per Item spec. no. 3.08

### **3.10 Providing and constructing Coursed rubble masonry in foundation and up to plinth level**

- a) The stones used shall be hard, durable rock, free from veins, flaws and other defects and shall conform to IS 1597 (Part 1). Height of each course in the masonry shall not be less than 150 mm. The stones in each course shall be of equal height. All courses shall be of the same height unless other wise specified. All stones shall be set in full cement mortar of proportion specified for the respective item of work. The Engineer shall be approved stones.
- b) The face stones shall be squared on all joints and beds. The beds being hammer dressed or chisel dressed type and squares for at least 75mm from the face and the joints for at least 40-mm. The face of the stone shall be hammer dressed so that bushings shall not project more than 40 mm.
- c) No spauls or pinnings shall be allowed on the face. All bed joints shall be horizontal and side joints vertical and no joints shall be more than 10 mm in thickness.
- d) No face stone shall be less in breadth than in height or shall tail into the work to a length less than the height and at least 1/3rd the number of stones shall tail into the work to at least twice their height, or in walls over 600 mm in thickness 3 times their height.
- e) Through stones shall be inserted every 1.5 meters to 1.8 meters apart in every case and shall run right through when the wall is not more than 600 mm thick when the wall is more than 600 mm thick a line of two or more headers shall be laid from the face to face which shall overlap each other by at least 150 mm. A header shall have a length of at least thrice its height.
- f) Stones shall break joint at least half the height of the course. Quoins shall be formed of stones at least 45 cm long laid stretcher and header alternately. They shall be laid square in their beds, which shall be fair

dressed to a depth of at least 100-mm. The corner shall be chisel dressed for a width of 25 mm.

- g) The work on the interior face shall be precisely the same as on the exterior face unless the work is to be plastered in which case the side joints need not be truly vertical.
- h) Hearting shall consist of flat bedded stones carefully laid on their proper beds and solidly bedded in mortar chips and spauls of stone being wedged in wherever necessary so as to avoid thick beds or joints of mortar. Care shall be taken so that no dry work or hollow spaces shall be left anywhere in the masonry. The face and backing shall be brought up every bed. The backing should not be levelled up at each course by the use of chips.
- i) The joints shall be evenly racked to a depth of 12 mm using a proper racking tool during the progress of the work for masonry above original or formed ground level. The joints in masonry below ground level shall be flushed. If asked for after racking when mortar is green joints shall be applied with CM 1:3 mortar and neatly pointed simultaneously at no extra cost. The face of the wall to be cleaned of the mortar burrs if any to leave the surface clean and even.

The mortar for the work shall be as specified in the respective item of work. Curing of masonry shall continue for a minimum of ten days.

**Mode of Measurement:** Same as per Item spec. no. 3.08

### **3.11 Providing and constructing Coursed rubble masonry in superstructure**

Same as in Item spec. no. 3.10 but for course rubble masonry in super structure at all levels including scaffolding etc complete as directed

**Mode of Measurement:** Same as per Item spec. no. 3.10

## **5.00 FINISHING WORKS**

### **Applicable Codes**

IS:2394 Code of practice for application of lime plaster finish.

IS:1477 *Code of practice for painting of ferrous metals in buildings and allied finishes (part I &II)*

**IS: 427 *Distemper, dry colour as required***

IS:2395 Code of practice for painting concrete, masonry and plaster surfaces.

IS:428 Distemper, oil emulsion, colour as required.

### **5.01 Providing & Applying Cement plaster 12 mm thick**

The surface to be plastered shall be washed with fresh clean water free from all dirt, loose material grease etc. and thoroughly wetted for 6 hours before plastering work is commenced. Concrete surfaces to be plastered will however be kept dry. The wall should not be too wet but only damp at the time of plastering the dampening shall be uniform to get uniform bond between the plaster and the wall. The junction between the brickwork and RCC should be fixed with chicken wire mesh/PVC strip as directed before plaster.

The proportion of the mortar shall be as specified under the respective items of work. Cement shall be mixed thoroughly in dry condition and then just enough water added to obtain a workable consistency. The quality of water, sand and cement shall be as mentioned in the Specifications for Concrete & allied works. The mortar thus mixed shall be used immediately and in no case shall the mortar be allowed to stand for more than 30 minutes after mixing with water. The plaster shall be laid in a single coat. The mortar shall be splashed on the prepared surface with a trowel and finished smooth by trowelling. The plastered surface shall be rubbed with iron plate till the surface shows cement paste. The work shall be in required line, level and plumb including cutting and providing grooves of 20mm x6mm or as per the details. Curing of plaster shall be started as soon as the applied plaster has hardened enough so as not to be damaged. Curing shall be done by continuously applying water in a fine spray and shall be carried out for at least 7 days.

The plaster shall be carried out on jambs, lintel and sill faces top and undersides, etc. as shown in the drawing or as directed by the engineer.

#### **Mode of Measurement:**

The quantity of work to be paid for under this item shall be calculated by taking the projected surface of the area plastered after making necessary deductions for openings, doors, windows etc. as given below:-

- i) No deductions shall be made for opening or end steel joints, beams, post girders etc. up to 0.5 SqM area. No addition shall be made for joints, soffits and sills of such openings. This is applicable to both the sides of the wall.
- ii) Where opening exceeds 0.5 SqM but does not exceed 3 SqM and also when only one side of the wall is treated and other side is not treated, deduction shall be made if the width of the reveal on the treated sides is less than that on the untreated side but if the width of the reveal is more then no deduction nor addition shall be made for reveals for jambs, soffits, sills etc.
- iii) For openings more than 0.5 SqM but not exceeding 3 SqM and also when both the sides of the wall is plastered with the similar plaster, deduction shall be made for one face only. But when both the sides treated with different plaster, then deduction shall be

made from the side on which the reveal is less and no deduction on the other side.

- iv) For openings whose respective areas exceed 3 SqM deduction shall be made for the full opening of the wall treatment on both faces while at the same time jambs, sills and soffits shall be measured in sq m for payment. In measuring the jambs deduction shall not be made for the area in contact with the frames of doors, windows etc.
- v) If the average thickness of the plaster is more than the specified thickness due to any account nothing extra shall be paid for the same.
- vi) Nothing extra shall be paid for double scaffolding and the rate is applicable for work at all levels.

It shall be measured in SqM.

### **5.02 Providing & Applying Cement plaster 19 mm thick**

The general specification is same as Item spec. no. 5.01 but for 19 mm thickness of the plaster. The plaster work shall be carried out in single or two layers as specified in schedule of quantities, the first layer being 12 mm thick and the second layer being 7mm thick. The proportions of the mortar for both the layers shall be as specified in the item specification. The first layer shall be splashed against the prepared surface with a trowel to obtain an even surface. The second layer shall then be applied and finished leaving an even and uniform surface, trowel finished unless otherwise directed by the engineer. The plastered surface shall be rubbed with the iron plate till the cement paste comes on the surface.

**Mode of Measurement:** Same as per Item spec. no. 5.01.

### **5.03 Providing & Applying lime punning to the plastered surface**

The plastered surface shall be finished smooth by trowelling on the surface with neeru (lime cream). Neeru shall be properly slaked fat lime with addition of 10 % cement to prepare neeru for bond as per the instructions of Engineer. The neeru shall be applied at the rate of 2.2 kg per SqM.

**Mode of Measurement:** Same as per Item spec. no. 5.01

### **5.04 Providing and Applying 19mm sand faced plaster**

This shall be applied in 2 coats. The first coat or the base coat should be 12 mm and shall be continuously carried out without break to the full length of wall or natural breaking points such as doors, windows etc. The base coat shall be splashed on to the prepared surface with heavy pressure, brought to true and even surface and then lightly roughened by cross scratch lines, to provide bond for the finishing coat. The mortar

proportion for this base coat shall be as specified in the respective item of work. The base coat shall be cured for at least seven days

The second coat shall be 7mm thick. Before application of the second coat, the base coat shall be evenly damped. This coat shall be applied from top to bottom in one operation and without joints, finish shall be straight, true and even. The mortar proportions of this coat shall be as specified under the respective item work. Sand to be used for the second coat and for finishing work shall be as specified in the item description. The second coat shall be finished with sponge to give proper finish. Grooves of 20mm 10mm or of specified size as per drawings / instructions of the Engineer shall be cut and provided and finished as per the drawings. These grooves shall be formed in the first coat and then finished in second coat. This includes double scaffolding. All the scaffolding holes if any, shall be bridged and finished in the first coat of plaster.

Mode of Measurement: **Same as per Item spec. no.5.01.**

#### **5.05 Providing & Applying rough cast plaster**

This shall be carried out in two coats. The base plaster shall be of 12 mm thick and of specified proportion of cement mortar. It shall be roughened to receive the top coat. The top coat shall be 7mm thick. It shall be of 3 parts cement, 6 parts coarse sand & 4 parts of 6mm single or crushed stone aggregate. General specifications are same as of Item spec. no. 5.04.

Mode of Measurement: **Same as per Item spec. no.5.01.**

#### **5.06 Providing & applying water-proof cement plaster**

The plaster shall be of specified thickness and of specified mortar proportions. The contractor shall use approved waterproofing admixture manufactured by reputed manufacturer in the mortar for plasterwork. The quantity to be used shall be in accordance with the manufacturer's instructions, however subjected to the approval of the Engineer. The use of Calcium chloride shall be prohibited unless specifically allowed by engineer and shall conform to IS: 2645. The plaster shall be cured at least for 7 days.

General specification shall be same as item n0. 5.01

**Mode of Measurement:** It shall be measured in SqM. The quantity of waterproofing material used in this item shall be measured and paid for separately.

#### **5.07 Providing & Applying neat cement**

The specification same as per item 5.03 except that neat cement is applied to the plaster surface in place of lime neeru.

**Mode of Measurement:** Same as per Item spec. no. 5.01

### **5.08 Providing & applying cement pointing**

The dust shall be brushed out of the joints and the wall be washed with water.

The mortar shall consist of one part of cement to one part of fine sand. Mortar shall be filled into joints and well pressed with special steel trowels. The joints shall not be touched against after it has once begun to set.

The joints of the pointed work shall be neat. The lines of false joints shall be allowed.

The work shall be cured for a week after the pointing is complete. Whenever coloured pointing has to be done the colouring pigment of the colour required shall be added to cement in proportion as recommended by the manufacturer and as approved by the engineer.

**Mode of Measurement:** Same as per Item spec. no. 5.01

### **5.09 Providing& Applying White washing on new works/old work - 3 or more coats**

Walls to be thoroughly scrapped with sand paper before white wash is applied. White wash shall be prepared from a good quality fat lime. Lime shall be slaked with water to the Consistency of a cream and allowed to remain under water for 2 days. It shall then be strained through a cloth and 2 kg of clean gum of approved quality shall be added for every cubic meter of lime or ready to use binding compound of approved make be added as per manufacturer's specification, as specified in the item specification or by the Engineer, and indigo up to 3gm per kg of lime dissolved in water shall then be added and stirred well.

It shall be applied with a stroke of the brush from the top downwards, another from bottom upwards over the first stroke and similarly one stroke from the right and another from the left over the first brush, before it dries. Minimum three coats shall be applied on the plastered surface for desired finish. If the desired finish is not obtained extra coats shall be applied without any extra cost.

The rate shall be applicable for carrying out the work at all heights, double scaffolding etc. all complete. Extra 20% shall be added to the area for AC corrugated sheets and 10% for semi-corrugated sheets, cornices and others.

**Mode of Measurement:** Same as per Item spec. no. 5.01 for plain surface.

### **5.10 Providing & Applying Plastic Emulsion paint**

Paint to be used should be of approved make. The painting work shall be carried out as directed by the engineer, keeping however in view the recommendations of the manufacturer. Where painting with plastic emulsion is specified, all uneven surfaces shall thoroughly cleaned of all dust dirt and sand papered including rubbing the surface with 60 grit grinding stone in case of smooth plastered surface (without neat cement / neeru finished surfaces). One primer coat with cement putty shall be applied and rubbed smooth with sand paper to prepare the surface. The surface thus prepared shall be free from undulations / waviness. The prepared surface shall then be applied with minimum 2 coats of emulsion paint to be applied with roller / brush to give an even finish. The scope of work includes providing necessary scaffolding / staging. Workmanship shall conform to the requirements of IS: 2395.

**Mode of Measurement: Same** as per Item spec. no. 5.01 for plain surface.

#### **5.11 Providing & Applying Cement paint**

This may be "SNOWCEM" or of equivalent make to be applied over plastered surface including sand faced plaster. The surface shall be prepared cleaning the surface washing etc. This shall be applied with brush on the plastered wall. The painting work shall be carried out as per the procedure recommended by the manufacturer. The strokes shall be even and it shall be cured at least for 7 days. No patch or brush stroke shall be seen. Two or more 'coats to be applied in succession one after the other at a gap of 24 hours as per the instructions of the Engineer.. A pre coat of primer as per manufacturer's specification shall be applied with out extra cost.

**Mode of Measurement:**

It shall be measured in SqM. The deductions for opening shall be as specified in the Item spec. no. 5.01.

#### **5.12 Providing & applying silicon paint**

This shall be applied over the exposed / external surface for rendering it waterproof. The paint shall be of approved quality and reputed approved make. The paint shall be applied as per the manufacturer's specification. This shall be applied with brush to achieve full coverage. Nothing extra shall be paid for applying on uneven surface such as exposed aggregate plaster.

**Mode of Measurement:**

It shall be measured in SqM. The deductions for opening shall be as specified in the Item spec. no. 5.01.

#### **5.13 Providing & fixing GI chicken wire mesh**

The GI wire mesh shall be of 24 gauge of specified width as per details / instructions of the Engineer and it shall be fixed with screws at the junction of brick masonry and RCC elements. The screw holes shall be drilled in RCC elements to ensure fixidity. If need be washers to be

provided for holding. The chicken wire mesh shall not sag in between the screws. This shall be done before the application of plaster.

**Mode of Measurement:** It shall be measured in SqM. Measurement shall be taken before the application of the plaster.

#### **5.14 Providing & Applying dry distemper:**

Distemper shall be of approved make. It shall be applied by a broad stiff brush in two coats over a coat of primer. The first and second coat shall be applied only after the primer coat has thoroughly dried. The first coat shall be of a lighter tint. The shade of the distemper shall be got approved by the Engineer. Water bound and oil bound distemper shall conform to the requirements of IS: 427 and IS 428 respectively.

**Mode of Measurement:**

It shall be measured in SqM. The deductions for opening shall be as specified in the Item spec. no. 5.01.

#### **5.15 Providing & Applying Colour Wash**

The mineral colours, not affected by lime shall be added to white wash. Colour wash shall be applied the same way as white wash. Necessary and approved colouring chemical shall be added to the white wash, which has been strained. Only colour wash required for the day's work shall be prepared. If the finished surface is Powdery and comes off easily or the general appearance is streaky, the work shall be rejected. The Contractor has to redo the work at no extra cost. Indigo (Blue / Neel) shall not be added in colour wash.

**Mode of Measurement:** Same as per Item spec. no. 5.09.

#### **5.16 Providing and Applying Exposed Aggregate Plaster**

Exposed aggregate plaster shall be applied on walls at all heights above and below plinth level with 8 to 10mm size hard approved variety stone chips or as specified in the item description. Stone chips to be screened, washed and dried properly. The base mortar shall be in two layers. The first layer shall be 12mm thick plaster with cement mortar 1:4 with necessary grooves of 20 to 12 mm width as shown in architect's drawing and as directed and continuously carried out to the full length of wall or natural breaking points such as doors, windows or a through joint by splashing on to the prepared surface with heavy pressure, brought to true and even surface and then lightly roughened by cross scratch lines, to provide bond for the finishing coat. If instructed water proofing admixture to be added which will be paid under relevant tender item.

The top layer shall be cement paste of thickness up to 4mm applied over the 1<sup>st</sup> layer plaster surfaces. The cement paste shall be applied on a



limited area at a time so that it would not become hard before stone chips are applied. The stone chips shall then be applied after properly raking the plastered surfaces by means of floats or trowels, dashing them against the still fresh cement paste already applied. Where uniform texture is not obtained, chips shall be stuck suitably by hand. Care should be taken that application of cement paste shall be done uninterruptedly within one panel so that the joints and patches are avoided. Precautionary steps to be taken to protect the surface already done, during the process of finishing adjoining areas so that the areas completed shall not get stained. Necessary scaffolding curing breaking the chips etc. are to be done as per the instruction of the Engineer. All the inner/ outer corners shall be finished properly up to the drip moulds in case of soffits of lintel / beams or slabs. The grooves shall be pointed with cement slurry mixed with water proofing compound to make them water proof before applying top stone chips finish without any extra cost.

**Mode of Measurement:** It shall be measured in SqM. The measurement shall be taken for un-plastered surface. The deductions for the openings etc shall be as specified under Item spec. no. 5.01.

#### 5.17 **Exposed aggregate (Grit Wash) Plaster**

This is the type of finish in which aggregates particle are embedded in the plaster and exposed to give a permanent, natural and beautiful look specially for facing walls. The finish is widely used on exterior surfaces and is obtained by washing the finished surface with water thus exposing the aggregate. The aggregate used can either be white or coloured or a mixture of both in any proportion to get the desired effect. The aggregate commonly used are marble chips dolomite or calcined flint stone etc. of 3 to 10 mm size and it is advisable to add about 10% of finer aggregate size 1.5 mm for better grading. **As far as possible only marble stone aggregate should be used. Use of sand stone aggregate should be avoided.**

#### **Raw materials**

**White cement** of approved make

**Marble Powder** – Marble powder of 100-150 mm mesh free from duct, dirt and other foreign impurities.

**Aggregate** – Marble chips of sizes 2A/2B/3 or mixture of these three sizes. One could use a greater proportion of larger chips, if so desired.

**Colouring pigments** – synthetic inorganic pigments or oxide colours as per the colour / shade desired.

**Water** – Water used for mixing and curing should be potable quality, clean, free from salt, foreign impurities, dust, dirt, oil and grease etc.

#### **Mix proportion**

Dry Mix: The required quantity of white cement or cement as specified is mixed with marble powder and with marble chips. For preparing colour mix, the required quantity of colouring pigment should be mixed and

dispersed thoroughly with white cement before mixing marble chips and sieved through a fine “malmal” cloth to obtain uniform shade.

Wet mix: To one volume of dry mix add less than half volume of water (appx. Water cement ration = 0.41) and mix well to get uniform and thick workable plastic consistency. The quantity of wet mix prepared should be consumed within one hour.

### **Technique of Application**

#### **Surface preparation**

- a) Old masonry surface: For proper adhesion of finishing plaster, it is important that the base plaster should be rough. So the surface of old masonry plaster should be chipped properly to make it rough and washed thoroughly to remove old dust or dirt and wet well before the application of finishing plaster.
- b) New plastered surface: In case the base plaster is new or freshly applied and proper combing has been done, the finishing plaster can be applied directly after cleaning and curing.
- c) Smooth Brick work: Where the brick work is smooth and even a base plaster of ordinary Portland cement mortar is applied before the finishing plaster of white cement mortar. For base plaster, one part of ordinary Portland cement should be mixed with 3 parts of clean sand and 2% water proofing compound. The thickness of basecoat should be made rough by combining it with wavy horizontal lines to form a key surface for the finishing plaster. After drying the surface should be cured thoroughly with water and finishing coat should be applied after 24 hours.
- d) Rough Brickwork: When the brick work is rough and uneven, two layers of ordinary cement plaster should be applied. The thickness of the second layer should be about 8mm. The preparation of mortar mix and treatment of the surface will be the same as suggested above.

#### **Application**

1. Under layer of 12mm thick in cement plaster 1:4 (1cement:4 coarse sand) be applied to prepare the surface in true line and level and roughened by cross scratch lines.
2. Apply a thick coat of cement slurry over the base coat.
3. Top layer 15mm thick cement and stone grit in mix 1:1 (1cement 50% white cement 50% grey cement : 1 stone grit 12mm to 15mm) including addition of 15% marble dust to the cement.
4. The aggregate plaster finish shall be laid in panel as per Architectural drawing. Grooves of size up to 20mm to 25mm shall be provided between panels by nailing in the wall 20mm to 25mm wide and 15mm

thick trapezoidal wooden beading in true plumb, line, and pattern and at corners as per architectural drawing.

5. Excess mortar on the surfaces of the aggregates shall be removed by washing with water or with a solution of dilute hydrochloric acid and then by water and finished by applying two coats of silicon paint (coat of silicon paint with labour etc shall be paid under relevant item).
6. The grit shall be broken approved natural grey colour granite stone aggregates and graded by sieving through two sieve of 15mm mesh. Only aggregate which passes through sieve of 15mm mesh and retaining on 12mm mesh shall be used in the works.

All grooves shall be pointed with neat cement paste mixed with water proofing compound as per manufacturer's specification

Prepare neat cement or coloured cement slurry and brush it within the panel shortly ahead of application of the finishing plaster. The cement or specified mortar is placed on the wall with trowel, after the water has receded sufficiently and about 30 minutes later, it re-trowelled. At this stage the surface should be made smooth by rubbing and trowelling and covering all the aggregate particles with skin with white cement / equivalent. The surface is washed after the coat has partially hardened. The water is poured lightly on the surface and rubbed simultaneously with a soft nylon brush to expose aggregate particles. Initial rubbing helps in removing the skin of J. K. white cement / equivalent and subsequent rubbing, with washing exposed aggregate particles. During rubbing, with water should be poured on the surface simultaneously to wash out the cement. Now the wooden strips should be taken out after the washing is completed.

Special care should be taken to take out the wooden strips. After 24 hours of air drying of the plaster, cure the surface thoroughly with clean water three to four times a day periodically for 7 days.

The time of washing is most important and its determination requires experience as the same is affected by temperature and other atmospheric conditions. If the washing is done early, aggregate particles will start falling down and if washing is delayed, it will be difficult to expose aggregate particles.

In case the surface of the aggregate with cement which cannot be washed off, the surface may be washed with dilute hydrochloric acid, but this acid washing is required the treatment should be done after the cement has set and fully hardened. Care should be taken to flush the residual acid thoroughly, otherwise the residual acid will tend to make the surface pale or yellow.

### **Precautions**

- a) The aggregate should be washed before use.
- b) White cement and marble powder should be mixed thoroughly before further mixing with marble chips.

- c) Only thick plastic consistency of White cement mortar should be maintained.
- d) The plaster should be cured thoroughly at regular intervals for 7 days.
- e) While washing the plaster to expose the aggregate care should be taken to not use excess water as it invites the problem of cracking.
- f) Washing should start from top of the surface and subsequently go down.
- g) While washing rub the surface with brush in a circular movement instead of straight rubbing.

**Mode of Measurement:** It shall be measured in SqM. The measurement shall be taken for un-plastered surface. The deductions for the openings etc shall be as specified under Item spec. no.5.01.

### **5.18 Providing and applying wrinkle plaster**

Providing and applying wrinkle plaster in two coats at all levels. First coat shall be of 12 mm thick cement plaster in cement mortar Cement: Sand 1:4 duly roughened by combining it with wavy horizontal lines to form a key surface for the finishing plaster curing the same. All the wholes in the wall surface should be bridged and finished evenly and no spots should be seen. The second and finishing coat shall be with pure cement paste of required consistency @ 10 kgs per SqM to form uniform wrinkle finish with the help of sponge. The strokes shall be unidirectional and workmanship need to be ensured. The finishing coat for each face of the building shall be applied from top to bottom and each building shall be finished at a stretch. Cement used for the second coat i.e. finishing coat shall be from one lot of the specific make to ensure the colour is maintained even on all the faces of a building and also all the buildings in premises. The finish shall be terminated up to grooves created at the soffit of the lintel / beams / chajjas which are smooth finished as per the architectural drawings and directions of the Engineer. The scope of work includes double scaffolding, curing etc complete.

**Mode of Measurement:** It shall be measured in SqM. The measurement shall be taken for un-plastered surface. The deductions for the openings etc shall be as specified under Item spec. no. 5.01.

### **5.19 Providing and applying plain 15 mm thick smooth plaster over insulation**

The general specification same as per Item spec. no. 5.01 but for Providing and applying plain 15 mm thick smooth cement plaster in C: M 1:3 over Insulated Surface, to be applied over a coat of cement slurry to be applied over the insulated surface for the bond, smooth finishing the surface with iron plate without any undulation including necessary staging / scaffolding, curing the plaster etc. complete as directed.

The surface of walls to be insulated shall be inspected jointly prior to carrying out plastering for preparation of the surface to receive insulation. The correctness of the surface shall be checked jointly on

completion of insulation work and to prepare the surface for application of plastering. The line, level and plumb shall be maintained.

**Mode of measurement:** Same as per Item spec. no.5.01.

**5.20 Providing and applying Acrylic based, Anti Fungus Exterior Paint (Sandtex-matt)**

The general specification same as per Item spec. no. 5.11 for providing and applying 2 coats of acrylic based, anti fungus exterior paint of approved shade and make like Sandtex Matt of Snowcem / or Asian Paints, Weather Coat of Berger or Shalimar Paints on smooth / sand faced / grit plaster finish as per as specified in the schedule of quantities, over a coat of Cement Paint in accordance with the manufacturers specifications etc complete.

**Mode of Measurement:** This will be measured in SqM for the area painted.

**5.21 Providing and applying synthetic enamel paint / flat paint**

Providing and applying synthetic enamel paint / flat paint of approved shade and makes like on walls / ceilings or any of the building elements at all heights, over new / old work including cleaning / sand papering / preparation of surface by applying cementitious putty and rubbing to make the surface true without any waviness , application of approved quality paint in two or more coats to give an even finish including all the materials, labour , scaffolding with two or more coats of approved first quality enamel paint as directed.

**Mode of Measurement:** This will be measured in SqM for the area painted.

**5.22 Providing and applying Epoxy Paint**

The general specification same as per Item spec. no.5.21 but for providing and applying two coats of Epoxy paint of approved make and shade, including preparation of surface on walls at all heights, of required shade and approved make on new / old work as specified in the schedule of quantities.

The painting shall be carried out as per the recommendation of the manufacturer.

**Mode of Measurement:** This will be measured in SqM for the area painted.

**5.23 Providing and applying Poly Urethane (PU) coating**

Providing and applying PU coating of approved shade and make like Shalimar Paints or equivalent make on new / old work including the preparation of surface by cleaning the surface , rubbing with sand paper applying cementitious putty including clearing the cleaned surface to achieve sound sub-base free from any type of defects like soft spots, waviness application of two coats of the PU coating as per

manufacturer's specification for painting, including applying primer to give even and uniform finish including all the materials, labour, scaffolding etc complete as directed.

**Mode of Measurement:** This will be measured in SqM for the area painted.

**6.00 FLOORING****Applicable codes**

IS: 1443 Code of practice for laying and finishing of cement concrete flooring tiles.

IS: 2114 Code of practice for laying in situ terrazzo floor finish.

IS: 777 Glazed earthenware tiles

**6.01 Providing & Fixing pre-cast Mosaic tile flooring**

The type, quality, size, thickness, colour etc. of the tiles for flooring shall be as per the item description given in the Schedule of Quantities and of best quality. The tile shall be factory made under pressure process with backing layer of cement to aggregate proportion of 1:3 and wearing layer of minimum 6 mm conforming to approved sample / manufacturer. The contractor shall provide the Engineer with necessary sample for approval.

Before the tiling work is commenced, the sub-surface shall be thoroughly cleaned and washed of all loose material, dirt, and scum and then shall be wetted without forming water pools on the surface. The tiles shall be laid on cement mortar or lime mortar bedding of thickness and proportion as specified in the item description. The mortar shall be evenly spread on the sub-floor. Over this mortar bed, 4.4 kg of cement per SqM of floor area shall be spread. The tiles shall be fixed on this bed one after another. Each tile being gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be perfectly straight and uniform in thickness. The tiles shall be laid perfectly in level unless otherwise specified by the Engineer. After laying the tiles the joints shall be cleaned with wire / coir brush and finished with cement slurry of matching colour with addition of pigment as specified / directed.

Floor tiles laid adjoining the wall shall project 12mm or as specified under the plaster, skirting or dado as directed by the Engineer. Half tiles and pieces shall be avoided as far as possible. After laying the tiles, it shall be cured for at least 14 days. About a week after laying the tiles each and every tile shall be lightly tapped with a small wooden mallet to find out if it gives a hollow sound, if it does, such tiles along with any other cracked or broken tiles shall be removed and replaced with a new tile to proper line and level. The same procedure shall be followed again after the tiles are finally polished. For the purpose of ensuring that such replaced tiles match with those earlier laid it is necessary that the Contractor order enough extra tiles from the factory to meet this contingency.

After the joints have attained sufficient strength, the floors shall be machine polished using carborundum stone of No. 60, followed by 120, 150 and final coat with 320 Grit stone to the desired finish approved by the Engineer. Sufficient quantity of water shall always be used during polishing to prevent scratches. After each coat of polish with grit No. 60,

120 / 150 the surface to be applied with cement slurry of matching shade and cured before next polish is taken up .After final polish with No. 320 stone, the surface to be cleaned with water and dried .Oxalic acid shall then be dusted over the surface @ 33 gms sprinkled with water and rubbed hard with Namadah blocks with machine.

Wax polishing shall be carried out as specified in the item specification by applying wax over the cleaned surface and sprinkling dry saw dust when the wax is set and then polish with machine fitted with Namadah or woolen rags block. The used saw dust shall then be swept to get polished surface. Care should be taken that the saw dust used is free from dust particles or any impurities. The final surface should not show any trace of wax when polished.

The final polished surface shall be mopped with wet cloth every day at least for 10 days.

**Mode of Measurement:** Unit of measurement for floor tiling shall be SqM or part thereof of the superficial area. Actual quantity of tiling work carried out shall be measured and paid for after making deductions for openings etc. The rate shall include embedding of tile below wall plaster / skirting.

#### **6.02 Providing & fixing pre-cast Mosaic tiles in skirting, dado and risers**

Quality of tile shall conform to same as specified in item 6.01 and of thickness not less than 12 mm. For dado and skirting work, the vertical surface shall be thoroughly cleaned, scraped/ dismantled so as to provide the face of the skirting/ dado in desired plane and wetted. Thereafter it shall be evenly and uniformly covered with about 12mm thick 1:3 cement mortar. For this work the tiles as obtained from the factory shall be of the size required and practically fully polished. The back of each tile to be fixed shall be covered with a thin layer of neat cement paste and the tile shall then be gently tapped against the wall with a wooden mallet. This shall be done from the bottom of the surface upwards. The joints shall be as close as possible and the work shall be truly vertical and flush. The tiles shall be fixed flush with the plaster or projected as specified by the Engineer. The junction of the plaster and the skirting or dado shall be neatly finished. The joints shall be cleaned and filled with cement with or without pigment to match the shade of tile. After the tile has set and cured the same to be polished with machine/ hand with carborundum stones as detailed in Item spec. no. 6.01 so that the surface ;attains a glossy finish. Corners and junctions be finished true.

**Mode of Measurement:** Skirting, dado or risers shall be measured in SqM. or part thereof. The rate shall include providing tiles including wastage, laying as per specifications, filling joints, curing, rubbing and polishing etc. all complete.

#### **6.03 Providing & laying cast-in-situ Marble chips flooring**

The marble chips shall be of best quality and of approved size, colour and shade. The cement used may be grey Portland or white cement or



cement mixed with colouring pigments or specific proportion of white and grey cement to archive silver grey shade as directed by the Engineer. The proportion of marble chips to cement shall be as specified in the item description, or it shall be 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 using the materials with prior approval of Engineer. The entire work shall conform to the approved samples. The terrazzo chips shall be laid after placing the base. The base shall consist of a layer of 28 mm thick 1:2:4 cement concrete (1 cement, 2 coarse sand, 4 19 mm and down graded stone aggregate) spread and levelled. While laying the flooring dividing strips of glass/PVC/Aluminium of specified thickness shall be inserted in the mortar bed according to the design of the floor. Care being taken to see that no panel exceeds 2.0 SqM in area. The top of strips shall be 10 mm above the surface of the under bed and shall conform to the finished level of the floor. Chips shall be thoroughly mixed dry and then white cement or cement of approved colour shall be added in specified proportion. Dry mix should be prepared for entire piece of work and stored in protected area. Chips and cement shall be thoroughly mixed and evenly spread on the platform and not heaped. Water shall then be added to obtain a plastic mix of suitable consistency as directed by the Engineer. Terrazzo layer shall be placed as soon as the screed coat has set sufficiently but in no case than the day thereafter. The thickness of terrazzo topping shall not be less than 10mm. The surface shall be rammed to obtain the consolidation and a levelled surface. Additional chips shall be sprinkled on the surface and rammed in until surplus cement is checked out and chips forced together so that the finished floor will show not less than 70% aggregate. The surface is finally trowelled lightly. The Contractor shall keep the floor moist for not less than seven days. After setting the wearing surface and curing for 36 hours the surfaces shall then be machine polished with course grade corboroundum stone (No.60) and washed clean and applied with cement grout with cement of matching colour. Then it shall be cured, kept moist for 5 to 7 days. The surface shall be polished with stone of 120 grit, then be cleaned, washed and applied with grout as before and cured for 3 to 5 days. The surface shall be polished with stone of 320 grit to get even surface. The surface shall then be cleaned and washed with oxalic acid as well as wax polish and mopped as detailed in 6.01 the floor shall be refinished wherever necessary during the stages right from laying wearing layer to final polishing to leave the work in first class condition.

**Mode of Measurement:** This shall be measured in SqM. The rate shall include providing and laying marble chips flooring with dividing strips, curing, machine/hand polishing. This item shall be also applicable for flooring in landings, kitchen platform cast in situ sinks etc.

#### **6.04 Providing &Laying cast-in-situ marble chips in skirting and dado**

The height of the skirting/dado shall be as per the drawing. The base layer shall be 12mm cement mortar of 1:3 proportion (1 cement, 3 coarse sand) and top 7 mm thick layer shall be of approved marble chips in proportion as specified in Item spec. no. 6.03 While laying the skirting/dado glass strips of specified width shall be provided. The skirting/dado shall be flush with the plaster or projected as specified by

the Engineer. The junction between the skirting/dado and the plaster shall be finished properly as per the details/as directed by the Engineer. The skirting/dado shall be hand machine polished as detailed in 6.03.

The rate shall include providing and laying marble chips in skirting/dado, dividing strips, curing, rounding off the corners of the floor and the skirting, hand polishing, cleaning etc.

**Mode of Measurement:** It shall be measured in SqM.

#### **6.05 Providing & laying pre-polished machine cut green Kota stone flooring**

Stones shall be of selected quality, hard, sound, dense and homogenous in texture free from cracks, decay weathering and flaws and of approved quality, size and uniform thickness as specified in the item specification, edges shall be chisel dressed/ machine cut and the top surfaces shall be machine polished with joints running true and parallel from side to side. The sides (edges) shall be table rubbed with coarse sand or machine rubbed before paving. Stones should be laid on a bed of cement or lime mortar of specified mix and thickness. The pattern of the flooring shall be as per the Architect's drawing or as directed by the Engineer. Thickness of mortar bedding shall be as specified in the item specification however thickness any place shall not be less than 12 mm. The stone slabs shall be thoroughly wetted with clean water. Mortar of the specified mix shall be spread under the area of each slab in accordance with the overall slope, roughly to the average thickness as specified in item. It shall be pressed tapped with wooden mallet and brought to the level. The stone to be lifted and laid aside. The top surface of the mortar to be corrected by adding fresh mortar at hollows. The mortar is allowed to harden a bit and cement slurry of honey like consistency shall be spread over the same @ 4.4 Kg per SqM. The edges of the slabs already paved to be buttered with cement with or without pigment. The slab to be tapped to desired level with a fine joint. The surplus cement slurry to be cleaned.

Care should be taken so that the stone slab is set over the bed and fixed over cement slurry without any hollow pocket. There should be no voids left underneath. The joints should be struck smooth cleaned with wire/ coir brush and grouted with cement slurry of matching colour. If specified terrazzo filling of specified thickness or strips of different stone strip shall be provided in the joints between the Kota stone slabs. The floor should be kept covered with damp sand or water for a week. The stone flooring shall be machine polished and then cleaned with oxalic acid and wax polished as specified in the item specification no.6.01. The finished floor shall be mopped with water mixed with kerosene as directed by the Engineer for 10 times in next 7 to 10 days.

The general slope for any area as per the drawing / directions of the Engineer shall be provided in sub base / PCC and or the grade slab as the case may be. Excess thickness of bedding mortar in the event of failure of maintaining necessary slope shall not be paid. The contractor should mark the levels well in advance and preceding course should be

laid accordingly. The contractor should also make level marks as per the final finished floor level before taking up the flooring work.

The rate shall include providing and laying, curing, machine polishing, cleaning etc. all complete.

**Mode of Measurement:** This shall be measured in SqM.

#### **6.06 Providing & Laying pre-polished machine cut Kota stone in skirting and dado**

The stone shall be of required sizes and the thickness shall be as mentioned in the item specification. The stones shall be pre-polished and machine cut. The thickness of the exposed edges shall be uniform and polished smooth before fixing. The stone's edges shall be dressed fine true, straight and at right angles to each other. The stones shall be fixed over cement mortar bed 1:4 (1 cement: 4 coarse sand) when dried with the help of cement slurry. The joints are filled with cement with addition of pigment to match the shade and machine/ hand polished washed as per Item spec. no. 6.01 and wax polished. The joint between the top of skirting/dado and plaster shall be finished properly. The joints in the flooring shall be continued in the skirting/dado also. The work shall be cured properly.

Skirting shall be of varying height where slopes are provided in the floor. The top of skirting / dado should be made in horizontal and in level to receive dado of glazed / ceramic tiles as per the approved scheme / drawing where finished surface shall be maintained in one plane. Cutting of masonry wall to the required depth keeping in view the finished wall treatment is included in this item.

**Mode of Measurement:** This shall be measured in SqM. The triangle skirting of staircase shall also be paid under this item.

#### **6.07 Providing & laying pre-polished, machine cut single piece Kota stone in treads, cills, and riser up to 1 M long.**

Pre-Polished green kota stone of specified thickness with machine cut edges shall be fixed for treads of steps in single piece or on the kitchen platform or open shelves and window sills as directed. It will be laid over average 20 mm thick cement mortar bedding of CM 1:4 (1 part cement : 4 parts sand) and thick cement slurry ( as detailed in Item spec. no. 6.05) The horizontal slab shall be embedded underneath in adjoining riser / plaster. If asked for, grooves to be provided in the treads without any extra cost. The thickness of all the exposed edges shall be uniform and polished smooth before fixing. The stones shall be machine / hand polished followed by cleaning with oxalic acid and wax polished as specified in the item specification. The laying procedure, curing, polishing and mopping is same as specified in the item 6.06 above.

**Mode of Measurement:** Measurement shall be in SqM of the stones laid. Embedding of the treads, cills, and platform tops shall not be measured and deemed to have been included in the item rates.

**6.08 Providing & laying pre-polished, machine cut single piece Kota stone in treads, cills, and riser up to 1.5 M long.**

The general specifications shall be same as per item 6.07.

**Mode of Measurement:** Same as per Item spec. no.6.07.

**6.09 Providing & fixing Kota stone shelves**

Stones shall be of selected quality, hard, sound, dense and homogenous in texture free from cracks, decay weathering and flaws and of approved quality, size and uniform thickness as specified in the item specification, edges shall be machine cut and both the top and bottom surfaces shall be full machine polished to fine grit. The exposed side ( face ) shall be made to uniform thickness and shall be machine rubbed prior to fixing. Thickness of the stone for a particular set of shelves should be uniform. The stones shall be placed in the brick masonry/ concrete jharies/ grooves with proper bearing equal to thickness of stone and the same shall be pointed and finished neatly with matching colour cement if required with addition of pigment. Or to be fixed over MS bracket (which will be paid under item of MS insert as per tender item). The finished work to be washed with oxalic acid, wax polished (as detailed in 6.01) and mopped for 10 times.

The rate shall include providing Kota stones, cutting jharies, placing the shelves, filling jharies, propping them till the CM sets and curing all complete.

**Mode of Measurement:** This shall be measured in SqM.

**6.10 Providing & laying rough chiselled Kota stone Flooring**

Stones shall be of selected quality, hard, sound, dense and homogenous in texture free from any defect cracks, decay weathering and flaws and of approved quality, size and uniform thickness as specified in the item specification, edges shall be chisel dressed / machine cut and the top surfaces shall be uniform. The size of the stone shall be 17" x 23" or 23"x23" with corners cut if asked for as per details. (When corners are cut as per specific details the gap shall be finished while pointing and top to be finished with neat cement)

The stones shall be laid over bedding of cement mortar as specified with uniform grooves as per details / as directed by the Engineer. The laying procedure shall be same as in Item spec. no. 6.05 however joints shall be kept all-around uniform width and depth and shall be racked. The joints shall be pointed with CM 1:2 (1 part cement, 2 parts fine sand ) leaving groove or flush pointed with neat cement topping as per drawing / details. The slope shall be maintained as given in the drawing or as

directed. The surface shall be finally cleaned and mopped for with coir / cloth for 7 days.

**Mode of Measurement:** This shall be measured in SqM.

#### **6.11 Providing & laying 40mm thick IPS flooring**

The mix shall be CC 1:2:4 (1 part cement, 2 parts coarse sand and 4 parts graded stone aggregate-12.5 mm nominal size). The flooring shall be laid in panels of uniform sizes of 2 SqM or as specified / directed by the Engineer. They shall be laid in alternate panels on alternate days. The edges shall be protected properly. Glass/PVC/ Aluminium strips shall be provided to separate the panels, as per the item description in the Schedule of Quantities. The slope shall be maintained as per drawing or as directed by the Engineer.

The mix shall be prepared by volumetric and shall be done in one bag mixers machine. The concrete shall be placed in position well compacted and levelled up with the help of wooden straight edge and trowel and beaten up well till slurry comes on top and holes filled up with concrete. If IPS has to be laid directly on RCC slab, the surface of the RCC slab shall be roughened up with brushes while the concrete is green. Before laying the floor, the laitance, loose materials, cake of mortar dropping shall be removed and the surface of the slab hacked and coat of cement slurry @2.75 kg of cement per SqM. shall be applied so as to get a good bond between the slab and IPS. If IPS has to be provided on lean concrete no slurry is required.

The flooring shall be finished with 12 mm thick cement mortar (1:2) and cement slurry @2.2kg of cement per SqM. and water shall be applied on top with wooden float till the voids in the concrete are filled with mortar cream. The surface must be uniform and even in colour. Minimum water cement ration to be maintained. Dry cement or cement sand mixer shall not be sprinkled to absorb excess moisture in the flooring. Colour pigments shall be added to the flooring if instructed by the Engineer. Curing shall be done for 10 days till the top layer is hardened. The edges of the panels shall be protected from damage. The finished surface to be cleaned and mopped.

The rate shall include providing and laying IPS flooring, finishing the work, curing, rounding of the edges between the walls and skirting.

**Mode of Measurement:** The flooring shall be measured in SqM. The finishing including neat cement finish is an integral part of IPS flooring item and shall not be measured & paid for separately.

#### **6.12 Providing & Laying, 50 mm thick IPS flooring**

-Do- same as item 6.11 but for 50mm thick. However, the under layer of concrete shall be 38 mm thick and top layer shall be of 12 mm thick.

**Mode of Measurement:** Same as per Item spec. no. 6.11

#### **6.13 Providing and laying 19 mm thick IPS in skirting/dado**

The specification shall be same as the item 6.11 but for the work is to be done on vertical surfaces. It is of two layers, the base layer shall be of 12mm thick PCC 1:2:4(1 cement; 2 sand; 4 graded stone aggregate of size 12mm and down). Then it shall be finished with 7mm thick plaster with CM 1:2. It shall be flushed with wall or projecting out by 6 mm uniformly from wall plaster, including rounding off the corners as directed by the engineer. The final surface to be finished smooth with neat cement @ 2.2 kg/ sq m and cured cleaned.

**Mode of Measurement:** This shall be measured in SqM.

The rate shall include the chipping of RCC/brick work, dividing strips, laying the base and the top layer, curing etc. all complete

#### **6.14 Providing , mixing and laying of Floor Hardener**

The non-ferrous Floor hardener / Ironite shall be of approved make / confirming to approve sample to be mixed / applied as per manufacturer's specifications. In case of Ironite, it shall be uniformly graded iron particles, free from non-ferrous metal particles, oil, grease, sand and soluble alkaline compounds and shall be mixed with cement in proportion of 4 cement and 1 compound by weight in the wearing course (top course) of the IPS. The laying procedure is same as per the specification for IPS flooring.

In case of Floor Hardener for the self finish concrete pavements / floors the application shall be as per manufacturer's specification.

**Mode of Measurement:** This shall be measured in Kg.

#### **6.15 Providing & Laying PVC flooring**

PVC flooring material shall conform to IS: 3462. It may be tiles, sheet or rolls as specified. It shall consist of a thoroughly blended composition of thermoplastic binder, filler and pigments. It shall be of approved make and shade and the thickness as specified. This shall be laid over IPS, concrete or any plane flooring. The tiles / rolls shall be fixed as per the Manufacturer's specifications. Before commencing the work the sub floor shall be examined for evenness and dryness. The sub-floor shall be cleaned with cloth, air blower. The flooring should not be laid unless the sub-floor is perfectly dried. The layout of the PVC flooring on sub-floor to be covered should be marked with guidelines. The PVC flooring shall then be laid for trial without adhesive and set the pattern. The PVC flooring should then be fixed with application of rubber based adhesive of approved make as per recommendation of the manufacturer. The PVC tiles shall be laid edge to edge without any gap where as the sheet / rolls to be welded to give a even and uniform finish. After laying the flooring material it shall be tapped with suitable roller weighing 5 Kg to develop proper contact. It shall be ensured that full contact is made and no air

pocket or formed. Cills, doorways, skirting shall be provided under this item observing necessary care and with due protection of the edges. Any part of work having any air gap or defect shall have to be re-done at no extra cost.

**Mode of Measurement:** This shall be measured in SqM.

#### **6.16 Providing & Laying acid and alkali proof, non-skid ceramic tile flooring**

Ceramic tiles of minimum 10 mm thick and of size, shade & quality **as specified in the item description** shall be laid over average 20 mm thick cement mortar bedding in CM 1:4 (1 part cement, 4 parts coarse sand). The floor shall be first applied with a coat of acid alkali primer and then the bed mortar is laid. One part cement for preparing the bed mortar shall be mixed with acid alkali proof powder of approved make and grade in a proportion specified / recommended by the manufacturer. The tiles shall be laid in desired pattern in proper line, level and slope with cement slurry of honey like consistency striking the joints all around of 6- 8 mm. The joints shall be of even thickness and 12 mm deep. The joints should be cleaned of the cement mortar or any slurry neat and with coir and finally with cloth after the mortar is set. These shall be filled with granular sand if directed to protect them from damage. It shall be cured for 7 days. After curing the floor to be dried and the joints should cleaned off the sand. These joints shall be filled with acid alkali proof epoxy mixed with hardener and filler material of approved make and grade in requisite proportion as per the manufacturer's recommendation. The joints after thorough cleaning and fully drying should be cleaned with air blower to remove any dust or burrs as well as joints are heated with blow lamp is to remove any residual moisture. The joints shall be filled with epoxy as stated here above with trowel and finished smooth.

All joints shall be finished neat and it shall be kept dry for at least for 48 hours.

**Mode of Measurement:** This shall be measured in SqM.

#### **6.17 Providing & Laying Acid & Alkali proof pre-polished red Mandhana stone in flooring**

Mandhana Stone slabs shall be of selected quality, hard, sound, dense and homogenous in texture free from any defect cracks, decay weathering and flaws and of approved quality, size and uniform thickness as specified in the item specification, edges shall be chisel dressed / machine cut and the top surfaces shall be uniform and pre polished smooth. The stone slabs should be selected and of uniform red colour and ones with any defect or spots of different colour shall be rejected.

The sizes of the stones shall be 600 mm x 600 mm or 600 mm x 450 mm or 450 mm x 450 mm or 450 mm x 300 mm or 300 mm x 300 mm, as directed , and the thickness shall be 25 to 30 mm for flooring and 18 to 20mm for skirting and dado. The skirting stone shall be of height up to 250 mm and length to match with the size of flooring stone.

The stone shall be acid and alkali resistance shall be approved by the Engineer.

The approved quality of acid and alkali preventive primer shall be applied uniformly in two coats over the slab or the concrete surface. The acid-alkali proof powder shall be mixed with the cement in the proportion 2:1 (2 part cement; 1 part powder) or as per the manufacturer's specification. The cement-powder mix and the sand shall be mixed in the ratio 1:4 (1 part cement, acid alkali proof powder: 4 parts coarse sand) for bed mortar. average 30 mm thick. The stones shall be laid on 30 mm thick mortar bed in level and line with 6mm to 8 mm wide joints ( of even width) all around.

The flooring to be laid in line and level in approved pattern over prepared surface coated with acid and alkali proof primer over bed 30 mm thick mortar as detailed. The joints should be raked to a depth of 12 mm and shall be filled epoxy as detailed in Item spec. no. 6.16.

The flooring shall then be machine polished. First coat of machine polish shall be using diamond tipped stone of grit No.60. The second coat shall be with grinding stone of grit No. 120 and final with 320 to give an even and flawless smooth finish. The surface then shall be washed with oxalic acid and wax polished and mopped as detailed in Item spec. no. 6.05. The work place shall be kept dry for the joint filling operation. Where ever the polishing machine can not be applied, the area shall be hand polished.

The rates include providing and fixing treads of stems, cills, door way, platform / machine foundation / pedestal top etc. The exposed edges of the stones shall be machine cut to uniform even thickness. Nothing extra shall be paid for cutting holes in the stones, machine cutting of edges of stones.

**Mode of Measurement:** This shall be measured in SqM.

#### **6.18 Providing & Laying Acid & Alkali proof pre-polished red Mandhana stone for skirting, dado**

The specification shall be same as per Item spec. no. 6.17 but with Mandana stone of 18 to 20 mm thick to be laid over 12 mm thick cement mortar bed/ plaster (with acid alkali proof powder over two coats of acid and alkali proof primer). The size of the stones shall be as specified in Item spec. no. 6.17 however height of skirting shall be up to 250 mm and risers shall be as per requirement. The skirting/ dado over pedestals, columns shall be with creating a right angle groove as per detail. The skirting/ dado shall be either flush with wall finish or projecting evenly. The rate shall include cutting of masonry / concrete elements to suit the level.

Joints filling and polishing shall be as per Item spec. no. 6.17.

**Mode of Measurement:** This shall be measured in SqM.



### 6.19 P & L Ceramic tiles in flooring

The ceramic tiles in flooring shall be of first class quality and approved make, size and shade. Sample and source of the tile shall be approved by the Engineer. The tiles shall be of standard size without warp and with straight edges, true and even in shape and size and of uniform colour. The tiles surface shall be of fine grained texture, dense and homogeneous. The thickness of the tile shall be as per the details and approved by the Engineer. The tiles shall be submerged in water till the bubbles cease.

They should be laid over a bed of 20 mm thick cement mortar of CM 1:4 (1 part cement: 4 parts coarse sand) and be fixed with cement slurry of paste consistency (3 kg/SqM). They shall be laid in line level, required slope as directed. The joint shall be very thin, uniform and perfectly straight.

Where full tiles are not possible, the same should be cut to take care of any circular opening of pipes or rectangular opening etc. or sawn to the required size and their edge rubbed to ensure straight and true joints. After the tiles are laid, extra cement grout shall be removed. The joints shall be cleaned with wire/ coir brush and then the joint shall be floated neatly with white or cement matching colour (white cement with addition of pigment) as approved by the Engineer. The horizontal surface of the pedestals machine foundations etc to be finished under this item with necessary cutting / metering and grinding the cut edges. The tiles shall be cleaned after the work is complete and finally cleaned with mild acid.

The rate quoted for flooring and dado work shall be inclusive of angles and corner pieces, cutting tiles for water points, such a way that the point is in the junction of four tiles, electrical points etc.

**Mode of Measurement:** This shall be measured in SqM.

### 6.20 Providing and laying ceramic tiles in skirting /dado

The ceramic tiles shall be of first class quality and approved make, size and shade of minimum 7 mm thickness. Sample of the tile shall be approved by the Engineer. The tiles shall be of standard size without warp and with straight edges, true and even in shape and size and of uniform colour. The tiles surface shall be of fine grained texture, dense and homogeneous. The tiles shall be submerged in water till the bubbles cease. They should be laid over a bed of 12 mm thick cement mortar of CM 1:3 (1 part cement: 3 parts sand) and be fixed with cement slurry of paste consistency (3 kg/SqM). They shall be laid in line; level and plumb flush with wall finish or uniformly projecting from the wall surface. The bed to be prepared exactly in line level and the surface be scratched with wire up to depth of 2 to 3 mm for better bond cured by keeping it damp for 2 to 3 days. The joint shall be very, uniform, square and perfectly straight in line or staggered as per details and directions.

Where full tiles are not possible, the same should be cut to take care of any circular opening of pipes or rectangular opening etc. or sawn to

the required size and their edge rubbed to ensure straight and true joints. After the tiles are laid extra cement grout shall be removed. The joints shall be cleaned with wire / coir brush and then the joint shall be floated neatly with white or cement matching colour (white cement with addition of pigment) as approved by the Engineer. The vertical surfaces of the pedestals machine foundations etc to be finished under this item with necessary cutting / metering and grinding the cut edges. The exposed edges shall be of virgin and the piece if any, to be accommodated properly at a convenient location. Necessary mark up of tiling pattern as per dimensions of the tile to be marked with blue or appropriate means after over bedding plaster so as make provision for cutting the tiles and adjust the full tiles, locate the electrical switch boxes, plumbing out lets/ points get the locations adjusted if required, and determine appropriate location for the cut tiles if any. The dado work should be carried out in co-ordination with internal electrification and plumbing agencies. The tiles should be cut neatly with proper tools to suit the opening and the edges be ground. By default cut piece of tiles should not be used in top most layer of dado or at corners other than jambs of width less than tile size. The backing cement paste shall be evenly applied and struck so as to ensure that no hollow pocket is left. In case any cavity is spotted in the day's work, then the same should be grouted on next day with out any extra cost. In case the finished and cured surface sounds hollow and found to have cavity, same shall be removed and re-done. The entire work to be cured for 7 days. The tiles shall be cleaned after the work is complete and finally cleaned with mild acid.

The rate quoted for flooring and dado work shall be inclusive of angles and corner pieces, cutting tiles for water points, such away that the point is in the junction of four tiles , electrical points etc.

**Mode of Measurement:** This shall be measured in SqM.

#### **6.21 Providing & Laying white glazed tiles in skirting / dado**

The glazed tiles shall be of 1<sup>st</sup> quality, free from any defect and of even colour size and thickness confirming to approved quality and make as specified in Item spec. no. 6.19. The colour, size, thickness shall be as specified in the item specification Bedding mortar and fixing shall be carried out as detailed in Item spec. no. 6.19.

**Mode of Measurement:** This shall be measured in SqM.

#### **6.22 Providing & Laying Coloured glazed tiles in skirting / dado**

The general specifications shall be same as per Item spec. no. 6.19 but with approved coloured tiles.

**Mode of Measurement:** This shall be measured in Sq m.

#### **6.23 Providing & Laying SHON ceramic tiles in skirting/dado/floor**

Ceramic tiles shall be of size 1"x1" or 1.5"x1.5" of approved make either glazed or matt finish of approved colour, pattern and design ( with multiple coloured tiles) sound, without any crack or any other defect, as

per architectural drawing and as directed in floor skirting dado over circular / or any shaped surface at all heights including scaffolding etc.. The tiles shall be pre arranged with backing brown paper ( it is manufactured and supplied mounted over backing paper with water soluble adhesive, in specific pattern/ design). The tiles in blocks shall be fixed over 12 mm thick cement mortar bed in CM 1:3 (one part cement : 3 parts sand) with white cement or white cement with pigment thick slurry in line level and plumb. When it is set sufficiently hard, then backing paper to be wiped off carefully and the joints to be cleaned with wire / coir brush gently ( to ensure that tile do not get disturbed) and the joints shall be filled with cement of white or matching colour. Bed with 12 mm thick cement mortar should be prepared and scratched with wire and cured for three days bykeeping it damp then, the layout be marked with blue or chalk as per the pattern true to line level and plumb to ensure all the horizontal and vertical joints are matched exactly. The top of the dado be finished smooth. The entire work is required to be cured for 7 days. The finished work shall be cleaned with water followed by cleaning with water mixed with mild acid etc complete.

**Mode of measurement:** It will be measure in SqM.

#### **6.24 Providing special mirror finish polish on Kota stone**

This shall be carried out over smooth polished surface by using 500 to 2000 grit emery polishing in six stages and final finishing with 2000 grit tin oxide and felt pads. The work shall be carried out with polishing machine with vibration free rubber lined mounting wheels.

**Mode of measurement:** It shall be measured in SqM.

#### **6.25 Providing special mirror finish polish on Mandhana stone**

This shall be carried out over smooth polished surface by using 500 to 2000 grit emery polishing in six stages and final finishing with 2000 grit tin oxide and felt pads. The work shall be carried out with polishing machine with vibration free rubber lined mounting wheels.

**Mode of measurement:** It shall be measured in SqM.

#### **6.26 Providing & Laying Marble flooring**

The stone shall be of specified quality, hard, sound, homogeneous in texture, free from cracks, weathering and flaws. All stones shall match each other All edges shall be true, square and free from chippings, the surface shall be level, smooth and machine cut and rubbed. The bed concrete base shall be cleaned and marked with the layout by chalk exactly as per the size and pattern of the flooring. The marble slab shall be placed over bed of dry sand in required level to check up and decide on the cutting etc. as may be required including matching the grain / streaks. The stone slab be cleaned of dust or powder sticking fully in advance, wetted at the time of laying. The stones shall be appropriately marked for fine cutting as the case may be and kept aside. The dry sand shall then be removed and the floor concrete

base be cleaned of the sand and dust etc and wetted with water with small quantity of grey cement. The stones shall be laid on a cement mortar bedding of 20mm thick 1:4 (1 cement : 4 sand) with white cement slurry of honey like consistency @ 4.4 Kg per SqM with minimum possible joint width in line level and slope as specified / directed. Care should be taken to match the corners and the sides are stuck with white cement while laying individual slabs to ensure no hollow or cavity is left under any stone or part thereof. The joints shall then be cleaned with coir brush and grouted with cement slurry. The stone work to be cured for 7 days. The surface be polished with polishing machine as per the procedure detailed in Item spec. no. 6.05 including mopping the floor.

The corners shall be finished with square cut groove by diagonally cutting the edges at the junction in part of the thickness and adjusting as well as the projecting exposed edges shall be rounded off (moulded) polished smooth as per architectural details or as directed without any extra cost.

The flooring bands in the flooring of other material or specific pattern slab shall be paid under this item without any extra cost.

Flooring to be machine polished as described in Item spec. no.6.17 and 6.05. No cement slurry shall be applied after each grinding.

**Mode of Measurement:** It shall be measured in SqM

#### **6.27 Providing & Laying Marble in skirting / dado / risers**

Specification same as per Item spec. no. 6.26 but for skirting , dado, risers to be laid over 12 mm thick cement mortar bedding 1:3 ( 1cement :3 parts of coarse sand) with white cement paste @ 4.4kg/SqM. The wall cladding (dado) will include cost of plaster of Paris for holding the stone slabs in position, etc completed as directed.

**Mode of Measurement:** It shall be measured in SqM

#### **6.28 Providing & Laying Shahabad stone in flooring**

The specification is same as per Item spec. no. 6.05.

**Mode of Measurement:** Same as per Item spec. no. 6.05.

#### **6.29 Providing and Laying Shahabad stone in skirting and dado**

The specification shall be same as per Item spec. no. 6.06.

**Mode of Measurement:** Same as per Item spec. no. 6.06.

#### **6.30 Providing & applying 115mm thick cement based brickbat water proofing treatment**

The terrace or area to be cleaned, removing any over burden, mortar droppings etc and finally cleaned with coir brush. To start with the levels to be checked and level marks to be provided as per slope. The area to be

wetted and applied with thin cement slurry and first layer of about 20mm thick cement mortar CM 1:3( 1 part cement, 2 parts coarse sand) mixed with waterproofing compound to be added with cement as per manufacturer's specification, shall be laid as instructed by the Engineer. Then brickbats out of well burnt bricks shall be laid over this in required slopes and levels as per the drawings and the instructions of the Engineer impregnating in base mortar with gap of 12 mm all around. The brick bats shall be sound and shall be either half brick or trimmed to suit the final slope. Brick bats should be prepared separately and should not be stacked on the same terrace where waterproofing treatment is taken up. The layer shall be cured for 3 days. The joints of already laid brick bats shall then grouted with cement mortar mixed with water proofing compound followed by application and filling with cement mortar CM 1:3( 1 cement: 3 coarse sand) mixed with waterproofing compound with due compaction so as to achieve a layer of around 15 to 20 mm over the brick bats. The surface shall be well floated and finished and finally floated with cement slurry @ 2.75 kg per sq m finished smooth with thread marks at 300 x 300 in desired patterns. All openings, sleeves, drains, pipes etc. shall be specially treated and made sure that they are water tight. The collection point near rain water pipe inlet be depressed by 25 mm with slope if asked for. To ensure that the ridges and valley are formed and proper slope is provided for efficient drainage of water. The treated area shall be cured with ponding the water at least for 15 days.

The sand to be used shall be screened, free from clay, silt, pebbles, organic matter and shall be 50% fine and 50% coarse or as directed by the Engineer. The work to be carried out at all the levels including lift and lead.

The returns shall be in 75 mm thick water proofing treatment and shall be measured separately in the respective item.

The work should be carried out through an approved specialized agency. A guarantee certificate for a period of ten years against leakage shall be issued by the Contractor for free maintenance of the treated area.

**Mode of Measurement:** The plan area treated shall be measured in SqM.

### **6.31 Providing & Laying 75mm thick cement based brickbat water proofing**

Specification shall be same as per Item spec. no. 6.30 but for 75mm thick waterproofing for balconies, sunk slabs, toilets, water tanks, slopping terrace, returns etc. with brick bat or stone aggregate of required size , and as directed by the engineer.

For the water tanks the construction joints to be grouted with cement slurry mixed with water proofing compound by making holes at 1 M c/c or as instructed by the Engineer and fixing sleeve pipe sleeves / coupling using a grouting pump or by gravity so as to ensure the joints to be water tight.

**Mode of Measurement:** Same as per Item spec. no. 6.30.

### **6.32 Providing & Laying Cast iron tile flooring/skirting**

Cast iron tiles of specified size shall be as per GAUSHALA's standard drawing top surface ground smooth and sides metered without any air or pin holes, casting burrs confirming to approved sample and the weight specified in the item specification.. The contractor should get a sample of the tiles approved prior to supplying

The tiles shall be laid over a bed of 30mm thick cement concrete 1:2:4, (1 part cement : 2 parts coarse sand : and 4 parts graded stone aggregate of nominal thickness 12 mm and down) in floor, skirting, treads or riser etc.. The tiles shall be fixed in line, level and slope as per the drawing and as directed by the Engineer over bed concrete and tapped with wooden mallet so that 50% depth of the holes are filled in. The concrete to be compacted with multiple pronged tool When the bed concrete is green, the remaining 50% holes of the tiles shall be filled with rich concrete mix prepared out of 6 mm aggregates and fine sand. The joints shall be of minimum uniform width of 2 mm. The joint should than be cleaned with wire brush and grouted with cement mortar (CM) 1:1. The top of the flooring be cleaned with soft cloth and coated with cement slurry. The surface to be cured at least seven days. The floor /skirting to be grinded with grinding machine with corundum stone of grit no. 80 followed by 120 / 150 smooth and area be cleaned off with water. Wherever machine grinding is not possible it should be grinded by hand grinding Curing shall be done at least for 15 days. The tiles shall be cut to suit site requirement with out any extra cost. Wastage if any shall be to the contractors account.

Nothing extra shall be paid for cutting tiles around drains and for corner pieces.

**Mode of Measurement:** This shall be measured in SqM.

### **6.33 Providing &Laying pre-polished Cuddapah stone in treads**

The specification is same as per Item spec. no. 6.07 for this item the stone shall be of specified quality, hard, sound, homogeneous in texture, free from cracks, weathering and flaws. All stones shall match each other All edges shall be true, square and free from chippings, the surface shall be level, smooth and machine cut and rubbed.

**Mode of Measurement:** Same as for Item spec. no. 6.07.

### **6.34 Providing & Laying Cuddapah stone in shelves**

The specification shall be same as per item 6.09. The stone shall be of specified quality, hard, sound, homogeneous in texture, free from cracks, weathering and flaws. All stones shall match each other. All edges shall be true, square and free from chippings, the surface shall be level, smooth and machine cut and rubbed.

**Mode of Measurement:** Same as for Item spec. no. 6.09.

**6.35 Providing and fixing 3 / 5 mm thick 37 to 50 mm wide glass strip**

Glass strips shall be cut from sheet glass of specified width and 1.2 m long suiting to size of the panels. These should not be bent or having angular sharp edges. The strips to be fixed in required pattern and in line level and slope corresponding to finished slope of floor or the plane of the vertical surface with cement concrete 1:2:4 at regular interval, firmly prior to taking up the flooring or dado after thoroughly cleaning the base and removing any overburden or plaster / concrete droppings as per details / as directed by the Engineer. This shall be cured till the flooring / dado is laid.

**Mode of measurement:** It shall be measured in RM

**6.36 Providing and fixing 3 / 5 mm thick 18 / 19 mm wide glass strip**

The specification is same as per Item spec. no. 6.35

**Mode of measurement:** It shall be measured in RM

**6.37 Providing and fixing 3 mm thick Aluminium strip- 37 / 40 mm wide**

Aluminium strips shall be of good quality straight, without any wrinkles or deformation and shall be specified width. Full length strip shall be used for forming the panels. The strips to be fixed in required pattern and in line level and slope corresponding to finished slope of floor or the plane of the vertical surface with cement concrete 1:2:4 at regular interval, firmly prior to taking up the flooring or dado after thoroughly cleaning the base and removing any overburden or plaster / concrete droppings as per details / as directed by the Engineer. This shall be cured till the flooring / dado is laid.

**Mode of measurement:** It will be measured in RM

**6.38 Providing and fixing 3 mm thick Aluminium strip- 50 mm wide**

The specification is same as per Item spec. no. 6.37

**Mode of measurement:** It shall be measured in RM

**6.39 Providing and fixing 3 mm thick Aluminium strip- 18/19 mm wide**

The specification is same as per Item spec. no. 6.37

**Mode of measurement:** It shall be measured in RM

**6.40 Providing and laying Pre-polished Granite stone flooring**

The Granite stone shall be natural pre polished, to mirror finish, machine cut of best quality uniform thickness, and approved colour, pattern and the size free from any flaws, surface irregularity and of specified origin. The size of the stone and laying pattern shall be as per the architectural drawings / as directed by the engineer. The contractor should mark the layout over cleaned base and lay the slabs over dry sand bed to decide / get the laying pattern approved. The stones shall be kept aside and sand be cleaned. The surface of bed concrete to be cleaned and applied with moisture barrier of epoxy coating of approved quality and make as per manufacturer's recommendations. Exposed edges of the Stones slabs for platform top, treads / cills shall be suitably rounded of as per details / directions. Stone to be laid over 20 mm thick cement mortar 1:4 ( 1 cement : 4 parts sand ) with cement paste @ 4.4 Kg .The joints shall be minimum, the slabs shall be accurately without gap however the hair joints to be cleaned and grouted with matching coloured cement, curing , polishing, protection of finished surface by covering with alkathin sheets and coating with plaster of Paris for allowing normal working for other agencies like interior / AC etc as per the directions, cleaning the same finally etc. complete as directed. Rates shall be inclusive of all the costs.

**Mode of measurement:** It shall be measured in SqM

#### **6.41 Providing and laying Pre-polished Granite stone for skirting / dado**

The specification is same as per Item spec. no. 6.40 but to be laid over 12 mm thick cement plaster of specified proportion.

**Mode of measurement:** same as per Item spec. no.6.40

#### **6.42 Providing and laying Pre-polished 6 to 10 mm thick Marble/ Granite Tile dado**

The Marble / Granite tiles shall be natural pre-polished, to mirror finish, machine cut of best quality uniform thickness, and approved colour, pattern and the size free from any flaws, surface irregularity and of specified origin. The size of the tiles and laying pattern shall be as per the architectural drawings / as directed by the engineer. The skirting, dado shall be flush with wall finish or projecting uniformly to be laid over 12 mm thick cement mortar 1:3 ( 1 cement : 3 parts sand ) with polymer modified tile fixing adhesive of approved make and grade matching with the colour of the tile as per recommendations of the manufacturer, necessary curing, protection of finished surface , cleaning the same finally . The internal / external corner to be finished properly if required metering the abutting edges. After application of bed plaster tile fixing layout to be marked accurately to decide on the pattern including incorporate / adjust the tiles or cut them to accommodated the switch boxes / get the switch boxes adjusted through concerned agency prior to laying the tiles in position.

The surface to be kept damp and cleaned finally etc complete.



**Mode of measurement:** It shall be measured in SqM.

**6.43 Providing and laying fine dressed 40 mm thick SIRA stone flooring**

The stones shall be of specified quality, sound free from any defects flaws and shall be fine dressed machine cut or hand cut and dressed 40 mm thick SIRA stone confirming to approved sample in flooring, treads, platforms with or without exposed edges in required size, (single piece for treads, plate forms) as per details to be laid in pattern over 20 mm thick cement mortar 1:4 (1 cement : 4 parts sand ) with cement paste @ 4.4 Kg close jointing or with 5 mm wide groove with pointing as per details, curing, cleaning the same with water and water mixed with mild acid etc complete. as directed. The sizes of the stones slabs, colour and laying pattern shall be as per architectural drawing / as directed by the Engineer.

**Mode of measurement:** It shall be measured in SqM.

**6.44 Providing and laying fine dressed 40 mm thick Sand Stone flooring**

The specification same as per Item spec. no. 6.43 but providing and laying Sandstone.

**Mode of measurement:** :It shall be measured in SqM.

**6.45 Providing and laying self finish Cement Concrete of M-20 flooring**

Providing and laying self finish cement concrete of grade M-20 in self finished flooring of 75 to 150 mm thickness or as specified in drawing over prepared sub-base in alternate panels of area 12 to 15 SqM and width up to 3.5 M or as per site conditions in line and level maintaining slopes as per drawing including Formwork using MS channels of required height, compacting with needle and surface vibrator, levelling with screed leveller, finishing smooth with a float of cement or cement mixed with floor hardener, curing, by providing grooves of specified width and depth along construction and expansion joints using proper size wooden strips with application of mould oil and finishing the same or cutting the concrete for all types of construction, contraction and expansion joints of size 10 mm wide x 6 to 8mm deep, providing necessary steel reinforcement, curing etc complete as per the drawing / as directed by Engineer.

General specification shall be same as Item spec. no. 2.05. Reinforcement, floor hardener expansion joint filler shall be measured separately in relevant tender items and paid for. The construction, contraction and expansion joints shall be maintained straight and marked for cutting a uniform width joint exactly over the concrete joints.

**Mode of measurement:** It will be measured in CuM.

**6.46 Providing and laying self finish Cement Concrete of M-25 flooring.**

The Specifications are same as per Item spec. no.6.45 but with providing and laying self finish Cement Concrete of grade M-25 in flooring.

**Mode of measurement:** It will be measured in CuM.

#### **6.47 Providing and carrying out vacuum de-watering floor finish over concrete surface or any surface as specified.**

Providing and carrying out vacuum de- watered floor finish of specified thickness, over concrete surface laid under item 6.45 and 6.46 involving levelling with trimix surface vibrator, Vacuum De-watering with trimix vacuum pump, floating and further compaction with trimix skin floater, floating disc, curing, cutting the concrete for all types of construction, contraction and expansion joints of size 10 mm wide x 6 to 8mm deep same as specified in Item spec. no. 6.45 and 6.46 providing necessary steel reinforcement, curing etc complete as per the drawing / as directed by Engineer.

The construction, contraction and expansion joints shall be cut straight of uniform width exactly over the concrete joint.

Reinforcement steel, if provided, shall be paid under relevant item.

**Mode of measurement:** This shall be measured in CuM.

#### **6.48 Providing and laying Pressed Clay tiles over roof/ terrace**

The pressed clay tiles shall be sound, modular from approved source free from any defect and of approved size, thickness minimum 20mm and smooth / flawless finish with out any surface irregularities. Tiles to be laid on roof tops / terraces over 20 mm thick cement mortar bed of CM 1:4 ( 1 part cement : 4 parts fine sand) with cement slurry, racking the joints with wire / coir brush and grouting with CM 1:2 mortar mixed with 2% integral water proofing compound, in line level and slope including cement slurry with waterproofing compound application over prepared surface, curing for ten days, cleaning / washing with water etc complete.

The tiles shall be metered / cut suitably for accommodating the drainage out let or any of the projections from the surface of roof / terrace. Special care should be taken to grout and finish so as to make it water tight. Localized depression to be made around the rainwater out let if asked for. Junction of horizontal and vertical surface to be treated specifically by providing the corners be hunched and tile should be embedded in the in finishing of the vertical surface.

**Mode of measurement:** It will be measured in SqM

#### **6.49 Providing and laying Pressed Clay tiles Flooring**

The specifications are same as per Item spec. no. 6.48 but for providing and laying pressed clay tiles in flooring including cleaning with water, wax polishing / buffing with hand / machine using Namadah blocks etc complete.

**Mode of measurement:** It will be measured in SqM.

**6.50 -do- as per Item spec. no. 6.23 but for 1”x1” or 1.5”x 1.5” glass mosaic tiles.**

Glass mosaic tiles shall be of size 1” x1” or 1.5”x1.5” of approved make finish of approved colour, pattern and design ( with multiple coloured tiles) sound, without any crack or any other defect, as per architectural scheme and as directed in skirting dado over circular / or any shaped surface at all heights including scaffolding etc.. The tiles shall be pre arranged with backing brown paper all other details shall be same as per item 6.23.

**Mode of measurement:** It will be measured in SqM.

**7.00 STEEL WORK**

**Applicable Codes**

IS:4351	-	Steel door frames
IS:1038	-	Steel door, windows and ventilators.
IS: 814 815 and 816	-	Metal arc welding

**7.01 Providing & Fixing Pressed steel frames for doors**

It shall be made of hollow metal pressed section of approved make It shall be single/ double rebated as per the Architect's drawing. It shall be made of CR sheet and size 65x125x1.25 mm or 65x150x1.25 mm thick or as specified. It shall be provided with butt hinges of 125x2 mm thick Minimum three hinges shall be provided per leaf of the door of width and height up to 900 mm and 2000 mm respectively, number of hinges to be suitably increased for the larger shutter as per drawing/ as directed. The frame shall be provided with 3 holdfasts of size 150x20x3 mm for each side and the same shall be embedded in brick work with CC 1:2:4 blocks of size 200 x 230/115 x 150 mm. The hollow portion of the frame shall be filled with CC 1:2:4 (1part cement: 2 Sand: 4 parts stone aggregates 10mm and down graded) and cured before the frame is fixed in position.

The frame shall be thoroughly cleaned, free from rust, mill scale, oil by mechanical means or chemical picking and painted with shop coat of zinc chromate primer after inspection of the same or as directed by the Engineer. There shall be provision in the frame for fixing of tower bolts, al-drop, louvers, mortise lock, bed plate for hydraulic door closer etc. The frame shall be painted with two or more coats of synthetic enamel paint of approved make and first quality to get a uniform finish.

**Mode of Measurement:** The length shall be measured in Running Meter correct to cm along the centre line of the frame.

**7.02 Providing & fixing pressed steel section windows /**

**Ventilators Open-able windows / ventilators**

The frame shall be of size 100x60x1.25mm thick and it shall be of approved make. The windows to be got fabricated in an approved workshop as approved by the Engineer. The frames shall be double rebated. The frame shall be provided with 3 holdfasts of 100x15x3 mm long and the same shall be grouted with CC 1:2:4 in the brickwork or to RCC member. Shutters shall be made of standard steel sections style F7d, sash bar of T6 and locking bar of F4b section. The hollow portion of the frame shall be filled with CC 1:2:4 as stated in Item spec. no. 7.01 before fixing the frame.

Glazing shall be using float glass of approved make minimum 4mm thick and as per the area of glass pan as specified in Item spec. no. 4.01, shall be fixed with beading as per the Architectural drawing. The beading shall be of Aluminium or GI hollow square pipe of 10 sq.mm and wall thickness 1.25 mm or as specified with EPM rubber gasket. The glass pane when tapped should not give rattling sound.

The section shall be provided with approved make powder coated aluminium stays, Al-drop, handles and washers etc.. The window section shall be shop painted with one coat of zinc chromate / red-oxide primer as specified and shall be painted after completion of the finishing work with two or more coats of synthetic enamel paint of approved make, first quality and shade followed with one coat of red oxide primer at site.

**Mode of Measurement:** It shall be measured in SqM out to out of frame.

**7.03 Providing & fixing pressed steel section windows Partly open-able and partly fixed windows**

The specification for this item is same as Item spec. no. 7.02.

**Mode of Measurement:** Same as per Item spec. no. 7.02.

**7.04 Providing & fixing pressed steel section windows / Ventilators - fixed type**

The specification for this item is same as Item spec. no. 7.02. however, without fittings, handles, stays etc.

**Mode of Measurement:** Same as per Item spec. no. 7.02.

**7.05 Providing & fixing pressed steel section - louvered ventilators**

Same as per Item spec. no. 7.02 however, fixed glass louvers of 4 mm or 5.5 mm thick float or frosted glass (4 mm thick for louvers up to 450 mm long and 5.5 mm for length of 451 mm or more) to be provided as per architectural drawing.

**Mode of Measurement:** Same as per Item spec. no. 7.02.

**7.06 Providing & fixing MS Mosquito/ fly proof shutter**

This shall be fabricated out of approved standard rolled sections (window sections) with 22 to 23 SWG galvanised wire net. The beading shall be of MS hollow pipe beading of 10 Sq.mm X 1.25 mm with screws. The shutter shall be provided with adequate number of hinges as per details / as directed.. Matching section shall be provided with an arrangement for fixing tower bolts and handles including providing and fixing aluminium oxidized/powder coated fittings as specified and as per architect's drawing. It shall be painted with one coat of primer and 2 or more coats of synthetic enamel paint approved make and first quality. The contractor should get the shop drawing approved .The fabrication shall be done through an approved manufacturer and approval of the Engineer be obtained in advance. General specification shall be as per Item spec. no. 7.02.

**Mode of Measurement:** The fly proof shutter out to out shall be measured in SqM without frame.

#### **7.07 Providing & Fixing GI BRC fabric grill**

This shall have a GI rectangular or square shape 75, 50, 25mm size as specified in the item specification.. The gauge of the wire shall be 8 to 10 SWG. The gap size shall be 75 x 25 mm in general unless specified otherwise. This shall be welded / bolted to the M S frame made of angle iron 40 x 40 x 6 and tee 40 x 40 x 6mm with a MS beading of 30x3 or 30x6 mm as per details. The fabricated grill shall be provided with a shop coat of zinc chromate primer and fixed in position by grouting the hold fasts in cement concrete blocks ( sides , bottom / top as the case may be ) or a pad plate be provided which shall fixed with expansion bolts as directed. Up on fixing and finishing the surrounding, it shall be painted 2 or more coats of synthetic enamel paint of approved quality and make over a coat of primer.

The MS sections used shall be paid under relevant items as specified in the item description. Grouting of the hold fasts in CC block of size 230x200 x150 or fixing with expansion bolts is included in the above item(s) and nothing extra shall be paid for.

**Mode of Measurement:** The area of BRC fabric in to in of the holding frame shall be measured in SqM.

#### **7.08 Providing & Fixing Rolling shutters – Push and Pull type**

The rolling shutters shall confirm to IS 6248 of reputed approved make and shall be of 18 gauge MS solid laths or grill with all the accessories such as top cover conform to the size indicated in drawings and shall be of quality specified in the item specification. The rolling slats shall be in one piece and be made of heavy gauge cold rolled steel strips. The thickness of the sheets from which the lathe sections have been rolled shall be not less than 0.9mm for the shutters up to 3.5 m width and 1.2 mm for shutters above 3.5 M width. Depth of the guide shall be 65 mm for rolling shutters of width 3.5 M and 75 mm for width 3.5 to 8 M. A cylindrical hood shall be of MS sheet not less than 0.90 mm thick with

appropriate MS angle/ flat stiffeners and of an approved profile shall be provided on the top to enclose the shutter when it is open. The rolling shutters shall be provided with suitable locking arrangements from inside and outside and deep channel guides. In case galvanised rolling shutters are specified the rolling shutter shall be made of hot dip galvanised slats hood, deep channel guides all preferably in one piece. The channels, guides shall be fixed with holding down bolts with PCC 1:2:4 (1 cement, 2 sand, 4 coarse aggregate of nominal size 12mm and down).

In case of hand operated pull and push type rolling shutters and very large gear operated rolling shutters of sizes larger than 10 SqM in area, they shall be provided with ball bearings for smooth and efficient operation. In case of large rolling shutters and depending upon local wind conditions, the rolling shutters should be provided with special locking type of wider channel guides or it shall be provided with central movable channel supports to take up the design wind pressures in the area. The rolling shutters shall be painted with a shop coat of primer and upon fixing and finishing be painted with two or more coats of enamel paint of approved make and quality followed by a coat of primer at site. **Contractor shall submit GA drawing as well as material details and get the make / arrangement approved prior to execution.**

**Mode of Measurement:** The measurement shall be in SqM .It shall be clear size of opening plus guide channels on both sides for width and 450mm on top for drum.

#### **7.09 Providing & Fixing Mechanically operated rolling shutters**

General specification shall be same as in Item spec. no. 7.08. In case of large opening with mechanical device, for opening the shutter the roller shall be fitted with a pinion wheel at one end which in contact with a worm fitted to the bracket plate , caging and pulley with two ball bearing shall be provided with liver box, pair of handles. The arrangement shall be got approved from the Engineer.

**Mode of Measurement:** Same as per Item spec. no. 7.08.

#### **7.10 Providing & Fixing partly grilled Rolling shutters**

Rolling grills are similar in design, construction and operation to rolling shutters and all provision of Item spec. no. 7.08 and shall be applicable to rolling grill and shall conform to IS:6248. Grill portion shall be fabricated with 8 mm diameter round bars. Straight bars and bent bars bent to the required profile are placed alternatively and held in position with 20 mm wide and 5 mm thick MS flat links. Straight bars shall space as per requirement 100 to 150 mm as per approved drawing. All other arrangement shall be same as per Item spec. no. 7.08.

**Mode of Measurement:** Same as per Item spec. no. 7.08.

#### **7.11. Providing & Fixing partly grilled and partly with solid lathe Rolling shutters with mechanical device.**

The general specifications shall be same as per Item spec. no. 7.08, 7.09 and 7.10

**Mode of Measurement:** Same as per Item spec. no. 7.08.

**7.12 Providing & Fixing in position grill, railing, steel ladder etc.**

This work shall be carried out as per the detailed drawing of the Architect. The MS sections shall be of approved quality. The welding shall be perfect and the junctions shall be ground properly. The frames shall be provided with holdfasts and the same shall be grouted with CC blocks of 1:2:4 in brickwork Or fixed with anchor bolt in RCC. It shall be painted with one coat of primer and 2 or more coats of synthetic enamel paint of approved make and first quality over a shop coat of primer.

No wastage or rolling margin for over weight of steel members/sections shall be payable whereas for under weight it should be paid at actual if allowed to use.

**Mode of Measurement:** The dimensions of the members shall be measured in unit lengths/area (for plates) and the same shall be converted in to weights as per the standard steel table. The payment shall be made based on the weight of the item in kg. Nothing extra shall be paid for rolling margin.

**7.13 Providing & Fixing MS inserts in RCC and Brick work**

MS inserts shall be using MS rolled sections like Channels, angles, "T", "I" sections, plates, flats etc. of approved make with necessary lugs/ bolts as per drawings and details. Inserts, bolts etc. shall be provided in masonry and concrete works as indicated on the drawing. It is imperative that all inserts, bolts fixtures and fittings shall be provided in their position very accurately. Such inserts and bolts are to be fixed with necessary templates. If due to negligence on the part of the contractor, the inserts, bolts fixtures, and fittings etc, are out of alignment the contractor shall make arrangements to have the inserts and bolts removed and refitted in their proper position as directed by the engineer, at no extra cost. The inserts shall be painted with shop coat of primer followed by one coat of primer and two or more coats of synthetic enamel paint of approved make and quality on completion.

Additional MS members used in the items like chain link fencing etc. other such items beyond the requirements detailed in the relevant item shall also be paid under this item.

**Mode of Measurement:** Same as per Item spec. no. 7.12.

**7.14 Providing & Fixing MS gate**

It shall be as per the drawing using standard rolled/ hollow sections, standard cold rolled MS sheets. The welding/ riveting shall be perfect and the junctions shall be ground properly. The welding joints shall be made proper including preparation of edges, welding grinding etc. The

grid out of MS square sections/ flats shall be fabricated by cutting, splicing or neatly riveting as per architect's details. The rates shall be inclusive of providing MS square sections with necessary turning for pivots/ hinges, guide channel/ rail track etc as per architects drawing. The gate shall be provided with arrangements for closing; hinges, locking arrangement, stays and it shall be painted with shop coat of primer followed and two or more coats of synthetic enamel paint of approved make and quality over a coat of primer after erection and completion of finishing works.

Nuts, bolts, washers required for fastening the hinges (permanent fasteners) shall be measured in Kg with hinge/ holdfasts and shall be paid as per quoted unit rate of the Item spec. no. 7.14.

**Mode of Measurement:** Same as per Item spec. no. 7.12

#### **7.15 Providing & Fixing MS pipe railing**

It shall be done with the specified class of MS pipe as per the item in the Schedule of Quantities. The design shall be as per the drawings/ instructions. All necessary specials, bends, elbows, tees and holdfasts or clamps shall be provided. If the pipe railing is to be fixed on ground or brick work, it shall be done by embedding the holdfasts, as directed by the Engineer, in concrete blocks PCC 1:2:4 (1cement, 2 sand, 4 graded coarse aggregate of size 12 mm and down). If it is to be fixed to a RCC member, the pipe shall be welded to the steel plate by embedding it in the RCC member. The fabricated railing shall be painted with a shop coat of primer and 2 or more coats of enamel paint of approved make and quality over a coat of primer.

**Mode of Measurement:** All the members of the railing shall be measured in unit lengths/area and the same shall be converted in to weight using standard steel tables as stated in Item spec. no. 7.12. Concrete for grouting shall be paid under relevant item. Nothing extra shall be paid for rolling margin. **It shall be paid in kg.**

#### **7.16 Providing & fixing MS door frame**

It shall be fabricated from standard MS rolled sections like flats, angle T etc. as per the details and drawings. All the members shall be free from rust, flakes, cracks and other fabrication defects. All holes for hinges, bolts, locking plates etc. shall be provided as per drawings/ instructed. The welding shall be smooth. The frame shall be erected and fixed with MS holdfasts of specified size and grouted with cement concrete 1:2:4 (1 cement, 2 sand, 4 graded coarse aggregate of nominal size 12mm and down) The frame shall be painted with a shop coat of primer before erection and 2 or more coats of synthetic enamel paint of approved make and quality over a coat of primer after erection.

**Mode of Measurement:** Same as per Item spec. no. 7.12.

#### **7.17 Providing & Fixing MS sheet door**



The frame shall be of MS as specified. The door shall be as per the Architects design. The specified gauge MS sheet door shall be welded to the shutter frame work. It should have 3 to 6 hinges as specified depending on the shutter size. It shall have fittings as specified in the item/ Architect's drawings. The door shall be applied with shop coat of primer and 2 or more coats of synthetic enamel paint of approved make and quality as specified over a coat of primer.

**Mode of Measurement:** Same as per Item spec. no. 7.12.

### 7.18 Providing & Fixing GI barbed wire fencing

This fencing shall be either made with RCC posts and struts or with MS posts and struts. RCC posts and struts shall be of size and length as specified in the item description in the Schedule of Quantities. It shall be free from cracks, twists and honeycombing.

MS posts and struts shall be of size and section as specified in the item description. One end of the angle shall be forked to have grip in the concrete and the other side shall have holes to fix the fencing wire. The post shall be applied with a coat of primer and 2 coats of first quality synthetic enamel paint.

#### GI wire

It shall be 12 to 14 gauges with 4 points barb with two wires twisted together or as specified in the item description. It shall be circular in section, free from scale and other defects and uniformly galvanised. The type, length and standard weight of the GI barbed wire shall be as specified below:-

Nominal dia. of wire Line wire	Point wire	Nominal distance between two bars	Length in M/100Kg		
			Nominal	Min.	Max.
2.5	2.2 4	75	1000	934	1066
2.5	2.2 4	150	1134	1066	1200
2.24	2.2 4	75	1576	1490	1668
2.24	2.2 4	150	1890	1778	2000

The GI barbed wire shall be well stretched in number of rows as specified with two diagonals. The spacing shall be at least 15cm from the ground and the rest shall be equidistant. The posts and struts shall be embedded in PCC 1:2:4 or as specified. It shall be fixed in line, level and plumb. The grouting concrete shall be cured for 7 days. The barbed wire shall be held to posts by means of GI staples, U clips or GI binding wire as specified. Turn buckles and straining bolts shall be used at the ends. Two struts

shall be provided at the corners and at every 25M. The length of the strut shall be 1.5 times the length of the post. Rate to include all material as MS post, cement concrete, painting etc.

**Mode of Measurement:** This shall be measured in Running Meter.

#### **7.19 Providing & Fixing GI barbed wire fencing – 1050mm high**

General specification are same as in Item spec. no.7.18 but fencing to be fixed over compound wall of height specified in schedule of quantities including flaring the end to be grouted, painting the same with bitumen, grouting the post in cement concrete 1:2:4 (1 part cement: 2 parts coarse sand: 4 parts aggregates) block of specified size, 600 mm length of the angle straight and balance 450 mm will be bent, duly drilled with holes for running/ securing barbed wire in position, placed at 2, 5 M, centre to centre, every 10<sup>th</sup> post and corner posts or at the change in level the vertical post to be strutted with MS angle of size 50x50x6 mm from both sides and the end post from one side using MS angle 50x50x6 mm grouted in concrete. This includes centring/ shuttering for the CC blocks as may be required, providing and fixing GI barbed wires of 12 to 14 gauge, 4 points wire with 7 horizontals and 4 diagonals fixing with approved U clips, painting the angles posts and struts with two or more coats of approved quality and make Aluminium/ synthetic enamel paint over a coat of primer etc all complete as per drawing/ as directed.

**Mode of Measurement:** This shall be measured in Running Meter.

#### **7.20 Providing & Fixing of Steel Windows/Ventilators fixed type**

Steel windows/ventilators of standard rolled sections (fabricated as per architects design) joints mitred and electrically flash welded (manufactured to relevant IS standard specifications) with non-oxidized lugs (15 x 3mm and not less than 100 length) embedded in cement concrete block 150 x 100 x 100mm of 1:2:4 (1 cement: 2 coarse sand: 4 hard stone ballast 20mm and down grade) cement concrete including glazing of approved quality float glass of standard thickness as specified in the item shall be fixed with aluminium / MS beading of approved quality and size.

The windows shall be fabricated through reputed manufacturer upon with the approval of drawing and the agency by the Engineer. Standard rolled section like T2,T3,T6, FF2, F3, F5,F4B,F7D, FX6,FZ7,FX8,FZ5,K11B,K12B of approved manufacturer shall be used as per the details. Stay, handle, locking arrangement, tower bolt etc shall be provided as per requirement.

Providing and applying shop coat of zinc chromate yellow primer coating for rust proof and 2 or more coats of approved shade and quality enamel paint after installation over a coat of primer.

- i) The section should confirm IS 4351-1976.
- ii) All frames supplied shall be phosphate on all surfaces and finished with zinc chromate yellow primer coating for rust proof.

- iii) All casements shall be measured at site and approved prior to fabrication.
- iv) Shop drawing to be made and approval to be obtained from Client/Architect prior to fabrication..
- v) Hardware fittings shall be provided at appropriate locations in the frames. The shop drawing should indicate the type of provision to be made for hardware fittings.
- vi) A sample of door/ window shall be submitted and got approved from the Engineer.

**Mode of Measurement:** This shall be measured in SqM out to out.

**7.21 Providing and fixing MS Windows / ventilators – Side / top hung openable**

General specification is as per Item spec. no. 7.20

**Mode of Measurement:** Same as per Item spec. no. 7.20

**7.22 Providing and fixing MS Windows / ventilators – Partly fixed partly openable**

General specification is as per Item spec. no. 7.20

**Mode of Measurement :** Same as per Item spec. no. 7.20

**7.23 Providing & fixing MS Window/ventilator–Centre hung type.**

General specification are as per Item spec. no. 7.20. Central hung window / ventilators shall hung on pair of brass cup pivots, riveted to inner and outer frames to permit the shutter to swing to an angle of approx 85Degree. The opening portion of the window / ventilator shall be so balanced that it remains open at any desired angle under normal weather conditions. Necessary handle, stay and locking arrangement to be provided.

**Mode of Measurement:** Same as per Item spec. no. 7.20

**7.24 Providing and Fixing Louvered Window / Ventilators**

These will be fabricated following general specification of Item spec. no. 7.20 It shall be fitted with machine made louvers made out of standard steel sheets to suit the width and thickness of wired glass of 5.5mm thickness. The machine louvers to be fixed with the frame by riveting as per approved drawing.

**Mode of Measurement:** Same as per Item spec. no. 7.20

**7.25 Providing and fixing ‘Z’ type ventilator**

General specification shall be as per Item spec. no. 7.20. Ventilators to be made out of standard MS sections as per architects design. Top and bottom fixed glazing shall be of 4 mm float glass as per Item spec. no. 4.01. In between 8 gauge BRC mesh of 25x25 mm shall be welded the

horizontal plane with 10 x 3 mm MS flat or of the suitable size beading with stiffeners as required..

**Mode of Measurement:** This shall be measured in SqM in the elevation out to out of frame.

#### **7.26 Providing and fixing Fibre glass sky light dome.**

The fibre glass dome shall be made out of specified thickness of fibre glass of any shape and colour as per architect's detail. The shop drawing shall be submitted and got approved as well as sample shall be got approved from the Engineer. A rim of adequate width and thickness and shape shall be provided in the design for fixing the dome on the bearing of element where it will be fixed with GI bolts, neoprene washers and nuts. The bolt head/nuts to be coated with epoxy compound to safeguard it against rusting. The rim shall overlap the width of wall or parapet to ensure and check ingress of rain water. If need be MS bearing plate or frame made out of standard MS section as per approved details to be fixed. approved drawing. The reinforcing MS members shall be coated with fibreglass and base plate etc. painted with one coat of primer and two or more coats of enamel paint of approved make and quality.

MS sections / base plates used shall be paid under relevant tender item.

**Mode of Measurement:** The surface area shall be measured in SqM. MS standard section used for structure shall be paid under the item 8.01.

#### **7.27 Providing and fixing Poly carbonate sky light.**

Plain or smoke brown plain polycarbonate sheet or multi-walled sheets of approved make, quality, thickness and shade as specified in schedule of quantities fixed with all accessories supported over anodised aluminium, MS powder coated or galvanized members with EPDM or approved gaskets, fixing hooks, cadmium coated self tapping screws, EPDM or approved washer nuts & bolts, clips including apply two or more coats of enamel paint of approved make and quality paint over a coat of red oxide over MS material etc. complete as directed. The entire job is to be executed using approved material as per architect's drawing including providing and filling gaps silicon sealant wherever necessary to make the surface water tight and leak proof. Nothing extra for providing silicon sealant shall be paid.

**Mode of Measurement:** This shall be measured in SqM. MS standard section used for structure shall be paid under the item 8.01.

#### **7.28 Providing and fixing GI pipe railing**

GI pipe of specified class and diameter of 800 to 1000 mm height above finish floor level shall be fixed @ 1000 mm c/c as vertical and top and bottom rail of GI "A" class 32 mm dia. NB or to be provided as per Architectural drawing including welding, specials, bends and 2 coats of enamel paint over a coat of red oxide primer. GI pipe railing shall be fabricated as per the drawing including cutting/fitting, grinding / mitring

to match curvature, preparation of surface for close jointing welding, bending etc. The supports, horizontal members shall be in single piece.

MS rolled sections used for base plate / or any other member in the railing work shall be paid under relevant Item spec. no. 7.12.

**Mode of measurement:** Length of the pipe(s) shall be measured to correct cm and multiplied by standard coefficient or actual unit weight which ever is lower to arrive quantity in Kg. It shall be paid in kg.

#### **7.29 Providing and fixing grill made out of MS hollow section**

General specification shall be same as per Item spec. no. 7.12 but using MS hollow round, square or rectangular sections as specified / as per drawing. MS standard sections like plates, angles, flats, channels etc used in the fabrication shall be measured separately under relevant Item spec. no.7.12.The grill / ladder shall be given a shop coat of anti rust zinc chromate primer and two or more coats of enamel paint of approved make, quality and shade over a coat of primer after installation.

**Mode of Measurement:**

The individual members shall be measured and converted in weight as per unit weights as per standard co-efficient or actual unit weight which ever is lower to arrive quantity in Kg.

It shall be paid in kg.

### **SECTION 9.00 MISCELLANEOUS WORKS**

#### **9.01 Providing and fixing night latch of approved make such as Godrej or equivalent.**

The night latch shall be approved make, quality and finish with locking horn and set of three keys (original supplied with lock) to fixed with brass screws of matching colour.

The rate shall be quoted for providing night latch of approved quality and make fixing the same in the door shutters / frame and finishing and polishing the surrounding.

**Mode of Measurement:** This shall be measured in Number.

#### **9.02 Providing & fixing approved make 6 lever Mortise lock with pair of brass oxidized / chromium plated handles.**

The lock shall be of approved make and finish with locking horn and set of three keys (original supplied with lock).

The rate quoted shall be for providing mortise lock with handles in doors and finishing as per item schedule.

**Mode of Measurement:** This shall be measured in Number.

**9.03 Providing & fixing tubular lock.**

The lock shall be of brass chromium plated or oxidized of approved make and model with locking horn to be fixed in doors and provided with a set three keys (original supplied with lock).

**Mode of Measurement:** This shall be measured in Number.

**9.04 Providing and fixing hydraulic door closer of approved size and make.**

The hydraulic door closer shall be of approved shape, size and colour suiting to the requirement. Shall be fixed well secured on door shutter and frame with brass screws of matching colour including filling and maintaining oil till the operations are set including fine adjustment. This shall be fixed at places as directed by the Engineer.

**Mode of Measurement** This shall be measured in Number.

**9.05 Providing and fixing PVC hand rail 50 mm wide of approved colour.**

The PVC hand rail shall be in one length and to be fixed over base flat securing it tightly including bending in curvature welding if needed and finishing smooth. The ends to be properly terminated so that it does not tend to come out etc complete as directed.

**Mode of Measurement:** This shall be measured in Running Meter.

**9.06 Providing & Filling the electrical jharis 250mm to 150mm wide and depth as specified in schedule of quantities with cement mortar 1:3 and finishing the same to match with the surrounding, curing for 7 days, finishing with painting/ white wash or any other finish, etc. complete as directed. The work is to be coordinated with internal electrification contractor and ensure that the conduits are secured properly. The top finish should be matched and should not be visible separately after finishing.**

**Mode of Measurement** This shall be measured in Running Meter.

**9.07 Dismantling brick masonry walls and partitions, plastered or unplastered as per instructions including finishing the broken surface to match with the surrounding, removing the debris as directed within site, cutting the reinforcements if any etc. complete as directed. The rates include necessary cordoning the area including erecting appropriate screen if required and necessary scaffolding etc. The dismantled debris is required to be collected and disposed off within the site including all lead and lifts. The dismantling for the opening shall be carried precisely as directed by the Engineer layer by layer.**

**Mode of Measurement:** This shall be measured in CuM.

- 9.08 Dismantling the RCC beams, slabs, lintels, columns, pardi walls, platform etc.** including finishing the broken surface to match with the surrounding, removing the debris within site, including cutting the reinforcement if any etc. complete as directed. The rates include necessary cordoning the area including erecting appropriate screen if required and necessary scaffolding etc. The dismantled debris to be collected and disposed off within the site including all lead and lifts with the progress of dismantling work. The dismantling for the opening shall be carried precisely as directed by the Engineer. The reinforcement steel recovered from dismantled concrete shall be stacked separately and shall be ultimately handed over to stores/yard of the Project Authority /GAUSHALA at site.

**Mode of Measurement** This shall be measured in CuM.

- 9.09 Filling the jharis 25mm to 150 mm wide and 50 to 100 mm deep with PCC (1:2:4)** and Finishing the top with plaster of appropriate grade to match with surroundings including painting as stated in Item spec. no. 9.06 etc. complete.

**Mode of Measurement** This shall be measured in Running Meter.

- 9.10 Making holes up to 30 CM in dia. or 30 x 30 cms. in size in RCC works** and filling the same with PCC(1:2:4) and finishing the same as per surrounding including scaffolding, cutting the reinforcement bars, curing etc. complete.

**Mode of Measurement** This shall be measured in Number.

- 9.11 Providing and fixing approved quality and make Hydraulic floor door spring.**

This shall be fixed in floor. The floor shall be cut properly for the placing of the Hydraulic floor spring if necessary. The flooring near the spring location shall be redone matching the existing flooring. Nothing extra shall be paid for this.

**Mode of Measurement:** This shall be measured in Number.

- 9.12 Providing and fixing 150mm wide PVC water stop** in proper alignment at construction joint, joining as per Suppliers recommendation complete as per direction of Engineer. Rate to be inclusive of wastage and overlap.

**Mode of Measurement** This shall be measured in Running Meter.

- 9.13 Providing and fixing in RCC side wall or bottom or cover slab of sump 75mm dia GI B class pipes up to 600 mm long with puddle flange and outside flange or threaded end for connecting the inlet, outlet, washout and overflow pipes.**

The specification of the GI pipe shall be as per the specification given in Section 11.00 of the this Technical specifications. It shall be placed during concreting the walls of the sump/over head water tank etc.

The rate quoted shall be for the providing and placing of the pipe with flange or threaded in line and level.

**Mode of Measurement:** This shall be measured in Number.

- 9.14 Providing and fixing in RCC side wall or bottom or cover slab of sump 50mm dia. GI B class pipes up to 600 mm long as per Item spec. no. 9.13.**

**Mode of measurement:** This shall be measured in Number

- 9.15 Providing and fixing in RCC side wall or bottom or cover slab of sump 38 or 40mm dia. GI B class pipes up to 600 mm long as per item spec. no. 9.13.**

**Mode of measurement:** This shall be measured in Number.

- 9.16 Providing and fixing in RCC side wall or bottom or cover slab of sump 25mm dia. GI B class pipes up to 600mm long as per item spec. no. 9.13.**

**Mode of measurement:** This shall be measured in Number.

- 9.17 Providing and fixing removable CI gratings of approved quality for rain water pipes including painting the same with two coats of approved enamel paint for 100mm dia**

**Mode of Measurement:** This shall be measured in Number

- 9.18 Providing and fixing removable CI gratings of approved quality for rain water pipes including painting the same with two coats of approved enamel paint for 150mm dia**

**Mode of Measurement:** This shall be measured in Number.

- 9.19 Providing and fixing special CI drain in flooring**

Providing and fixing of the special floor trap (CI or SS traps) and fixing in position as per drawing / details and as directed including providing and constructing 600 mm deep, 300 x 300 and 230 mm thick brick chamber in CM 1:6 with 75 mm thick PCC 1:4:8 PCC finishing the inside smooth with cement mortar 1:4 with neat cement punning, bottom to be finished with IPS 40 mm thick. The trap is required to be fixed at required level and be connected with CI / SW pipe to drainage line. The trap if required to be fixed line and level over the chamber but in PCC 1:4:8 (in lieu of internal finishing) as per the details. The out let of the trap shall be connected to CI / SW pipe up to required level before it is connected to main line through Tee etc complete as directed. CI / SW pipe line shall be measured and paid under relevant tender item.

**Mode of Measurement:** This shall be measured in Number.

- 9.20 Providing and fixing Air vent Cowl**



The Air vent cowl shall be of CI or PVC as specified in the item description. It shall be of approved quality and size matching to the air vent pipe including sealing the joint.

**Mode of Measurement:** This shall be measured in Number.

**9.21 Dismantling kota / mandhana stone / mosaic tiles ceramic / glazed tile in flooring, dado or skirting**

Work shall be carried out as per instructions of the engineer; including dismantling of under laid cement mortar and finishing the broken/dismantled surface of match with the surroundings. Disposal of debris/muck within the site at approved location, stacking the recovered stone pieces, stacking at site and handing over the useable ones to stores / yard etc. complete as directed.

Rate includes all labour, material, etc. complete.

**Mode of Measurement:** This shall be measured in SqM of area dismantled.

**9.22 Dismantling plain cement concrete (PCC) of any grade in flooring/pavement/wall foundation, etc. as per instruction of the site engineer and disposal of debris/muck within the site at approved location, etc. complete.**

**Mode of Measurement:** This shall be measured in CuM of PCC dismantled.

**9.23 Removing existing MS/Wooden doors/ windows/ ventilators/ grills, rolling shutter etc. carefully by removing screws / dismantling hold fasts as directed, stacking the same at site and handing over to project authority/GAUSHALA to Stores / yard. The broken surface shall be finished to match with surroundings. The rate includes all labour, material, etc, complete.**

**Mode of Measurement:** This shall be measured in SqM of the clear opening from the door/ window/ ventilator and grill rolling shutter is removed.

**9.24 Dismantling CI tile flooring including the under laid cement mortar. Disposing debris/muck/broken CI tiles as directed within the site at the approved location. The full CI tiles shall be handed over to the project authority to stores / yard.**

**Mode of Measurement:** This shall be measured in SqM of CI tile flooring dismantled.

**9.25 Providing and fixing aluminium sheet 20 gauge, 30cm wide on the expansion joint. One end of the sheet to be fixed with SS screw and other end to be kept partially free by making an elliptical slot and fixing with the screw so as to allow for the expansion of the building and consequent movement of the aluminium sheet. Rate includes all labour material, etc. complete.**

Rate to be inclusive of wastage and overlap.

**Mode of Measurement:** Measurement shall be taken for actual area of aluminium sheet laid and shall be paid in SqM.

**9.26 Dismantling/scrapping and removing fully the plain/sand faced/grit cement plaster** from the brick/RCC works including necessary scaffolding at all height and levels and disposing the debris within the site at approved location, etc. complete. Rate includes all labour, materials, etc. complete.

**Mode of Measurement:** shall be taken of the actual area exposed after the cement plaster is fully removed.

**9.27 Cutting RCC roads/floors/pavements with groove cutting machine to make grooves** 6 –10mm wide and up to 25mm deep in true line and absolutely vertical. The grooves shall be cut within 7 to 10 days of laying using RCC wing sharp cutter using appropriate cutting wheel and skilled operator in the perfect line as per the layout of groove already approved by the site engineer. The joints should be properly marked while laying flooring and be cut absolutely matching the construction expansion joint.

**Mode of Measurement** This shall be measured in the Running Meter of the grooves cut.

**9.28 Providing and filling silicon sealant of approved make and grade in grooves** in specified section (i.e. width and depth) as per the details and at the junction of windows/door/ventilators with the walls and in the floor grooves. The interior of the joints shall be filled with material like polypropylene rod and the sealant applied. The depth of sealant shall be 6 – 10mm or as specified for curing and vulcanization. The work shall be done strictly as per the manufacturer specification and preferably by their authorized applicator. Payment shall be made in running meter, per cm width per cm depth of the sealant applied. The rates shall be inclusive of all the labour, cost of material, filler and sealant etc. complete.

Procedure (general): Install the proper sealant as per the manufacturer specification in a neat workman like manner.

Material shall be stored at site as per manufacturer's specification.

Material which has exceeded its recommended shell life shall not be used.

Weather and temperature condition during installations shall confirm to manufacturer's recommendations

Prepare a mock installation of each major type and use of sealant at site for approval.

Test for the adhesion of the sealant by cutting about 10 cm length of the cured sealant and peel the remaining sealant from the substrates. The sealant should tear within itself and should not come out from the substrates line a ribbon bead. The product data and samples, the joint preparation and condition, joint design, joint filler material, application

maintenance and site quality control should be as per manufacturer specification.

**Mode of Measurement** This shall be measured in Running Meter of joint sealed proportionate to the section of joint sealed.

### **9.29 Providing and fixing gypsum board false ceiling**

Providing and fixing gypsum board false ceiling with necessary GI frame work/suspenders as per the specifications of India Gypsum Ltd. or approved equivalent in the profile as per architects drawing.

Suspenders (hangers) shall be of 4mm diameter GI rods to be fixed with GI fasteners, carriers and holding rails as per the specifications of the false ceiling manufacturer. The gypsum board to be joined and finished so as to have a flush look which includes filling and finishing the tapered and square edges of the board with jointing compound and applied with paper tape and a coat of primer suitable for gypsum board and providing and applying two coats of plastic emulsion or synthetic enamel paint, etc. complete as directed.

**Mode of Measurement:** This shall be measured in SqM.

**9.30 Taking the delivery of Insulated door ( Cold Store / Deep Freeze doors)** of maximum size 3m x2.5m, from the GAUSHALA / Contractors site store and fixing the same in line and level, cutting the brickwork, RCC and fixing with holdfast in cc 1:2:4 blocks or to be grouted in RCC mullion including supporting to keep in exact position till the CC blocks / RCC mullion attains sufficient strength, finishing the surface smooth, curing etc. in line level and plumb , all complete as directed. The concrete blocks or RCC mullion shall be paid under relevant tender item. This work to be carried out in coordination with the Cold Stores / Deep Freeze contractor.

**Mode of Measurement:** This shall be measured in SqM.

## **SECTION 11.0 WATER SUPPLY**

### **11.01 Providing & Laying under ground GI pipe line for 80 mm dia.**

The pipes shall be galvanized mild steel welded pipes and screwed and socketed tubes conforming to the requirements of IS: 1239-1982, for medium grade. They shall be of the diameter (nominal bore {NB}) specified in the description of the item. The sockets shall be designated for the respective nominal bores of the pipes for which they are intended. The pipes and sockets shall be cleanly finished well galvanized in and out and free from cracks surface flaws, laminations, and other defects. All screwed threads shall be clean and well cut. The ends shall be cut cleanly and square with the axis of the tube.

All screwed tubes and sockets shall have pipe threads conforming to the requirements of IS: 554 screwed tubes shall have taper threads while the sockets shall have parallel threads.

The fittings shall be of malleable cast iron or mild steel tubes complying with all the appropriate requirements as specified for pipes. The fittings shall be designated by the respective nominal bores of the pipes for which they are intended. The fittings shall have screw threads at the ends conforming to the requirements of IS: 554 Female threads on fittings shall be parallel and male threads (except on running nipples and collars of unions) shall be taper.

The pipes and fittings shall be inspected at site before use to ascertain that they conform to the specification. The defective pipes shall be rejected. Where the pipes have to be cut or re-threaded, the ends shall be carefully filed out so that no obstruction to bore is offered. The end of the pipes shall then be threaded conforming to the requirements of IS: 554 with pipe dies and taps carefully in such a manner as will not result in slackness of joints when the two pipes are screwed together. The taps and dies shall be used only for straightening screw threads which have become bent or damaged and shall not be used for turning of the threads so as to make them slack, as the latter procedure may not result in a water tight joint. The screw threads of pipes and fitting shall be protected from damage until they are fitted.

The pipes shall be cleaned of all foreign matter before being laid in jointing the pipes, the inside of the socket and the screwed end of the pipes shall be oiled and rubbed over with white lead and a few turns of spun yarn wrapped round the screwed end of the pipes. The end shall then be screwed in the socket, tee etc. with the pipe wrench. Care should be taken that all pipes and fittings are properly jointed so as to make the joints completely water tight and pipes are kept at all times free from dust and dirt during fixing. Burr from the joint shall be removed after screwing. After laying, the open ends of the pipes shall be temporarily plugged to prevent access of water, soil or any other foreign matter. Any threads exposed after jointing shall be painted or in the case of under ground piping thickly coated with approved anticorrosive paint to prevent corrosion.

If the galvanized iron pipes and fittings are laid in trenches, the widths and depths of the trenches for different diameters of the pipes shall be as in the table given below:-

**Table:**

<b>Diameter of pipe</b>	Width of trench	Depth of trench
15 mm to 50mm	30 cm	60 cm
65 mm to 100mm	45 cm	75 cm

At 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 for each work in trenches. After successful pressure testing, the pipe line to be painted a coat of APCOMIN ROZC primer PQ 1741, 25 micron DFT followed by two coats of Bituminous paint of approved make OR pipes shall be wrapped with thermo-fusible composite film 4 mm thick made out of fibre glass mat base with polymeric coatings (like PYKOTE ) of

approved make, as per the procedure recommended by the manufacturer **as specified in schedule of quantities**. The pipes shall be laid on a layer of 7.5 cm sand and filled up to 15 cm above the pipes. The remaining portion of the trench shall then be filled with excavated earth. The surplus earth shall be disposed off as directed. When excavation is done in rock the bottom shall be cut deep enough to permit the pipes to be laid on a cushion of sand 7.5 cm minimum. In case of bigger diameter pipes where the pressure is very high thrust blocks of cement concrete 1:2:4 (1 cement: 2 coarse sand : 4 graded stone aggregate of 20 mm nominal size) shall be constructed on all bends to transmit the hydraulic thrust without impairing the ground sand spreading it over a sufficient area.

**TEST:**

After laying and jointing, the pipes and fittings shall be inspected under working conditions of pressure and flow. Any joint found leaking shall be redone and all leaking pipes removed and replaced without extra cost.

The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 kg/sq.cm. (60 MWC). The pipes shall be slowly and carefully charged with water allowing all air to escape and avoiding all shock or water hammer. The draw off takes and stop cocks shall then be closed and specified hydraulic pressure shall be applied gradually. Pressure gauge must be accurate and preferably should have been recalibrated before the test. The test pump having been stopped the test pressure should maintain without loss for at least half an hour. The pipes and fittings shall be tested in sections as the work of laying proceeds, keeping the joints exposed for inspection during the testing. High thrust blocks of CC 1:2:4, if provided shall be paid under relevant concrete item.

**Mode of Measurement:** GI pipes with fittings completely fixed in position shall be measured and paid for the finished centre line lengths and the measurement shall be in Running Meter.

**11.02 Providing & laying under ground GI pipe line for 50mm dia underground**

The general specification is same as per Item spec. no. 11.01.

**Mode of Measurement:** Same as per Item spec. no.11.01

**11.03 Providing & Laying GI pipe 40 mm dia under ground**

The general specification is same as per Item spec. no. 11.01.

**Mode of Measurement:** Same as per Item spec. no.11.01

**11.04 Providing & laying 25mm dia GI pipe under ground**

The general specification is same as per Item spec. no. 11.01.

**Mode of Measurement:** Same as per Item spec. no.11.01

**11.05 Providing & Laying GI pipe 20mm dia under ground**

The general specification is same as per Item spec. no. 11.01.

**Mode of Measurement:** Same as per Item spec. no.11.01

**11.06 Providing & Laying GI pipe 15 mm dia under ground**

The general specification is same as per Item spec. no. 11.01.

**Mode of Measurement:** Same as per Item spec. no.11.01

**11.07 Providing & Laying open GI pipe line 80 mm dia**

For open line work the galvanised iron pipes and fittings shall run on the surface of the walls or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern holder bat clamps, keeping the pipes about 1.5 cm clear of the walls ceiling. pipes may be fixed in the ducts or recesses etc. provided there is sufficient space to work on the pipes with the usual tools.

All pipes and fittings shall be fixed truly vertical and horizontal unless unavoidable the pipes shall be fixed to walls with standard pattern holders bat clamps made out of MS flat carrier fixed with bolts in the RCC or brick masonry and “C” clamp fixed to secure the pipe with GI bolts / screws / washers of required shape and size so as to fit tightly on the pipes when tightened with screwed bolts. The clams shall be painted with two coats of enamel paint over a coat of anti-corrosive primer. The clamps shall be fixed at short length and near the fittings as directed by the Engineer. The pipe line shall be tested as specified in item 11.01.

The rate shall include providing and laying the pipe line with all necessary specials in open, properly fixing it with clamps and testing the line all complete including necessary scaffolding.

**Mode of Measurement:** GI pipes with fittings completely fixed in position shall be measured and paid for the finished centre line lengths and the measurement shall be in Running Meter.

**11.08 Providing & Laying open GI pipe line 50mm dia**

The general specification is same as per Item spec. no. 11.07

**Mode of Measurement:** Same as per Item spec. no.11.07

**11.09 Providing & Laying open GI pipe line 40 mm dia**

The general specification is same as per Item spec. no. 11.07

**Mode of Measurement:** Same as per Item spec. no.11.07

**11.10 Providing & Laying open GI pipe line 25mm dia**

The general specification is same as per Item spec. no. 11.07

**Mode of Measurement:** Same as per Item spec. no.11.07

**11.11 Providing & Laying open GI pipe line 20mm dia**

The general specification is same as per Item spec. no. 11.07

**Mode of Measurement:** Same as per Item spec. no.11.07

**11.12 Providing & Laying open GI pipe line 15 mm dia**

The general specification is same as per Item spec. no. 11.07

**Mode of Measurement:** Same as per Item spec. no.11.07

**11.13 Providing & Laying concealed in structure GI pipe line 80 mm dia**

For internal work the pipes shall be concealed in the brick masonry / RCC. Chasses or zarries shall be cut in the walls and the pipes shall be laid. The pipes laid in the zarries ( recess /grooves ) shall be secured in position by approved arrangement like duly painted MS holding hook The pipes shall not ordinarily be buried in solid floors. Where unavoidable pipes may be buried for short distances provided adequate protection is given against damage, but the joints in pipes shall not be buried. Where directed by the Engineer MS sleeve of appropriate diameter GI pipe shall be fixed at a place where a pipe is passing through a wall or floor for inception of the pipe and to allow freedom for expansion movements and contraction and other. All the embedded pipe lines in walls or floors to be painted with anti-corrosive bituminastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe shall be laid in layer of sand filling done under concrete floors or as directed by the Engineer. **The floor and wall shall be finished same as the surrounding surface after the completion of the work.** The line shall be tested as specified in the item 11.01. The rate shall include making zarries in the wall, cutting floor, making holes, painting the pipe line with anticorrosive bituminastic paint all complete.

**Mode of Measurement:** GI pipes with fittings laid properly shall be measured along the centre line lengths and the measurement shall be in Running Meter.

**11.14 Providing & Laying concealed in structure GI pipe line 50mm dia**

The general specification is same as per Item spec. no. 11.13

**Mode of Measurement:** Same as per Item spec. no.11.13

**11.15 Providing & Laying concealed in structure GI pipe line 40 mm dia**

The general specification is same as per Item spec. no. 11.13

**Mode of Measurement:** Same as per Item spec. no.11.13

**11.16 Providing & Laying concealed in structure GI pipe line 25mm dia**

The general specification is same as per Item spec. no. 11.13

**Mode of Measurement:** Same as per Item spec. no.11.13

**11.17 Providing & Laying concealed in structure GI pipe line 20mm dia**

The general specification same as per Item spec. no. 11.13

**Mode of Measurement:** Same as per Item spec. no.11.13

**11.18 Providing & Laying concealed in structure GI pipe line 15 mm dia**

The general specification is same as per Item spec. no. 11.13

**Mode of Measurement:** Same as per Item spec. no.11.13

**11.19 Providing and fixing Sluice valve for 80 mm dia pipe line**

Providing and fixing 80 mm diameter Sluice valve of approved make confirming to relevant IS etc complete as directed by Engineer.

**Mode of Measurement:** This shall be measured in Number.

**11.20 Providing and fixing Sluice valve for 50mm dia pipe line**

The general specification is same as per Item spec. no. 11.19

**Mode of Measurement:** Same as per Item spec. no.11.19

**11.21 Providing and fixing Sluice valve for 40mm dia pipe line**

The general specification is same as per Item spec. no. 11.19

**Mode of Measurement:** Same as per Item spec. no.11.19

**11.22 Providing and fixing Sluice valve for 25mm dia pipe line**

The general specification is same as per Item spec. no. 11.19

**Mode of Measurement:** Same as per Item spec. no.11.19

**11.23 Providing and fixing Sluice valve for 20mm dia pipe line**

The general specification is same as per Item spec. no. 11.19

**Mode of Measurement:** Same as per Item spec. no.11.19



- 11.24 Providing and fixing Sluice valve for 15 mm dia pipe line**  
The general specification is same as per Item spec. no. 11.19  
**Mode of Measurement:** Same as per Item spec. no.11.19
- 11.25 Providing and fixing of Gunmetal Wheel valve of approved quality for 80 mm dia pipe line**  
Providing and fixing 80 mm diameter Wheel valve of approved make confirming to relevant IS etc complete as directed by Engineer.  
**Mode of Measurement:** This shall be measured in Number.
- 11.26 Providing and fixing of Wheel valve of approved quality for 50mm dia pipe line**  
The general specification is same as per Item spec. no. 11.25  
**Mode of Measurement:** Same as per Item spec. no.11.25
- 11.27 Providing and fixing of Wheel valve of approved quality for 40mm dia pipe line**  
The general specification is same as per Item spec. no. 11.25  
**Mode of Measurement:** Same as per Item spec. no.11.25
- 11.28 Providing and fixing of Wheel valve of approved quality for 25mm dia pipe line**  
The general specification is same as per Item spec. no. 11.25  
**Mode of Measurement:** Same as per Item spec. no.11.25
- 11.29 Providing and fixing of Wheel valve of approved quality for 20mm dia pipe line**  
The general specification is same as per Item spec. no. 11.25  
**Mode of Measurement:** Same as per Item spec. no.11.25
- 11.30 Providing and fixing of Wheel valve of approved quality for 15mm dia pipe line**  
The general specification is same as per Item spec. no. 11.25  
**Mode of Measurement:** Same as per Item spec. no.11.25
- 11.31 Providing & Fixing Bib cock for 15mm dia pipeline**  
A bibcock ( foam flow) is a draw off tap with horizontal inlet and free outlet .It shall of brass chromium plated (CP) the finish obtained

electrolytically by applying layer of chromium so as to improve the appearance, enhance surface hardness, heavy duty of specified size and approved make & type and shall be of the screw down type. The closing device should work by means of a disc carrying a renewable non-metallic washer, which shuts against water pressure on a seating at right angles to the axis of the threaded spindle, which operates it. The handle shall be catch type securely fixed to the spindle. The cocks shall open in anti-clockwise direction. The bib cocks shall be chromium plated, the chromium plating shall be of grade B type conforming to IS: 1068 in finish and appearance, the plated articles shall be free from plating defects such as blister, pits, and roughness and shall not be stained or discoloured. A suitable matching CP brass flange is included in this item. A sample of each kind of fittings shall be got approved from the Engineer and all supplies made according to the approved sample.

**Mode of Measurement:** This shall be measured in Number.

**11.32 Providing & fixing long body bib cock**

The general specification is same as per Item spec. no. 11.31. but for providing and fixing the bib cock with long body which is generally provided for the kitchen sink or similar utilities.

**Mode of Measurement:** This shall be measured in Number.

**11.33 Providing & Fixing stop cock for 15mm dia. pipeline**

A stopcock (stop tap) is a valve with a suitable means of connections for insertion in a pipe line for controlling or stopping the flow. It shall be heavy duty made of Brass chromium plated of an approved make, specified size and shall be of the screw down type. The closing device should work by means of a disc carrying a renewable non-metallic washer, which shuts against water pressure on a seating at right angles to the axis of the threaded spindle which operates it. The handle shall be catch type securely fixed to the spindle. Valve shall be of the loose letter seated pattern. The cocks shall open in anti-clockwise direction. The chromium plating shall be of grade B type conforming to IS: 1068, in finish and appearance, the plated articles shall be free from plating defects such as blister, pits, roughness and shall not be stained or discoloured. A sample of each kind of fittings shall be got approved from the Engineer and all supplies made according to the approved sample.

**Mode of Measurement:** This shall be measured in Number.

**11.34 Providing & Fixing stop cock for 20mm dia pipe line**

The general specification is same as per Item spec. no. 11.33.

**Mode of Measurement:** This shall be measured in Number.

**11.35 Providing & Fixing Angle valve**

The brass fittings shall be of heavy quality, CP. and approved manufacture and pattern with screwed or flanged ends as specified. The fittings shall in all respects comply with the requirements of IS: 781. The standard size of brass fittings shall be designated by the normal bore of the pipe to which the fittings are attached. A sample of each kind of fittings shall be got approved from the Engineer and all supplies made according to the approved samples. All cast fitting shall be sound and free from lumps pot holes and pittings, both internal and external surfaces shall be clean, smooth and free from sand etc. burring, plugging stopping or patching of the casting shall not be permitted. The bodies, spindles and other parts shall be truly machined or that when assembled the points shall be axial, parallel and cylindrical with surfaces smoothly finished. The area of the water way of the fittings shall not be less than the areas of the nominal bore. The fittings shall be fully examined and cleared of all foreign matter before being fixed. The fittings shall be fitted in the pipe line in a workman like manner. The joints between fittings and pipes shall be made leak proof. The joints and fittings shall be leak proof when tested to a pressure of 6 kg/sq.cm and the defective fittings and joints shall be replaced or redone. The rates shall include providing and fixing of angle valve with the flange (disc) all complete.

**Mode of Measurement**

This shall be measured in Number.

**11.36 Providing & Fixing shower rose**

CP Brass heavy duty overhead shower of approved make and model confirming to approved sample with CP brass 190 mm matching arm with wall flange . The Shower shall be pressure adjusted shower with revolving joint or single flow shower as specified in the item specification etc complete as directed by the Engineer

**Mode of Measurement:** This shall be measured in Number.

**11.37 Providing & fixing 25mm dia GI hydrant for gardening**

The work shall be carried out as per the drawing and as directed. It shall be provided with a wheel valve and a vertical piece of GI pipe to keep the hydrant above dressed ground level or at a height as directed by the Engineer. The scope of work includes excavation, making connection with main GI pipeline, GI specials as required, connecting pipe, spout of appropriate GI pipe etc complete as directed by the Engineer.

In case a brick chamber is necessary same shall be of size 450x450 mm and depth 230 to 500 mm to suit the site conditions. The bottom of the chamber shall be finished with PCC 1:4:8 100 mm thick and the walls shall be finished with 12 mm thick plaster in CM 1:4. with a MS cover for the chamber however the chamber shall be measured under relevant tender items and shall be paid for. Nothing extra shall be paid over and above item rates for the construction of chamber if required to be provided. The rates shall be for providing the hydrant

and connecting it to the main line with required specials, providing and fixing wheel valve and GI pipe piece, as specified above.

**Mode of Measurement:** This shall be measured in Number.

**11.38 Providing & fixing 6mm thick asbestos or other equivalent non asbestos string for 25mm dialine**

This shall be wound closely and uniformly wound over the GI pipe line to open/ concealed in structure. Sample of asbestos string shall be got approved from the Engineer before use.

**Mode of Measurement:** This shall be measured in Running Meter of the pipe treated as above.

**11.39 Providing & fixing 6mm thick asbestos or other equivalent non asbestos string for 15mm dia line**

The general specification is same per as Item spec. no.11.38

**Mode of Measurement:** Same as per Item spec. no. 11.38

**11.40 Providing & Fixing Towel rail**

This shall be heavy duty brass chromium plated or as specified, of approved make. The length shall be 610 mm and the rod shall be of 20mm dia cover cup / disc. It shall be fixed with brass screws on each end, firmly securing the towel rail firmly, as directed by the Engineer. Sample of the towel rail needs to be got approved by the Engineer.

**Mode of Measurement:** This shall be measured in Number.

**11.41 Providing & Fixing CI manhole cover of 40 kg**

This shall be of approved make and conforming to relevant IS specification. The cover shall be provided over CI frame. The frame shall be properly grouted in the brickwork / RCC cover slab of the chambers.

**Mode of Measurement:** Manhole cover with frame (as one unit) shall be measured in Number.

**11.42 Providing & Fixing Ball cock for 40mm dia pipe**

This shall be of approved class and make. This may be of brass or PVC as specified in the item with arm and the ball to be fixed in the incoming water supply line. The cock shall withstand the pressure and shall be fixed directly on the water line as directed by the Engineer.

**Mode of Measurement:** This shall be measured in Number.

**11.43 Providing & fixing ball cock for 25mm dia pipe**

The general specification is same as per Item spec. no.11.42

**Mode of Measurement:** Same as per Item spec. no. 11.42

**11.44 Providing & Fixing Ball cock for 15mm dia pipe**

The general specification is same as per Item spec. no.11.42

**Mode of Measurement:** Same as per Item spec. no. 11.42

**11.45 Providing & Fixing CP brass water spout 15mm dia**

This shall be provided and fixed at places as directed by the Engineer. The part of brickwork around the spout shall be finished to match the external finish. No patch shall be seen. The spout shall be of approved quality and make.

**Mode of Measurement:** This shall be measured in Number.

**11.46 Providing & Fixing GI 'B' class water spouts of 80mm dia**

The spout shall be 200 to 450 mm in length as directed by the Engineer. One end of the pipe shall be cut diagonally and tack welded at the bottom to facilitate the flow of water. It shall be fixed at places as directed by the Engineer. The brickwork after the placement of the spout shall be finished properly to match the external finish. The spout shall be painted with paint of approved shade and make. The rate shall be quoted for providing and fixing water spout in RCC or brick work as specified above.

**Mode of Measurement:** This shall be measured in Number.

**11.47 P&F GI water spout of 50mm dia**

The general specification is same as per Item spec. no.11.46

**Mode of Measurement:** Same as per Item spec. no. 11.46

**11.48 P&F GI water spout of 40mm dia**

The general specification is same as per Item spec. no.11.46

**Mode of Measurement:** Same as per Item spec. no. 11.46

**11.49 P&F GI water spout of 25mm dia**

The general specification is same as per Item spec. no.11.46

**Mode of Measurement:** Same as per Item spec. no. 11.46

**11.50 Fixing of Geyser**

The Geyser shall be shifted from the Site stores to the required place. Supply and fixing the geyser with necessary anchor bolts with nuts,

washer, CP brass angle valves, CP brass copper pipes and installation of the standard accessories supplied by the geyser supplier etc complete as directed by the Engineer. The rate shall be quoted for fixing Geyser including angle valve and chromium plated copper pipe as specified above

**Mode of Measurement:** This shall be measured in Number

**11.51 Fixing of Water coolers**

The Water cooler shall be shifted from the Site stores to the required place. Then necessary coach/anchor bolts with nuts, CP brass pipes and CP brass angle valves for inlet and GI outlet pipe of 25mm dia up to drain point shall be provided and fixed. The rate shall be quoted for fixing of Water cooler and other accessories supplied by the manufacturer as specified above.

**Mode of Measurement:** This shall be measured in Number

**11.52 Fixing HDPE/ PVC water tank- 2000 Ltr. capacity**

To take delivery of the tank / shifting from the site stores to the place of installation as directed by the Engineer. All accessories supplied by shall be fitted to the tank and the tank shall be properly installed over the Pedestals / base constructed for installation as directed by the Engineer. (Construction of the pedestals / base shall be carried out and same shall be measured and paid under relevant tender item. Nothing extra shall be paid for the construction of pedestals / base. The rate shall be quoted for fixing water tank as specified above.

**Mode of Measurement:** This shall be measured in Number.

**11.53 Fixing HDPE/PVC Water Tank- 1000 Ltr. capacity**

The general specification is same as per Item spec. no. 11.52.

**Mode of Measurement:** This shall be measured in Number.

## LIST OF SUGGESTED MAKES

The following is the suggested list of products and name of the manufacturer against each product for civil and electrical works. The contractor shall quote rates for the various items of works such that their rates should be valid for all makes suggested hereunder and or equivalent. It will be prerogative of Sabarmati Ashram Gaushala to approve any make out of this list or any other equivalent make. Wherever make is not suggested, the material should be as per relevant BIS specification.

### CIVIL WORKS:

S. N.	ITEM DESCRIPTION	Suggested Makes/Manufactures
➤	Cement Grey- OPC IS8112-43 grade/IS-12269-53 grade	Ultratech/ACC/JK/BINANI /BIRLA/GUJARAT AMBUJA
➤	Sand	Sieved - River sand(fine sand will not be accepted)
➤	Bricks	As per approved sample
➤	White Cement, Putty, Primer to be applied with putty	Birla White/ JK White / Birla putty & Primer / JK Putty & Primer
➤	Water Proofing Compound, Other all Construction Chemicals, Concrete admixtures of all types, Epoxy and Resin materials etc. Acid and Alkali resistant primers/powder	FOSROCK/SIKA/CICO/PIDILITE /MYK SCHAUMBURG/CIBA / BASF/CHOKSEY CHEMICLS PVT.LTD.
➤	Reinforcement Steel-IS1786-Fe415,Fe500 (minimum) - all diameters.	SAIL / TATA TISCON /VIZAG / RINL/ JSPL (Jindal Steel & Power Ltd), <ul style="list-style-type: none"> <li>• For balance minimum quantity ELECTROTHERM(ET TMT) or any equivalent approved make</li> </ul>
➤	Structural Steel and all Mild Steel elements and plates.	SAIL / TISCO /ESSAR / VIZAG /JINDAL/ARCELOR MITTAL /APOLLO / JSPL/Asian
➤	Laminates, all Ply materials, Flush Shutters	Century/Greenlam/KITPLY / AICA / (Formerly known as Sunmica)/Merino/Formica
➤	Glazing	Modi Float/Asahi Float/Saint Gobain/TATA/Triveni
➤	SS Fittings	Kich/Golden / ENOX / Garg / Palladium / DORMA / GODREJ / OZONE / FLORA (Acme Industries) / EPPW (Electro Plating and Polishing)

		Works, Gujarat)
➤	Aluminium Sections	Hindalco/Jindal
➤	Friction Stay	Hettich/Hafele/EBCO
➤	Hydraulic Door Closure- IS-3564-1986	Golden/Godrej/Hardwyn/EVERI TE/HYPER
➤	Aluminium Composite Panel	Alucobond/Reynobond/Alpolic
➤	Anti-termite treatment	Pest Control (India) Limited
➤	All types of Paints and Primers/red-oxide	Asian/Nerolac/Berger/ICI/Snow cem India Ltd.
➤	Ceramic / Glazed Tile/Vitrified tiles	KAJARIA/H&R JHONSON/NITCO/ RESTILE / BELL/ SPARTEK / ASIAN /ORIENT/RAK
➤	Vitrified Tile	Restile/Bell/Granito/H&R Johnson/Nitco/Asian/SPARTEK/ RAK/KAJARIA
➤	Looking Mirror	MODI / LION/ CERA / Golden Fish
➤	Floor Hardener	FOSROCK/SIKA/CICO/ CHOKSEYCHEMICALS PVT.LTD.
➤	Green Kota	As per Sample Approval
➤	MS Tube/Pipe (RHS, SHS)	Jindal/TATAstructural/SAIL / DECCAN/APOLLO/Asian
➤	Stainless Steel	Salem/Jindal
➤	uPVC Pipe, specials and fittings/all PVC materials	Finolex/Supreme/Astral/Prince/ Dutron
➤	PVC Vinyl Flooring	BHOR / ARMSTRONG
➤	PVC water stop	Maruti / EQUIVALENT
➤	PVC Water Tank	SINTEX
➤	Door Closer	Enox/Godrej/Hardwyn/Ozon
➤	Floor Spring	Enox/Doorma/Ozon
➤	CI Rungs	Neco or equivalent approved
➤	Polysulphide Silicon Sealant	FOSROCK/SIKA/CICO/PIDILITE CHOKSEY CHEMICALS PVT.LTD.
➤	Bitumen, Sealing Compound, Bitumen Board	Shalitex, IOC or equivalent approved
➤	All Sanitary wares and Plumbing Fixtures, fittings, accessories, pipes etc all	Jaquar/Parryware/Hindustan/ Cera/EssEss
➤	CP Fittings	Jaquar or equivalent approved
➤	CI Soil, Waste & Fittings (IS:3989)	NECO or equivalent approved



➤	GI Pipes-medium class (IS:1239)	TATA / Jindal /Asian
➤	GI Fittings	“R” / “KS” / UNIK brand or equivalent approved
➤	SS Sink	Nirali or equivalent approved
➤	CI S & S Class LA pipe	IISCO/Kesoram/Electrosteel
➤	CI Butterfly Valve (IS13095)	ZOLOTO/LEADER/KARTAR
➤	CI Manhole Cover	NECO / SRIF / RIF
➤	CI Valves	ZOLOTO /LEADER
➤	SW pipe	As per approval
➤	Door locks and hardware fittings	GODREJ / WELMADE / GOLDEN or Equivalent approved
➤	Gun Metal wheel valve	ZOLOTO / LEADER
➤	Anti cockroaches Stainless Steel Perforated trap	Chilly make or equivalent approved
➤	Stainless Steel Perforated trap cover	Chilly make or equivalent approved
➤	Galvalume Sheets	TATA BLUE SCOPE / INTERARCH / POLYSTEEL (DENDRO) / UNIMETAL / METACOLOUR / ISPAT/JINDAL
➤	Fibre Glass Wool Insulation Sheets	TWIGA/Lloyd/MINWOOL/ROCK WOOL
➤	TURBO VENTILATOR/ROOF EXTRACTOR/ECO VENTILATOR	DEVASHISH TURBO / SYGURU VADODARA or approved equivalent.
➤	HUME PIPE	Indian Hume Pipe Co. /equivalent approved.

## NOTE :

- 1 ALL SAMPLES OF FIXTURES/FITTINGS SHALL BE GOT APPROVED FROM CONSULTANT/ENGINEER PRIOR TO BULK ORDERING.
- 2 THE EQUIVALENT BRAND SHALL BE GOT APPROVED FROM CONSULTANT/ENGINEER IN WRITING PRIOR TO BULK ORDERING.
- 3 ANY MAKE OR BRAND OF THE MATERIAL SPECIFIED IN THE SOQ/BOQ OR ABOVE FOR ALL THE ITEM WOULD ALSO ALLOW FOR OR EQUIVALENT MAKES AND BRAND ONLY IF ALL SPECIFICATIONS AND DURABILITY OF THE SAID MATERIAL IS PROVED BY THE BIDDER SUPPORTED WITH ALL TESTS, CERTIFICATES, GUARANTEES, PERFORMANCE OF THE WORK

ALREADY DONE AT OTHER PLACES, SAMPLES AND OTHER INSPECTIONS BY PROJECT MANAGER. CONTRACTOR SHALL BEAR ALL THE COST FOR PROVING THE EQUALITY.

- 4 FOR THE ITEMS NOT INDICATED ABOVE BUT TO BE USED IN CONSTRUCTION, SPECIFIC APPROVAL TO BE TAKEN BEFORE PROCUREMENT AND USE AFTER SUBMITTING SAMPLE, DETAIL OF MANUFACTURER, SOURCE OF SUPPLY ETC.
- 5 IF BIDDER IS UNABLE TO PROVIDE ANY MATERIAL REQUIRED FOR CONSTRUCTION AS PER SAMPLE APPROVED BY PROJECT MANAGER /PROJECT AUTHORITY, SHALL BE FREE WITHOUT ANY PREJUDICE TO PROCURE THE MATERIAL AND GET THE WORK EXECUTED AT RISK COST AND RESPONSIBILITY OF THE BIDDER.

WE HAVE NOTED THE ABOVE AND CONFIRM THAT OUR TENDER IS BASED ON ABOVE SUGGESTED MAKES.

**Date:** \_\_\_\_\_

**Signature and Seal of Bidder**

## **Drawings**

Layout drawings of the structures to be erected is given on Page – 173 – 175.

The detailed drawings are available at Sabarmati Ashram Gaushala, Bidaj Farm, PO Lali, Dist. Kheda – 387120. Interested bidder may view the same on any working day between 9.00 AM to 3.00 PM.

# Bill of Quantities

Objectives:

The objectives of the Bill of Quantities are:

- (a) to provide sufficient information on the quantities of Works to be performed to enable bids to be prepared efficiently and accurately; and
- (b) when a Contract has been entered into, to provide a priced Bill of Quantities for use in the periodic valuation of Works executed.

In order to attain these objectives, Works should be itemized in the Bill of Quantities in sufficient detail to distinguish between the different classes of Works, or between Works of the same nature carried out in different locations or in other circumstances which may give rise to different considerations of cost. Consistent with these requirements, the layout and contents of the Bill of Quantities should be as simple and brief as possible.

The estimated cost of specialized work to be carried out, or of special goods to be supplied, by other contractors should be indicated in the relevant part of the Bill of Quantities as a particular provisional sum with an appropriate brief description. A separate procurement procedure is normally carried out by the Employer to select such specialized contractors. To provide an element of competition among the bidders in respect of any facilities, amenities, attendance, etc., to be provided by the successful Bidder as prime Contractor for the use and convenience of the specialist contractors, each related provisional sum should be followed by an item in the Bill of Quantities inviting the Bidder to quote a sum for such amenities, facilities, attendance, etc.

These Notes for Preparing a Bill of Quantities are intended only as information for the Employer or the person drafting the Bidding Documents. They should not be included in the final documents.

**Bill of Quantities  
OR  
Schedule of Quantity**

Civil, structural, Water Supply and Ancillary works for Over Head Water Tank and Miscellaneous civil work at Bull Production unit, SAG, Bidaj Farm, PO. Lali, Ta & Dist. Kheda-387120. Gujarat, INDIA.

<b>Trade</b>	<b>DESCRIPTION</b>
01	Earth Work
02	Concrete Work
03	Masonry Work
05	Finishing Work
06	Flooring Work
07	Steel Work
09	Miscellaneous Works
11	Water Supply
12	Sanitary Work
	Trade wise Summary Sheet

**SCHEDULE OF QUANTITIES (SOQ) / BILL OF QUANTITIES (BOQ)**

<b>Item no.</b>	<b>Description</b>	<b>Qty</b>	<b>Unit</b>	<b>Rate (Rs)</b>	<b>Amount ( Rs. )</b>
<b>1.00</b>	<b>EARTH WORK</b>				
1.01	Excavation in all types of soil, including murrum, for foundations of wall, columns, plinth beams, basement, raft, ducts, trenches, underground sumps, septic tanks, soak well, manhole chambers, gully chambers, including shoring, strutting, bailing out water/pumping off water if required, re-filling the trenches, foundation pits, ramming, watering consolidating in 15 cms to 20 cms layers, removing and stacking simultaneously the excavated stuff any where within the site area and/or spreading soils in layers for site development filling in plinth in the same building and consolidating etc. complete as directed. Rate included with removal of existing masonry foundation, pcc, cc during excavation. <b>From existing ground level to - up to 1.5 m depth</b>	81	CuM		
1.02	Earthwork in excavation in all types of soil including as per item no.1.01 but for depth <b>exceeding 1.5 m, but up to 3.0 m</b>	23	CuM		
1.07	<b>Filling excavated earth</b> in ground other than plinth, for <b>land development</b> etc. with in the site, to required level, spreading in layers of 30 cms. to 60 cms., watering, ramming, consolidating etc., including cost of transportation anywhere within site complete as directed.	31	CuM		
1.10	Providing and laying in a compact manner <b>150 to 300 mm thick Metal/Rubble soling</b> in plinth/in foundation in two layers using average 60 to 80 mm size stones, including filling in the voids with largest possible stones, covering and levelling the surface with sand/	15	CuM		

Item no.	Description	Qty	Unit	Rate (Rs)	Amount ( Rs. )
	layer of murum, dry compaction followed by watering topping up with sand / murrum and consolidation with mechanical plate compactor etc. all complete as directed.				
1.16	Carting away the surplus earth and/or debris outside of site, including loading at site, transportation, unloading, spreading etc. complete as directed [ 80% of fill measurement of earth/debris in truck shall be paid for].	10	CuM		
1.19	Labour charges for site cleaning of plot.incl. shrubs, roots, debries loading, unloading & carting away debries out side of site primissis as directed by site -Incharge.	80	SqM		
	<b>Total of Item No: 1</b>				

**CONCRETE WORK:**

<b>Item no.</b>	<b>Description</b>	<b>Qty.</b>	<b>Unit</b>	<b>Rate ( Rs.)</b>	<b>Amount (Rs.)</b>
<b>2.0</b> 2.01	<b>CONCRETE</b> Providing and laying machine mixed brickbat cement concrete <b>(BBCC)</b> in volumetric proportion <b>1:4:8</b> (1 part of cement:4 part coarse sand:8 part brickbats aggregates of size 37 mm and down) for specified thickness, for foundations below walls, column footings, sunk floor terraces at any height above plinth level raft at any depth below floors, pavements roads, plinth protection, etc. including centring and shuttering if required, laying spreading, ramming, consolidating as per requirement and curing etc. complete as directed.	-----	CuM	Rate not to be quoted	
2.03	-Do- as per item No.2.01 but for providing and laying plain cement concrete <b>(PCC) 1:4:8</b> with 1 part of cement: 4 parts of coarse sand: 8 parts of stone aggregate of size 37 mm and downgraded complete as directed.	10	CuM		
2.05	Providing & laying in position machine mixed and machine vibrated cement <b>concrete of controlled grades</b> for reinforced cement concrete structural elements in any shape, size, thickness or depth and design viz. foundations, columns, beams, slabs, raft, floor plinth beams, plinth beam ledges, window sills, copings, thin band beams, walls parapets boxes, folded plates, chajjas, mullions, retaining walls, fins, staircases, overhead and underground water and other fluid tanks, statically loaded foundation rafts/floor, water troughs, manhole slab, septic tank slab, soak well slab etc. its concrete elements in any shape, size, thickness/depth and design as per structural design	-----	CuM	Rate not to be quoted	



Item no.	Description	Qty.	Unit	Rate ( Rs.)	Amount (Rs.)
	<p>and as directed in specified compressive strength compressed in N/mm<sup>2</sup> at 28 days as per IS 456-2000 using 20 mm or as specified size of crushed stone aggregates including design of concrete mixes, auto weigh batched proportioning, cost of admixtures, necessary lift and lead as specified, finishing concrete surfaces, curing etc. complete but excluding centring/shuttering and reinforcement. The conversion of weigh batching to equivalent volumetric one, if permitted, should be got approved from Engineer before execution.</p> <p>For <b>concrete grade M- 20</b> at all levels <b>below andup to highest plinth level.</b></p>				
2.06	-Do- as per item No.2.05 but for providing and laying cement concrete of grade <b>M- 25 for RCC structures below andup to highest plinth level.</b>	36	CuM		
2.09	-Do- as per item 2.05 but for providing and laying cement concrete of grade <b>M-25 for RCC structures up to all height from highest plinth level.</b>	41	CuM		
2.15	<p>Providing and fixing <b>Precast concrete slab</b> perforated type for shelves, ledges, trench / pit / chamber covers/gutter covers ( <b>50 to 150 mm thick</b> )etc. as per drawing in controlled concrete of grade M-20 , to cast, cure, hoisting, fixing in position including necessary form work ( providing exposed concrete finish for visible faces ), grouting holes / grooves, inserts, projections, providing and fixing lifting hooks using MS rounds etc. grouting and pointing of joints finishing neat etc. complete but excluding reinforcement steel etc complete as per the drawing and as directed.</p>	----			

Item no.	Description	Qty.	Unit	Rate (Rs.)	Amount (Rs.)
	(a) 1500 x 300mm wide	7	SqM		
	(b) 1050 x300 wide	4	SqM		
2.16	<p>Providing and erecting in position <b>form work shuttering</b>&amp; boxing using <b>new steel/plywood</b> shuttering materials of approved quality for concrete elements vertical, horizontal, inclined, circular, curved etc. in all sizes, shapes and designs as per drawing including necessary staging at all intermediate levels, scaffolding, bolts/nuts, fastener nails, wires for keeping in position till concrete is laid and members have acquired required strength, removal thereafter, applying shuttering oil etc. complete as directed.</p> <p>At all levels <b>below ground level and up to highest plinth level</b> for all concrete elements of any shape, size &amp; direction etc complete as directed.</p>	74	SqM		
2.17 a	- Do – as per item no. 2.16 but for providing and erecting in position <b>Form Work in superstructure up to 7.50 Mtr. height above highest plinth level</b> for concrete elements of any shape, size and direction etc. complete as directed.	95	SqM		
2.17 b	- Do – as per item no. 2.16 but for providing and erecting in position <b>Form Work in superstructure up to 7.50 Mtr.to 10.50 Mtr. height above highest plinth level</b> for concrete elements of any shape, size and direction etc. complete as directed.	214	SqM		
2.24	Supplying and mixing with cement for cement concrete/cement mortar, <b>water proofing compound</b> approved make & quality as per the requirements and manufacturer's specifications etc. complete as directed.	10	Ltr		
2.25	Providing, fabricating and fixing in	----	Kg.	Rate not	

Item no.	Description	Qty.	Unit	Rate (Rs.)	Amount (Rs.)
	position <b>reinforcement steel</b> confirming to IS 432 (part I & II) for RCC structures as per design including transporting, unloading and incidental charges for handling cutting, bending, and binding with two strands of annealed steel wire of 18-gauge, welding, if necessary, etc. complete as directed.  With <b>mild steel bars</b> for all heights below and above plinth level, etc complete as directed.			to be quoted	
2.26	-Do- as per item No. 2.25 but providing, fabricating and fixing in position <b>TMT reinforcement steel bars</b> of minimum grade <b>Fe 500 confirming to IS 1786 - 1985</b> of approved make etc. complete as directed.	8783	Kg		
2.30a	Providing and applying concrete bonding compound of approved or equivalent make to old / new concrete surfaces at all levels, in vertical and horizontal planes as directed by engineer after necessary chipping & cleaning surface dust free.	5	Lit.		
2.31	Providing and Fixing of reinforcement steel dowel bar in the existing RCC elements by re-bar method including machine drilling (minimum drilling hole dia. shall be 1.5 times of the dia. of dowel bar to be inserted and up to suitable inset depth as directed), supply of necessary anchoring chemicals such as epoxy based resin and hardener of approved make like HILTI India or equivalent approved and work to be carried through the competent agency including all materials, labours, tools, etc complete as directed for 10 mm dia bars. (Reinforcement shall be paid under relevant item of this tender), complete as directed.	10	No.		
2.32	-- Do -- as per item no. 2.31 but for 12 mm dia bar.	10	No.		

<b>Item no.</b>	<b>Description</b>	<b>Qty.</b>	<b>Unit</b>	<b>Rate (Rs.)</b>	<b>Amount (Rs.)</b>
2.33	-- Do – as per item no. 2.31 but for 16 mm dia bar.	10	No.		
2.34	P & F Rebar of 20 mm dia reinforcement	10	No.		
<b>Total of Item No: 2</b>					

**Note: - Items having no. from 2.31 to 2.34 are self-descriptive and have no detailed technical specifications in this bidding document.**

**Note:**

**[1] Bidder is allowed to use only new/fresh shuttering/formwork material for this work.**

**[2] M.S. props/Cup lock system is preferred for vertical support & scaffolding.**

**[3] Wooden vertical support is not allowed.**

**MASONRY WORK**

<b>Item no.</b>	<b>Description</b>	<b>Qty.</b>	<b>Unit</b>	<b>Rate (Rs.)</b>	<b>Amount (Rs.)</b>
<b>3.00</b> 3.01	<b>MASONRY WORK</b> Providing and constructing <b>brick masonry</b> in any shape in Cement Mortar (CM) 1:6 (1 part cement and 6-part coarse sand) in all works with approved quality bricks having minimum crushing strength 50 Kg./Sq.cm including all necessary scaffolding, racking out the joints, curing etc. complete as directed. <b>In foundation</b> at all levels below and up to highest plinth level.	9	CuM		
3.02	-Do- as per item No.3.01 but for providing and constructing <b>Brick masonry in superstructure</b> at all heights above highest plinth level.	2	CuM		
3.03	Providing and constructing 115 mm thick brick <b>masonry in partition</b> with approved quality bricks having minimum crushing strength 50 Kg./Sq.cm, at all levels in CM 1:4 (1 part cement and 4-part coarse sand) including scaffolding, racking out joints, reinforcement of 2 Nos. 6 mm dia bars at every fourth course or 25 mm x 1.2 mm iron hoop in every 3rd course, curing, etc. complete as directed. (Rate includes the cost of MS bars or iron hoop).	-----	SqM		
<b>Total of Item No: 3</b>					

**FINISHING WORK**

<b>Item no.</b>	<b>Description</b>	<b>Qty.</b>	<b>Unit</b>	<b>Rate (Rs.)</b>	<b>Amount (Rs.)</b>
<b>5.00</b>	<b>FINISHING WORK</b>				
5.01	Providing and applying <b>12 mm thick plain cement plaster</b> finish at all heights and below highest plinth level in Cement Mortar (CM) 1:4 (1 part cement: 4 parts sand- 50% coarse and 50% fine) in line, level and plumb to the walls, concrete elements, beams, ceiling, stair, columns, pardis, including making plaster bands, stripes, moulds, pattas, grooves etc, over any brick or concrete surface as specified including scaffolding, curing and finishing smooth, complete as directed.	155	SqM		
5.02	-Do- as per Item No.5.01 but for <b>19 mm thick plain cement plaster</b> finish in two layers with first coat of 12 mm thick with C:M (1:4)(1 part cement: 4 part sand 50% coarse and 50% fine) in line, level and plumb and second coat of 7 mm thick with C:M (1:2) (1 part cement:2 part fine sand) in line, level, plumb. The plaster surface shall be rubbed with iron plate till the surface shows cement paste, etc. Complete as directed.	42	SqM		
5.04	Providing and applying <b>19 mm thick sand faced cement plaster</b> in two coats at all heights below and above highest plinth level with first coat of 12 mm thickness with cement mortar 1:4 (1part cement: 4 part of coarse sand) and top coat of 7 mm thickness with cement mortar 1:3 (1part cement: 3 parts of coarse sand) finishing using sponge to give uniform finish, on all types of concrete/brick surfaces including making plaster bands, stripes, pattas, grooves, drip moulds as per drawing/details,	153	SqM		

Item no.	Description	Qty.	Unit	Rate (Rs.)	Amount (Rs.)
	including scaffolding, curing etc., complete as directed.				
5.06	<p>Providing and applying <b>25 mm thick water proof cement plaster</b> in two layers of 15 mm under layer and 10 mm thick top layer both in C M 1: 3 (1 part cement: 3-part sand -50% coarse and 50% fine) in line, level and plumb at all heights below and above highest plinth level, including adding water proofing compound of approved quality and make as per manufacturer's specifications necessary scaffolding curing etc complete as directed.</p> <p>Quantity of waterproofing admixture shall be added as per the manufacturer's specification.</p>	42	SqM		
5.24	<p>Providing and applying Apex weather proof exterior acrylic emulsion paint of M/s Asian Paint Limited or equivalent of desired shade on new/old, plain plaster and or sand faced plaster work at all heights, below and above highest plinth level, two coats to give an even shade followed by one coat of primer of M/s Asian Paint as recommended by them including all scaffolding etc complete as per manufacturers specifications and as directed.</p> <p>Note: The measurement shall be paid as per sand face plaster work and no extra measurements/ claims shall be paid for rough surfaces.</p>	299	SqM		
	<b>Total of Item No: 5</b>				

**Note: - Item no. 5.24, is self-descriptive and have no detailed technical specifications in this bidding document.**

**FLOORING WORK**

<b>Item no.</b>	<b>Description</b>	<b>Qty</b>	<b>Unit</b>	<b>Rate (Rs.)</b>	<b>Amount (Rs.)</b>
<b>6.00</b>	<b>FLOORING WORK</b>				
6.11	Providing and laying <b>40 mm thick IPS flooring</b> with under layer of 28 mm thick Cement concrete 1:2:4 (1 part cement, 2 part coarse sand and 4 part stone aggregate 12.5 mm and downgraded) finished smooth with top layer of 12 mm thick mortar in CM 1:2 (1 part cement : 2 part coarse sand )and cement slurry @ 2.2 Kg / Sq.M including rubbing/ grinding the top surface to match, including rounding off the junction and corners with floors and walls, necessary construction joints, finishing the top surface smooth / chequered or broom, curing etc. complete as directed.	10	SqM		
6.12	- Do- as per item no. 6.11 but for providing and laying <b>50 mm thick IPS flooring</b> with under layer of 38 mm thickness and top layer of 12 mm thickness complete as directed.	51	SqM		
6.19	Providing and laying 1st quality minimum 10mm thick ceramic tiles of approved make, shade and size and thickness in flooring over average 20 mm thick cement mortar 1:4 ( 1 part cement : 4 part coarse sand) bed laid to requisite, line, level and slope, fixed with cement slurry of honey like consistency, cleaning the joints with coir brush , filling the them with white cement or white cement mixed with requisite matching colour pigment, curing, cleaning the area with water or water with mild acid etc complete as directed.	21	SqM		
6.20	Providing and laying 1st quality ceramic tiles minimum 7 mm thick of approved make, shade and size in skirting / dado set in cement slurry over bedding of 12 mm thick cement mortar 1 : 3 (1 part cement : 3 part coarse sand) laid to requisite	29	SqM		



Item no.	Description	Qty	Unit	Rate (Rs.)	Amount (Rs.)
	, line, level and plumb, either flush with the wall surface or uniformly projecting as per details / directed including cutting / making holes , raking cleaning the joints and filling with white / coloured cement, curing and cleaning with mild acid etc complete as directed.				
6.30	Providing and laying <b>cement water-proofing of average 115 mm</b> thick for balcony, terrace etc at all the levels, with layer of 20 mm thick cement mortar 1:3 ( 1 part cement : 3 part coarse sand )mixed with water proofing compound of approved make and as specified by the manufacturer, laying brick bats of required size impregnating in to the base mortar bed with gap of 12 mm all around according to slope, level and curing the same, the gaps around brick bats filled with cement mortar 1:3 (1 part cement : 3 part coarse sand) mixed with waterproofing compound as above , 15 to 20 mm layer above brick bats and finishing top with neat cement @ 2.75 Kg/Sq.M. making square 300 x 300 mm chequered finish marks with string , finishing around rain water outlets curing etc. complete including furnishing of guarantee for 10 years. The work should be carried out through an approved specialised agency like India Water Proofing Co. or equivalent.	27	SqM		
6.31	-Do- as per item no.6.30 but for providing and laying <b>75 mm thick waterproofing treatment</b> for balcony, sunk slabs, toilets, water tanks, slopping terraces, returns (watta) at all levels with brick / stone aggregates etc complete as directed.	4	SqM		
6.51	- Do- as per item no. 6.11 but for providing and laying <b>75 mm thick IPS flooring</b> with under layer of 63 mm thickness and top layer of 12 mm thickness complete as directed.	21	SqM		

<b>Item no.</b>	<b>Description</b>	<b>Qty</b>	<b>Unit</b>	<b>Rate (Rs.)</b>	<b>Amount (Rs.)</b>
6.52	Providing and laying China Mosaic flooring work over the Indian water proofing surfaces in slope using broken equal pieces of white glazed tiles not more than 25 to 37 mm wide and long and colored glazed tiles equal pieces for making pattas, vattas etc. as per details with necessary bedding in CM (1:4) laid in required slope, consolidating with wooden hammer, filling joints with Birla white cement, cleaning the surface and acid washing etc. complete as directed at any height.	32	SqM		
	<b>Total of Item No: 6</b>				

**Note:**

1. Note: The Work to be carried out at all the heights. The individual rates shall be inclusive of all lifts, lead and handling of materials, necessary scaffolding and staging.
2. Rates shall be inclusive of the slopes to be provided in all the above flooring items as directed and as per the drawings.
3. Note: - Items no. 6.51 to 6.52 are self-descriptive and have no detailed technical specifications in this bidding document.

**STEEL WORK**

<b>Item no.</b>	<b>Description</b>	<b>Qty.</b>	<b>Unit</b>	<b>Rate (Rs.)</b>	<b>Amount ( Rs. )</b>
<b>7.00</b>	<b>STEEL WORK</b>				
7.12	Providing, fabricating and fixing in position, <b>grill, railing, steel ladder, monkey ladder, Safety MS bars</b> to windows/ ventilator of MS rolled sections as per architect's details including cutting welding, grinding to smooth surface, fixing hold fast of MS sections embedded in concrete 1:2:4 (1 part cement, 2 part coarse sand, 4 part of stone aggregate 12 mm and down), anchor bolts including 2 or more coats of first quality synthetic enamel paint of approved make over a coat of primer upto any height above plinth etc. complete as directed.	335	Kg.		
7.13	Providing, fabricating and fixing in position <b>MS inserts</b> such as nosing, corner angles of columns, plates, flats, tee's, protection channels of reception dock, supports, brackets and monorails, hooks, frame around cut-out, MS pipe sleeves etc. as per drawings and specifications, in true line and level including embedding the same into the permanent works at the time of casting of RCC works or fixing with or without base plate fixed to RCC element with appropriate size expansion bolts as per design, with necessary welding, grinding and painting with two or more coat of approved first quality synthetic enamel paint over a coat of primer etc. complete as directed.	18	Kg.		

7.29	Providing, fabricating and fixing in position grill of MS hollow section as per the details given by the architect including cutting, welding, grinding to smooth surface, fixing hold fast embedded in concrete 1:2:4, anchor bolts, painting with two or more coats of first quality synthetic enamel paint of approved make and quality over a coat of red-oxide primer complete as directed.	50	Kg		
7.42	Providing and fixing Anchor Fastener approved make including drilling of hole in frame, concrete/ masonry etc. complete as per manufacturers specification & direction of Engineer In-charge for 16 mm Dia	10	No.		
7.43	Providing and fixing Anchor Fastener approved make including drilling of hole in frame, concrete/ masonry etc. complete as per manufacturers specification & direction of Engineer In-charge for 20 mm Dia	10	No.		
<b>Total of Item No: 7</b>					

**Note:**

**Items having no. from 7.42 and 7.43 are self descriptive and have no detailed technical specifications in this bidding document.**

**MISCELLANEOUS WORK**

<b>Item no.</b>	<b>Description</b>	<b>Qty.</b>	<b>Unit</b>	<b>Rate ( Rs.)</b>	<b>Amount ( Rs. )</b>
<b>9.00</b>	<b>MISCELLANEOUS WORK</b>				
9.07	<b>Dismantling stone/Brick masonry walls</b> or partition wall plastered or un plastered as per instructions including finishing the broken surface to match with the surroundings, removal and disposal of debris within site including cutting the reinforcement bars, if any etc. complete as directed.  (This shall be measured in CuM taking in to account of all plaster or finished surface before dismantling is commenced jointly)	13	CuM		
9.08	<b>Dismantling the RCC</b> beams, slabs, lintels, columns, pardi, walls, platform etc and all other RCC elements plastered or un plastered at all heights including converting them in to small lumps finishing the broken surface to match with the surroundings, removal and disposal of debris and muck at places within site and levelling the same properly, including cutting the reinforcement/ MS inserts stacking the same and handing over to stores / yard within site etc. complete as directed. (This shall be measured in CuM taking in to account of all plaster or finished surfaces before dismantling is commenced jointly)	2	CuM		
9.13	Providing and fixing in RCC side wall or bottom or cover slab of sump or water tank <b>100 mm diameter GI B class pipe insert</b> of up to 300 mm long with puddle flange and with outside flange / threaded (on one end) for connecting the pipeline for inlet, outlet, drain / overflow etc complete as directed.	1	No.		
9.14	Providing and fixing in RCC side wall or bottom or cover slab of sump or water tank <b>75 mm diameter GI B class pipe insert</b> of up to 300 mm long with puddle flange and with	1	No.		

Item no.	Description	Qty.	Unit	Rate ( Rs.)	Amount ( Rs. )
<b>9.00</b>	<b>MISCELLANEOUS WORK</b>				
	outside flange / threaded (on one end) for connecting the pipeline for inlet, outlet, drain / overflow etc complete as directed.				
9.15	Providing and fixing in RCC side wall or bottom or cover slab of sump or water tank <b>50 mm diameter GI B class pipe insert</b> of up to 300 mm long with puddle flange and with outside flange / threaded (on one end) for connecting the pipeline for inlet, outlet, drain / overflow etc complete as directed.	1	No.		
9.22	<b>Dismantling plain cement concrete</b> in flooring/pavement/ wall foundation etc. as per instruction and disposing the debris/muck within the site at approved location.	2	CuM		
9.24	Making Khurras 45 x 45 cm with average minimum thickness of 5 cm cement concrete 1:2:4 (1 cement: 2 coarse sand :4 graded stone aggregate of 20 mm nominal size) over PVC sheet 1m x 1m x 400 microns, finished with 12 mm cement plaster 1:3(1 cement: 3 coarse sand) and a coat of neat cement rounding the edges and making and finishing the outlet complete.	1	No.		
9.33	Providing and laying PCC vatta and returns in maximum 250mm height and 250mm wide forming triangular curvature profile shape as per the drawing in cement concrete 1:2:4 (1 part cement: 2 parts of sand and:4 parts of stone aggregate 12mm and downgraded), including all manual compaction, finishing, curing etc complete as directed.	25	RM		
9.51	Providing and fixing cast iron rungs of approved quality and make such as be " NICCO " weighing 5.3 KG / No. at 300 c/c as per detail as specified as	8	No.		

<b>Item no.</b>	<b>Description</b>	<b>Qty.</b>	<b>Unit</b>	<b>Rate ( Rs.)</b>	<b>Amount ( Rs. )</b>
<b>9.00</b>	<b>MISCELLANEOUS WORK</b>				
	directed.				
	<b>Total of Item No: 9</b>				

**Note: - Items having no. 9.13, 9.14, 9.15, 9.24,9.33 & 9.51 are self-descriptive and have no detailed technical specifications in this bidding document.**

**WATER SUPPLY**

<b>Item no.</b>	<b>Description</b>	<b>Qty.</b>	<b>Unit</b>	<b>Rate (Rs.)</b>	<b>Amount (Rs.)</b>
<b>11.00</b>	<b><u>WATER SUPPLY</u></b>				
11.01	Providing and laying <b>concealed underground waterline of “B” class GI pipe</b> of ISI mark of the following diameters, including all necessary heavy-duty specials of ISI mark, excavation, providing and applying metal primer and two coats of Bituminous paint of approved make after successful pressure testing of the pipeline, sand cushioning and covering with sand, refilling of trenches, compaction etc. complete as directed. <b>For 100 mm nominal bore (NB) GI pipe.</b>		RM	Rate not to be quoted	
11.25	Providing, fixing, testing & commissioning of C.I. Butterfly valve conforming to IS: 13095 with flanges, heavy duty rubber packing, gaskets, nuts, bolts and washers complete for following sizes: - [PN 25 rating]. <b>for 100 mm dia</b>	1	No.		
11.26	Providing, fixing, testing & commissioning of C.I. Butterfly valve conforming to IS: 13095 with flanges, heavy duty rubber packing, gaskets, nuts, bolts and washers complete for following sizes: - [PN 25 rating]. <b>for 75/80 mm dia</b>	1	No.		
11.27	Providing, fixing and testing heavy duty lever operated wafer type Butterfly valve (confirming to IS 13095) manufactured from Ductile Cast Iron/SG Iron, lever & locking plate made from carbon steel, various other components made from carbon steel and stainless steel metals including providing and fixing with compatible insert counter flanges with bolts and nuts as per manufacturers recommendations to be fixed with GI/uPVC/cPVC pipelines of the following nominal bore (NB) size etc complete as directed of approved make for providing, fixing and testing of <b>50mm</b>	1	No.		



Item no.	Description	Qty.	Unit	Rate (Rs.)	Amount (Rs.)
	<b>dia Butter fly Valve.</b>				
11.41	Providing & fixing CI Circular manhole cover of 455mm dia. of 40 Kg. weight including CI frame of approved make. The cover shall be got approved in advance and shall be fixed by grouting the frame in brickwork / RCC cover slab, including painting with two coats of bituminous paint etc. complete as directed.	588	KG.		
11.60	-- Do – as per item no. 11.01 but for Providing and laying concealed in earth waterline <b>UPVC pipe SCH- 80 class water pipe line of ISI mark</b> of the following diameter, excavation of trenches in soil/murum up to 900 mm depth, laying and jointing the pipe in line and level, filling sand <b>for 100 mm dia.</b> around pipe, as per manufacturer's specification, The Rate Shall including refilling of the trenches, testing etc. complete as directed.	20	RM		
11.61	-Do- as per item no. 11.60 but for providing and laying <b>75/80 mm dia</b> UPVC pipe complete as directed.	30	RM		
11.62	-Do- as per item no. 11.60 but for providing and laying <b>50 mm dia</b> UPVC pipe complete as directed.	20	RM		
11.63	Providing and laying <b>open or concealed 25 or 15 mm dia UPVC SCH 80</b> at all levels, including all necessary specials, fixing with clamps with approved MS clamps, making holes, cutting floors, making good and walls and floors or making zaries and filling with CM (1:4) etc complete as directed.	-----	RM	Rate not to be quoted	
11.64	Do- as per item no. 11.63 but for providing and laying <b>75 mm dia</b> UPVC pipe complete as directed.	30	RM		
11.65	Do- as per item no. 11.63 but for providing and laying <b>100 mm dia</b> UPVC pipe complete as directed.	60	RM		
11.75	-Do- as per item no. 11.01 but for concealed underground / Open/ concealed in structure waterline of	50	RM		

Item no.	Description	Qty.	Unit	Rate (Rs.)	Amount (Rs.)
	<p><b>“C” class GI pipe of ISI mark</b> of the following diameters, including all necessary heavy duty specials of ISI mark, including excavation in soil/murum/rock, providing and applying metal primer and two coats of Bituminous paint of approved make after successful pressure testing of the pipeline, sand cushioning and covering with sand, refilling of trenches, compaction etc. <b>Also including</b> all necessary specials, fixing with clamps with approved wood gutties / MS clamps, making holes, cutting floors, making good and walls and floors or making zaries and filling with CM (1:4) etc. complete as directed.for <b>100 mm nominal bore (NB) GI pipe.</b></p>				
	<b>Total of Item No:11</b>				

**Note: - Items having no. 11.60,11.61,11.62,11.63,11.64,11.65,11.75 are self-descriptive and have no detailed technical specifications in this bidding document.**

**SANITARY**

<b>Item no.</b>	<b>Description</b>	<b>Qty.</b>	<b>Unit</b>	<b>Rate (Rs)</b>	<b>Amount (Rs)</b>
<b>12.00</b>	<b><u>SANITARY</u></b>			Rate not to be quoted	
12.19	Providing and laying 75 mm diameter PVC rain water line of 4 Kg / Sq cm rating of approved make with all necessary specials to be jointed adhesive as per manufacturers specifications etc complete for open pipeline / in brick wall / RCC structure including clamping to secure in position etc. complete as directed.	-----	RM		
12.20	-Do as it.no 12.19. PVC (4.5 Kg) Rainwater pipe for 110 mm Dia	15	RM		
	<b>Total of Item No:12</b>				

**Note:**

1. "PVC" to be considered as per the same specification of "uPVC" for all PVC pipes and specials mentioned under items of the Schedule of Quantity.
2. "Dia." or "Diameter" refers to Nominal bore size of the pipes and specials mentioned under items of Schedule of Quantity.
3. Scaffolding, staging at all required levels, lift, lead, transportation, loading, unloading, all wastages, rolling margins, works at all the heights and levels etc. are inclusive for all the items required to be executed under the Schedule of Quantities of this contract even if not mentioned in an item.
4. Plinth level of the buildings shall be finished floor level of the Ground Floor.
5. Item for which no rate or price has been entered in will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities.
6. Unit rates and prices shall be quoted by the bidder in Indian Rupees.

7. Where there is a discrepancy between the rate in figures and words, the rates in words will govern.
8. Where there is a discrepancy between the unit rate and the line-item total resulting from multiplying the unit rate by quantity, the unit rate quoted shall govern.
9. Any make or brand of the material or methodology if specified in the SOQ/BOQ above for all the item would also allow for or equivalent makes and brand if all specifications and durability is proved by the bidder supported with all tests, certificate, guarantees, performance of the work already done at other places, samples and other inspections if required by Project Manager.

**TRADEWISE SUMMARY SHEET**

Civil, structural, Water Supply and Ancillary works for Over Head Water Tank and Miscellaneous civil work at Bull Production unit, SAG, Bidaj Farm, PO. Lali, Ta & Dist. Kheda-387120 Gujarat, INDIA.

<b>TRADE CODE</b>	<b>SECTION</b>	<b>TOTAL IN (RS)</b>
	<b>CIVIL WORKS</b>	
1.0	EARTHWORK	
2.0	CONCRETE	
3.0	MASONRY WORK	
5.0	FINISHING WORK	
6.0	FLOORING WORK	
7.0	STEEL WORK	
9.0	MISCELLANEOUS WORKS	
11.0	WATER SUPPLY WORK	
12.0	SANITARY WORK	
<b>TOTAL PRICE</b>		
<b>DISCOUNT</b> _____ %		
<b>NET TOTAL PRICE</b>		

**NET TOTAL PRICE IN WORDS** \_\_\_\_\_

\_\_\_\_\_

Signature & Seal of Bidder

**Annexure E****Acceptable Formats of Bank Guarantees and Solvency Certificate**

<b>S. No.</b>	<b>Description</b>
1	Performance Security
2	Retention money
3	Solvency Certificate

**1.0 Form of Bank Guarantee for Performance Security (On Non-Judicial Stamp Paper of Rs. 100 minimum or as per the stamp act of Local State Government.)**

Bank Guarantee no.

Date:

This deed of guarantee made this \_\_\_\_\_ day of \_\_\_\_ (Two thousand \_\_\_\_\_) by (Name and the address of the Bank), hereinafter referred to as the bank, which expression shall unless repugnant to the context and meaning thereof includes its legal representatives, successors and assignees and the Sabarmati Ashram Gaushala Bidaj, (hereinafter referred to as the SAGB) which expression shall unless repugnant to the context AND meaning thereof include its legal representative, successors or assignees.

Where as SAGB/its clients has awarded a contract bearing no.\_\_\_\_ dated \_\_\_\_\_ on M/s. \_\_\_\_\_ (name and the address of the party), hereinafter referred to as the Contractor, for the execution, completion and the maintenance of \_\_\_\_\_ .

And whereas, the Contractor has agreed to submit a performance security in the form of a bank guarantee to the SAGB as per the terms and conditions of the bidding documents and the Contract which will be kept valid up to \_\_\_\_\_ calendar months from the date of bank guarantee ( the period should be till end of Period of Maintenance). And whereas, the bank and its duly constituted agent and officer has already read and understood the Contract made between the SAGB and the Contractor.

In consideration of the SAGB having agreed to award the Contract on the Contractor, we \_\_\_\_\_ (the name of bank), do hereby guarantee, undertake, promise and agree to with the SAGB, its legal representatives, successors and assignees that the within named (the name of the Contractor) their legal representatives and assignees will faithfully perform and fulfil everything within the bidding document and the Contract order on their part to be performed or fulfilled, at the time (time being the essence of the Contract) and in the manner therein provided, do all obligations hereunder and we further undertake and guarantee to make payment to the SAGB a sum of Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_ only) without any demur, in case the Contractor, their legal representatives and assignees do not faithfully perform and fulfil everything within the bidding document and the Contract order on their part to be performed or fulfilled, at the time and in the manner therein provided and do not wilfully and promptly do all obligations hereunder.

In case, the Contractor fails to perform or fulfill the Contract as per the terms and conditions agreed upon, the SAGB is entitled to demand an amount equal to Rs. \_\_\_\_\_ from the Contractor and the demand made by the SAGB itself will be conclusive evidence and proof that the Contractor has failed to perform or fulfil his obligations under the Contract and neither the

Contractor nor the Bank will be entitled to raise any dispute regarding the reasons for the failure of performance or fulfilment on any ground .

We, (the name of the Bank), do hereby undertake to pay an amount equal to Rs. \_\_\_\_\_, being the amount due and payable under this guarantee, without any demur, merely on a demand from the SAGB which has to be served on us before the expire date of bank guarantee i.e. \_\_\_\_\_ stating that the amount claimed is due by way of non-performance of the Contractual obligations as aforesaid by the Contractor or by the reason of the Contractor's failure to perform the said contractual commitments , any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_ only) being the full amount guaranteed.

We, (the name of bank), further agree that the performance security herein contained shall remain in full force and effect for a period of \_\_\_\_\_ calendar months from the date of the bank guarantee ( the period shall be till the end of Period of Maintenance)and till the SAGB certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said Contractor and accordingly discharge the guarantee, unless a demand or a claim under this guarantee is made on us in writing by the SAGB on or before \_\_\_\_\_ we shall be discharged from all liabilities under this performance security thereafter.

We, (the name of bank), further agree with the SAGB that the SAGB shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and the conditions of said bidding document and the Contract or to extend the time of performance by the said Contractor from time to time or postpone for any time or from time to time and any of the power exercisable by the SAGB against the Contractor and to forebear or enforce any of the terms and conditions relating to the said bidding document and the Contract and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Contractor, or for any forbearance, act or omission on the part of the SAGB to the said Contractor by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

This guarantee shall be in addition to and without prejudice to any other securities or remedies which the SAGB may have or hereafter possess in respect of the works executed or intended to be executed and the SAGB shall be under no obligation to marshal in favour of the bank any such securities or funds or asset that the SAGB may be entitled to receive or have a claim upon and the SAGB at its absolute discretion may vary, exchange, renew, modify or refuse to complete to enforce or assign any security or instrument.

The bank agrees that the amount hereby guaranteed shall be due and payable to the SAGB on serving us with a notice before expiry of bank guarantee, requiring the payment of the amount and such notice shall be deemed to have been served on the bank either by actual delivery thereof to the bank or by dispatch thereof to the bank by registered post at the address of the bank.



In order to give full effects to the provisions of this guarantee the bank hereby waives all rights inconsistent with the above provisions and which the bank might otherwise as a guarantor be entitled to claim and enforce.

We, \_\_\_\_\_, undertake to renew the Bank Guarantee provided the request for renewal is made by the contractor before the expiry of Bank Guarantee.\_

We, \_\_\_\_\_, lastly undertake not to revoke this guarantee during its currency except with the previous consent of the SAGB in writing and the guarantee shall be a continuous and irrevocable guarantee up to a sum of Rs.\_\_\_\_\_ (Rupees \_\_\_\_\_.)only.

Notwithstanding anything stated hereinbefore: (i) our liability under this guarantee is restricted to Rs.\_\_\_\_\_ (ii) the guarantee shall remain in force till \_\_\_\_\_ and (iii) the Bank is liable to pay the guarantee amount or any part thereof under this bank guarantee only if the SAGB serves upon the Bank a written claim or demand on or before \_\_\_\_\_.

SIGNATURE

PLACE

BANK SEAL

DATE

BANK CODE NO.

**NOTE:**

- 1: The contractor should ensure that the seal and the code no. of the signatory are put by the bankers, before submission of the bank guarantees.
- 2: **The value of stamp duty should be minimum Rs. 100 or as per the latest stamp act of local State Government from where the Bank Guarantee is issued.**

**2.0 Form of Bank Guarantee for Release of Retention Money (on Non-judicial Stamp Paper of Rs. 100 minimum or as per stamp act of local state Govt.)**

Bank Guarantee no.

Date:

This deed of guarantee made this \_\_\_\_\_ day of \_\_\_\_\_ (two thousand \_\_\_\_\_) by \_\_\_\_\_ (Name and the address of the Bank), hereinafter referred to as "the Bank", which express where the context and the meaning so require, include its legal representatives, successors and assignees of the bank and Sabarmati Ashram Gaushala Bidaj, (hereinafter referred to as the SAGB) which expression shall unless repugnant to the context and the meaning thereof include its legal representative, successors and assignees.

WHEREAS the SAGB has placed its Contract order bearing no. \_\_\_\_\_ dated \_\_\_\_\_ on (name and address of the party) hereinafter called the Contractor, for the construction of \_\_\_\_\_

AND WHEREAS the SAGB has agreed to pay to the Contractor the retention money i.e. **5% of the value of the Contract** on submission of a Bank guarantee of equal amount, which will be kept valid up to \_\_\_\_\_.

In consideration of the SAGB having agreed to pay to the Contractor Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_ only) being the retention money we (the Bank), hereby undertake and guarantee to make repayment to the SAGB of the said amount without any demur or any part thereof which does not become payable to the Contractor by the SAGB in accordance with and subject to the terms and conditions of the said Contract. The Bank further undertakes not to revoke this guarantee during its currency except with the previous consent of the SAGB in writing and this guarantee shall be a continuous and irrevocable guarantee up to a sum of Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_ only).

The Bank shall not be discharged or released from this guarantee by any arrangement between the Contractor and the SAGB with or without the consent of the Bank or any alterations in the obligations of the parties or by an indulgence, forbearance shown by the SAGB to the Contractor and the same shall not prejudice or restrict remedies against the Bank nor shall the same in any event be a ground of defence by the Bank against the SAGB. We (name of bank) do hereby undertake to pay an amount equal to Rs. \_\_\_\_\_ being the amount due and payable under this guarantee without any demur, merely on a demand from the SAGB stating that the amount claimed is due to the SAGB. In case, the SAGB puts-forth a demand in writing on the bank for the payment of amount in full or in the part against this bank guarantee, the bank shall consider that such demand by itself is conclusive evidence and proof that the contractor has failed in compliance with the terms and conditions stipulated by SAGB in the contract and payment shall be made to SAGB without raising any dispute regarding the reasons for any such lapse/ failure on the part of the contractor.

This guarantee shall be in addition to and without prejudice to any other securities or remedies which the SAGB may have or hereinafter possess in respect of the works executed or intended to be executed and the SAGB shall be under no obligation to marshal in favour of the bank any such securities or funds or assets that the SAGB may be entitled to receive or have a claim upon and the SAGB at its absolute discretion may vary, exchange, renew, modify or refuse to complete to enforce or assign any security or instrument.

The Bank agrees that the amount hereby guaranteed shall be due and payable to the SAGB on SAGB's serving us with a notice before expiry of Bank Guarantee requiring the payment of the amount and such notice shall be deemed to have been served on the Bank either by actual delivery thereof to the Bank or by dispatch thereof to the Bank by registered post at the address of the said Bank.

We, \_\_\_\_\_, undertake to renew the bank guarantee provided the request for renewal is made by the contractor before the expiry of bank guarantee.

In order to give full effect to the provisions of this guarantee the Bank hereby waives all rights inconsistent with the above provisions and which the Bank might otherwise as guarantor be entitled to claim and enforce.

Notwithstanding anything stated hereinbefore : (I) our liability under this guarantee is restricted to Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_ only), (ii) The guarantee shall remain in force till \_\_\_\_\_ and (iii) The Bank is liable to pay the guarantee amount or any part thereof under the bank guarantee only if the SAGB serves upon the Bank a written claim or demand on or before \_\_\_\_\_.

Place

Signature

Date

Bank Seal

Bank Code no.

**Note:**

- 1: Contractor should ensure that the seal and code no. of signatory is put by the Bankers, before submission of the Bank guarantees.
- 2: The value of stamp duty should be minimum Rs. 100 or as per latest stamp act of Local State Government from where the Bank Guarantee is issued.

**3.0 Format of Solvency Certificate (On the letter head of issuing bank)**

Ref:

Date:

**FORMAT OF SOLVENCY CERTIFICATE FROM THE NATIONALISED /  
SCHEDULED BANK / FOREIGN BANKS OPERATING IN INDIA**

This is to certify that to the best of our knowledge & information M/s. / Shri \_\_\_\_\_ having the address as per bank records as \_\_\_\_\_,

a customer of our bank is respectable and can be rated as good for any engagement upto a limit of Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_).

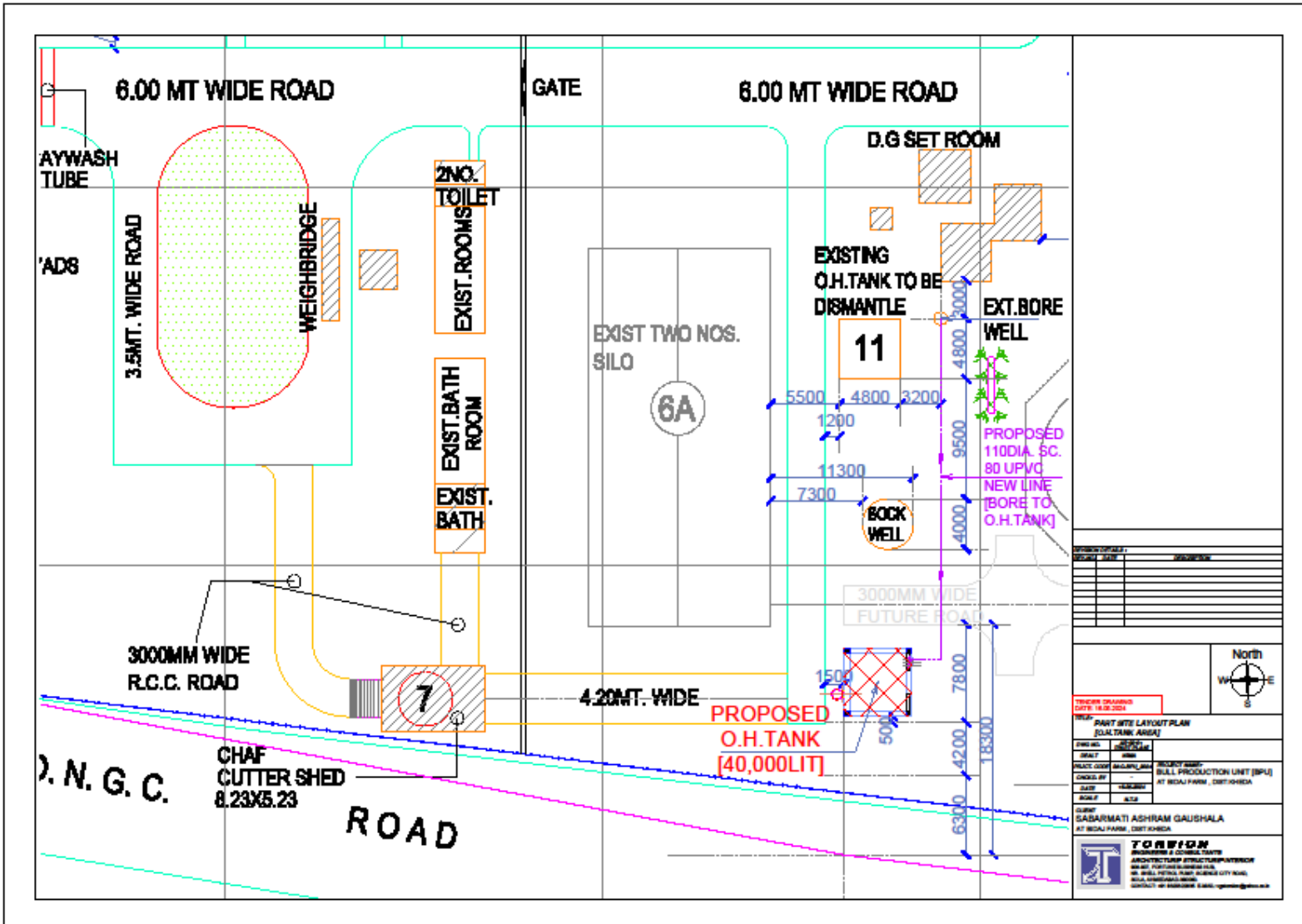
The certificate is issued without any guarantee and responsibility on behalf of the bank or any of its Officers.

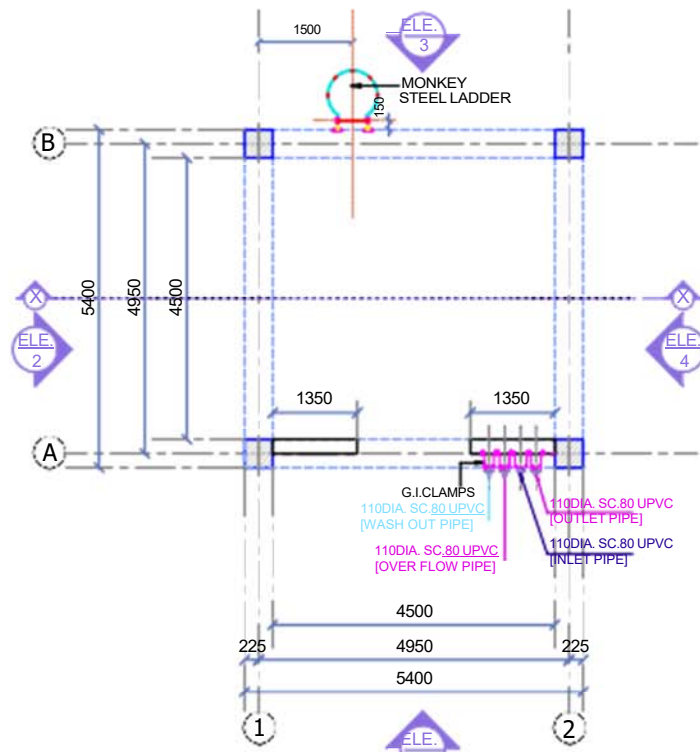
Date \_\_\_\_\_

(Signature)

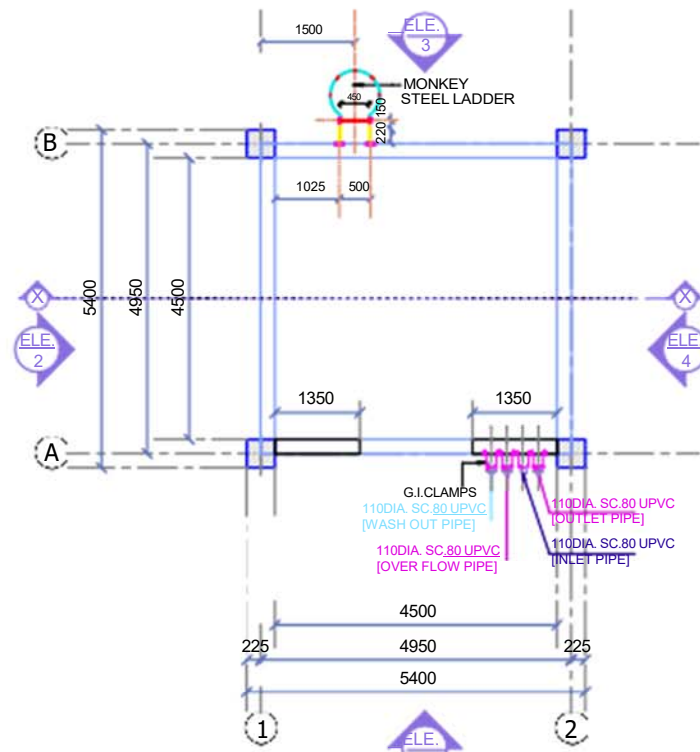
(Name & designation of the officer with address of Bank & its branch code)

(Bank's Official Rubber Stamp)

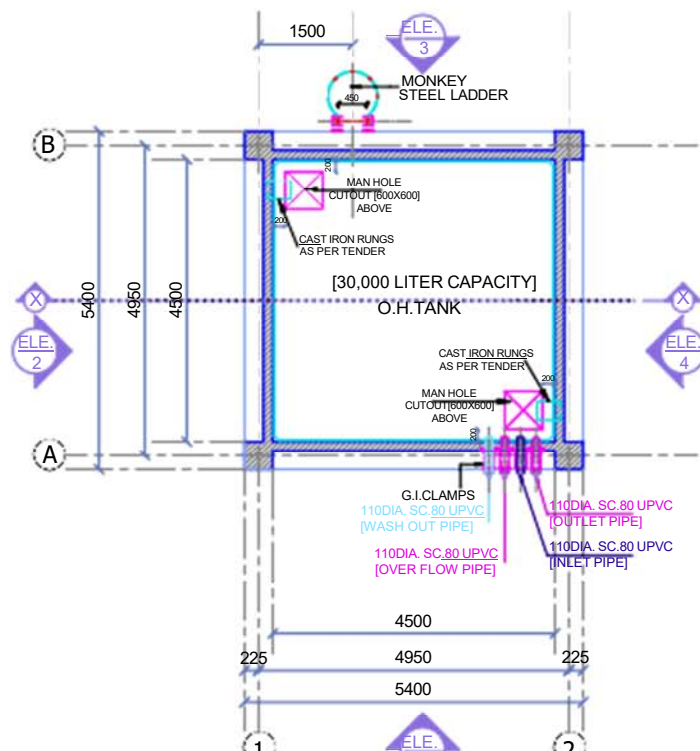




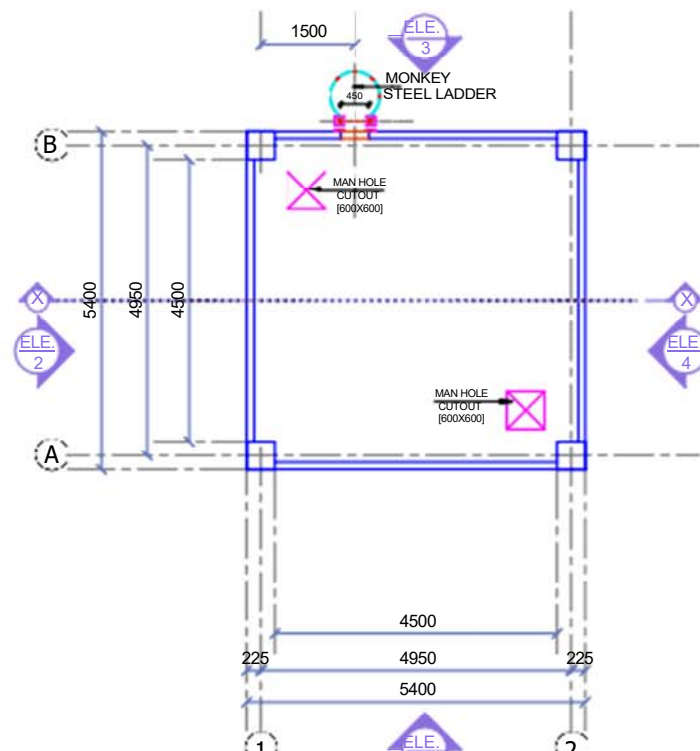
+/- 0000 LEVEL PLAN



TIE BEAM LVL.PLAN (+3750 LVL.)

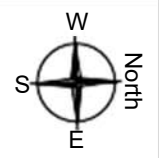


OHW BOTTOM SLAB LVL.PLAN (+7500 LVL.)



OHW TOP SLAB LVL.PLAN (+9450 LVL.)

REVISION DETAILS :		
REV.NO.	DATE	DESCRIPTION



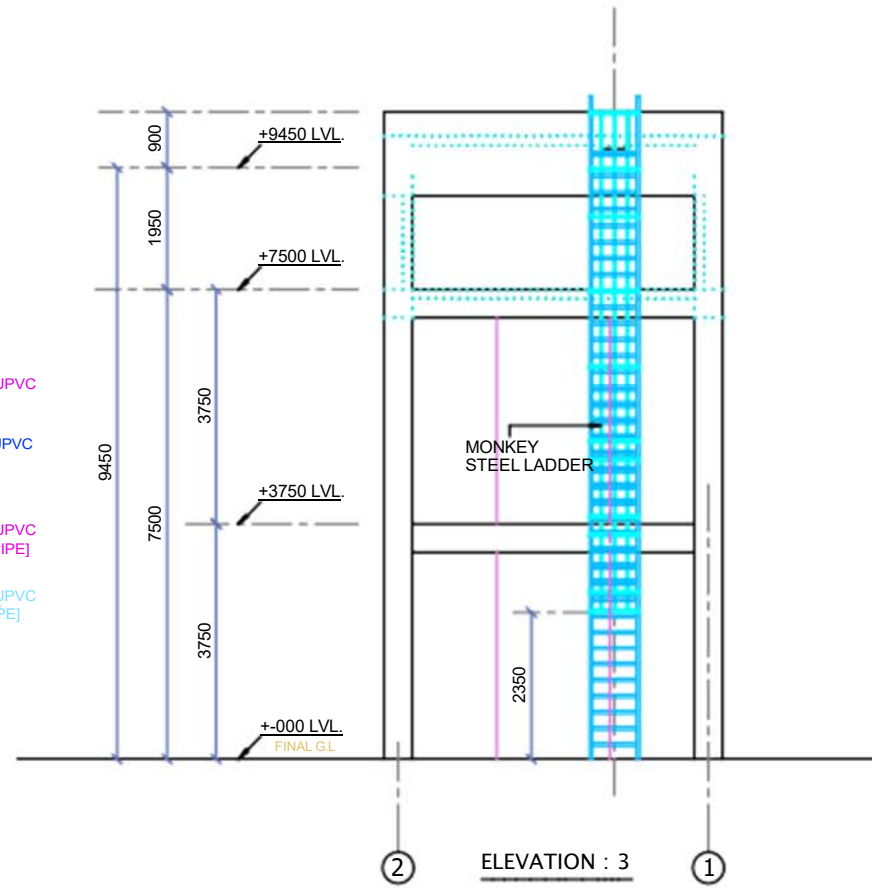
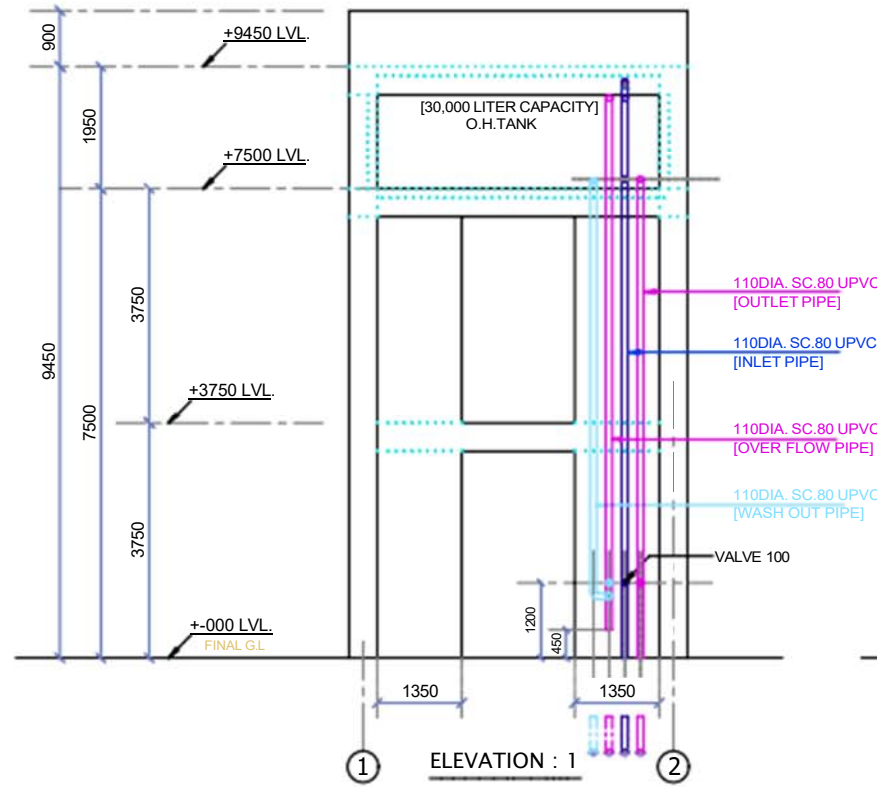
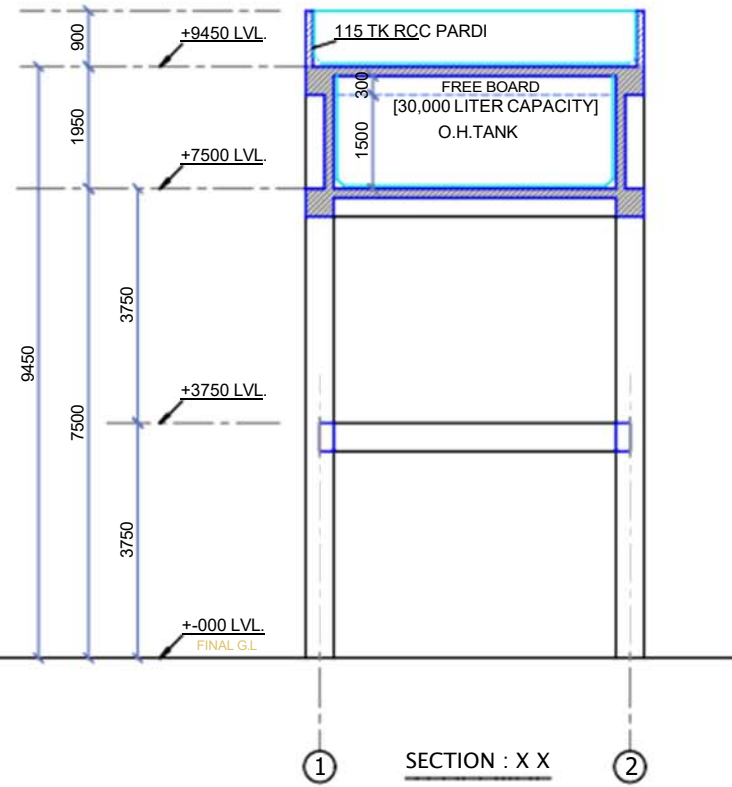
TENDER DRAWING  
DATE: 29.01.2025

TITLE:- +/-0000 LEVEL PLAN , +3750 LEVEL PLAN,  
+7500 LEVEL PLAN, +9450 LEVEL PLAN,

DWG NO.	AR-15-01	NAME OF BUILDING:-
DEALT	NIMA	[15] O.H.TANK
PRJCT. CODE	SAG.BPU_2024	[30,000 LITER CAPACITY]
CHCKD. BY	-	PROJECT NAME:-
DATE	11.04.2022	BULL PRODUCTION UNIT [BPU]
SCALE	N.T.S	AT BIDAJ FARM , DIST:KHEDA

CLIENT  
SABARMATI ASHRAM GAUSHALA  
AT BIDAJ FARM , DIST:KHEDA

**TORSION**  
ENGINEERS & CONSULTANTS  
ARCHITECTURE - STRUCTURE - INTERIOR  
906-907, FORTUNE BUSINESS HUB,  
NR. SHELL PETROL PUMP, SCIENCE CITY ROAD,  
SOLA, AHMEDABAD-380060.  
CONTACT: +91 8320322835 E-MAIL: vgstorsion@yahoo.co.in



REVISION DETAILS :		
REV.NO	DATE	DESCRIPTION

TENDER DRAWING  
DATE: 29.01.2025

TITLE:- SECTION : X-X , ELEVATION : 1 & 3

DWG NO.	AR-15-02	NAME OF BUILDING:-
DEALT	NIMA	[15] O.H.TANK
PRJCT. CODE	SAG.BPU_2024	[30,000 LITER CAPACITY]
CHKD. BY	-	PROJECT NAME:-
DATE	11.04.2022	BULL PRODUCTION UNIT [BPU]
SCALE	N.T.S	AT BIDAJ FARM , DIST:KHEDA

CLIENT  
SABARMATI ASHRAM GAUSHALA  
AT BIDAJ FARM , DIST:KHEDA

**TORSION**  
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