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GENERAL CONDITION
THE CONTRACTORS SHOULD READ THE FOLLOWING CONDITION VERY
CAREFULLY AND SIGN EACH PAGE :

1. A work order book shall maintained on the site. The contractor shall countersign the orders issued in it by the Executive Engineer in Charge and shall carry them out promptly.
2. The contractor shall provide all labours, peg strings, measured taps and other materials as required for lining and setting the out the work without any payment including theodolites / level instruments.
3. The contractor shall have to clear the entire site before the work is commenced and after its completion without any extra cost. The clearance of site shall include removal of grass, extra trees, vegetations, buildings, foundation of any existing old construction works coming in foundation of new building, debris and extra excavated earth at site in order to level the site as required. The contractor shall also be responsible to keep the site and its approaches clean and maintain them in prefect order during the course of constructions and on completion of work.
 The contractor shall give responsible facilities as required by the Engineer in charge and to other contractors and other agencies of the corporation for executing ancillary work such as road, sewer mains water supply, domestic electrifications street light etc. G.S.P.H.C.Ltd. shall withhold Rs.500 (five hundred) per unit or Rs. 1,00,000/- whichever more as may be decided by Engineer in charge for satisfactory commissioning of the quarters on handing over.
4. The contractor shall at his own expenses make all necessary provisions for housing, water supply and sanitary arrangement for his employees and shall pay direct, to the authorities concerned all rates, taxes, sales tax and other charges. Water required for the construction of work shall also be arranged by the contractor at his own cost. The contractor shall also comply with all requirement of the Health Department of the Municipality or any authority in charge if management at the locality particularly in regard to Anti-Malaria and other health hygiene measures.
5. The roots of tree or the tree coming in the alignment of the structures shall to be cut removed by the contractor at their own cost after taking permission of the Executive Engineer in charge including all roots for which no extra payment shall be made salvaged materials will be the property of the corporation and will have to be carted and stacked as directed by the Engineer-in-charge. The roots to be remove but as required and surface of the roots remaining shall be burnt or coat tarred as required without any extra cost. In case where official permission as necessary from G.S.P.H.C.Ltd. shall be taken up the agency. The rates quoted shall be deemed to be inclusive of this and no extra shall be payable.
6. The contractors shall have to prepare to make a sample unit with all item as per instruction of Engineer-in-charge and cleanliness is to be maintained periodically till the completion of project and must be handed over to concern authority, after approval of sample unit contractors shall have to execute the other items in other unit. Also if not specified in the item then the work has to be carried out any floor without claiming any extra cost which may please be noted. If so desired by Engineer-in-charge no payment shall be made to contractors before preparing a sample unit (Tenaments/ Flats).
7. Whenever conventional bricks are to be used in the works the same shall be kiln brunt of approved quality and of standard available sizes as mentioned in M15 of General specification of materials to be used. Wherever sand is to be used in work the same shall be of good and approved quality.
8. All water supply sanitary fitting and material required for the work shall be fully tested and certified as per G.S.P.H.C.Ltd. requirements. The sanitary work shall be carried out by the Experienced plumber as per standard practice and Licensed plumber is required in all Municipal connections.
9. The samples of material shall be got approved prior to actual use and satisfactory test for the work shall be given.
10. The contractor shall supply a Board if fitting and fixture of civil items to the Engineer-in-charge for approval and after same is approved such board with fittings will have to be handed over by the contractors to the Executive Engineer-in-charge for guidance and the execution of work.
11. The contractors shall have to construct godown at the site of work at his own cost so as to accommodate minimum 1000 bags at a time and if required more godowns needs to be constructed by the contractor at his own expense. The Cement bags must be stacked as per IS Code 4082(1996). The typical sketch of cement godown is attached separately. The work shall not be started in case of failure on part of the contractor to construct the said godown within fifteen days from the date of work order. These godown needs to be demolished by the contractor after completion of work with permission of the Executive Engineer and shall remove all the dismantled materials and clear the site as directed.
12. If desire contractor shall use mechanically machine mixed mortar, if directed so far original / special repair works – transportation of materials through vertical lifts preferred for original works.
13. Shuttering for R.C.C. members must be in steel/ply board – including steel propping.
14. For scaffoldings – 'H' – frames must be used in all type of superstructures.
15. The contractors shall provide a temporary office building as directed by the Engineer-in-charge. The furniture

shall be provided as per direction of Executive Engineer and same shall be for the use of office of the Corporation during the course of construction of work. The furniture provided for the office shall be property of the contractor and same will be allowed to be removed after the work is completed. Maintenance of the office building shall be borne by the contractors till the final completion of the work.

16. The present layout of building may have to be altered to suit local conditions. The contractors shall be bound to agree to the revised layouts as may be finally decided and communicated to him by the Executive Engineer.
17. During construction of the work storage tank at ground level on site of work shall be constructed as per instructions of Engineer-in-charge. The walls of tank should be kept 2'-6" high above ground level. Necessary care by providing wooden hedge of fence should be taken to avoid an accident of falling in. If any accident occurs, the Contractor shall be solely responsible.
18. It shall be the responsibility of contractor to make suitable management for water required during the construction. However, if the contractor is permitted to use water for construction purpose from Corporation's/Police Depts. (existing well) above well recovery at the rate of 0.75% of the value of the work done shall be levied for using water from the existing source of water within the premises for using water till date of completion of work. Such recovery shall be made through respective R.A. bill and final bill.
 - (1) Contractor will have to make his own arrangement to maintain the progress of work. No extension of time limit will be granted on this account.
 - (2) In such circumstances the rate will not be reduced by the Corporation. The contractor has to give in writing the above undertaking for applying for water supply and corporation / department reserves its right to permit the use of water and/or discontinue without any prior notice.
19. All Construction and furniture materials such as cement, steel, Sanitary & C.P. Fittings, Water Supply Pipes, drainage pipes, tiles, paints, Plywood, laminates and hardware to be used in furniture work shall be as per separately attached approved GSPHCL list.
20. On starting of work, agency along with Corporation's representative shall make a list of various items required to be taken up in consultation with the beneficiary (occupant) and on attending to the same shall take a signature as a token of satisfactory completion, such statements shall be produced for claiming payment for any work done completed during course of contract.
21. The contractor shall not be entitled to claim for any compensation on the grounds that subsequent to the acceptance of the tender there was :
 - A. Any increase in the price of material or food stuffs whether controlled by Govt. or non or
 - B. Any increase in the wages, allowance or amenities to labor whether an account of any legislation of law passed by Governmental for any other reasons or
 - C. Any increase of the traffic freight charges and fare or any other charges in railways, roads, sea or air or
 - D. Any increase in the rate of quarry fees, Royalties or any other taxes, fees or charges or
 - E. An increase of any similar nature, however the difference between actual price and the std. rate of cement and steel shall be paid as per condition given separately.

22. GENERAL:

- (1). In the specification "as directed"/"approved" shall be taken to mean, "as directed"/"approved" by the Engineer in charge.
- (2). Wherever a reference to any Indian Standards appears in the specification, it shall be taken to mean as a reference to latest edition of the same enforce on the date of agreement.
- (3). In "Mode of measurement" in the specification wherever a dispute arises in the absence of specific mention of a particular point of aspect, the provision of the particular points, or aspects in the relevant and latest Indian standard shall be referred.
- (4). All measurement and computations, unless otherwise specified, shall be carried out nearest to the following limits:

I. Length, Width and Depth (Height)	0.01 metre
II. Areas	0.01 Sq. metre
III. Cubic Contents	0.01 Cu. Metre

In recording dimensions of work the sequence of length and width and height (depth) or thickness shall be followed.
- (5). The distance which constitutes lead shall be determined along the shortest practical route and not necessary the route actually taken. The decision of the Engineer in charge in this regard shall be taken as final.
- (6). Where no lead is specific it shall mean "all leads."
- (7). Lift shall be measured from Plinth Level.
- (8). Up to "floor two level" means actual height of floor (Max. 4.0m) up to 3 m. above plinth level.

- (9). Definite particulars covered in the items of work, though not mentioned or elucidated in it specifications shall be deemed to be included therein.
- (10). Reference to specifications of materials as made in the detailed specification of the items of works is in the form of a designation containing the number of the specification of the material and prefix 'M' e.g. 'M-5'.
- (11). Approval to the samples of various materials given by the Engineer in charge shall not absolve the contractor from the responsibility of replacing defective material brought on site or materials used in the work found defective at a later date. The contractor shall have no claim to any payment of compensation whatsoever on account of any such materials being rejected by the Engineer in charge.
- (12). The contract Rate of the item of work shall be for the work completed in all aspects.
- (13). No collection of material shall be made before it is got approved from the Engineer in charge.
- (14). Collection of approved materials shall be done at site of work in systematic manner. Materials shall be stored in such a manner as to prevent damage, deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness of the work.
- (15). Materials, If and when rejected by the Engineer in charge, shall be immediately removed from the site of work.
- (16). No materials shall be stored prior to during and after execution of structure in such a way as to cause the preservation of their quality and fitness for the work.
- (17). All work shall be carried out in workman like manner as per the best techniques for the particular item.
- (18). All tools, templates, machinery and equipment for correct execution of the work as well as for checking lines, levels, alignment of the work during execution shall kept in sufficient number and in good working condition on the site of the work.
- (19). The mode, procedure and manner of execution shall be such that it does not cause damage or overloading of the various components of the structure during the execution or after completion of the work.
- (20). Special mode of construction not adopted in general Engineering practise, proposed to be adopted by the Contractor, shall be considered only if the contractor provides satisfactory evident that such special mode of construction is safe, sound and helps in speedy construction and completion of work to the required, strength and quality. Acceptance of the same by the Engineer-in-charge shall not, however absolve the contractor of the responsibility of any adverse effects and consequences of adopting the same in the course of execution of completion of work.
- (21). All installation pertaining to water supply and fixtures thereof as well as drainage lines and sanitary fittings shall be deemed to be completed only after satisfactory tests by the contractor.
- (22). The contractor shall be responsible for observing the rules and regulations imposed under the "Minor Minerals Act" and such other laws and rules prescribed by government from time to time.
- (23). All necessary safety measures and precautions (including those laid down in the various relevant and latest Indian Standards) shall be taken to ensure the safety of men, materials and machinery on the works as also of the work itself.
- (24). Where no floor is specific, it shall mean "all floors"
- (25). Approval to any of the executed items for the work done in no way relieves the contractor of his responsibility for the correctness, soundness and strength of the structure as per the drawings and specifications.
- (26). All type of flooring shall be laid as per drawings furnished – it shall include for all pattas / pattis.
- (27). Plaster work includes all grooves, pattas, pattis, Tapak (Plaster Drip) as may be directed by the engineer in charge and GSPHCL Ltd.
- (28). CC cover must be used in all type of RCC works. The Thickness of CC Covers must be as per Structural Drawings or as directed by Engineer-in-Charge. The concrete grade of CC cover must be as per concrete grade of concerned concrete member.
- (29). Digital Weigh Batcher must be used in all Controlled Cement Concrete works.
- (30). All Types of Structural Steel/TMT must be stacked above Ground minimum 150mm and bars of different Classification, Sizes and lengths must be stacked separately. In coastal areas or in case of long storage suitable protective coating of primer paint shall be given to prevent scaling and rusting.

STACKING AND STORAGE OF MATERIALS

Cement

In case cement is received in bags.

Cement shall be stored at the work site in a building or a shed which is dry, leakproof and as moisture proof as possible. The building or shed for storage should have minimum number of windows and close fitting doors and these should be kept closed as far as possible.

Cement shall be stored and stacked in bags and shall be kept free from the possibility of dampness or moisture coming in contact with them. Cement bags shall be stacked off the floor on wooden planks in such a way as to keep about 150 mm to 200 mm clear above the floor. The floor may comprise of lean cement concrete or two layers of dry bricks laid on well consolidated earth. A space of 600 mm minimum shall be left around between the exterior walls and the stacks (see Fig.)

In the stacks the cement bags shall be kept close together to reduce circulation of air as much as possible. Owing to pressure on the bottom layer of bags sometimes 'warehouse pack' is developed in these bags. This can be removed easily by rolling the bags when the cement is taken out for use. Lumped bags, if any should be removed and disposed off.

The height of stack shall not be more than 10 bags to prevent the possibility of lumping up under pressure. The width of the stack shall be not more than four bags length or 3 metres. In stacks more than 8 bags high, the cement bags shall be arranged alternately length-wise and cross-wise so as to tie the stacks together and minimize the danger of topping over. Cement bags shall be stacked in a manner to facilitate their removal and use in the order in which they are received; a label showing date of receipt of cement shall be put on each stack to know the age of cement.

For extra safety during the monsoon, or when it is expected to store for an unusually long period, the stack shall be completely enclosed by a water proofing membrane such as polyethylene, which shall close on the top of the stack. Care shall be taken to see that the waterproofing membrane is not damaged any time during use.

Cement in gunny bags, paper bags and polyethylene bags shall be stored separately.

In case cement is received in drums

These shall be stored on plane level ground, as far as possible near the concrete mixing place. After taking out the required quantity of cement, the lid of the drum shall be securely tied to prevent ingress of moisture.

In case cement is received in silos

The silos shall be placed near the concrete batching plant. Proper access shall be provided for the replacement of silos.

Different types of cements shall be stacked and stored separately.

BRICKS

Bricks shall be stacked in regular tiers as and when they are unloaded to minimize breakage and defacement. These shall not be dumped at site.

Bricks stacks shall be placed close to the site of work so that least effort is required to unload and transport the bricks again by loading on pallets or in barrows. Building bricks shall be loaded or unloaded a pair at a time unless palletized. Unloading of building bricks or handling in any other way likely to damage the corners or edges or other parts of bricks shall not be permitted.

Bricks shall be stacked on dry firm ground. For proper inspection of quality and ease in counting the stacks shall be 50 bricks long, 10 bricks high and not more than 4 bricks in width, the bricks being placed on edge, two at a time along the width of the stack. Clear distance between adjacent stacks shall not be less than 0.8 m. Bricks of each truck load shall be put in one stack.

Bricks of different types, such as clay bricks, clay fly ash bricks, fly ash lime bricks, sand lime (calcium silicate) bricks, auto-clave bricks etc. shall be stacked separately. Bricks of different classification and size consideration (such as, conventional and modular) shall be stacked separately. Also bricks of different types, such as, solid, hollow and perforated shall be

stacked separately.

BLOCKS

Blocks are available as hollow and solid concrete blocks, hollow and solid light weight concrete blocks, autoclaved aerated concrete blocks, concrete stone masonry blocks and soil based blocks.

Blocks shall be unloaded one at a time and stacked in regular tiers to minimize breakage and defacement. These shall not be dumped at site. The height of the stack shall not be more than 1.2m. The length of the stack shall not be more than 3.0 m, as far as possible and the width shall be of two or three blocks.

Normally blocks cured for 28 days only should be received at site. In case blocks cured for less than 28 days are received, these shall be stacked separately. All blocks should be water cured for 10 to 14 days and air cured for another 15 days; thus no blocks with less than 28 days curing shall be used in building construction.

Blocks shall be placed close to the site of work so that least effort is required for their transportation.

Blocks manufactured at site shall be stacked at least for required minimum curing period as given in 1.9.3.

The date of manufacture of the blocks shall be suitably marked on the stacks of blocks manufactured at factory or site.

FLOOR, WALL AND ROOF TILES

Floor, wall and clay roof tiles of different types, such as, cement concrete tiles (plain, coloured and terrazzo) and ceramic tiles (glazed and unglazed) shall be stacked on regular platform as far as possible under cover in proper layers and in tiers and they shall not be dumped in heaps. In the stack, the tiles shall be so placed that the mould surface of one faces that of another. Height of the stack shall not be more than one metre. During unloading, these shall be handled carefully so as to avoid breakage.

Tiles of different quality, size and thickness shall be stacked separately to facilitate easy removal for use in work. Tiles when supplied by manufacturers packed in wooden crates, shall be stored in crates. The crates shall be opened one at a time as and when required for use.

Ceramic tiles and clay roof tiles are generally supplied in cartons which shall be handled with care. It is preferable to transport these at the site on platform trolleys.

AGGREGATES

Aggregates shall be stored at site on a hard dry and level patch of ground. If such a surface is not available, a platform of planks or old corrugated iron sheets, or a floor of bricks, or a thin layer of lean concrete shall be made so as to prevent contamination with clay, dust, vegetable and other foreign matter.

Stacks of fine and coarse aggregates shall be kept in separate stock piles sufficiently removed from each other to prevent the material at the edges of the piles from getting intermixed. On a large job, it is desirable to construct dividing walls to give each type of aggregates its own compartment. Fine aggregates shall be stacked in a place where loss due to the effect of wind is minimum.

Unless specified otherwise or necessitated by site conditions stacking of the aggregates should be carried out in regular stacks. The suggested sizes for stacks are as follows :

Sl. no.	Material	Size of Stack (in m)		
		Length	Breadth	Height
(i)	Soling stone	5.0	2.0	0.50
		Or 5.0	1.0	0.50
(ii)	Coarse aggregates	2.0	2.0	0.50
		Or 5.0	5.0	1.00
		Or 5.0	1.0	0.50
(iii)	Fine aggregates	2.0	2.0	0.50
		Or 5.0	5.0	1.00
		Or 5.0	1.0	0.50

STEEL

For each classification of steel, separate areas shall be earmarked. It is desirable that ends of bars and sections of each class be painted in distinct separate colours.

Steel reinforcement shall ordinarily be stored in such a way as to avoid distortion and to prevent deterioration and corrosion. It is desirable to coat reinforcement with cement wash before stacking to prevent scaling and rusting.

Bars of different classification, sizes and lengths shall be stored separately to facilitate issues in such sizes and lengths so as to minimize wastage in cutting from standard lengths.

In case of long storage, reinforcement bars shall be stacked above ground level by at least 150 mm. Also in coastal areas or in case of long storage a coat of cement wash shall be given to prevent scaling and rusting.

Structural steel of different classification, sizes and lengths shall be stored separately. It shall be stored above ground level by at least 150 mm upon platforms, skids or any other suitable supports to avoid distortion of sections. In coastal areas or in case of long storage suitable protective coating of primer paint shall be given to prevent scaling and rusting.

ALUMINIUM SECTIONS

Aluminium sections of different classification, sizes and lengths shall be stored separately, on a level platform under cover. The aluminium sections shall not be pulled or pushed from the stack nor shall be slid over each other, to protect the anodizing layer.

DOORS, WINDOWS AND VENTILATORS

General

While unloading, shifting handling and stacking timber or other lignocellulosic material based, metal and plastic door and window frames and shutters, care shall be taken that the material is not dragged over the other as it may cause damage to the surface of the material particularly in the case of decorative shutters. The material should be lifted and carried preferably flat avoiding damage of corners or sides.

Metal and plastic doors, windows and ventilators shall be stacked upright (on their sills) on level ground preferably on wooden battens and shall not come in contact with dirt and ashes. If received in crates they shall be stacked according to manufacturer's instructions and removed from the crates as and when required for the work.

Metal and plastic frames of doors, windows and ventilators shall be stacked upside down with the kick plates at the top. These shall not be allowed to stand for long in this manner before being fixed so as to avoid the door frames getting out of shape and hinges being strained and shutters drooping.

During the period of storage all metal doors, windows and ventilators shall be protected from loose cement and mortar by suitable covering such as tarpauline. The tarpauline shall be hung loosely on temporary framing to permit circulation of air to prevent condensation.

All timber and other lignocellulosic material based frames and shutters shall be stored in a dry and clean covered space away from any infestation and dampness. The storage shall preferably be in well ventilated dry rooms. The frames shall be stacked one over the other in vertical stacks with cross battens at regular distances to keep the stack vertical and straight. These cross battens should be of uniform thickness and placed vertically one above the other. The door shutters shall be stacked in the form of clean vertical stacks over the other and at least 80 mm above ground on pallets or suitable beams or rafters. The top of the stack shall be covered by a protecting cover and weighted down by means of scantlings or other suitable weights. The shutter stack shall rest on hard and level ground.

If any timber or other lignocellulosic material based frame or shutter becomes wet during transit, it shall be kept separate from the undamaged material. The wet material may be dried by stacking in shade with battens in between adjacent boards with free access of dry air generally following the guidance laid down in IS 1141.

Separate stacks shall be built up for each size, each grade and each type of material. When materials of different sizes, grades and types are to be stacked in one stack due to shortage of space, the bigger size shall be stacked in the lower portion of the stacks. Suitable pallets or separating battens shall be kept in between the two types of material.

GLASS SHEETS

It is important that all glass sheets whether stored in crates or not shall be kept dry. Suitable covered storage space shall be provided for the safe storage of the glass sheets. In removing glass sheets from crates, great care shall be taken to avoid damages. The glass sheets shall be lifted and stored on its long edges against a vertical wall or other support with the first sheet so placed that its bottom edge is 25 mm from the vertical support. The stacks shall be of not more than 25 panes and shall be supported at two points by fillets of wood at 300 mm from each end. The whole stack shall be as close and as upright as possible.

The glass sheets of different sizes, thickness and type shall be stacked separately. The distance between any two stacks shall be of the order of 400 mm.

POLYETHYLENE PIPES

Natural polyethylene pipe should be stored under cover and protected from direct sunlight. However, black polyethylene pipes may be stored either under cover or in the open.

Coils may be stored either on edges or stacked flat one on top of the other, but in either case they should not be allowed to come into contact with hot water or steam pipes and should be kept away from hot surface.

Straight lengths should be stored on horizontal racks giving continuous support to prevent the pipe taking on a permanent set.

Storage of pipes in heated areas exceeding 27°C should be avoided.

UNPLASTICIZED PVC PIPES

The pipe should be given adequate support at all times. Pipes should be stored on a reasonably flat surface free from stones and sharp projections so that the pipe is supported throughout its length. In storage, pipe racks should be avoided. Pipe should not be stacked in large piles, especially under warm temperature conditions as the bottom pipes may distort, thus giving rise to difficulty in jointing. Socket and spigot pipes should be stacked in layers with sockets placed at alternate ends of the stacks to avoid lopsided stacks.

It is recommended not to store pipe inside another pipe.

On no account should pipes be stored in a stressed or bent condition or near the sources of heat.

Pipes should not be stacked more than 1.5 m high. Pipes of different sizes and classes should be stacked separately.

The ends of pipe should be protected from abrasion particularly those specially prepared for jointing either spigot or socket solvent welded joints or shouldered for use with couplings.

In tropical conditions, pipes should be stored in shade. In very cold weather, the impact strength of PVC is reduced making it brittle and more care in handling shall be exercised in wintry condition.

If due to unsatisfactory storage or handling a pipe becomes kinked, the damaged portion should be cut out completely. Kinking is likely to occur only on very thin walled pipes.

WATER

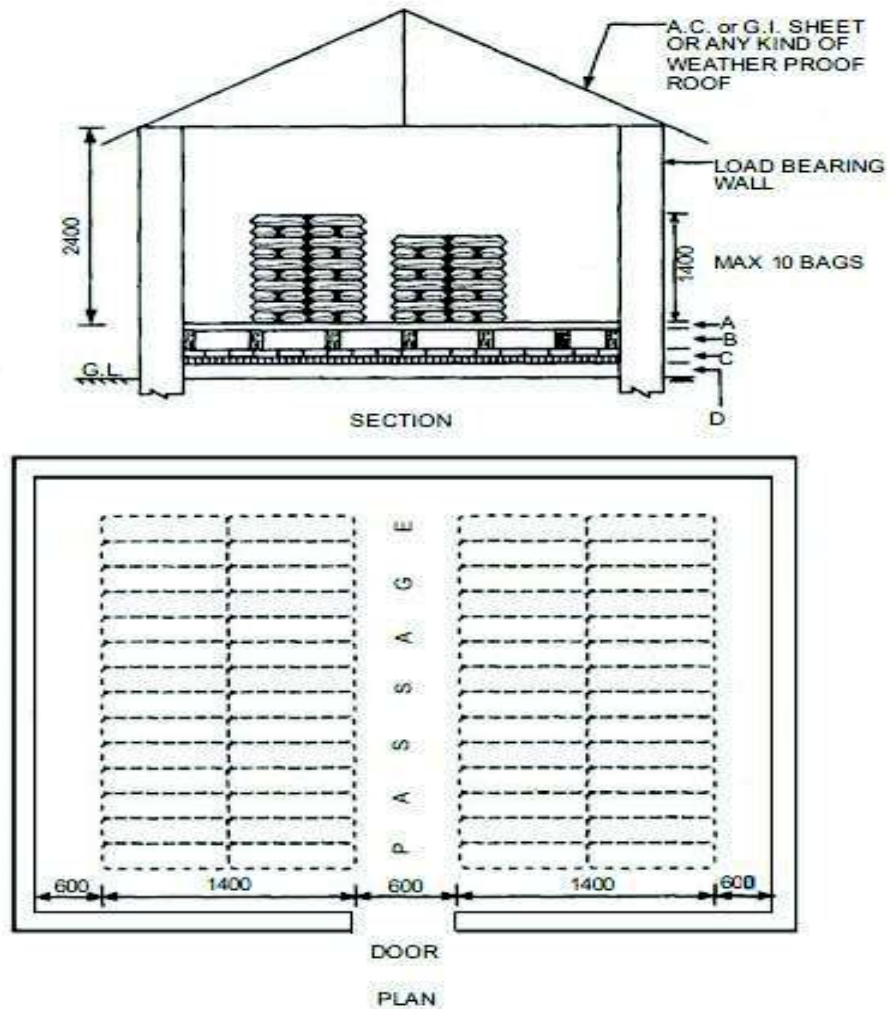
Wherever water is to be stored for construction purposes this shall be done in proper storage tanks to prevent any organic impurities getting mixed up with it.

OIL PAINTS

All containers of paints, thinners and allied materials shall preferably be stored in a separate room on floors with sand cushions. The room shall be well-ventilated and free from excessive heat, sparks of flame and direct rays of sun. The containers of paint shall be kept covered or properly fitted with lid and shall not be kept open except while using. The containers of paints have expiry date marked by the manufacturers, which should be highlighted so as to facilitate use of paint within due period.

TYPICAL SKETCH FOR CEMENT GODOWN

Typical Arrangement in Cement Godown



Drawing not to scale
All Dimensions in millimetres

A = Planks
B = Wooden Battens
C = 150 Dry Bricks in two Layers or Lean Cement Concrete
D = 150 Consolidated Earth

FREQUENCY AND ACCEPTANCE CRITERIAS FOR BUILDING MATERIALS USED FOR CONSTRUCTION

Sr No.	Building Materials	Frequency Criteria	Test to be Carried Out	Acceptance Criteria		IS Code
1	Water	Once for Approval of Each Source of water and subsequently in case of Doubt.	Chemical Analysis	PH Value	Not less than 6	IS : 456 - 2000 (Reaffirmed 2021) IS: 3025- Part-17 (Reaffirmed) IS: 3025 - Part-24 (Reaffirmed 2019) IS: 3025-Part-32 (Reaffirmed 2019) IS: 3025-Part-18 (Reaffirmed 2012) IS: 3025-Part-18 (Reaffirmed 2012)
				Suspended Matter	Max. 2000 mg/l	
				Sulphate (as SO_4^{-2})	Max. 400 mg/l	
				Chloride (as Cl)	Max. 2000 mg/l for Concrete not containing ambeded steel	
				Organic Matter	Max. 500 mg/l for Reinforce concrete Work Max. 200 mg/l	
				Inorganic Matter	Max. 3000 mg/l	

				0.02 N, NaOH Required to Neutralize 100 ml of water sample using Phenolphthalein as an indicator (Acidity)	Not more than 5 ml		IS: 3025- Part- 22 (Reaffirmed 2019)
				0.02 N, NaOH Required to Neutralize 100 ml of water sample using Mixed indicator (Alkanity)	Not more than 25 ml		IS: 3025- Part- 23 (Reaffirmed 2019)
				Fluoride (as F)	1.5 mg/l		
				Magnesium	100 mg/l		
				Alkanity (As CaCO_3)	600 mg/l		
2	Cement	One Test for every 50 M.T and or change of brand	(1) Setting Time (I) Intial in Minute (Min.) (II) Final in Minute (Max.) (2) Finess (m^2/kg) Min. (3) Compressive Strength N/mm^2 Not less than	OPC- 33	OPC- 43	OPC- 53	IS: 269-2015 (Reaffirmed 2020) IS: 4031-2016 IS: 4031-2016 IS: 4031-2016
				30	30	30	
				600	600	600	
				225	225	225	

			(I) 3 days (72 ±1 h.) Min. (II) 7 days (168 ± 2 h.) Min. (III) 28 days (672 ± 4 h.)Min. (4) Soundness by le-chatelier method in mm (Max.) (5) Consistency	16 23 33 10 About 30%	23 33 43 10	27 37 53 10	IS: 4031-2016 IS: 4031-2016 IS: 4031-2016 IS: 4031-2016 IS: 4031-2016
3	Sand For Concrete/ Reinforced Concrete Work	One test during Working Season . Minimum Two Tests i.e Prior to Monsoon and after monsoon (Minimum one Test for 150 m3 of Material used)	Silt Content (Max.) Gradation Zoning Tests	3 % by Weight or 8 % by Volume IS Sieve Designatio n Zone I Zone II Zone III Zone IV 10 mm 100 100 100 100 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 µm 15-34 35-59 60-79 80-100 300 µm 5-20. 8-30. 12-40. 15-50. 150 µm 0-10 0-10 0-10 0-15 Grading Zone IV should not be used in Reinforce Concrete Work As Above			IS :383- 2016

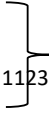
			Specific Gravity Water Absorption (%)	Min. 2.60 Max. 2 %	As per MORTH
4	Sand for Plaster	One test during Working Season . Minimum Two Tests i.e Prior to Monsoon and after monsoon (Minimum one Test for 150 m ³ of Material used)	Silt Content Fineness Modulus Gradation Specific Gravity Water Absorption (%)	Not More than 5 % by weight Not less than 1.4 in case of Crushed stone Sand Not less than 1.5 in case of naturally accouring sand IS Sieve Designation Percentage Passing 10 mm 100 4.75mm 95-100 2.36 mm 95-100 1.18 mm 90-100 600 micron 80-100 300 micron 20-65 150 micron 0-15 Min. 2.60 Max. 2 %	IS: 1542 - 1992 (Reaffirmed 2019) IS: 2386-1973 (Part-I) (Reaffirmed 2021) As per MORTH
5	Sand for Masonry		Silt Content (Max.)	Not more than 5 % by Weight in case of Natural sand and Crushed Gravel sand and Not more than 5 % by Weight in case of Crushed stone sand	

			Fineness Modulus Gradation	IS Sieve Designation	Percentage Passing	IS :2116-1980 (Reaffirmed 2017)
				4.75 mm	100	
				2.36mm	90-100	
				1.18mm	70-100	
				600 micron	40-100	
				300 micron	5--70	
				150 micron	0-15	
			Specific Gravity Water Absorption (%)	Min. 2.60		
				Max. 2 %		
6	Kapachi and Metal (For Concrete & Road Work)	2 Tests per Season i.e prior to and after monsoon / Minimum one test for 150 m ³ of material used	Specific Gravity Water Absorption %	Up to 3.00		IS :383- 2016
			Impact Value %	Up to 1.5 %		IS : 2386-1963 (Reaffirmed 2021)
				In Concrete for Wearing surfaces 30 % Maximum (For Road)		
				In Concrete other than Wearing surface 45 % Maximum		
			Combined Flankiness & Elongation Index %	Combined Flakiness & Elongation Index shall not exceed 40 % for uncrushed or crushed aggregate		
				(a) In Concrete for Wearing surfaces 30 % Maximum (For Road)		

			Crushing Value % Abrasion Value % Gradation Percent passing of IS Sieve	(b) In Concrete other than for Wearing surfaces 30 % Max. if In case agg. Crushing value exceeds 30 %, then the 10 % fines test should be conducted and the minimum load for the 10 % fines should be 50 KN In Concrete for Wearing Surfaces 30 % Maximum (For Road) In Concrete other than wearing surface 50 % Maximum IS : 383-2016 Table No :7 Clause No. 6.1 & 6.2 Page No 6	
7	Bricks	One set to test every 50,000 bricks and or change of brand /mark	Water Absorption Efflorescence Compressive Strength Dimension	Not more than 20 % by Weight up to class 12.5 (Table -1 Clause-4.1) Not more than Moderate up to Class 12.5 Not less than 3.5 N/mm ² (Class 3.5) Dimension Tolerances as per IS : 1077-1992 (Reaffirmed 2016) (Per 20 Bricks) Clause 6.2 Page No 1 Length : 4520 to 4680 mm Width : 2160 to 2240 mm Depth : 1360 to 1440 mm Dimension Tolerance as per IS 1077-1992 (Reaffirmed 2016) Per 20 Bricks, Clause 6.2, Page No.1	IS : 1077 - 1992 (Reaffirmed 2016) (3.5 class Table-1)
8	Reinforcement HYSD/TMT/ CRS	Each set to test for each diameter of bars for every 20	Diameter in mm (Chemical	Tolerance of nominal Mass Sr.No Nominal Size Tolerance on the Nominal Mass, Percent	IS : 1786-2008(Reaffirmed 2018)

		M.T or part thereof.	composition and tolerance in unit weight)		Batch	Individual Sample	Individual Sample for Coils only	Table No.2 Clause No. 6.2 & 7.2.2
				i) Up to and including 10	± 7	-8	± 8	
				ii) Over 10 up to and including 16	± 5	-6	± 6	
				iii) Over 16	± 3	-4	± 4	
				i) For individual sample plus tolerance is not specified. A single sample taken from a batch define in 3.1 shall not be considered as individual sample				
				ii) For Coils batch Tolerance is not specified.				
			Ultimate Tensile Strength	Grade Fe 415- 485 N/mm ² (Min.)				Table No. 3, Clause 8.1 Page No. 6
				Grade Fe 500 - 545 N/mm ² (Min.)				
				Grade Fe 500 D - 565 N/mm ² (Min.)				
			Yield Stress (0.2 % Proof Stress) (TMT/CRS)	Grade Fe 415- 415 N/mm ² (Min.)				Table No. 3, Clause 8.1 Page No. 6
				Grade Fe 500 - 500 N/mm ² (Min.)				
				Grade Fe 500 D - 500 N/mm ² (Min.)				
			Elongation % (TMT/CRS)	Grade Fe 415 - 14.5 % (Min.)				Table No. 3, Clause 8.1 Page No. 6
				Grade Fe 500 - 12 % (Min.)				

9	C.C. Cubes	Quantity Cmt. 1-5.	No of Samples 1	Corrosion Resistance Steel	Grade Fe 500 D - 16 % (Min.)	Clause-4.2, Note-3.																								
				Compressive Strength (N/mm2)	The chemical composition shall be as per IS 1786-2008 (Reaffirmed 2018)(Amendment No.3- March 2017)																									
				Acceptance Criteria for strength of CC Cubes at 28 Days (IS : 456-2000 and Amendment 2013)		IS :456 -2000 (Reaffirmed 2021) Table No.11 Clause No 16.1 & 16.3																								
					<table><tr><td>Grade</td><td>Established Standard deviation (N/mm²)</td><td>Acceptance Value (N/mm²) For all grade of Concrete</td></tr><tr><td>M10</td><td>3.5</td><td rowspan="10">Fck+0.85 X SD Rounded up to nearer 0.5 N/mm2 or Fck+3 (N/mm2) Whichever is Greater</td></tr><tr><td>M15</td><td>3.5</td></tr><tr><td>M20</td><td>4</td></tr><tr><td>M25</td><td>4</td></tr><tr><td>M30</td><td>5</td></tr><tr><td>M35</td><td>5</td></tr><tr><td>M40</td><td>5</td></tr><tr><td>M45</td><td>5</td></tr><tr><td>M50</td><td>5</td></tr><tr><td></td><td></td></tr></table>	Grade	Established Standard deviation (N/mm ²)	Acceptance Value (N/mm ²) For all grade of Concrete	M10	3.5	Fck+0.85 X SD Rounded up to nearer 0.5 N/mm2 or Fck+3 (N/mm2) Whichever is Greater	M15	3.5	M20	4	M25	4	M30	5	M35	5	M40	5	M45	5	M50	5			
Grade	Established Standard deviation (N/mm ²)	Acceptance Value (N/mm ²) For all grade of Concrete																												
M10	3.5	Fck+0.85 X SD Rounded up to nearer 0.5 N/mm2 or Fck+3 (N/mm2) Whichever is Greater																												
M15	3.5																													
M20	4																													
M25	4																													
M30	5																													
M35	5																													
M40	5																													
M45	5																													
M50	5																													
					NOTE: The Above Values Correspond to the site control having proper Storage of cement, Weighbaching of all Materials control addition of water, regular checking of all materials, aggregate grading and moisture content, and periodically checking of workability and strength, Where there id deviation from the above value given in the above table shall be increase by 1 N/mm ²																									
10	Flooring Tiles/ Mosaic/Plain	One Test for every 10,000 Nos. of		Water Absorption %	Average Percentage of Water Absorption Shall not Exceed 10	IS : 1237-2012 (Reaffirmed																								

		tiles used and Change of Brand Mark and per Batch lot	Transerver Strength Abrasion Size Tolerance	<p>The Average Wet Transerver Strength Shall not be less than 3 N/mm²</p> <p><u>For General Purpose Floor Tiles</u></p> <p>Average Wear Not Exceed 3.5 mm</p> <p>Wear on individual Specimen Not Exceed 4 mm</p> <p><u>For heavy duty floor tiles</u></p> <p>Average Wear Not Exceed 2 mm</p> <p>Wear on individual Specimen Not Exceed 2.5 mm</p> <p>length - ±1 mm</p> <p>width- ±1 mm</p> <p>Thickness - +15 % Negative size not permitted</p>	2017) Clause NO. 12.5, Page No. 3
11	Bela Stone	2 Sets of test per Working Seasons to i.e Prior and after Monsoon	Water Absorption Crushing Strength Specific Gravity	<p>0.15 % by Weight</p> <p>  </p> <p>IS : 1123-1975 (Reaffirmed 2017) Table No. 1, Page No. 4</p>	IS : 1123-1975 (Reaffirmed 2017)
12	Teak Wood / Non Teak Wood		Color Hardness Weight Feature Density Porosity	IS :4970 -1973 & IS : 1708-1969 (Reaffirmed 2020) as per Trade name of teak wood or Botanical name	

			<p>Cross Grain</p> <p>Sound Knots & Live Knots</p> <p>Decayed Knots, dead Knots and knots holes</p>	<p>Not steeper than 1 in 15</p> <p>size (Max) = 20mm No. per meter = 1</p> <p>Not more than 10 mm Size Centrally located and not more than 1 knot per meter. These shall be completely put out and tightly plugged with seasoned timber of the same species properly glued, so that its grains run in the direction of main pieces</p>					IS : 4021 - 1995 (Reaffirmed 2000) Table No 1, Clause 4.1.5, Page No. 5
13	Seasoned & Chemically treated wood	One samples for the lots	<p>Moisture Content</p> <p>Absorption of Presentative Windows</p>	<p>Door & Windows</p> <p>50 mm and Above in thickness</p> <p>Thinner than 50 mm</p> <p>Average Moisture Content of all the samples from a lot shall be within ± 3 percent and moisture Content of individual sample with ± 5 percent of the permissible moisture content for the particular end use and locality indicated under IS :287-1993 (Reaffirmed 2017) Table No.1 Clause No. 4 & 5</p> <p>For Zone refer Map given in IS :287-1993 (Reaffirmed 2017)</p> <p>Preservation Recommended Absorption Kg/m</p>	Zone I	Zone II	Zone III	Zone IV	<p>IS :287-1993 (Reaffirmed 2017) Table No. 1, Clause 4 & 5, Page No. 2</p> <p>IS : 401-2001 (Reaffirmed 2016) Table No. 2, Clause 8.2</p>

				CTC/LTC	80			
				CCA	4			
				ACA	4			
				CCB/BCCA	6.5			
				Copper naphthate/abietate	0.5			
				Zinc abietate	0.8			
				TCP	4			
				Boric Acid Borax	5			
14 (a)	Coarse Aggeregare for WBM	1 Test for 100 cu.m	(A) Coarse Aggeregare Gradation	Grading Number	Size Range and Compacted thickness for layer	Sieve Designation (IS 460)	Percent by Weight Passing the Sieve	IRC : 19-2005
				1	90 mm to 45 mm (100mm)	125 mm 90mm 63 mm 45 mm 22.4 mm	100 90-100 25-60 0-15 0-5	
				2	63 mm to 45 mm (75 mm)	90 mm 63 mm 53 mm 45 mm	100 90-100 25-75 0-15	

					22.4 mm	0-5	
				3	53 mm to 22.4 mm (75 mm)	63 mm	100
					53 mm	90-100	
					45 mm	65-90	
					22.4 mm	0-10	
					11.2 mm	0-5	
					<u>For Sub base</u>	<u>For Surfacing</u>	
			Abrasion Value by Los. Angles	Max. 50 %		Max. 40 %	
		5 Test for 501 to 1500 cu.m	Impact Value	Max. 40 %		Max. 30 %	
			(B) Screening for WBM				
		1 Test for 100 cu.m	Gradation	Gradation Claasificati on	Size of Screening (IS 460)	Sieve Designation Passing the Sieve	Percent by Weight
				A	13.2 mm	13.2 mm	100

					11.2 mm	95-100	
					5.6 mm	15-35	
					180 micron	0-10	
				B	11.2 mm	11.2 mm	100
					5.6 mm	90-100	
					180 micron	15-35	
			Specific Gravity	Upto 3.00			
			Water Absorption	Upto 1.5 %			
14 (b)	Binding Material for WBM		Sieve	Fine Grained Material Passing 100 % through 425 micron Sieve			IRC : 19-2005
			Plasticity Index	4-8 :- WBM used for Surfacing Wearing			
				< 6 :- WBM used for Sub base			
15	G.I Pipes Medium Grade IS	One Sample From each batch lot for each Dia. of Pipes	(1) Weight 15 mm dia	1.22 Kg/m			IS: 1239 (Part-I) - 2004 (Reaffirmed
			20mm dia	1.57 Kg/m			

			25 mm dia 32 mm dia 40 mm dia 50 mm dia 65 mm dia 80 mm dia 100 mm dia 125 mm dia 150 mm dia (2) Tolerance in thickness & mass (3) Galvanizing (4) Leak proof test	2.43 Kg/m 3.13 Kg/m 3.60 Kg/m 5.10 Kg/m 6.54 Kg/m 8.53 Kg/m 12.5 Kg/m 16.4 Kg/m 19.5 Kg/m As per IS: 1239 (Part-I) - 2004 (Reaffirmed 2016) , Clause No. 9.00 As per IS: 4736-1986 (Reaffirmed 2021) Hydraulic Test shall be carried out Pressure of 5 Mpa and same maintained or atleast 3 and shall not show any leakage in the pipe	2019) Table No. 4, Clause No. Table No.3- For light Table No. 4- for Medium Table No. 5- For heavy IS: 4736-1986 (Reaffirmed 2021)
16	Admixtures		pH Value Chloride Iron Content (%)	7--8 Within 10 % of the value or 0.2 % whichever is greater as stated by Manufactures	IS : 9103 - 1999 (Reaffirmed 2018) , Table No. 2, Clause No. 9, Page No. 5 (

			Relative Density Dry Material Content (%) For Liquid Admixture For solid Admixture	Within 0.02 of the value stated by Manufactures Within 3 percent of the value stated by the manufacture	Annexture-E for Test)
17	C.C Blocks of Grade (C.5.0)	Per 10000- 1 set of Sample 20000- 1 set of Sample	Block Density Water Absorption % Compressive Strength (N/mm ²) Drying Shrinkage Moisture Content	Minimum Block Density 1800 Kg/m ² Average Water Absorption Should not be more than 10 % by mass Minimum Average Compressive Strength not less than 5.00 N/mm ² at 28 Days Average Value of Drying Shrinkage shall not exceed 0.06 % Average Moisture Content shall not exceed 0.09 %	IS : 2185 (Part-1)- 2005 (Reaffirmed 2020) Table No.2, Clause No. 5.1, 5.2 & 9.4 Page No. 4
18	CPVC Pipe SDR 11/13.5/17	One Sample From each lot of each Dia of Pipe	Working Pressure	As per mentioned in IS Code	IS : 15778 - 2007 (Reaffirmed 2012) Table No. 1, Page No. 2

			Wall Thickness and Outside Diameter		IS : 15778 - 2007 (Reaffirmed 2012) Table No. 2, Clause No. 7, 7.1, 7.2 and 7.1.2.1 Page No. 4
			Density	The Density of pipe shall be between 1450 Kg/m ³ to 1650 Kg/m ³	
19	UPVC Pipe Type A : Rain Water Type B : Soil & Waste Water	One Sample From each lot of each Dia of Pipe	Color Wall Thickness and Outside Diameter Resistance to Sulphuric Acid Tensile Strength Water Tightness of a Joint	Surface color of the pipe shall be Dark Shade of Grey IS : 13592 -2013 , Table No 1 & Table No. 2 Clause 7.1 Page No. 2 Neither Increase by more than 0.032 g nor Decrease by more than 0.13 g Strength at Break shall Not be less than 45 Mpa Apply Pressure of 0.05 Mpa for a Period of 15 min and there should be no leakage at any Joint	IS : 13592-2013 (Reaffirmed 2018)
20	(Cohesive Non swelling) Soil	Once for Approval of Each Source of soil and sub Sequently in case of Doubt	Grain size analysis Consistency Limit	Clay - 15-25 % Silt - 35-50 % Sand - 30-40 % Gravel - < 10 % Liquid Limit - 30-50 % Plastic Limit - 20-50 %	IS: 2720 (Part- IV)-1985 (Reaffirmed 2020) IS : 2720 (Part-5)-1985

			<p>Plasticity Index - 10-25 %</p> <p>Shrinkage Limit - 15 % and Above</p> <p>Swelling Pressure</p> <p>Swelling Pressure when compacted to maximum dry density corresponding to Standard Proctor Compaction with Zero Initial Compaction Moisture Constant, For no Volume Change Condition.</p> <p>Swelling Pressure when compacted to maximum dry density corresponding to Standard Proctor Compaction and initial Compaction moisture corresponding to optimum Moisture Content for no Volume Change Condition.</p> <p>Clay Minerals</p> <p>Preferable Kaolinite and Illite</p> <p>Shear Strength</p> <p>Shear Strength of Sample Compacted to maximum dry density Correspond to Standard Proctor Compaction and Initial Moisture Content Corresponding to Optimum Moisture Content, but sample tested on saturation</p> <p>(a) From Unconfined Compression</p> <p>Cu 0.15 - 0.35 Kg/cm² (15 to 35 KN/m²)</p> <p>(b) From Consolidated Undrained direct shear test</p> <p>Cu 0.1 - 0.35 Kg/cm² (10 to 30 KN/m²)</p> <p>Ø Cu 8° - 15°</p>	<p>(Reaffirmed 2020)</p> <p>IS : 2720 (Part- XLI)- 1977 (Reaffirmed- 2016)</p> <p>IS : 2720 (Part- 13)- 1986 (Reaffirmed- 2016)</p>
21(a)	AAC Block(Autoclaved cellular Aerated Concrete block)	Per 10000 Nos.- 1 set of Sample and each Batch	<p>Compressive Strength</p> <p>Minimum 4.00 N/mm² (Grade-1)</p> <p>For Compressive Strength the mean value say X shall be determined. The Test shall be grouped into groups of 4 and individual Values of range shall be determined and the average range R Calculated from the value and shall satisfy the following Condition</p> <p>$X - 0.6 R \geq \text{Minimum Value specified in Table No. 1}$</p>	<p>IS: 2185 (Part- 3)-1984 (Reaffirmed- 2020) Table No.1, Clause No. 4.1, 8.3,</p>

			Average Block Dry Density Thermal Conductivity Drying Shrinkage Tolerance in dimension	551 to 650 Kg/m ³ Shall not exceed 0.24 W/m-k Not more than 0.05 % Length - Not more than ± 5 mm Width & Height } Not more than ± 3 mm	8.4, 8.5, 11.2, 11.3, 11.4, Page No. 7
21 (b)	AAC Block Jointing Mortar		Color Pot Life Tensile Spilting Strength	Grey 1 to 2 Hours. 0.30 to 0.80 or more N/mm ²	
22	Paver Block	One Sample From Lot	Dimension Tolerance Water Absorption (Max.) in %	Thickness < 100mm Length - ± 2 mm Width - ± 2 mm Thickness - ± 3 mm <u>Individual</u> <u>Average</u> 7% 6%	IS : 15658-2021 Table No.2, Clause No. 7.2, Page No. 4 Anne x C IS : 15658-2021 Table No. 3, Clause No 7.3 and

			Compressive Strength, Mpa (Min.)	fck-3	fck-0.825 X Established Standard Deviation	Anne x D	9.1.4, Page No 5
					Rounded of to nearest 0.5 Mpa		
					or		
					fck+3, Whichever is greater		
			Tensile Spilting Strength, Mpa (Min.)	0.08 fck for grade < M40	0.085 fck for grade < M40	Anne x F	
				3.0 Mpa for grades \geq M40	3.6 Mpa for grades \geq M40		
			Flexural Strength, Mpa (Min.)	0.10 fck	0.11 fck	Anne x G	
			Abrasion Resistance mm ³ per 5000 mm ² (Max.)				
			Dry	20000	18000	Anne x E	
			Wet	22000	20000		
			Thickness of Wearing Layer	Minimum 6 mm			
23	S.S Railing (AISI-304)	One Sample From Lot for each shape/ dia	Iron	66.74-71.24 % (Balance)			(1) AISI- 304 (S.S)(American Iron and
			Chromium(Cr)	17.00- 20.00 %			

			Nickel (Ni) Manganese (Mn) Silicon (Si) Carbon (C) Phosphorus (P) Tensile Strength (Mpa)	9-13 % Max. 2 % Max. 1 % Max. 0.08 % Max. 0.045 % 510-705 N/mm ²		Steel Institute) (2) IS Code : 6913-1973 (Reaffirmed 2013)
24	Structural Steel	One Sample From Lot for each shape	Chemical Composition Tolerance Tensile Strength Mpa (Min.) Yield Strength Mpa (Min.) Elongation in Gauge Length (Min.)	<u>Structural Steel</u> C Mn S P Si CE Acceptance as per IS code 2062 Table No.1 Clause 5.8.1/5.8.2 IS : 2062-2011 (Reaffirmed 2016) Clause No. 16 Page No. 8 IS : 2062-2011 (Reaffirmed 2016) Table No.2, Clause No. 5, 10.3, 10.3.1, 11.3.1, 12.2, 12.4, Page No.4	<u>Steel Tubes (Structural Steel)</u> IS : 1161-2014 (Reaffirmed 2019) Clause 6.2 , Page No. 3 IS : 1161-2014 (Reaffirmed 2019) Table No. 2, Clause No. 3.1, 11.2, page No. 4	IS : 1161-2014 (Reaffirmed 2019) IS :2062 (Reaffirmed 2016), Table No. 1 Clause 5.8.1

			Weight of Steel	IS: 808 (Reaffirmed 2021)					
25	Tiles			Test Req. for tiles with W.B $E \leq 0.08\%$ (Group B Ia) Table No. 9	Test Req. for tiles with W.B $0.08 < E \leq 3$ (Group B Ib) Table No. 8	Test Req. for tiles with W.B $3 < E \leq 6$ (Group B IIa) Table No. 7	Test Req. for tiles with W.B $6 < E \leq 10$ (Group B IIb) Table No. 6	Test Req. for tiles with W.B $E > 10\%$ (Group B III) Table No. 5	IS: 15622-2017
			Water Absorption %	Average ≤ 0.08 , Individual 0.1 Max.	Average $0.08 < E \leq 3$, Individual 3.3 Max.	Average $3 < E \leq 6$, Individual 6.2 Max.	Average $6 < E \leq 10$, Individual 10.5 Max.	Average $> 10\%$ (When the Value exceed 20% shall be indicated by the manufacture	
			Modulus of Rupture N/mm ²	Average 35 , Individual 32 , Min.	Average 30 , individual 27 Min.	Average 22 , individual 20 Min.	Average 18 , individual 16 Min.	12 , Min. for Thickness ≥ 7.5 mm 15 , Min. for Thickness < 7.5 mm	

		Breaking Strength (N)	700 Min. for Thickness < 7.5mm	700 Min. for Thickness ss < 7.5mm	600 Min. for Thickness ss < 7.5mm	500 Min. for Thickness ss < 7.5mm	200, Min. for Thickness < 7.5 mm
			1300 Min. for Thickness ≥ 7.5 mm	1100 Min. for Thickness ss ≥ 7.5 mm	1000 Min. for Thickness ss ≥ 7.5 mm	800 Min. for Thickness ss ≥ 7.5 mm	600, Min. for Thickness ≥ 7.5 mm
		Moisture Expansion in mm/m	Max. 0.02	Max. 0.02	Max. 0.03	Max. 0.04	Max. 0.04
		Resistance to surface abrasion class 1 to v ³	Min. Class II	Min. Class II	Min. Class II	Min. Class II	Min. Class II
		Coefficient of linear thermal expansion from ambient temperature to 100 c	Max 6 X 10 ⁻⁶	Max 7 X 10 ⁻⁶	Max 9 X 10 ⁻⁶	Max 9 X 10 ⁻⁶	Max 9 X 10 ⁻⁶
		Crazing Resistance	4 cycles at 7.5 Bar Min.	4 cycles at 7.5 Bar Min.	4 cycles at 7.5 Bar Min.	4 cycles at 7.5 Bar Min.	4 cycles at 7.5 Bar Min.

Impact Resistance	Min. 0.55	Min. 0.55	Min. 0.55	Min. 0.55	Min. 0.55
Thermal Shock resistance	Min. 10 cycle	Min 10 Cycle	Min 10 Cycle	Min 10 Cycle	Min. 10 Cycle
Scratch Hardness Of Surface on Moh's Scale	Min. 5	Min 5	Min 4	Min 4	Min. 3
Bulk Density	Min. 2.2 g/cc	Min. 2.2 g/cc	-	-	-
Dimension					
(a) The Devlation , in percent of the average size for each tile (4 side)from the work size	N≤ 20 cm ± 0.3 N>20 cm - ± 0.1	N≤ 20 cm ± 0.3 N>20 cm -± 0.1	N≤ 20 cm ± 0.3 N>20 cm -± 0.1	N≤ 20 cm ± 0.3 N>20 cm -± 0.1	N≤ 15 cm ± 0.2 N > 15 cm- ± 0.2
(b) The deviation , in percentage of the average size for each tile (4 side) from the work Size of the 10 test specimens (40 sides)	N≤ 20 cm ± 0.2 N>20 cm - ± 0.1	N≤ 20 cm ± 0.2 N>20 cm -± 0.1	N≤ 20 cm ± 0.2 N>20 cm -± 0.1	N≤ 20 cm ± 0.2 N>20 cm -± 0.1	N≤ 15 cm ± 0.3 N > 15 cm- ± 0.2

Straightness of Sides (facial sides)	N≤ 20 cm ± 0.3	N≤ 20 cm ± 0.3	N≤ 20 cm ± 0.3	N≤ 20 cm ± 0.3	± 0.15
the maximum deviation from strightness in percent related to the Correspondin g Work Size	N>20 cm - ± 0.1	N>20 cm -± 0.1	N>20 cm -± 0.1	N>20 cm -± 0.1	
Rectangularit y the maximum deviation from strightness in percent related to the Correspondin g Work Size	N≤ 20 cm ± 0.3	N≤ 20 cm ± 0.3	N≤ 20 cm ± 0.3	N≤ 20 cm ± 0.3	± 0.2
Surface Flatness (a) Centre of curvature related to diagonal calculated from the work size	N≤ 20 cm ± 0.75	N≤ 20 cm ± 0.75	N≤ 20 cm ± 0.75	N≤ 20 cm ± 0.75	± 0.3
	N>20 cm - ± 0.5	N>20 cm -± 0.5	N>20 cm -± 0.5	N>20 cm -± 0.5	

(b) Edge of curvature related to corresponding Work Size	N ≤ 20 cm ± 0.75	N ≤ 20 cm ± 0.75	N ≤ 20 cm ± 0.75	N ≤ 20 cm ± 0.75	± 0.3
	N > 20 cm - ± 0.5	N > 20 cm - ± 0.5	N > 20 cm - ± 0.5	N > 20 cm - ± 0.5	
(c) Warpage, related to the Diagonal Calculated From the Work Size	N ≤ 20 cm ± 0.75	N ≤ 20 cm ± 0.75	N ≤ 20 cm ± 0.75	N ≤ 20 cm ± 0.75	± 0.3
	N > 20 cm - ± 0.5	N > 20 cm - ± 0.5	N > 20 cm - ± 0.5	N > 20 cm - ± 0.5	
Deep abrasion	Removed Volume in mm ³ for unglazed tiles 140 Max.	Removed Volume in mm ³ for unglazed tiles 175 Max.	Removed Volume in mm ³ for unglazed tiles 345 Max.	Removed Volume in mm ³ for unglazed tiles 540 Max.	-
Chemical Properties					
(a) Resistance to staining of Glazed tiles	Class 1 Min.	Class 1 Min.	Class 1 Min.	Class 1 Min.	Class 1 Min.

		(b) Resistance to Household Chemical and Swimming pool water Cleansers except to cleaning agent containing Hydrofluroic acid and its Compounds Resistance to acid and alkali with the exception of hydrofluroic acid and its Compound	Class AA Min.	Class AA Min.	Class AA Min.	Class AA Min.	Class AA Min.	
			Required	Required	Required	Required	Required	

GENERAL SPECIFICATION FOR MATERIALS TO BE USED

M – 1 Water:

Water shall not be salty or brackish and shall be clean, reasonably clear and free from objectionable quantities of silt and traces of oil, injurious alkalis, salts, organic matter and other deleterious materials which will either weaken the mortar of concrete or cause efflorescence or attach the steel in RCC container for transport, storage and handling of water shall be clean. Water shall conform to the standards specified in IS 456-2000 (Reaffirmed 2021) or its latest edition.

If required by the Engineer In charge it shall be tested by comparison with distilled water. Comparison shall be made by means of standard Cement tests for Soundness, time of setting and mortar strength as specified in IS 269-2015 (Reaffirmed 2020) or its relevant and latest edition. Any indication of unsoundness, change in time of setting by 30 minutes or more or decrease of more than 10 percent in strength of mortar prepared with water compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.

Water for curing mortar, concrete or masonry should not be too acidic or too alkaline. It shall be free of elements which significantly affect the hydration reaction of otherwise interfere with the hardening of mortar or concrete during curing of those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces.

Hard and bitter water shall not be used for curing.

Potable water will generally found suitable for curing mortar or concrete.

M – 2 Lime:

Lime shall be hydraulic lime as per IS 712-1984 (Reaffirmed 2019) or its relevant and latest edition. Necessary tests shall be carried out as per IS 6932(Part I to X) 1973 (Reaffirmed 2019) or its relevant and latest edition.

The following field tests for limes are to be carried out :

- a. A very rough idea can be formed about the type of lime by its visual examination i.e. fat lime bears pure white color, lime in form of porous lumps of dirty white color indicate quick lime, and solid lumps are the un-burnt lime stone.
- b. Acid tests for determining the carbonate content in lime. Excessive amount of impurities and rough determination of class of lime.

Storage shall comply with I.S. 712-1984 (Reaffirmed 2019) or its relevant and latest edition. The slaked lime, if stored, shall be kept in a weather proof and damp-proof shed with impervious floor and sides to protect it against rain, moisture, weather and extraneous materials mixing with it. All lime that has been damaged in any way shall be rejected and all rejected materials shall be removed from site of work.

Field testing shall be done according to IS 1624-1986 (Reaffirmed 2019) or its relevant and latest edition to show the acceptability of materials.

M – 3 Cement:

3.1.1 The cement used shall be any of the following grade and the type selected should be appropriate for the intended use.

- (a) 33 grade ordinary Portland cement conforming to IS 269-2015 (Reaffirmed 2020).
- (b) 43 grade ordinary Portland cement conforming to IS 269-2015 (Reaffirmed 2020).
- (c) 53 grade ordinary Portland cement conforming to IS 269-2015 (Reaffirmed 2020).
- (d) Rapid hardening Portland cement conforming to IS 8041-1990, Reaffirmed 2014.
- (e) Portland slag cement conforming to IS 455-2015, Reaffirmed 2020.
- (f) Portland Pozzolana cement (flyash based) conforming to IS 1489 (Part 1)-2015, Reaffirmed 2020.
- (g) Portland Pozzolana cement (calcined clay based) conforming to IS 1489 (part 2)-1991, Reaffirm Apr 2014.

- (h) Hydrophobic Portland cement conforming to IS 8043-1991, Reaffirmed 2014.
- (i) Low heat Portland cement conforming to IS 12600-1989, Reaffirmed 2014.
- (j) Sulphate resisting Portland cement conforming to IS 12330-1988, Reaffirmed 2019.
- (k) White cement conforming to IS 8042-2015, Reaffirmed 2020.

Different types of cement shall not be mixed together. In case more than one type of cement is used in any work, a record shall be kept showing the location and the types of cement used.

3.1.2 Caution in Use of Cement Grade 53 in Construction: Because of the faster hydration process, the concrete releases heat of hydration at a much faster rate initially and release of heat is the higher in case of Grade. 53. The heat of hydration being higher, the chances of micro-cracking of concrete is much greater. Thus, during initial setting period of concrete, the higher heat of hydration can lead to damaging micro-cracking within the concrete which may not be visible at surface. This cracking is different from shrinkage cracks which occurs due to faster drying of concrete in windy conditions.

The situation can be worse when we tend to increase the quantity of the cement in the concrete with a belief that such increases are better for both strength and durability of concrete. Thus, it is very essential to be forewarned that higher grade cement specially grade 53 should be used only where such use is warranted for making higher strength concrete and also where good Quality Assurance measures are in place, by which proper precaution are taken to relieve the higher heat of hydration through chilling of aggregates or by proper curing of concrete. There are instances where higher grade cement is being used even for low strength concrete, as, mortar or even for plastering. This can lead to unnecessary cracking of concrete/ surfaces.

Another issue to be cautioned against is the tendency of the manufacturers to project Grade 53 cement as stronger cement, whereas Grade 33 or 43 are enough to produce the concrete of desired characteristic strength. The scenario of method of production of cement by various manufacturers should also be kept in mind while ordering various grades of cement. The ability to produce cements of particular fineness get fixed by the machinery installed by the manufacturers, and thus the ability to produce other various grades of cement by a particular manufacturer also gets limited. Whereas tendency today is to supply the consumer what he orders for by the manufacturers by simply stamping such grades on the bags. Thus, it is often observed that cement bags marked as grade 33 or 43 may really be containing cements of much higher grade.

3.1.3 Compressive Strength : Compressive strength requirement of each type of cement for various grades when tested in accordance with IS 4031 (part 6) shall be as under:

Sample	Strength in N/mm ² not less than for		
Age at testing	Gr. 33	Gr. 43	Gr. 53
72 + 1 hr	16	23	27
168 + 2 hrs	22	33	37
672 + 4 hrs	33	43	53

3.1.4 Setting Time: Setting time of cement of any type of any grade when tested by Vicat apparatus method described in IS 4031 (Part-5)-1988 (Reaffirm-2014) shall conform to the following requirement:

- (a) Initial setting time: Not less than 30 minutes
- (b) Final setting time: Not more than 600 minutes

3.1.5 Supply : The cement shall be packed in jute sacking bags conforming to IS 2580, double hessian bituminized (CRI type) or woven HDPE conforming to IS 11652. Woven polypropylene conforming to IS 11653, jute synthetic union conforming to IS: 12174, or any other approved composite bags, bearing the manufacturer's name or his registered trade mark if any, with grade batch no. and type of cement, with date of manufacturing of batch of cement.

Every delivery of cement shall be accompanied by a producer's certificate conforming that the supplied cement conforms to relevant specifications. These certificates shall be endorsed to the Engineer-in-Charge for his record.

Every consignment of cement must have identification marks on packages indicating date of manufacturing grade and type of cement batch no. etc. **Cement** brought to works shall not be more than 6 weeks old from the date of manufacture.

Effective precautionary measures shall be taken to eliminate dust-nuisance during loading or transferring cement.

3.1.6 Stacking and Storage : Cement in bags shall be stored and stacked in a shed which is dry, leakproof and as moisture-proof as possible. Flooring of the shed shall consist of the two layers of dry bricks laid on well consolidated earth to avoid contact of cement bags with the floor. Stacking shall be done about 150 to 200 mm clear above the floor using wooden planks. Cement bags shall be stacked at least 450 mm clear off the walls and in rows of two bags leaving a space of at least 600 mm between two consecutive rows. In each row the cement bags shall be kept close together so as to reduce air circulation. Stacking shall not be more than 10 bags high to avoid lumping under pressure. In stacks more than 8 bags high, the cement bags shall be arranged in header and stretcher fashion i.e. alternately lengthwise and crosswise so as to tie the stacks together and minimise the danger of toppling over.

A typical arrangement for storing and stacking of cement is shown in Fig. 1. of sub-head of Carriage of Materials.

Different types of cement shall be stacked and stored separately.

Cement bags shall be stacked in a manner to facilitate their removal and use in the order in which they are received.

For extra safety during monsoon, or when cement is expected to be stored for an unusually long period, each stack shall be completely enclosed by a water proofing membrane, such as polyethylene, which shall cover the top of the stack. Care shall be taken to see that the water proofing membrane is not damaged at any time during use.

Storage of cement at the work site shall be at the contractor's expense and risk. Any damage occurring to cement due to faulty storage in contractor's shed or on account of negligence on his part shall be the liability of the contractor.

M – 4 White Cement:

The white cement shall be conforming to IS 8042-E-2015 (Reaffirmed 2020) or its relevant and latest revision.

M – 5 Coloured Cement:

Coloured cement shall be with white or grey Portland cement as specified in the item of the work.

The Pigments used for coloured cement shall be of approved quality and shall not exceed 10 % of cement used in the mix. The mixture of pigment and cement shall be properly ground to have a uniform colour and shade. The pigments shall have such properties as to provide for durability under exposure to sunlight and weather. The pigment shall have the property such that it is neither affected by the cement nor detrimental to it.

M – 6 Sand:

Sand shall be natural sand, clean, well graded, hard strong, durable and gritty particles free from injurious amounts of dust, clay, kankar nodules, soft of flaky particles shale, alkali, salts organic matter, loam, mica or other deleterious substance and shall be got approved from the Engineer In charge. The sand shall not contain more than 8% of silt as determined by method prescribed in Appendix "C". If necessary the sand shall be washed to make it clean. It must be screened prior use.

Grading : On the basis of particle size, fine aggregate is graded in to four zones. The grading when determined in accordance with the procedure prescribed in Appendix 'B' of Chapter 3 shall be within the limits given in Table 3.1 below. Where the grading falls outside the limits of any particular grading zone of sieves, other than 600 micron IS sieve, by a total amount not exceeding 5 per cent, it shall be regarded as falling within that grading zone.

TABLE 3.1
Fine Aggregates for Concrete (IS 383-2016)
(Clause 3.1.3)

IS Sieve	Percentage passing for			
	Grading Zone I	Grading Zone II	Grading Zone III	Grading Zone IV
10 mm	100	100	100	100
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 microns	15-34	35-59	60-79	80-100
300 microns	5-20	8-30	12-40	15-50
150 microns	0-10	0-10	0-10	0-15

Note 1: For crushed stone sands, the permissible limit on 150 micron sieve is increased to 20 per cent.

This does not affect the 5 per cent allowance permitted in 3.1.1.8 applying to other sieves.

Note 2: Allowance of 5% permitted in 3.1.1.8 can be split up, for example it could be 1% on each of three sieves and 2% on another or 4% on one sieve and 1% on another.

Note 3: Fine aggregate conforming to Grading Zone IV shall not be used in reinforced cement concrete unless tests have been made to ascertain the suitability of proposed mix proportions.

Note 4: Sand requiring use for mortar for plaster work shall conform to IS 1542-1992 (Reaffirmed 2019) and for masonry work shall conform to IS 2116-1980 (Reaffirmed 2017).

Type and grading of fine aggregate to be used shall be specified. Use of sea sand shall not be allowed, unless otherwise specified.

Fine aggregate may further be sub-divided into following parts:-

Coarse sand shall be either river sand, pit sand, **crushed stone sand**, **crushed gravel sand** or a combination of these. It shall be clean, sharp, angular, gritty to touch and composed of hard siliceous material. Its grading shall fall within the limits of grading zone I, II, III of Table 3.1. Grading of sand shall conform to IS 2116 -1980 (Reaffirm-2017) for use in Masonry work of Table 3.2.

Fine sand shall be either river sand or pit sand or a combination of the two. Its grading shall fall within the limits of Grading zone IV of Table 3.2. Grading of sand shall conform to IS 1542-1992 (Reaffirmed 2019) for use in plaster work.

Stone dust/**Gravel dust** shall be obtained by crushing hard stones or gravel. Its grading shall fall within the limits of grading Zone, I, II, III **or IV** of Table 3.1.

Marble dust shall be obtained by crushing marble. Its grading shall fall within the limits of Grading Zone IV of Table 3.1. Grading of Marble dust for use in Mortar shall be as per following table.

Grading of Marble Dust

<i>IS Sieve</i>	<i>Percentage Passing</i>
10 mm	100
4.75 mm	95-100
2.36 mm	95-100
1.18 mm	90-100
600 micron	80-100
300 micron	15-50
150 micron	0-15

Sand for Masonry Mortar and for Plaster- Sand shall consist of natural sand, crushed stone sand or crushed gravel sand or a combination of any of these. Sand shall be hard durable, clean and free from adherent coating and organic matter and shall not contain the amount of clay, silt and fine dust more than specified as under.

Deleterious Material: Sand shall not contain any harmful impurities such as iron, pyrites, alkalis, salts, coal or other organic impurities, mica, shale or similar laminated materials, soft fragments, sea shale in such form or in such quantities as to affect adversely the hardening, strength or durability of the mortar. The maximum quantities of clay, fine silt, fine dust and organic impurities in the sand / Marble dust shall not exceed the following limits:

- | | |
|--|---|
| (1) Clay, fine silt and fine dust when determined in accordance within IS 2386 (Part II)-1963 (Reaffirmed-2021). In natural sand or crushed gravel sand & crushed stone sand | Not more than 5% by mass |
| (2) Organic impurities when determined in accordance with IS 2386 (Part II) - 1963 (Reaffirmed-2021) | Colour of the liquid shall be lighter than that indicated by the standard specified in IS 2386 (Part II) -1963 (Reaffirmed-2021). |

Grading of sand for use in masonry mortar shall be conforming to IS: **2116 -1980 (Reaffirmed-2017)**

(Table 3.2 below).

Grading of sand for use in plaster shall be conforming to IS 1542-1992 (Reaffirmed-2019) (Table 3.2 below):

TABLE 3.2
Grading of Sand for use in Masonry Mortar and Plaster

<i>Grading of sand for use in masonry mortar (IS 2116-1980, Reaffirmed 2017)</i>		<i>Grading of sand for use in plaster (IS 1542-1992 (Reaffirmed-2019))</i>	
<i>IS Sieve Designation</i>	<i>Percentage passing by mass</i>	<i>IS Sieve Designation</i>	<i>Percentage passing by mass</i>
10 mm	100	10 mm	100
4.75 mm	100	4.75 mm	95 to 100
2.36 mm	90 to 100	2.36 mm	95 to 100
1.18 mm	70 to 100	1.18 mm	90 to 100
600 micron	40 to 100	600 micron	80 to 100
300 micron	5 to 70	300 micron	20 to 65
150 micron	0 to 15	150 micron	0 to 15

Note: For crushed stone sands, the permissible limit on 150 micron IS Sieve is increased to 20%, this does not affect the 5% allowance as per IS 2386 (Part 1)-1963 (Reaffirmed 2021).

TEST FOR PARTICLE SIZE (SIEVE ANALYSIS)
(Clause 3.1.1.7)

Apparatus: Perforated plate sieves of designation 10 mm, 4.75 mm and fine mesh sieve of designation 2.36 mm, 1.18 mm, 600 micron, 300 micron and 150 micron should be used.

The balance or scale shall be such that it is readable and accurate to 0.1 per cent of the weight of the test sample.

Sample: The weight of sample available shall not be less than the weight given in the table below. The sample of sieving shall be prepared from the larger sample either by quartering or by means of a sample divider.

TABLE SHOWING MINIMUM WEIGHTS FOR SAMPLING

Maximum size present in substantial proportions (mm)	Minimum weight of sample for sieving (Kg)
10	0.5
4.75	0.2
2.36	0.1

Test Procedure: The sample shall be brought to an air-dry condition before weighing and sieving. This may be achieved either by drying at room temperature or by heating at a temperature of 100 degree to 110 degree centigrade. The air dry sample shall be weighed and sieved successively on the appropriate sieves starting with the largest. Care shall be taken to ensure that the sieves are clean before use.

Each sieve shall be shaken separately over a clean tray until not more than a trace passes, but in any case for a period of not less than two minutes. The shaking shall be done with a varied motion, backwards and forwards, left to right, circular clockwise and anti-clockwise, and with frequent jarring, so that the material is kept moving over the sieve surface in frequently changing directions. Materials shall not be forced through the sieve by hand pressure, but on sieves coarser than 20 mm, placing of particles is permitted, Lumps of fine material, if present may be broken by gentle pressure with fingers against the side of the sieve. Light brushing of under side of the sieve with a soft brush may be used to clear the sieve openings.

Light brushing with a fine camel hair brush may be used on the 150 micron IS sieve to prevent segregation of powder and blinding of apertures. Stiff or worn out brushes shall not be used for this purpose and pressure shall not be applied to the surface of the sieve to force particles through the mesh.

On completion of sieving the material retained on each sieve, together with any material cleaned from the mesh, shall be weighed.

Reporting of Results: The results shall be calculated and reported as:

- (a) The cumulative percentage by weight of the total sample passing each of the sieves, to the nearest whole number:
or
- (b) The percentage by weight of the total sample passing one sieve and retained on the next smaller sieve, to the nearest 0.1 percent.

TEST FOR SILT CONTENT

The sand shall not contain more than 8% of silt as determined by field test with measuring cylinder. The method of determining silt contents by field test is given below:

A sample of sand to be tested shall be placed without drying in a 200 ml measuring cylinder. The volume of the sample shall be such that it fills the cylinder upto 100 ml mark

Clean water shall be added upto 150 ml mark. Dissolve a little salt in the water in the proportion one tea spoon to half a litre. The mixture shall be shaken vigorously, the last few shakes being sidewise direction to level off the sand and the contents allowed to settle for three hours.

The height of the silt visible as settled layer above the sand shall be expressed as a percentage of the height of sand below. The sand containing more than the above allowable percentage of silt, shall be washed so as to bring the silt contents within allowable limits.

M – 7 Stone Dust:

As described above in Sand.

M – 8 Stone Grit:

Grit shall consist of crushed or broken stone and be hard, strong, dense, durable, clean of proper gradation and free from skin or coating likely to prevent proper adhesion of mortar. Grit shall generally be cubical in shape and as far as possible flaky elongated pieces shall be avoided. It shall generally comply with the provisions of IS 383-2016 or its relevant and latest edition. Unless special stone of particular quarries is mentioned grit shall be obtained from the best black trap of equivalent hard stone as approved by the Engineer In charge. The Grit shall have no deleterious reaction with cement.

The Grit shall confirm to the following gradation as per sieve analysis.

IS Sieve Designation	Percentage by weight passing through sieve
12.50 mm	100
10.00 mm	85-100
4.75 mm	0-20
2.36 mm	0-5

The crushing strength of grit will be such as to allow the concrete in which it used to build up the specified strength of concrete.

The necessary test for grit shall be carried out as per the requirements of IS 2386 – (Part I to VIII) – 1963 (Reaffirmed 2021), as per instruction of the Engineer In charge. The necessary of test will be decided by the Engineer In charge.

M – 9 Cinder:

Cinder is well burnt furnace residue which has been fused or sintered into lumps of varying sizes.

Cinder aggregate shall be well burnt furnace residue obtained from furnace using coal fuel only. It shall be sound clean and free from clay, dirt, ash or other deleterious materials.

The average grading for cinder aggregates shall be mentioned below.

IS Sieve Designation	Percentage by weight passing through sieve
20 mm	100
10 mm	86
4.75 mm	70
2.36 mm	52

M – 10 Lime Mortar:**LIME:**

Lime shall confirm to specification M-2. Water: Water shall confirm to specification M-1. Sand: sand shall confirm to specification M-6.

PROPORTION OF MIX:

Mortar shall consist of such proportions of slaked lime and sand as may be specified in item. The slaked lime and sand shall be measured by volume.

PREPARATION OF MORTAR:

Lime mortar shall be prepared by wet process as per IS 2250-1981 (Reaffirmed 2020) or its relevant and latest edition. Power driven mill shall for preparation of lime mortar. The slaked lime shall be placed in the mill in an even layer and ground for 180 revolutions with sufficient water. Water shall be added as required during grinding (care being taken not to add more water) that will bring the mixed material to a consistency of stiff paste. Thoroughly wetted sand shall then be added evenly and the mixture ground for another 180 revolutions.

STORAGE:

Mortar shall always be kept damp protected from sun and rain till used up, covering it by tarpaulin or open sheds.

USE:

All mortar shall be used as soon as possible after grinding. It should be used on the day on which it's prepared. But in no case mortar made earlier than 36 hours shall be permitted for use.

M – 11 Cement Mortar:

Water shall conform to specification M-1 Cement : Cement shall conform to specifications M-3 sand : Sand shall conform to M-6

PROPORTION OF Mix

Cement and sand shall be mixed to specified proportion sand being measured by measuring boxes. The proportion of cement will be by volume on the basis of 50 kg/bag of cement being equal to 0.0347 cu.m. the mortar may be hand mixed or machine as directed.

Mixing

The mixing of mortar shall be done in mechanical mixers operated manually or by power as decided by Engineer-in-Charge. The Engineer-in-Charge may, however, permit hand mixing at his discretion taking into account the nature, magnitude and location of the work and practicability of the use of mechanical mixers or where item involving small quantities are to be done or if in his opinion the use of mechanical mixer is not feasible. In cases, where mechanical mixers are not to be used, The contractor shall take permission of the Engineer-in-Charge in writing before the commencement of the work.

- (a) Mechanical Mixing: Cement and sand in the specified proportions shall be mixed dry thoroughly in a mixer. Water shall then be added gradually and wet mixing continued for at least three minutes. Only the required quantity of water shall be added which will produce mortar of workable consistency but not stiff paste. Only the quantity of mortar, which can be used within 30 minutes of its mixing shall be prepared at a time. Mixer shall be cleaned with water each time before suspending the work.
- (b) Hand mixing: Cement and sand in the specified proportions shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3 times or more till a homogeneous mixture of uniform colour is obtained. Mixing platform shall be so arranged that no deleterious extraneous material shall get mixed with mortar or mortar shall flow out. While mixing, water shall be gradually added and thoroughly mixed to form a stiff plastic mass of uniform colour so that each particle of sand shall be completely covered with a film of wet cement. The water cement ratio shall be adopted as directed.

The mortar so prepared shall be used within 30 minutes of adding water. Only such quantity of mortar shall be prepared as can be used within 30 minutes.

M – 12 Stone coarse aggregate for Nominal Mix Concrete: IS 383: 2016

Coarse aggregate shall be of machine-crushed stone of black trap of equivalent and be hard, strong, dense, durable cleaned and free from skin and coating likely to prevent proper adhesion of mortar. The aggregate shall generally be cubical in shape. Unless special stones of particular quarries are mentioned aggregates shall be machine-crushed from the best black trap of equivalent hard stone as approved. Aggregate shall have no deleterious reaction with cement. The size of the coarse aggregate for plain cement concrete and ordinary reinforced cement concrete shall generally be as per the table given below. The nominal maximum size of coarse aggregate should be as large as possible within the limits specified but in no case greater than one-fourth of the minimum thickness of the member. However, for most work, 20mm aggregate is suitable where is no restriction to the flow of concrete into sections, 40mm or larger size may be permitted. In concrete elements with thin sections, closely spaced reinforcement or small cover, consideration should be given to use of 10mm nominal maximum size. For heavily reinforced cement concrete member as in the case of ribs of main beams, the nominal maximum size of the aggregate should usually be restricted to 5mm less than the minimum clear distance between the main bars or 5mm less than the minimum cover to the reinforcement whichever is smaller.

Table

IS Sieve Designation	Percentage passing for single sized aggregate of Nominal size.		
	40 mm	20 mm	16 mm
80 mm	-	-	-
63 mm	100	-	-
40 mm	85-100	100	-
20 mm	0-20	85-100	100
16 mm	-	-	85-100
12.5 mm	-	-	-
10 mm	0-5	0-20	0-30
4.75 mm	-	0-5	0-5
2.35 mm	-	-	-

NOTE: This percentage may be varied somewhat by the engineer in charge when considered necessary for obtaining better density and strength of concrete.

The grading test shall be taken in the beginning and at the change of source of materials. The necessary tests indicated in IS 383-2016 or its relevant and latest edition and IS 456-2000 (Reaffirmed 2021) or its

relevant and latest edition shall have to be carried out to ensure the acceptability. The aggregates shall be stored separately and handled in such manner as to prevent the inter mixing of different aggregates. If the aggregates are covered with dust, they shall be washed with water to make them clean.

M – 13 Black Trap or Equivalent Hard Stone Coarse Aggregate:

Aggregate for Design Mix Concrete: Coarse aggregates shall be of machine crushed (Vertical Shaft Impact Crusher) stone of black trap or equivalent hard stone and be hard, strong, dense durable, clean and free from skin and coating likely to prevent proper adhesion of mortar. If vertical shaft impact crusher is unavailable in local region then machine crushed aggregate is to be used as per detailed tender specification.

The aggregate shall be cubical in shape. Unless special stone of particular quarries are mentioned, aggregates shall be machine crushed from the best, black trap or equivalent hard stones as approved. Aggregate shall have no deleterious reaction with cement.

The necessary tests indicated in I.S. 383-2016 or its relevant and latest edition and I.S. 456-2000 (Reaffirmed 2021) or its relevant and latest edition shall have to be carried out to ensure the acceptability of the material.

If aggregate is covered with dust it shall be washed with water to make it clean.

M – 14 Brick Bats Aggregate

Brick bat aggregate shall be broken from well burnt or slightly over burnt and dense bricks. It shall be homogeneous in texture, roughly cubical in shape, clean and free from dirt or any other foreign material. The brick bats shall be 40 mm to 50 mm size unless otherwise specified in the item. The under burnt or over burnt brick bats shall not be allowed.

The brick bats shall be measured by suitable box or as directed.

M – 15 Bricks: IS 1077-1992 (Reaffirmed 2016)

The bricks shall be of 3.5 class as per IS 1077-1992 (Reaffirmed 2016) Table-1. Bricks shall be hand or machine moulded and made from suitable soils and kiln burnt. They shall be free from cracks and flaws and nodules of free lime. They shall have smooth rectangular faces with sharp corners and shall be of uniform colour. The bricks shall be moulded with a frog of 100 mm x 40 mm and 10 to 20 mm deep on one of its flat sides. The bricks shall not break when thrown on the ground from a height of 1000 mm.

The size of the conventional bricks shall be as under: 230 x 110 x 70 mm.

Only bricks of one standard size shall be used on one same work.

The following tolerances shall be permitted in the conventional size for 20 no. of brick adopted in particular work.

- Length $4600 \pm 80\text{mm}$,
- Width $2200 \pm 40\text{mm}$,
- Height $1400 \pm 40\text{ mm}$

The crushing strength of the bricks shall not be less than 35 Kg/Sq. Cm. The average water absorption shall not be more than 20 percent by weight. Necessary tests for crushing strength and water absorption etc. shall be carried out as per IS 3495(Part I to IV) 2019 or its relevant and latest edition.

M – 16 Stone : IS 1124-1974 (Reaffirmed 2017)

The stone shall be of the type specified such as granite, trap, limestone, sand stone, quartzite, etc. and shall be obtained from the quarries, approved by the Engineer-in-Charge. Stone shall be hard, sound, durable and free from weathering decay and defects like cavities, cracks, flaws, sand holes, injurious veins, patches of loose or soft materials and other similar defects that may adversely affect its strength and appearance. As far as possible stones shall be of uniform colour, quality or texture. Generally stone shall not contain cryptocrystalline silica or chart, mica and other deleterious materials like iron-oxide organic impurities etc.

Stones with round surface shall not be used.

The compressive strength of common types of stones shall be as per Table-A and the percentage of water absorption shall generally not exceed 5% for stones other than specified in Table-A. For laterite this percentage is 12%.

TABLE - A

Type of stone	Maximum Water Absorption	Minimum Compressive
	Percentage by weight	Strength kg./sq. cm.
Granite	0.5	1000
Basalt	0.5	400
Lime stone (Slab & Tiles)	0.15	200
Sand stone (Slab & Tiles)	2.5	300
Marble	0.40	500
Quartzite	0.40	800
Laterite (Block)	12	35

Note 1: Test for compressive strength shall be carried out as laid down in IS 1121 (Part I)-2013 (Reaffirmed 2017).

Note 2: Test for water absorption shall be carried out as laid down in IS 1124-1974 (Reaffirmed 2017).

M – 17 Laterite Stone:

Laterite stone shall be obtained from the approved quarry. It shall be compacted in texture, sound, durable and free from soft patches. It shall have minimum crushing strength of 100 Kg/Cm² in its dry condition. It shall not absorb water more than 20 % of its' own weight, when immersed from 24 hours in water. After quarrying, the stone shall be allowed to weather for some time before using in work. The stone shall be dressed into regular rectangular blocks so that all faces are free from waviness and unevenness, and the edges true and square. Those type of stones in which white clay occurs should not be used. Special corner stones shall be provided where so directed.

M – 18 Mild Steel Bars: IS 432-1982 (part-1) (Reaffirmed 2020)

Mild steel bars reinforcement for R.C.C work shall conform to IS 432-1982(part-1) (Reaffirmed 2020) or its relevant and latest edition and shall be of tested quality. It shall also comply with relevant part of IS 456-2000 (Reaffirmed 2021) or its relevant and latest edition.

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

M-19 High Yield Strength Steel Deformed Bars / TMT / CRS :

High Yield Strength Steel Deformed bars and TMT shall be cold twist or rolled and shall conform to IS 1786-2008 (Reaffirmed 2018) or its relevant and latest edition respectively.

Sr. No.	Dia. Of Bar	Unit Wt. of Bar/Rmt
1	6 mm	0.22 Kg/Rmt.
2	8 mm	0.39 Kg/Rmt.
3	10 mm	0.62 Kg/Rmt.
4	12 mm	0.89 Kg/Rmt.
5	14 mm	1.21 Kg/Rmt.
6	16 mm	1.58 Kg/Rmt.
7	18 mm	2.00 Kg/Rmt.
8	20 mm	2.47 Kg/Rmt.
9	22 mm	2.98 Kg/Rmt.
10	25 mm	3.85 Kg/Rmt.
11	28 mm	4.83 Kg/Rmt.
12	32 mm	6.31 Kg/Rmt.
13	36 mm	7.99 Kg/Rmt.
14	40 mm	9.86 Kg/Rmt.

NOTE: For the purpose of payment, the bar shall be measured correct up to 10 mm length and weight payable worked out at the rate specified below (mild steel / H.Y.S.D. / T.M.T. bars):

For HYSD/TMT : Chemical composition and tolerance in unit weight shall be as per IS 1786-2008 (Reaffirmed 2018).

For Corrosion Resistance steel : The chemical composition shall be as per IS 1786-2008 (Reaffirmed 2018) (Amendment No.3- March 2017) Clause-4.2, Note-3.

M – 20 Mild Steel Binding Wire: IS 280-2006 (Reaffirmed 2015)

The mild steel wire shall be of 1.63 mm or 1.22 mm (16 or 18 gauge) diameter and shall conform to IS 280-2006 (Reaffirmed 2015) or its relevant and latest edition.

The use of black wire will be permitted for binding reinforcement bars. It shall be free from rust, oil, paint, grease, loose mill scale or any other undesirable coating which may prevent adhesion of cement mortar.

M - 20A Structural Steel: I.S. 2062-2011 (Reaffirmed 2016)

20A.1 All structural steel shall conform to I.S. 2062-2011 (Reaffirmed 2016) or its relevant and latest edition. The steel shall be free from the defects mentioned in I.S. 2062-2011 (Reaffirmed 2016) or its relevant and latest edition and shall have a smooth finish. The material shall be free from loose mill scale, rust pits or other defects affecting the strength and durability.

20A.2 When the steel is supplied by the contractor test certificate of the manufacturer shall be obtained according to I.S. 2062-2011 (Reaffirmed 2016) or its relevant and latest edition and other relevant Indian Standards.

M – 21 Shuttering

The shuttering shall be of wooden planking with smooth finish. The minimum thickness of the wooden planking shall be 30mm and steel plates stiffened by steel angles. Shuttering used shall be of sufficient stiffness to avoid excessive deflection and joints shall be tightly butted to avoid leakage of slurry. Rubberized lining of material must be provided in all the joint. The shuttering shall be supported on battens and beams and props of vertical steel propping properly cross braced together so as to make the centering rigid. Steel propping is mandatory.

The form work shall be sufficiently strong and shall have camber, so that it assumes correct shape after deposition of the concrete and shall be able to resist forces caused by vibration of live load of men working over it and other incidental loads associated with it. The shuttering shall have smooth and even surface and its joints shall not permit leakage of cement grout.

If at any stage or work during or after placing concrete in the structure, the form work sags or bulge out beyond the required shape of the structure, the concrete shall be removed and work redone with fresh concrete and adequately rigid form work. The complete form work shall be got inspected and approved from the Engineer-in-charge, before the reinforcement bars placed in position.

Double wedges shall further be provided between the sole plate and Steel props so as to facilitate tightening and easing of shuttering without jerking the concrete.

The timber used in shuttering of beam bottom shall not be so dry as to absorb water from concrete and swell or bulge nor so green or wet as to shrink after erection. The timber shall be properly sawn and planed on the sides and the surface coming in contact with concrete. Wooden form work with metal sheet lining or steel plates stiffened by steel angles shall be permitted.

As far as practicable, clamps shall be used to hold the forms together and use of nails and spikes avoided.

The surface of timber shuttering that would come in contact with concrete shall be well wetted and coated with soap solution before the concreting is done. Alternatively coat of raw linseed oil or oil of approved manufacturer may be applied in place of soap solution. In case of steel shuttering either soap solution or raw linseed oil shall be applied after thoroughly cleaning the surface. Under no circumstances black or burnt oil shall be permitted.

The shuttering for beams and slabs shall have camber of 4mm per meter (1 in 250) or as directed by the engineer-in-charge so as to offset the subsequent deflection. For cantilevers the camber at free end shall be 1/50 of the projected length or as directed by the Engineer-in-charge.

M – 22 Teak Wood:

The teak wood shall be good quality as required for the item to be executed. When the kind of wood is not specifically mentioned, good Indian teak wood as approved shall be used.

Teak wood shall generally be free large, loose, dead or cluster knots, flaws, shakes, warps, twists, bends, or any other defects, it shall generally be uniform in substance and of straight fibers as far as possible. It shall be free from rot, decay, harmful fungi and other defects of harmful nature, which will affect the strength, durability or its usefulness for the purpose for which it is required. The colour shall be uniform as far as possible. Any effort like planing, using and adhesive resinous materials made to hide the defects shall render the pieces liable to rejection by the Engineer in charge.

All scanting, planks etc. shall be sawn in straight line and planes in the direction of grains and of uniform thickness.

The tolerances in dimensions shall be allowed at the rate of 1.5 mm per face to be planed.

FIRST CLASS TEAK WOOD:

First Class teak wood shall have no individual hard and sound knots, more than 6 sq. cm. in size and the

aggregate area of such knots shall not be more than 1 % of area of piece. The timber shall be closed grained.

SECOND CLASS TEAK WOOD:

No individual hard and sound knots shall be more than 15 sq. cm. in size and aggregates area of such knots shall not exceed 2 % of the area of piece.

M – 23 Non Teak Wood:

The non teak wood shall be chemically treated, seasoned as per IS Specifications and of good quality. The type of wood shall be got approved before collecting the same on site Fabrication of wooden members shall be started only after approval.

For this purpose wood of Bio, Kalai, Sires, Added, Jamun, Sisoo will be used for door where as only Kalai, Sires, Halda, Kalam etc. will be permitted for shutters after proper seasoning and chemical treatment. The non teak wood shall be free from large, loose, dead or cluster knots, flaws, shakes, warps, bends or any other defects. IT shall be uniform in substance and of straight fibers as far as possible. It shall be free from rots, decay, harmful fungi and other defects of nature which will effect the strength, durability or its usefulness for the purpose for which it is required. The color of wood shall be uniform as far as possible thickness. The department will use the Agency to produce certificate from Forest Department in event of dimension shall be allowed at 1.5 mm per face to be planned.

For door, window, ventilation frame shall be confirm to IS 4021-1995 (Reaffirmed 2017)

M – 24 Wooden Flush Door Shutters: (Solid Core) IS 2202(Part I)-1999 (Reaffirmed 2017)

The solid core type flush door shutters shall be decorative or non-decorative type as specified in the drawing. The size and thickness of the shutter shall be as specified in drawings or as directed. The timber species of core shall be used as per IS 2202(Part I)-1999 (Reaffirmed 2017) or its relevant and latest edition. The timber shall be free from decay and insect attack. Knots and knot holes less than half the width of cross section of the members in which they occur may be permitted. Pitch pockets, pitch strakes and harmless pin holes shall be permissible except in the exposed edges of the core members. The commercial plywood, cross bands shall conform to IS 303-1989 (Reaffirmed 2018) or its relevant and latest edition.

The face panel of the shutters shall be formed by gluing by the hot press process on both faces of the core with either ply wood or cross bands and care veneers. The lapping, rebating, opening of glazing venations etc. shall be provided if specified in the drawing.

All edges of the door shutter shall be square. The shutter shall be free from twist of warn in its plane. Both faces of the shutters shall be sand papered to smooth even texture.

The shutter shall be tested for

- (1). END IMMERSION TEST: The test shall be carried out as per IS 2202(Part-I)-1999 (Reaffirmed 2017) or its relevant and latest edition, There shall be nodelaminating at the end of the test.
- (2). KNIFE TEST: The face panel when tested in accordance with IS 2202(Part-I)-1999 (Reaffirmed 2017) or its relevant and latest edition shall pass the test.
- (3). GLUE ADHESION TEST:
The flush door shall be tested for glue adhesive test in accordance with IS 2202(Part-I)-1999 (Reaffirmed 2017) or its relevant and latest edition. The shutters shall be considered to have passed the test if no delamination occurred in the glue lines in the plywood and if no single delamination more than 80 mm in length and more than 3 mm in depth has occurred in the assembly glue lines between the plywood face and the style and rail. Delamination at the corner shall be measured continuously around the corner. Delamination at the knots, knots hole and enter permissible wood defects shall not be considered in assessing the sample.

The tolerance in size of solid core type flush door shall be as under.

In nominal thickness ± 2 mm and in nominal height ± 3 mm

The thickness of the shutter shall be uniform throughout with a permissible variation of not more than 0.8 mm when measured at any two points.

M – 25 Mild Steel wire (wire gauge jali)

Mild steel wire may be galvanized as indicated. All finished steel wire shall be well cleanly drawn to the dimension and size of wire as specified in item. The wire shall be sound, free from splits, surface flaws, rough and imperfect edges and other harmful surface defects and shall conform to IS 280-2006 (Reaffirmed 2015) or its relevant and latest edition.

M – 26 Plywood: IS 303-1989 (Reaffirmed 2018)

Plywood shall be of BWP grade or BWR grade & MR grade as per IS 303-1989 (Reaffirmed 2018).

The plywood for general purpose shall conform to IS 303-1989 (Reaffirmed 2018) or its relevant and latest edition. Plywood is made by cementing together thin boards or sheets of wood in to panels. There are always an odd number of layers 3, 5, 7, 9, ply etc. The plies are placed so that grain of each layer is at right angles to the grain in the adjacent layer.

The chief advantage of plywood over a single board of the same thickness is the more uniform strength of the plywood, along the length and width of the plywood and greater resistance to cracking and splitting with change in moisture content.

Usually synthetic resins are used for gluing, phenolic resins are fussy cured in a hot press which compresses and simultaneously heat the plies between hot plates which maintain a temperature of 90 degree C to 140 degree C and a pressure of 11 to 14 Kg/Sq. Cm. on the wood. The time of heating may be anything from 2 to 60 minutes depending up on thickness.

When water glue are used the wood absorbs so much water that the finished plywood must be dried carefully. When synthetic resins are used as adhesive the finished plywood must be exposed to an atmosphere of controlled humidity until the proper amount of moisture has been absorbed.

According to IS 303-1989 (Reaffirmed 2018) or its relevant and latest edition the plywood for general purpose shall be of the grades namely BWR, WWR and CWR depending upon the adhesive used for bending the veneers and it will be further classified into six types namely AA, AB, AC, BB, BC and CC based on the quality of the plywood should be reconditioned to moisture content not less than 5 percent and not less than 15 percent when tested in accordance with IS 1734 (Part-1)-1983.

Thickness of plywood Boards:

Board	Thickness in mm	Board	Thickness in mm
3	3, 4, 5, 6	9	12, 15, 16, 19
5	5, 6, 8, 9	11	19, 22, 25
7	9, 12, 15, 16	above 11	as ordered

M – 27 Glass: IS 2835-1987 (Reaffirmed 2018)

All glass shall be of the best quality, free from specks, bubbles, smokes, veins, air holes, blisters and other defects. The kind of glass to be used shall be mentioned in the item of specification or in the special provision or as shown in the detailed drawings. The thickness of glass panels shall be uniform. The specification for different kinds of glass shall be as under.

SHEET GLASS:

In absence of any specified thickness or weight in the item or detailed specification of the item of work.

Sheet glass shall be weighing 7.5 Kg/Sq. m. for panels up to 600mm x 600 mm.

For panes larger than 600 mm x 600 mm and up to 800 mm x 800 mm the glass weighing not less than 8.75 Kg./Sq.m. shall be used. For bigger panes up to 900 mm x 900 mm glass weighing not less than 11.25 Kg./Sq.m. shall be used.

Sheet glass shall be patent flattened glass of best quality and for glazing and framing purpose shall conform to IS 2835-1987 (Reaffirmed 2018) or its relevant and latest edition. Sheet glass of the specified colours shall be used, if so shown on detailed drawings or so specified. For important buildings and for panes with any dimension over 900 mm plate glass of specified thickness shall be used.

PLATE GLASS:

When plate glass is specified, it shall be "Polished patent plate glass" of best quality it shall have both the surface ground flat and parallel and polished to obtain clear undisturbed vision and reflection. The plate glass shall be of any specified thickness, the thickness of plate glass to be supplied shall be 6 mm and a tolerance of 0.20 mm shall admissible.

OBSCURED GLASS:

This type of glass transmits light so that vision is partially or almost completely obscured. Glass shall be plain rolled, figured, ribbed or fluted, or frosted glass as may be specified as required. The thickness and type of glass shall be as per details on drawings or as specified or as directed.

WIRED GLASS:

Glass shall be with wire netting embedded in a sheet of plate glass. Electrically welded 13 mm Georgian square mesh shall be used. Thickness of glass shall not be less than 6 mm. Wired glass shall be of type and thickness as specified.

M – 28 Particle Board: I.S. 3087-2005 (Reaffirmed 2020)

The particle boards used for face panels shall be best quality free from any defects. The particle boards shall be made with phenol formaldehyde adhesive. The particle boards shall conform to I.S. 3087-2005 (Reaffirmed 2020) or its relevant and latest edition "Specification for wood particle board for general purpose. " The size and the thickness shall be indicated.

M – 29 Fixtures and Fastenings:

GENERAL:

The fixtures and fastening, that is butt, hinges, tee and strap hinges, sliding door bolts, tower bolts, door latch, bath-room latch, handles, door stoppers, casement window fasteners, casement stays and ventilators catch shall be made of the metal as specified in the item of its specification.

They shall be S.S. 304 grade, brass, aluminum, chromium plated iron, chromium plated brass as specified.

The fixture and fastenings shall be smooth finished and shall be such as will ensure ease of operations.

The samples of fixtures and fastenings shall be got approved as regards, quality and shape before providing them in position.

The fixtures and fastenings shall be bright or matt finished.

HOLDFAST:

Hold fast shall be made from Mild Steel flat 25x6 mm-150mm length and one of the holdfast shall be bent at right angle and two nos. of 6 mm diameter holes, shall be made in it for fixing it to the frame with screws. At the other end the holdfast shall be forked and bent at right angles in opposite direction.

S.S. BUTT HINGES: IS 12817-2020

Butt Hinges shall be confirm to IS 12817-2020. This shall be of stainless steel of specified size, shape and pattern as approved by engineer in charge. Stainless steel Butt hinges shall not be less than grade 304. The finish shall be bright or matt finish as approved by engineer in charge.

S.S. SLIDING DOOR BOLTS (ALDOROPS): IS 15834-2020

Sliding door bolts shall be confirm to IS 15834-2020. This shall be of stainless steel of specified size, shape and pattern as approved by engineer in charge. Stainless steel sliding door bolts shall not be less than grade 304. The finish shall be bright or matt finish as approved by engineer in charge.

S.S. TOWER BOLTS (BARREL TYPE): IS 15833-2009 (Reaffirmed 2018)

Tower bolts shall be confirm to IS 15833-2009 (Reaffirmed 2018). This shall be of stainless steel of specified size, shape and pattern as approved by engineer in charge. Stainless steel tower bolts shall not be less than grade 304. The finish shall be bright or matt finish as approved by engineer in charge.

DOOR LATCH (Tadi)/ Bathroom Latch:

The door latch/Bathroom latch shall be of S.S.304 grade. This shall be of stainless steel of specified size, shape and pattern as approved by engineer in charge. Stainless steel Door latch/Bathroom latch shall not be less than grade 304. The finish shall be bright or matt finish as approved by engineer in charge.

Stainless steel HANDLE:

These shall be of stainless steel of specified size, shape and pattern as approved by Engineer-in-Charge for using in doors, windows and kitchen cabinets. Doors handles shall be of 125 mm or 100 mm size and window handles of 75 mm size unless, otherwise specified. Kitchen cabinet handles shall of 125 mm, 100 mm or 75 mm as specified. These shall be fixed with stainless steel screws 20 mm long. Stainless steel handles shall not be less than grade 304. The finish can be bright or matt finish as specified.

DOOR STOPPER: IS 17296-2020

Door stopper shall be confirm to IS 17296-2020. This shall be of stainless steel of specified size, shape and pattern as approved by engineer in charge. Stainless steel door stopper shall not be less than grade 304. The finish shall be bright or matt finish as approved by engineer in charge.

S.S. DOOR CATCH:

S.S. Door catch shall be fixed at a height of about 900 mm from the floor level such that one part of the catch is fitted of the shutter and the other part is fixed in the wall with necessary wooden plug arrangement for appropriated fixity. The catch shall be sized 20 mm inside the face of the door easy operation of catch.

WOODEN DOOR STOP WITH HINGES:

Wooden door stop of size 100 mm x 60 mm x 40 mm shall be fixed on the door frame with a hinge of 75 mm size and at a height of 900 mm from the floor level. The wooden doorstop shall be provided with 3 coats of approved oil paint.

CASEMENT WINDOW FASTENER:

Casement window fastener for single leaf window shutter shall be left of right handed as directed.

CASEMENT STAYS (STRAIGHT PEG STAY)

The stays shall be made from a channel section having three holes at appropriate position so that the window can be opened either fully or partially as required. Size of the stay shall be 250mm to 300 mm as directed.

VENTILATOR CATCH:

The pattern and shape of the catch shall be as approved.

M – 30 Paints:**30.1(A) OIL PAINTS: IS 2933(Part-1)-2013 (Reaffirmed 2018)**

Oil paints shall be of the specified colour and shade and as approved. The ready mixed paint shall only be used. However, if ready mixed paint of specified shade or tint is not available white ready mixed paint with approved stainer will be allowed in such a case the contractor shall ensure that the shade of the paint so allowed shall be uniform.

All the paints shall meet with the following general requirement.

1. Paints shall not show excessive setting in a freshly opened full can and shall easily be redispersed with a paddle to a smooth homogeneous state. The paint shall show curdling, levering, cracking or colour sagging tendencies.
2. The paint as received shall brush easily, possess good levelling properties and show no running or sagging tendencies.
3. The paint shall not skin with 48 hours in a three quarters filled closed container.
4. The paint shall dry to a smooth uniform finish free from roughness, grit, unevenness and other imperfections.
5. Ready mixed paint shall be used exactly as received from the manufacturers and generally according to their instruction and without any admixtures whatsoever. Paint shall be of approved brand and shade as per GSPHCL.

30.2 (B) ENAMEL PAINTS

30.2.1 The enamel paints shall satisfy in general requirements in specification of oil paints. Enamel paints shall conform IS 2933(Part-1)-2013 (Reaffirmed 2018) or its relevant and latest edition & paint shall be of approved brand and shade as per GSPHCL.

30.3 (C) Plastic Paints

30.3.1. Plastic paints shall conform IS 15489-2013 (Reaffirmed 2018) or its relevant and latest edition & paint shall be of approved brand and shade as per GSPHCL.

30.4 (D) Exterior Paints

30.4.1. Exterior paints shall conform IS 2933(Part-1)-2013 (Reaffirmed 2018) and IS 2932(Part-1)-2013 (Reaffirmed 2018) or its relevant and latest edition & paint shall be of approved brand and shade as per GSPHCL. The paint shall be (Textured exterior paint/Acrylic smooth exterior paint/premium acrylic smooth exterior paint/100% premium acrylic emulsion paint) of approved brand and manufacture.

30.5 (E) Primer Paints

3.5.1 The primer for wood work, iron work or plastered surface shall be as specified in the description of item.

3.5.2 Primer for plaster/wood work/Iron & Steel/Aluminium surfaces shall be as specified in the table below:

TABLE

S.No	Surfaces	Primer to be used
1.	Wood work (hard and soft wood)	Pink conforming to IS 3536
2.	Resinous wood and plywood	Aluminium primer conforming to IS 3585
3.	(A) Aluminium and light alloys	Zinc chromate primer conforming to IS 104
	(B) Iron, Steel and Galvanized steel	Red Oxide Zinc chromate Primer conforming IS 2074
4.	Cement/Concrete/RCC/brick work, Plastered surfaces, non-asbestos surfaces to receive Oil bound distemper or Paint finish.	Cement primer conforming to IS 109

M – 31 Marble Chips for Mosaic Terrazzo:

The marble chips shall be approved quality and shades. It shall be hard, sound dense and homogeneous in texture with crystal line and coarse grains. It shall be uniform in colour and free from stains, cracks, decay and weathering.

The size of various colour of marble chips ranging from the smallest up to 20 mm shall be used where the thickness of top thickness of top wearing is 6 mm. The marble chips of approved quality and colour only as per grading as decided by the engineer in charge shall be used for marble mosaic tiles of works.

The chips shall be machine crushed. They shall be free from foreign matter, dust etc. except as about the chips shall conform to IS 2114-2018 or its relevant and latest edition

M – 32 Flooring tiles:**32.1.(A) PLAIN CEMENT TILES:**

The plain cement tiles shall be of general-purpose type. These are the tiles in the manufacture of which no pigments are used cement in the manufacture of tiles shall be as per Indian Standards.

The tile shall be manufactured from a mixture of cement and natural aggregates by pressure process. During manufacture the tiles shall be subjected to pressure of not less than 140 Kg./ Sq.Cm. the proportion of cement to aggregate in the backing of tiles shall be not less than 1:3 by weight. The wearing face though the tiles are of plain cement shall be provided with stripe chips of 1 of 2 mm size. The proportion of cement to aggregate in the wearing layer of the tiles be three parts of cement to one parts of chips by weight. The minimum thickness of wearing layer shall be 3 mm. The colour and texture of wearing layer shall be uniform its face and thickness. On removal from mould, the tiles shall be kept moist uniform condition continuously at least for seven days and subsequently, if necessary, for such long period as would ensure their conformity to requirements of IS 1237-2012 (Reaffirmed 2017) or its relevant and latest edition regarding strength resistance to wear and water absorption.

The wearing face of the tiles shall be planes, free from projections, depressions and cracks and shall be reasonable parallel to the back face of the tile. all angles shall be right and all edges shall be sharp and true.

The size of tiles shall generally be square shape 24.85 Cm. or 25 Cm x 25 Cm. x 20mm. thick or 30 cm. x 30 Cm. x 25 mm thick as specified.

Tolerance if length and breadth shall be plus or minus one millimeter. Tolerance on thickness shall be plus 5 mm.

The tiles shall satisfy the tests as regards traverse strength resistance to wear and water absorption as per I.S. 1237-2012 (Reaffirmed 2017).

32.2(B) PLAIN COLOURED TILES:

These tiles shall have the same specification as for plain cement files as per (A) above except that they shall have a plain wearing surface wherein pigments are used. They shall conform to I.S. 1237-2012 (Reaffirmed 2017).

The pigments used for colouring cement shall not exceed 10 percent by weight of cement used in the mix. The pigments synthetic or other wise, used for colouring tiles shall have permanent colour of the tiles shall be specified in the item or as directed.

The colour of the tiles shall be specified in the item or as directed.

32.3(C) MARBLE MOSAIC TILES:

These tiles have same specification as per plain cement tiles except the requirements as stated below.

The marble mosaic tiles shall conform to I.S.:1237-2012 (Reaffirmed 2017). The wearing face of the tiles shall be mechanically ground and filled. The wearing face of the tiles shall be free projections, depressions and cracks and shall be reasonable parallel to the back face of the tiles. All angles shall be right angles and all edges shall be sharp and true. Chips used the tiles be from smallest upto 20mm. The minimum thickness of wearing layer of tiles shall be 06 mm or 10 mm as per specified. For pattern of chips to be had on the wearing face a few samples with or without their full size photographs as directed shall be presented to the Engineer-in-charge for approval.

Any particular samples if found suitable shall be approved by the Engineer-in-charge, or he may ask for a few more samples to be presented. The samples shall have to be made by the contractor till a suitable sample is finally approved for use in the work. The contractor shall ensure that the tiles supplied for the work shall be in conformity with the approved sample only, in terms of its dimensions thickness of backing layer and wearing surface, materials, ingredients, colour, shade, chips distribution etc. required.

The tiles shall be prepared from cement conforming to Indian Standards or coloured Portland cement generally depending upon the colour of tiles to be used or as directed.

32.4(D) CHEQUERED TILES :

Chequered tiles shall be plain cement tiles or marble mosaic tiles. The former shall have the same specification as per (A) above and the later as per marble mosaic tiles as per (C) except as mentioned below.

The tiles shall be of nominal size 250mm x 250mm of as specified. The centre to centre distance of chequer shall not be less than 25 mm and not more than 50 mm. The over all thickness of the tile shall be 22mm.

The grooves in the chequers shall be uniform and straight. the depth of the grooves shall not be less than 3 mm. the chequered tiles shall be plain, coloured and mosaic as specified. The thickness of the upper layer measured from the top of the chequers shall not be less than 6 mm. the tiles shall be given the first grinding with machine before delivery to site.

Tiles shall conform to relevant I.S. 1237-2012 (Reaffirmed 2017).

32.5(E) CHEQUERED TILES FOR STAIR CASES :

The requirements of these tiles shall be the same as chequered tiles as per (D) above except in following respects:

- (1) The length of a tile including nose shall be 330 mm
- (2) The minimum thickness shall be 28 mm.
- (3) The nosing shall have also the same wearing layer as at the top.
- (4) The nosing edge shall be round.
- (5) The front portion of the tile for a minimum length of 75 mm from and including the nosing shall have grooves running parallel to parallel to nosing and at centers not exceeding 25 mm. beyond that the tiles have normal chequer pattern.

M – 33 Rough Kotah Stone :

The kotah stones shall be hard, even, sound, and regular in shape and generally uniform in colour. The colour of the stone shall generally be green. Brown coloured shall not be allowed for use. They shall be without any soft veins, cracks or flaws.

The size of the stones to be used for flooring shall be as per drawing or as directed by engineer in charge. However smaller and longer sizes will be allowed to be used to the extent of maintaining required pattern. Thickness shall be as specified.

Tolerance of minus 30 mm. on accounts of chisel dressing of edges shall be permitted for length as well breadth. Tolerance in thickness shall be +3 mm.

The edges of stones shall be truly chiseled and table rubbed with coarse sand before paving. All angles and edges of the stones shall be true, square and free from chipping and the surface shall be true and plain.

When machine cut edges are specified, the exposed and the edges at joints shall be machine cut. The thickness of the exposed machine cut edges shall be uniform.

M – 34 Polished Kota stone:

The slabs shall be of selected quality, hard, sound, dense and homogeneous in texture free from cracks, decay, weathering and flaws. They shall be hand or machine cut to the requisite thickness. They shall be of uniform green colour unless specified or as instructed by the Engineer-in-Charge.

The slabs shall have the top (exposed) face polished before being brought to site, unless otherwise specified. The slabs shall conform to the size required. Before starting the work the contractor shall get the samples of slabs approved by the Engineer-in-Charge and the size of kotah stone as directed by Engineer-in-charge.

M – 35 Glazed/Ceramic/Vitrified Tiles (Pressed Ceramic Tiles)

The above tiles shall conform to IS 15622-2017. The size, shape, shade and colour shall be as per tender description or as directed by engineer in charge. The tiles shall be of best quality as approved by the Engineer In charge. They shall be flat, and true to shape and free from blisters crazing, chips, welts, crawling or other imperfections detracting from their appearance. The tiles shall be tested as per IS 13630 (Part-1 to 16)-2019.

Classification and Characteristics of pressed ceramic tiles shall be as per IS 13712-2019.

M – 36 Galvanised Iron pipes and fittings:

36.1 Galvanised iron pipes shall be of medium type and of required diameter and shall comply with IS 1239(Part-1)-2004 (Reaffirmed 2014). The specified diameter of the pipes shall refer to the inside diameter of the bore. Z-Clamps, screws and all galvanized iron fittings shall of standard R or equivalent make.

M – 37 Bib Cock and stop cock:

A Bib cock is drawing off tap with a horizontal inlet and outlet. A stop cock is a valve with a suitable means of connection for inserting in a pipe line for controlling of stopping the flow.

They shall be of screw down type and/or brass chromium plated and of diameter as specified in the description of the item. They shall conform to IS 781-1984 (Reaffirmed 2020) and they shall be best Indian make. They shall be polished bright.

The minimum finished of bib cock and stop cock shall be as given below.

The minimum finished weights of bib tap and stop valve shall be as specified in Table.

TABLE
Minimum Finished Mass of Bib Taps and Stop Valves

Size	Minimum Finished Mass			
	Bib Taps	Internally Threaded	Externally Threaded	Mixed End
(1)	(2)	(3)	(4)	(5)
mm	kg	kg	kg	kg
8	0.250	0.220	0.250	0.235
10	0.300	0.300	0.350	0.325
15	0.400	0.330	0.400	0.365
20	0.750	0.675	0.750	0.710
25	1.250	1.180	1.300	1.250
32	--	1.680	1.800	1.750
40	--	2.090	2.250	2.170
50	--	3.700	3.850	3.750

In case these are required to be nickel plated, the plating shall be of the first quality with a good thick deposit of silvery whiteness capable of taking high polish which will not easily tarnish or scale.

The model of Bib cock & Stop cock shall be as described in tender.

M – 38 Gun metal wheel valve:

- 38.1 The gun metal wheel valve shall be approved quality. These shall be metal fitted with wheel and shall be of gate valve opening full way and as the size of specified. These shall conform to IS 778-1984 (Reaffirmed 2020).

M – 39 White Glazed Porcelain wash basin:

Wash basin shall be of white porcelain first quality best Indian make and it shall conform to IS 2556 (Part-I)-1994 (Reaffirmed 2017), IS 2556 (Part-IV)-2004 (Reaffirmed 2019) and IS 771(Part-I)-1979 (Reaffirmed 2017). The size of the wash basin shall be as specified in the item. Wash basin shall be of one piece construction with continued over flow arrangements. All internal angles shall be designed so as to facilitate cleaning. Wash basin shall have single tap hole or two holes as specified. Each basin shall have circular waste hole which is either rebated or bevel internally with 65 mm diameter at top and 10 mm depth to suit the waste fitting. The necessary stud slot to receive the bracket on the underside of the basin shall be provided. Basin shall have an internal soap recess which shall fully drain into the bowl.

White glazed pedestal of the quality and colour as that of the basin shall be provided where specified in the item. It shall be completely recessed at the back for reception of supply and wash pipe. It shall be capable of supporting the base rigidly and adequately and shall be so designed as to make the height for the floor to top of the rim of basin 750 mm to 800 mm as directed.

M – 40 European type water closet with low level flushing:

The European type water closet shall be white glazed porcelain first quality and shall be of wash down type conforming to IS 2556 (Part-I)-1994 (Reaffirmed 2017), IS 2556 (Part-II)-2004 (Reaffirmed 2019) and IS 771(Part-I)-1979 (Reaffirmed 2017). 'P' or 'S' trap shall be provided as required with water seal not less than 50 mm.

The wall mounted type European pan trap shall conform to IS 2556(Part-16)-2002 (Reaffirmed 2017). 'P' or 'S' trap shall be provided as required.

The solid plastic seat and cover shall be of best quality make conforming to IS 2548-1996 (Reaffirmed 2017). They shall be made of moulded synthetic materials which shall be tough and hard with high resistance to solvents and shall be free from blisters and surface defects and shall have chromium plated brass hinges and rubber of suitable size.

M – 41 Orissa type water closet:

- 41.1 The specification of Orissa pan type white glazed water closet of first quality shall conform to IS 2556 (Part-I)-1994 (Reaffirmed 2017) & IS 2556 (Part III)-2004 (Reaffirmed 2019) and IS 771(Part-I)-1979 (Reaffirmed 2017) and relevant specification of Indian type water closet except that pan will be with the integral squatting pan of size 580 mm x 440 mm or as described in tender item with raised footrest. 'P' or 'S' trap shall be provided as required.

M – 42 Indian type water closet:

- 42.1 The Indian type white glazed water closed of first quality shall be of size as specified in the item conforming to 771(Part-I)-1979 (Reaffirmed 2017) and IS 2556 (Part III)-2004 (Reaffirmed 2019). Each pan shall have integral flushing. IT shall have in inlet at back or front for connection flush pipe as directed. The inside of the bottom of the pan shall have sufficient slope form the front towards the outlet and surface shall be uniform and smooth. Pan shall be provided with 100 mm diameter 'P' or 'S' trap with approximately 50 mm water seal and 50 mm diameter vent horn.

M – 43 Foot Rest

- 43.1 A pair of white glazed earthenware rectangular foot of minimum size 250 mm x 130 mm x 20 mm shall be provided with the water closet.

M – 44 Flush Cock:

- 44.1 Half turn flush cock (heavy weight) shall be of chromium plated brass of diameter as specified in the description of the item. The flush cock shall conform to relevant Indian Standard IS 781-1984 (Reaffirmed 2020).

M – 45 Cast iron pipes and fittings.

All soil, water, vent and antisiphonage pipe and fitting shall conform to I.S. 1729-2002(Reaffirmed-2017) The pipes shall have spigot and socket ends with head on spigot end. The pipes and fitting shall be true to shape, smooth, cylindrical, their inner and outer surface being as nearly as practicable concentric. They shall be sound and nicely cast and shall be free cracks, laps, pinholes or other imperfection and shall be neatly dressed and carefully fitted.

The end of pipes and fittings shall be reasonable square to their axis.

The sand cast iron pipes shall be of the diameter as specified in the in the description and shall be in lengths of 1.5 M, 1.8M and 2 M. including socket ends of the pipe unless shorter lengths are either specified or required at junctions etc. The pipes and fittings shall be supplied without ears unless specified or directed otherwise.

TOLERANCES :

The standard weights and thickness of pipes shall be shown in the following table: A tolerance upto minus 10 per cent may however be allowed against these standards weights.

Sr. No	Nominal dia of bore	Thickness	Overall	Weight of pipe	Excluding ears.
1	75 mm	5.0 mm	1.5 m long 12.83 Kg	1.8 m long 16.52 Kg.	2 m long 18.37 Kg
2	1000 mm	5.0 mm	18.14 Kg	21.67 Kg	24.15 g

A tolerance upto minus 15 percent in thickness and 20mm. in length will be allowed. for fittings tolerance in lengths shall be plus 25 mm. and minus 10mm.

The thickness of fittings and their socket and spigot dimensions shall conform to the thickness and dimensions specified for the corresponding sizes of straight pipes. The tolerance in weights and thickness shall be the same as for straight pipes.

M – 46 Nahni Trap:

Nahni trap shall be PVC and shall be sound free from porosity or other defects which affects serviceability. The thickness of the base shall not be less than 6.5 mm. The surface shall be smooth and free from craze, chips and other flaws or any other kind of defects which affect serviceability. The size of nahni trap shall be of specified and shall be of self cleansing design.

The nahni trap shall be quality approved by the Engineer-in-charge and shall generally conform to the relevant Indian Standard.

The nahni trap provided shall be with deep seal minimum 50 mm except at places where trap with deep seal cannot be accommodated. The cover shall be S.S. perforated cover shall be provided on the trap appropriate size.

M – 47 Gully Trap:

Gully trap shall conform to IS 651-2007 (Reaffirmed 2017) or its relevant and latest edition. It shall be sound free from defects such as fire crack or haircrack. The glaze of the traps shall be free from crazing. They shall give a sharp clear note when struck with light hammer. There shall be no broken blisters. The size of gully trap shall be as specified in the item.

Each gully trap shall square size corresponding to the dimension of inlet of gully trap. It will also have after tight CI cover with frame inside dimensions 300 mm x 300 mm the cover weighing not less than 4.53 Kg and the frame not less than 2.72 Kg. The cover and the frame shall be sound and good casting and shall have truly square machined seating faces.

M – 48 Glazed Stone ware Pipe and fitting

The pipes and fittings shall be of best quality at approved by the Engineer-in-charge. The pipe shall be of best quality manufactured from stone-ware of fire clay, salt glazed thoroughly burnt through the whole thickness, of a close even texture, free from air blows, fire blisters, cracks and other imperfections, which affect the serviceability. The inner and outer surfaces shall be smooth and perfectly glazed. The pipe shall be capable to withstand pressures of 1.5 M. lead without showing sign of leakage. The thickness of the wall shall not be less than 1/12th of the internal dia. The depth of socket shall not be less than 38mm. The socket shall be sufficiently large to allow a joint of 6 mm around the pipe.

The pipes shall generally conform to relevant I.S 651-2007 (Reaffirmed 2012) or its relevant and latest edition.

M – 49 Wall Peg Rail

- 49.1 The wall peg nail shall be of S.S.304 grade and the size and model shall be as mentioned in tender item.

M – 50 G. I. Water Spout

The pipes of 40 mm dia. shall be of medium quality and specials shall be of 'R' brand or equivalent brand of best approved quality.

The pipe shall have length as required for the thickness of wall in which it is fixed, and at outside end tee and bend cut at half the length shall be provided and at other end, coupling shall be provided to have better fixing. The water spout be provided as per detailed drawing or as directed.

M – 51 Asbestos cement Pipe (A.C.Pipe)

- 50.1 The asbestos cement pipe of diameter as specified in the description of the item shall conform to I.S. 1592-2003 (Reaffirmed 2018). Special like bends, shops, cowls, etc. shall conform to relevant Indian standards. The interior of pipe shall have smooth finish regular, surface and regular diameter. The tolerance in all dimensions shall be as per I.S. 1592-2003 (Reaffirmed 2018).

M – 52 Crydon Ball valve

- 52.1 Ball valve of screwed type including polythene float and necessary level etc. shall be of the size as mentioned in the description of item and shall conform to I.S. 1703-2000 (Reaffirmed 2020) or its relevant and latest edition.

M – 53 Selected earth

The selected earth shall be that obtained from excavated material or shall have to be brought from outside as indicated in the item. If item does not indicate anything, the selected earth shall to be brought from outside.

For selected soil Maximum Dry Density (MDD) shall be in the range of 1850-2280 kg/Cum and Optimum Moisture Content (OMC) shall be in the range of 7 to 15%.

The selected earth shall be good yellow soil and shall be got approved from the Engineer-in-charge. In no case black cotton soil or similar expansive and shrinkable soil, shall be used. It shall be clean and free from all rubbish and perishable materials, stones or brick bats. The clods shall be broken to a size of 50 mm or less. Contractor shall make his own arrangement at his own cost for land for borrowing selected earth. The stacking of material shall be done as directed by the Engineer-in-charge in such a way as not to interfere with any constructional activities and in proper stacks.

When excavated material is to be used only selected stuff got approved from the Engineer-in-charge. It shall be stacked separately and shall comply with all the requirements of selected earth mentioned above.

M – 54 Barbed wire

The barbed wire shall be of galvanized steel and it shall generally conform to I.S.278-2009 (Reaffirmed 2020) or its relevant and latest edition. The barbed wire shall be of type-I whose nominal diameter for line wire shall be 2.5mm and point wire 2.24 mm. The nominal distance between two barbs shall be 75 mm unless otherwise specified in the item. The barbed wire shall be formed by twisting together two line wires, one containing the barbs. The size of the line and point wires and barb spacing shall be as specified above. The permissible deviation from the nominal diameter of the line wire and point shall not exceed +0.808mm.

The barbs shall carry four points and shall be formed by twisting two point wires, each two turns, lightly round one line wire, making altogether four complete turns. The barbs shall be so finished that the four points are set and locked at right angles to each other. The barbs shall have a length of not less than 13 mm and not more than 18 mm. The point shall be sharp and cut at an angle not greater than 35 degree of the axis of the wire forming the barbs.

The line and point wires shall be circular in section free from scale and other defects and shall be uniformly galvanized. The line wire shall be in continuous length and shall not contain any welds other than those in the rod before it is drawn. The distance between two successive splices shall not be less than 15 meters.

The lengths per 100 Kg. of barbed wire I.S. type I shall be as under :

Nominal 1000 meter. Minimum 934 meter. Maximum 1066 Meter.

M – 55 AAC Block

The AAC block shall be confirm to IS 2185(Part-3)-1984 (Reaffirmed 2020) and the block masonry work shall be carried out as per IS 6041-1985 (Reaffirmed 2020).

M – 56 Interlocking Paver Block

The grade of concrete for paver block and thickness shall be as specified in tender item. The shape of paver block shall be approved by engineer in charge. The Interlocking paver block shall be confirm to IS 15658-2021. The laying of paver block shall be as per IS 16777-2019.

M-57 Granite stone

Material shall be confirm to IS 14223(Part-1)-1995 (Reaffirmed 2017). Thickness of the granite shall be 15mm to 18mm.

Granite should be free from all imperfections and injurious minerals that may interfere with the appearance, strength, structural integrity and its amenability to take good polish. Imperfections are mostly imparted by the textural variations which is a function of degree of uniformity and the distribution of the constituent minerals. Hair line cracks / joints, flowers, moles, knots, white and dark lines due to segregation of light coloured minerals in multi-coloured granites and ferromagnesium minerals in light coloured granites are considered to be the imperfections. Granites should be free from deleterious minerals such as pyrite, marcasite and minerals such as biotite, chlorite, ilmenite, etc. which interfere with the colour and appearance on weathering and also affect polishing characteristics.

SECTION – 1 EXCAVATION

1. [4.0.0(A)] Excavation for foundation up to 1.5 m. depth including sorting out and stacking of useful material and disposing of the excavated stuff for all leads and lifts in loose or soft soil.

1.0 Loose or Soft Soil

Any soil which generally yields to the application of pickaxes and shovels, phawaras rakes or any such ordinary excavating implements or organic soil, gravel, silt, sand turf loam, clay, peat etc., fall under this category.

2.0 Clearing the site

The site on which the structure is to be built shall be cleared, and all obstructions, loose stone, materials and rubbish of all kind, brush, wood and trees shall be removed as directed. The materials so obtained shall be property of the Government and shall be conveyed and stacked as directed within 50 m. lead. The roots of trees coming in the sides shall be cut and coated with hot asphalt.

The rate of site clearance is deemed to be included in the rate of earth work for which no extra will be paid.

3.0 Setting out

After clearing the site, the centre lines will be given by the Engineer in charge. The contractor shall assume full responsibility for alignment, elevation and dimension of each and all part of the work. Contractor shall supply labours, materials, etc., required for setting out the reference marks and bench marks and shall maintain them as long as required and directed.

4.0 Excavation

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

5.0 Excavated stuff

(A) In foundation & plinth

The excavated stuff of the selected type shall be used in filling the trenches and plinth in layer not more than 20cm including watering and ramming by steel rod. If the balanced excavated stuff is used in campus filling for leveling the ground, the same shall be done in layer wise (maximum 20cm of each layer) including ramming and watering and rolling by mechanically compactor etc.

(B) In campus

Filling shall be done in layer wise (maximum 20cm of each layer). Each layer shall be water sprinkle and compacted by power roller of 8 to 10 tons. To ensure proper compaction, OMC & ODD tests to be carried out for surplus excavated earth and after compaction FDD test needs to be carried out. The result of FDD must be minimum 95% of ODD. The balance of the excavated quantity shall be removed by the contractor from the site of work to a place as directed with all leads and lifts.

6.0 Mode of measurements & payment

The measurement of excavation in trenches for foundation shall be made according to the sections of trenches shown on the drawing or as per sections given by the Engineer in charge. No payment shall be made for surplus excavation made in excess of above requirements or due to stopping and sloping back as found necessary on account conditions of soil and requirements of safety. At the time of excavation if the ground water found same shall be dewatered by agency without any extra cost.

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

2.[4.0.0 (B)] Excavation for foundation up to 1.5 M depth including sorting out and stacking of useful materials and disposing of the excavated stuff for all leads and lifts in dense or hard soil.

1.0 Dense or Hard Soil

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

2.0 Workmanship

The relevant specification of Item No. 4.0.0 (A) shall be followed except that the excavation work shall be carried out in dense or hard soil.

3.0 Mode of measurements & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.
The rate shall be for a unit of one cubic meter.

3[4.0.0.(C)] Excavation for foundation up to 1.5 M. depth including sorting out and stacking of useful materials and disposing of the excavated stuff for all leads and lifts in hard murrum.

1.0 Hard Murrum

The hard murrum is disintegrated rocks which contains silicon materials and natural mixture of clay of calcareous origin which can be excavated by pickaxe or chisel.

2.0 Workmanship

The relevant specification of Item No. 4.0.0 (A) shall be followed except that the excavation work shall be carried out in hard murrum.

3.0 Mode of measurements & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.
The rate shall be for a unit of one cubic meter.

4[4.0.0 (D)] Excavation for foundation up to 1.50 M. depth including sorting out and in stacking of useful materials and disposing of the excavated stuff for all leads and lifts-soft rock not requiring blasting.

Soft Rock:

Generally any rock which can be excavated by splitting with crow bars or picks and does not require blasting, wedging or similar means for excavation such as lime stone, sand stone, hard laterite, hard conglomerate and un-reinforced cement concrete below ground level.

If required light blasting may be resorted to for loosening the materials but this will not in anyway entitle the material to be classified as 'Hard rock'.

1.0 Workmanship

The relevant specification for item No. 4.0.0. (A) Shall be followed except that the excavation shall be carried out in soft rock not requiring blasting.

The excavation in soft or disintegrated rock shall be carried out by crow bars, pickaxes or pneumatic drills or any other suitable means. If contractor desires to resort to blasting, he can do so with permission of the Engineer in charge but nothing extra shall be paid to him.

The materials available from soft rock excavation shall be disposed for any lead and lift as directed by Engineer in charge for which no extra payment will be made.

The classification of strata of the foundation soil shall be done by the Engineer in charge and shall be acceptable to the contractor.

2.0 Mode of measurements & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.
The rate shall be for a unit of one cubic meter.

5[4.0.0.(E)] Excavated for foundation up to 1.50 M. depth including sorting out and stacking of useful materials and disposing of the excavated stuff for all leads and lifts in hard rocks.

Hard rock: Generally any rock or boulder for the excavation of which blasting is required such as quartzite, granite, basalt, reinforced cement concrete (reinforcement to be cut through but not separated from concrete) below ground level and the like.

Hard rock (blasting prohibited): Hard rock requiring blasting as described above but where the blasting is prohibited for any reason and excavation has to be carried out by chiseling, wedging, use of rock hammers and cutters or any other agreed method.

1.0 Workmanship

The relevant specification of item 4.0.0 (A) shall be followed except that the excavation for foundation work shall be carried out in hard rock.

Excavation shall be done by blasting to the dimensions shown in the drawings or as directed. The blasting shall be carried out only with written permission of the Engineer in charge. All the laws, regulations etc., pertaining to the precautions, acquisition, transport, landing and use of explosive shall be rigidly followed. The magazine for the storage for explosive shall be built to the design and specification of explosive authority and located at the approved site. No unauthorized persons shall be admitted in to the magazine and when not in use it shall be kept securely locked. No matches or inflammable materials shall be allowed in Magazine. The Magazine shall have an effective lightning conductor. The rules of explosive 1940 revised from time to time shall be followed strictly for obtaining, starting, handling, undertaking blasting work. The contractor shall be responsible for damage to property, workmen, public due to any accident due to use of explosive and operation.

PRECAUTIONS

The blasting operation shall remain in charge of competent and experienced supervisor and workmen who are thoroughly acquainted with the detail of handling explosive and blasting operations. The blasting shall be carried out during fixed hours of the day, preferably during the mid-day, lunch hours or at the close of the work as ordered in writing by the Engineer in charge. The hours of blasting shall be notified in advance to the people in the vicinity, all the charges shall be prepared by the person in charge only.

Red danger flags shall be displayed prominently in all directions during the blasting operations.

People except these who actually light the fuse shall be prohibited from entering into this area. The flags shall be stationed at 200m from the firing site in all directions and all persons including workmen shall be excluded from the flagged area at least 10 minutes before the firing warning whistle being sounded for this purpose.

During excavation in rock blasting, the lowest 15cm of the stratas shall be blasted with light charges so as not to shatter or weaken the underlying rock on which the foundation will be actually laid. If excavation in rock is done to larger widths and length then those shown on the drawings or as directed, no payments shall be made for such over break. If excavation done to depths greater than shown on the drawings or directed excess depth shall be made up with foundation grade concrete as directed at the contractors cost.

The charged hole shall be drilled to the required depth and in suitable places when blasting is done with powder, the fuse cut to the required length shall be inserted in the holes and the powder dropped in. The powder shall be gently tamped with copper rod with rounded ends. The explosion powder shall then be covered with trapping materials which shall be prepared by inserting the square cut ends of fuse into the detonator, the finished with dippers at the open ends. The detonator should be gently pushed into the primer leaving one third or the copper exposed outside. The primer shall be housed into the explosive, Bore holes shall be of such size that the cartridges can be easily passed down. The holes shall be cleared of all debris and explosive inserted. The space for about 20cm above the charge shall then be gently filled with dry clay pressed home and rest of the tamping is with from any convenient materials gently packed with a wooded cover.

At a time not more than 10 such charges shall be prepared and fired. The man in charge shall blow a whistle in a recognized manner for cautioning the people. All the people shall then be required to move to safe distance. The charges shall be lighted by the man in charge only. The man in charge shall count the number of explosions. He shall satisfy himself that all the charges have been exploded before allowing the workmen to go to the work site.

The contractor shall be fully responsible to strictly follow the prevailing rules and procedures regarding blasting procedures.

MISFIRE

In case of a misfire the following procedure shall be observed:

Sufficient time shall be allowed to account for the delayed blast. The man in charge shall inspect all the charges and determine the missed charge.

If it is the blasting powder charge it shall be completely flooded with water. A new hole shall be drilled at about 45 cm. from the old and fired. This should blast the old charge the procedure shall be repeated till the old charge is blasted.

In case of charge of gelatin, dynamite etc., the man in charge shall gently remove the tamping and primer with detonator and primer shall then be used to blast the charge. Alternatively the hole may be cleared of one foot of tamping and the direction then ascertained by placing a stick in the hole. Another hole may then be drilled 15 cm. away and parallel to it. The man in charge shall report to the office all cases of misfire and cause of the same and what steps were taken in connection therewith.

If a misfire has been found to be due defective detonator or dynamite, the whole quantity in the box from which defective article was taken must be sent to authority as directed for inspection to ascertain whether all the remaining materials in the box are also defective or not.

ACCIDENTS

The contractor shall be solely responsible for any accident during the entire procedure of handling explosive and blasting and shall pay necessary compensation to persons affected or damage to lands or property etc. due to the blasting, without extra claims on the department.

ACCOUNTS

A careful and day to day account of explosives shall be maintained by the contractor in an approved manner and shall be open to inspection of the Engineer in charge. Surprise visits may also be paid by the Engineer in charge to the storage and in case of any unaccountable shortage or unsatisfactory accounting the contractor shall be liable to be penalized by forfeiture or part or whole of his Security Deposit or by cancellation of Tender in which case he shall not be entitled for any compensation.

DISPOSAL OF EXCAVATED MATERIALS

Materials excavated from foundation trenches of whatever kind they may be, are to be placed even temporarily nearer than 1.5 m. or distance prescribed by the Engineer from the outer edge of excavation. All materials excavated shall remain the property of Government. Rate of excavation includes sorting out of useful materials and stacking them separately as directed within the specific lead. Materials suitable and useful for backfilling or other use shall be stacked convenient places but not in such a way as to obstruct free movement of men, animals and vehicles or encroach upon the area required for construction purposes. The site shall be left clean of all debris on completion.

Disposal of excavated materials is subject to the following:

Unsuitable materials obtained from clearing site and excavation shall be disposed off up to any lead and lift as directed. Useful materials obtained from clearing site and excavation shall be stacked within any lead beyond the building area as directed. Materials suitable for backfilling shall be stacked at convenient places for reuse.

2.0 Mode of measurement & payment

The work shall be measured for the work limited to the dimension shown on drawings or directed Excavation to dimension in excess of the above will not be measured or paid for and if so ordered by the Engineer, the contractor shall have to fill up the excess depth with cement concrete specified for foundation without extra payment.

Driving of sounding bars, drill holes to explore the nature of substratum up to a total length of meter distributed in 2 or 3 places in each foundation if necessary, will be considered incidental work and will not be paid for separately.

Removal of slips and blows in the foundation trenches will not be measured or paid for.

If it is necessary in the opinion of the Engineer in charge to carry foundation below the levees shown on the plans, the excavation for the first 1.5m of additional depth will be included in the quantity for the particular classification and will be paid to as extra work at rate to be decided under the general conditions of contract unless the contractor is willing to accept payment is tendered rates.

At the time of excavation if the ground water found same shall be dewatered by agency without any extra cost.

The rate shall be for a unit of One Cubic Meter.

6 [4.0.01 (A)] Excavation for foundation for depth from 1.5 M. to 3.0 M. including sorting out and stacking of useful materials and disposing of the excavated stuff for all leads and lifts for loose or soft soil.

7

1.0 Workmanship

The relevant specification of item No. 4.0.0 (A) shall be followed except that the excavation work shall be carried out in loose or soft soil with lift of 1.5 M. to 3.0 M.

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The excavation work of from 1.5 M. to 3.0 M. shall be measured under this item.

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

8 [4.0.01 (B)] Excavation for foundation for depth from 1.5 M. to 3.0 M. including sorting out and stacking of useful materials and disposing of excavated stuff for all leads and lifts in Dense or Hard Soil.

1.0 Workmanship

The relevant specification of item no. 4.0.0 (B) shall be followed except that the excavation work shall be carried out with 1.5 m. to 3.0 M. lift in dense or hard soil.

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed

The excavation work of from 1.5 M. to 3.0 M. shall be measured under this item.

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

9 [4.0.01 (C)] Excavation for foundation for depth from 1.5 M. to 3.0 M. including sorting out and stacking of useful materials and disposing of excavated stuff for all leads and lifts in hard murrum.

10

1.0 Workmanship

The relevant specification of item no. 4.0.0 (C) shall be followed except that the excavation work shall be carried out with 1.5 m. to 3.0 M. lift in hard murrum.

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The excavation work of from 1.5 M. to 3.0 M. shall be measured under this item.

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

11 [4.0.01 (D)] Excavation for foundation for depth from 1.5 M. to 3.0 M. including sorting out and stacking of useful materials and disposing of excavated stuff for all leads and lifts in soft rock not required blasting.

1.0 Workmanship

The relevant specification of item no. 4.0.0 (D) shall be followed except that the excavation work shall be carried out with 1.5 m. to 3.0 M. lift in soft rock not required blasting

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The excavation work of from 1.5 M. to 3.0 M. shall be measured under this item.

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

12 [4.0.01 (E)] Excavation for foundation for depth from 1.5 M. to 3.0 M. including sorting out and stacking of useful materials and disposing of excavated stuff for all leads and lifts in hard rock

1.0 Workmanship

The relevant specification of item no. 4.0.0 (E) shall be followed except that the excavation work shall be carried out with 1.5 m. to 3.0 M. lift in hard rock

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The excavation work of from 1.5 M. to 3.0 M. shall be measured under this item.

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

13 [4.0.02 (A)] Excavation for foundation for depth from 3.0 M. to 5.0 M. including sorting out and stacking of useful materials and disposing of the excavated stuff for all leads and lifts in loose or soft soil.

1.0 Workmanship

The relevant specification of item No. 4.0.0 (A) shall be followed except that the excavation work shall be carried out from 3.0 M. to 5.0 M. lift in loose or soft soil.

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The excavation work of from 3.0 M. to 5.0 M. shall be measured under this item.

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

14 [4.0.02 (B)] Excavation for foundation for depth from 3.0 M. to 5.0 M. including sorting out and stacking of useful materials and disposing of the excavated stuff for all leads and lifts in Dense or Hard soil.

1.0 Workmanship

The relevant specification of item No. 4.0.0 (B) shall be followed except that the excavation work shall be carried out from 3.0 M. to 5.0 M. lift in Dense or Hard soil.

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The excavation work of from 3.0 M. to 5.0 M. shall be measured under this item.

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

15 [4.0.02 (C)] Excavation for foundation for depth from 3.0 M. to 5.0 M. including sorting out and stacking of useful materials and disposing of the excavated stuff for all leads and lifts in Hard murrum.

1.0 Workmanship

The relevant specification of item No. 4.0.0 (C) shall be followed except that the excavation work shall be carried out from 3.0 M. to 5.0 M. lift in hard murrum

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The excavation work of from 3.0 M. to 5.0 M. shall be measured under this item.

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

16 [4.0.02 (D)] Excavation for foundation for depth from 3.0 M. to 5.0 M. including sorting out and stacking of useful materials and disposing of the excavated stuff for all leads and lifts in soft rock not requiring blasting.

1.0 Workmanship

The relevant specification of item No. 4.0.0 (D) shall be followed except that the excavation work shall be carried out from 3.0 M. to 5.0 M. lift in soft rock not requiring blasting.

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The excavation work of from 3.0 M. to 5.0 M. shall be measured under this item.

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

17 [4.0.02 (E)] Excavation for foundation for depth from 3.0 M. to 5.0 M. including sorting out and stacking of useful materials and disposing of the excavated stuff for all leads and lifts in Hard rock.

1.0 Workmanship

The relevant specification of item No. 4.0.0 (E) shall be followed except that the excavation work shall be carried out from 3.0 M. to 5.0 M. lift in hard rock.

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The excavation work of from 3.0 M. to 5.0 M. shall be measured under this item.

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

18 [4.0.03 (A)] Extra for additional depth more than 5.0 M. excavation for foundation including sorting out and stacking of useful disposing of excavated stuff for all leads and lifts in loose or soft soil.

1.0 Workmanship

The relevant specification of item No. 4.0.0 (A) shall be followed except that the excavation work shall be carried out for more than 5.0 M. lift in loose or soft soil.

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The rate shall be paid extra over and above the rate of item No. 4.0.02 (A) for carrying out excavation work for additional depth for 5.0 M. and above.

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

19 [4.0.03 (B)] Extra for additional depth more than 5.0 M. excavation for foundation including sorting out and stacking of useful disposing of excavated stuff for all leads and lifts in Dense or Hard soil.

1.0 Workmanship

The relevant specification of item No. 4.0.0 (B) shall be followed except that the excavation work shall be carried out for more than 5.0 M. lift in dense or hard soil.

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The rate shall be paid extra over and above the rate of item No. 4.0.02 (B) for carrying out excavation work for additional depth for 5.0 M. and above.

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

20 [4.0.03 (C)] Extra for additional depth more than 5.0 M. excavation for foundation including sorting out and stacking of useful disposing of excavated stuff for all leads and lifts in Hard murrum.

1.0 Workmanship

The relevant specification of item No. 4.0.0 (C) shall be followed except that the excavation work shall be carried out for more than 5.0 M. lift in hard murrum.

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The rate shall be paid extra over and above the rate of item No. 4.0.02 (C) for carrying out excavation work for additional depth for 5.0 M. and above.

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

21 [4.0.03 (D)] Extra for additional depth more than 5.0 M. excavation for foundation including sorting out and stacking of useful disposing of excavated stuff for all leads and lifts in soft rock not requiring blasting.

1.0 Workmanship

The relevant specification of item No. 4.0.0 (D) shall be followed except that the excavation work shall be carried out for more than 5.0 M. lift in soft rock not requiring blasting.

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The rate shall be paid extra over and above the rate of item No. 4.0.02 (D) for carrying out excavation work for additional depth for 5.0 M. and above.

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

22 [4.0.03 (E)] Extra for additional depth more than 5.0 M. excavation for foundation including sorting out and stacking of useful disposing of excavated stuff for all leads and lifts in Hard rock

1.0 Workmanship

The relevant specification of item No. 4.0.0 (E) shall be followed except that the excavation work shall be carried out for more than 5.0 M. lift in hard rock.

2.0 Mode of measurement & payment

The relevant specification of item No. 4.0.0 (A) shall be followed.

The rate shall be paid extra over and above the rate of item No. 4.0.02 (E) for carrying out excavation work for additional depth for 5.0 M. and above.

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

23 [4.12] Filling with available excavated earth (excluding rock) in trenches, plinth sides of foundations, etc. in layers not exceeding 20cm depth, considering each deposited layer by ramming and watering.

1.0 Workmanship

The earth to be used for filling shall be free from salts, all roots, grass, shrubs, rank vegetation, brushwood, trees, sapling and rubbish, organic or other foreign matter. All clods of earth shall be broken.

As soon as the work in foundation has been completed and measured the site of foundation shall be cleared of all debris, brick bats, mortar dropping etc., and filled with earth in layers not exceeding 20cm. Each layer shall be adequately watered, rammed and consolidated before the succeeding layer is laid. The earth shall be rammed with iron rammers where feasible and with the butt ends of crow-bars, where rammer cannot be used. The plinth shall be similarly filled with earth in layers not exceeding 20cm adequately watered and

consolidated by ramming with iron or wooden rammers. When filling reaches finished level, the surface shall be flooded with water for at least 24 hours and allowed to dry and then rammed and consolidated.

The finished level of filling shall be kept to shape intended to be given to floor.

In case of large heavy duty flooring like factory flooring, the consolidation may be done by power rollers, where so specified. The extent of consolidation required shall also be as specified.

The excavated stuff of the selected type shall be allowed to be used in filling the trenches and plinth. Under no circumstances black cotton soil be used for filling the plinth. If available earth is to be used in campus filling, prior levels of existing ground level is to be recorded before starting of earth filling.

2.0 Mode of measurement & payment

The payment shall be made for filling in plinth and trenches. No deduction shall be made for shrinkage or voids, if consolidated as instructed above.

The rate shall be for unit of one cubic meter.

24 [4.24] Filling in plinth with sand under floor including watering, ramming, consolidating and dressing etc. complete.

1.0 Materials

Sand shall conform to M-6. Sand must be screened prior to use.

2.0 Workmanship

The relevant specification of item no. 4.12 shall be followed except that sand shall be filled in under floors, including watering, ramming, consolidating and dressing etc. complete.

3.0 Mode of measurement & payment

The relevant specification of item No. 4.12 shall be followed.

The rate includes cost of collecting, carting sand with all lead and labour for filling the same plinth under floors

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

25 [4.0.04] : Filling with selected soil or murrum brought from outside in layers of 20 cm. thickness including watering, ramming and consolidating etc., complete. For (A) In foundation & plinth, (B) In campus.

1.0 Materials

Selected soil shall be clean, of good binding quality and of approved quality obtained from approved plots.

Workmanship

(A) In Foundation & plinth

The relevant specification of item No. 4.12 shall be followed except that the selected soil shall be filled in foundations and plinth 20cm layers including consolidating ramming, watering, dressing etc. complete.

(B) In Campus

For campus filling, leveling the ground, filling shall be done in layer wise (maximum 20cm of each layer) including ramming and watering and rolling etc. Each layer shall be water sprinkle and compacted by power roller of 8 to 10 tons. To ensure proper compaction, OMC & ODD tests to be carried out for the earth used in filling and after compaction of each layer, FDD test needs to be carried out. The result of FDD must be minimum 95% of ODD. If the desire FDD is not obtained the water sprinkling and rolling needs to be done until desire value of FDD is obtained.

2.0 Mode of measurement & payments

The relevant specification of item No. 4.12 shall be followed.

The rate includes cost of collecting and carting selected earth of approved quality with all lead, lift and labour required for filling in trenches and plinth.

Rate shall be for a unit of one cubic meter.

26 [4.0.05] Filling in foundation and plinth with brick-bats/chhara in layers of 20cm thickness including watering, ramming and consolidating etc., complete.

1.0 Materials

Brick bats shall conform to No. M-14.

2.0 Workmanship

The relevant specification item No. 4.12 shall be followed except that brick bats of burnt bricks shall be filled in foundation of plinth in 20cm layer including watering, ramming, consolidating etc., complete.

3.0 Mode of measurement & payment

The relevant specification item No. 4.12 shall be followed.

The rate includes cost of collecting and carting brick bats/chhara with all lead labour, required for filling in trenches and plinth.

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

- 27 [4.27]: Boring holes 3.5 M. deep in ordinary soil (for cast in situ piles) and getting out the soil and disposal of the surplus excavated soil as directed with any lead and lift for following diameter of piles (i) 200 mm. (ii) 250 mm. (iii) 300 mm.**

1.0 Workmanship

The ground shall be roughly levelled and after making the position of piles, the holes shall be bored with a spiral angle to the 3.5 M. depth and specified diameter using boring guide.

The bore holes shall be truly vertical and uniform bore through out of specified diameter. After boring to the required depth, the bore shall be cleared off the loose soil and disposal of surplus excavated stuff as directed with any lead & lift.

2.0 Mode of measurement & payment

The rate for boring hole shall include:

Roughly leveling the ground in positions where piles are to be provided (b) Making the position of pile by pegs and boring guide and also for shifting of boring guide. (c) Bailing out water, if any, met with during boring, (d) Disposal of surplus excavated soil with any lead and lift, (e) All tools, plants, equipment and labour required for satisfactory completion of work.

The rate shall be for a unit of one Number.

- 28 [4.28] Extra for under ramming inside the bore holes for under rammed piles of following nominal diameter: (1) 200 mm. (ii) 250 mm. (iii) 300 mm.**

1.0 Workmanship

The relevant specification of item No. 4.27 shall be followed except that after boring to the required depth, the bore shall be enlarged at the bottom by an under rammer 2 to 2.5 time the diameter of the bore as directed. It shall be ensured that the bore for the pile shall be enlarged to the correct diameter.

2.0 Mode of measurement & payment

The rate shall be paid extra over and above the rate of item No. 4.27 for under ramming the piles.

The rate shall be for a unit of one Number.

SECTION – 2

PLAIN & R.C.C. Work

- 1[5.3.2(A)] Providing and laying cement concrete 1:3:6 (1 Cement: 3 coarse sand: 6 graded stone aggregate 40 mm. nominal size) and curing complete excluding the cost of form work in foundation and plinth.**

1.0 Materials

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Graded stone aggregate 40 mm. nominal size shall conform to M-12.

2.0 Workmanship

- 2.1 Before starting concrete the bed of foundation, trenches shall be cleared of all loose materials, levelled, watered and rammed as directed.

2.2 PROPORTION OF MIX:

The proportion of cement, sand and coarse aggregate shall be one part of cement, 3 parts of sand and 6 parts of stone aggregates and shall be measured by volume.

2.3 Mixing:

Concrete shall be mixed in mechanical batch type concrete mixers conforming to IS 1791 having two blades and fitted with power loader (lifting hopper type). Half bag mixers and mixers without lifting hoppers shall not be used for mixing concrete. In exceptional circumstances, such as mechanical break down of mixer, work in remote areas or power breakdown and when the quantity of concrete work is very small, hand mixing may be done with the specific prior permission of the Engineer-in- Charge in writing subject to adding 10% extra cement. When hand mixing is permitted, it shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the concrete is uniform in colour and consistency. Before mixing the brick aggregate shall be well soaked with water for a minimum period of two hours and stone aggregate or gravel shall be washed with water to remove, dirt, dust and other foreign materials. For guidance, the mixing time may be 1.5 to 2 minutes, for hydrophobic cement it may be taken as 2.5 to 3 minutes.

Machine Mixing: The mixer drum shall be flushed clean with water. Measured quantity of coarse aggregate shall be placed first in the hopper. This shall be followed with measured quantity of fine aggregate and then cement. In case fine aggregate is damp, half the required quantity of coarse aggregate shall be placed in the hopper, followed by fine aggregate and cement. Finally the balance quantity of coarse aggregate shall be fed in the hopper, & then the dry materials are slipped into the drum by raising the hopper. The dry material shall be mixed for atleast four turns of the drum. While the drum is rotating, water shall be added gradually to achieve the water cement ratio as specified or as required by the Engineer- in-Charge. After adding water, the mixing shall be continued until concrete of uniform colour, uniformly distributed material and consistency is obtained. Mixing shall be done for atleast two minutes after adding water. If there is segregation after unloading from the mixer, the concrete should be remixed.

The drum shall be emptied before recharging. When the mixer is closed down for the day or at any time exceeding 20 minutes, the drum shall be flushed cleaned with water.

Hand Mixing: When hand mixing has been specifically permitted in exceptional circumstances by the Engineer-in-Charge in writing, subject to adding 10% extra cement, it shall be carried out on a smooth, clean and water tight platform of suitable size. Measured quantity of sand shall be spread evenly on the platform and the cement shall be dumped on the sand and distributed evenly. Sand and cement shall be mixed intimately with spade until mixture is of even colour throughout. Measured quantity of coarse aggregate shall be spread on top of cement sand mixture and mixing done by shovelling and turning till the coarse aggregate gets evenly distributed the cement sand mixture. Three quarters of the total quantity of water required shall be added in a hollow made in the middle of the mixed pile and the material is turned towards the middle of pile with spade. The whole mixture is turned slowly over and again and the remaining quantity of water is added gradually. The mixing shall be continued until concrete of uniform colour and consistency is obtained. The mixing platform shall be washed and cleaned at the end of the day.

2.4 Transportation and Handling : Concrete shall be transported from the mixer to the place of laying as rapidly as possible by methods which will prevent the segregation or loss of any of the ingredients and maintaining the required workability.

During hot or cold weather, concrete shall be transported in deep containers, other suitable methods to reduce the loss of water by evaporation in hot weather and heat loss in cold weather may also be adopted.

Placing

The concrete shall be deposited as nearly as practicable in its final position to avoid rehandling. It shall be laid gently (not thrown) and shall be thoroughly vibrated and compacted before setting commences and should not be subsequently disturbed. Method of placing shall be such as to preclude segregation. Care shall be taken to avoid displacement of reinforcement or movement of form work and damage due to rains. As a general guidance, the maximum free fall of concrete may be taken as 1.5 metre.

2.5 Compaction

Concrete shall be thoroughly compacted and fully worked around embedded fixtures and into corners of the form work. Compaction shall be done by mechanical vibrator of appropriate type till a dense concrete is obtained. The mechanical vibrators shall conform to IS 2505-1992(Reaffirmed 2019), IS 2506-1985(Reaffirmed 2021), IS 2514-1963(Reaffirmed 2017) and IS 4656-1968(Reaffirmed 2007). To prevent segregation, over vibration shall be avoided.

Compaction shall be completed before the initial setting starts. For the items where mechanical vibrators are not to be used, the contractor shall take permission of the Engineer-in- Charge in writing before the start of the work. After compaction the top surface shall be finished even and smooth with wooden trowel before the concrete begins to set.

2.6 CURING:

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

2.7 MODE OF MEASUREMENTS & PAYMENTS:

The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plan or as directed.

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

2[5.3.3(A)] Providing and laying cement concrete 1:4:8 (1 Cement: 4 coarse sand: 8 graded stone aggregate 40 mm. nominal size) and curing complete excluding the cost of form work in foundation and plinth.

Materials

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Graded stones aggregate 40 mm. nominal size shall conform to M-12.

Workmanship

Relevant specifications of item No. 5.3.2 (A) shall be followed except that cement concrete shall be mixed in the proportion of 1:4:8 instead of 1:3:6 by volume.

Mode of measurements & payments:

The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plan or as directed.

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

3[5.3.4(A)] Providing and laying cement concrete 1:2:4 (1 Cement: 2 coarse sand: 4 graded stone aggregate 20 mm. nominal size) and curing complete including the cost of form work in wall caps/coping and in foundation & plinth.

Materials & Workmanship

The relevant specification of item No. 5.3.2 (A) shall be followed except that the work shall be carried out for coping, wall caps and foundation & plinth. The stone aggregate 20 mm nominal size shall be used. The concrete work of wall caps, coping and foundation & plinth.

Mode of measurement and payment

The relevant specification of item No. 5.3.2 (A) shall be followed except that the rate includes cost of necessary form work.

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

4[5.3.5(A)] Providing and laying bricks bats cement 1:4:8 (1 Cement: 4 coarse sand: 8 graded brick bats), and curing complete excluding the cost of form work in foundation and plinth.

Materials

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Brick bat shall conform to M-14.

Workmanship

The specification of this item shall be followed as per item No. 5.3.3 (A). The proportion of brick bat cement concrete shall be 1:4:8 i.e. 1 part of cement, 4 parts of coarse sand and 8 parts of graded brick bat by volume, using graded brick bat as coarse aggregate instead of 40mm graded stone aggregates.

Mode of measurement & payment

The concrete work shall be measured in length, breadth and depth as specified on drawing limiting dimension to those specified on drawings or as directed.

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

5[5.3.6(A)] Providing and laying cement concrete 1:5:10 (1 Cement: 5 coarse sand: 10 graded stone aggregate 40 mm. nominal size) and curing complete excluding the cost of form work in foundation and plinth.

Materials

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Stones aggregate 40mm. nominal size shall conform to M-12.

Workmanship

Relevant specifications of item No. 5.3.2 (A) shall be followed except that the work is to be carried out in cement concrete 1:5:10.

Mode of measurements & payments:

The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plan or as directed.

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

6[5.3.7(A)] Providing and laying brick bats cement concrete 1:5:10 (1 Cement: 5 coarse sand: 10 graded brick aggregate 40 mm. nominal size) and curing complete excluding the cost of form work in foundation and plinth.

Materials

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Bricks aggregate 40 mm. nominal size shall conform to M-14.

Workmanship

Relevant specifications of item No. 5.3.2 (A) shall be followed except that the work is to be carried out in brick bats cement concrete 1:5:10. Using graded brick bats as coarse aggregate instead of 40mm graded stone aggregates.

Mode of measurements & payments:

The concrete shall be measured for its length, breadth and depth, limiting dimensions to those specified on plan or as directed.

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

7 [5.3.8(B)] Providing and laying brick bat cement concrete 1:3:6 (1 Cement: 3 coarse sand: 6 graded brick bats) and curing complete excluding cost of form work in foundation and plinth.

Material & workmanship

The specification of item No. 5.3.2 (A) shall be followed, except that the brick bats shall be used as instead of graded stone aggregates.

Mode of measurement & payment

The relevant specification of item No. 5.3.2 (A) shall be followed for mode of measurement and payment except that it excludes cost of form work.

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

8 [5.4.9] Providing throating or plaster drip and moulding to RCC chhajjas.**Materials**

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

Workmanship

The work shall be carried out as directed. The proportion of mix for finishing shall be as per concerned plaster. Curing shall be done for not less than 7 days. The work shall be carried out in best workman like manner. The throating, plaster drip and moulding shall be one centimeter in thickness and 4 centimeter wide.

9 [5.4.10] Extra for providing and mixing Water proofing material in cement concrete in mix proportions recommended by manufactures.**Workmanship**

The proportion of materials for the cement concrete shall be mentioned with the specification of that item. The quantity of water proofing materials to be added and the method of addition shall be as specified by manufacturers.

Mixing

The mixing of the water proofing materials in cement, water of concrete shall be done according to the specifications of the manufacture.

Mode of measurement and payment

The payment is extra over and above the rate of concrete for mixing water materials powder.

The rate shall be for a unit of one litre or Kg. per bag of cement in which water proofing material is added.

10 [5.4.11] Providing and laying damp proof course 25 mm. thick cement concrete 1:2:4 (1 cement: 2 coarse sand:4 stone aggregate 10 mm nominal size) and curing complete.

The specification of item No. 5.3.4 (A) of ordinary concrete with or without reinforcement shall be followed except that the size of the stone aggregate shall be done 10 mm nominal sizes and the concrete work shall be carried out in 25 mm. thick damp proof course.

Mode of measurement & payment

The rate includes cost of all materials and labour required to complete the item.

The rate shall be for a unit one Sq. meter.

11 [5.4.12(A)] Providing and laying cement concrete 1:2:4 (1 cement: 2 coarse sand:4 stone aggregate 20mm nominal size) and curing complete excluding the cost of form work in (A) foundation and plinth, (B) independent piers, columns and pillars up to floor two level.**Materials**

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Stones aggregate 20mm nominal size shall conform to M-12.

General

The concrete mix is not required to be designed by preliminary tests. The proportion of the concrete mix shall be 1:2:4 (1 cement: 2 coarse sand: 4 stone aggregate 20 mm. nominal size) by volume. Concrete work shall have smooth concrete surface or as specified in the item.

Nominal mix concrete may be used for concrete M20 or lower. The proportions of materials for nominal mix concrete shall be accordance with Table below.

The ingredients required for ordinary concrete containing one bag of cement of 50 Kg. by weight (0.0347 Cu. M.) for different proportions of mix shall be as under.

Grade of Concrete (N/mm ²)	Total quantity of dry aggregate by volume per 50 Kg. of cement to be taken as the sum of individual volume of fine and coarse Aggregates Kg. maximum	Proportion of fine aggregate to coarse aggregate (By mass).	Quantity of water per 50Kg. of cement maximum
1	2	3	4
M-5 (1:5:10)	800	Generally 1:2 but subject to an upper limit of 1:1½ and lower limit 1: 2½	60
M-7.5 (1:4:8)	625		45
M-10 (1:3:6)	480		34
M-15 (1:2:4)	330		32
M-20 (1:1½ :3)	250		30

The water cement ratios shall be not more than specified in the above table. The cement content of the mix specified in the Table shall be increased if the quantity of water in mix has to be increased to overcome the difficulties of placements and compaction so that the water-cement ratio specified in the table is exceeded.

Workability of concrete shall be controlled by maintaining water-cement ratio that is found to give a concrete mix which is just sufficient wet to be placed and compacted without difficulty with the means available.

The maximum size of coarse aggregate shall be as large as possible within the limits specified but in no case greater than one fourth of the minimum thickness of the member, provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and to fill the corners of the form.

For reinforced concrete work. Coarse aggregates having a nominal size of 20mm. are generally considered satisfactory.

For heavily reinforced concrete members as in the case of ribs of main beams, the nominal maximum size of coarse aggregate should usually be restricted to 5 mm less than the minimum clear distance between the main bars, or 5 mm less than the minimum cover to the reinforcement whichever is smaller.

Where the reinforcement is widely spaced as in solid slabs, limitation of size of the aggregate may be so important, and the nominal size maximum size sometimes be as great as or greater than the minimum cover.

Admixture may be used in concrete only with approval of engineer in charge based upon the evidence that with the passage of time, neither the compressive strength of concrete is reduced nor are other requisite qualities of concrete and steel are impaired by the use of such admixtures.

Workmanship

Proportioning: Proportioning shall be done by volume, except cement which shall be measured in terms of bags of 50 Kg. weights, the volume of one such bag being taken as 0.0347 Cu. M. Boxes of suitable size shall be used for measuring sand and aggregate. The size of boxes (internal) shall be 35x25x40 cm deep while measuring the aggregate and sand the boxes shall be filled without shaking, ramming or hammering. The proportioning of sand shall be on the basis of its dry volume and in case of dampness allowances for bulking shall be made.

Mixing:

For all work, concrete shall be mixed in mechanical mixer which along with other accessories shall be kept in first class working condition and so maintained throughout the construction. Measured quantity of aggregate, sand and cement required for each batch shall be poured into the drum of the mechanical mixer while it is continuously running. After about half a minute or dry mixing measured quantity of water required for each batch of concrete mix shall be added gradually and mixing continued for another one and half minute. Mixing shall be continued till material are uniformly distributed and uniform colour of the entire mass is obtained and each individual particle of the coarse aggregate shows complete coating of mortar is obtained its proportionate amount of cement. In no case shall the mixing be done for less than 2 minutes after all ingredients have been put into the mixer.

When hand mixing is permitted by the engineer in charge for small jobs or for certain other reasons, it shall be done on the smooth water tight platform large enough to allow efficient turning over the ingredients of concrete before and after adding water. Mixing platform shall be so arranged that no foreign material gets mixed with concrete nor does the mixing water flow out. Cement in required number of bags shall be placed in a uniform layer on top of the measured quantity of fine and coarse aggregate, which shall also be spread in a layer of uniform thickness on the mixing platform. Dry coarse and fine aggregate and cement shall then be mixed thoroughly by minimum 3 times turning over to get a mixture to uniform colour. Specified quantity water shall then be added gradually through a rosecan and the mass turned over till a mix of required consistency is obtained. In hand mixing quantity of cement shall be increased by 10 percent above that specified.

Mixers which have been out of use for more than 30 minutes shall be thoroughly clean before putting in a new batch. Unless otherwise agreed to be the engineer in charge the first batch of concrete from the mixture shall contain only two thirds of nominal quantity of coarse aggregate. Mixing plant shall be thoroughly cleaned before changing from one type of cement to another.

Consistency:

The degree of consistency which shall depend upon the nature of the work and methods of vibration of concrete, shall be determined by regular slump test in accordance with IS 1199-1959 (Reaffirmed 2018) or its latest or relevant edition. The slump value shall be as per IS 456-2000 (Reaffirmed 2021) Clause 7.1, Page No.-17.

<i>Placing Conditions</i>	<i>Degree of Workability</i>	<i>Slump (mm)</i>
(1)	(2)	(3)
Blinding concrete: shallow sections: Pavements using pavers	Very low	See (A)
Mass concrete: Lightly reinforced sections in slabs, beams, wall, columns, : floors	Low	25-75
Hand placed pavements: canal lining; Strip footing	Medium	50-100
Heavily reinforced sections in slabs, beams, walls, columns:		
Slip form work: Pumped concrete	Medium	75-100
Trench fill	High	100-150
Tremie concrete	Very High	See (B)

Note:- For most of the placing conditions, internal vibrators (needle vibrators) are suitable. The diameter of the needle shall be determined based on the density and spacing of reinforcement bars and thickness of sections.

- (A) In the 'very low' category of workability where strict control is necessary, for example, pavement quality concrete, measurement of workability by determination of compacting factor will be more appropriate than slump (see IS 1199) and a value of compacting factor of 0.75 to 0.80 is suggested.
- (B) In the 'very high' category of workability, measurement of workability by determination of flow will be appropriate (see IS 9103-1999 (Reaffirmed 2018)).

Inspection:

Contractor shall give the Engineer in charge due notice before placing any concrete in the forms to permit him to inspect and accept the false work and forms as to their strength, alignment and general fitness but such inspection shall not relieve the contractor of his responsibility for the safety of men, machinery, materials and for results obtained. Immediately before concreting, all forms shall be thoroughly cleaned.

Centring design and its erection shall be got approved from the engineer in charge. One carpenter with helper shall invariably be kept present throughout the period of concreting. Movement of labour and other person shall be totally prohibited for reinforcement laid in position. For access to different parts suitable mobile platforms shall be provided so that steel reinforcement in position is not disturbed.

For ensuring proper cover, precast concrete cover block of suitable size & concerned concrete grade shall be used and tied to the reinforcement. Timber, kapachi, metal or any other pieces shall not be used for this purpose.

Transporting and laying

The method of transporting and placing concrete shall be approved. Concrete shall be so transported and placed that no contamination, segregation or loss of its constituent material takes place. All form work shall be cleaned and made free from standing water, dust, snow or ice immediately before placing of concrete. No concrete shall be placed in any part of the structure until the approval of the engineer in charge has been obtained.

Concreting shall proceed continuously over the area between construction joints. Fresh concrete shall not be placed against concrete which has been in position for more than 30 minutes unless a proper construction joint is formed. Concrete shall be compacted in its final position within 30 minutes of its discharge from the mixer. Except where otherwise agreed by the engineer in charge, concrete shall be deposited in horizontal layers to a compacted depth of not more than 0.45 metre when internal vibrators are used and not exceeding 0.30 meter in all other cases.

Unless otherwise agreed to by the engineer in charge, concrete shall not be dropped in to place from a height exceeding 1 meter. When trunking or chutes are used they shall be kept close and used in such a way as to avoid segregation.

When the work has to be resumed on a surface which has hardened, such surface shall be roughened. It shall then be swept clean and thoroughly wetted. For vertical joints, neat cement slurry, of workable consistency by using 2 kgs of cement per sqm shall be applied on the surface before it is dry. For horizontal joints, the surface shall be covered with a layer of mortar about 10-15 mm thick composed of cement and sand in the same ratio as the cement and sand in concrete mix. This layer of cement slurry or mortar shall be freshly mixed and applied immediately before placing of the concrete.

Where the concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes, care being taken to avoid dislodgement of particles of coarse aggregate. The surface shall be thoroughly wetted and all free water removed. The surface shall then be coated with neat cement slurry @ 2 kgs of cement per sqm. On this surface, a layer of concrete not exceeding 150 mm in thickness shall first be placed and shall be well rammed against old work particular attention being paid to corners and close spots; work, thereafter, shall proceed in the normal way.

Compaction

Concrete shall be thoroughly compacted and fully worked around embedded fixtures and into corners of the form work. Compaction shall be done by mechanical vibrator of appropriate type till a dense concrete is obtained. The mechanical vibrators shall conform to IS 2505-1992(Reaffirmed 2019), IS 2506-1985(Reaffirmed 2021), IS 2514-1963(Reaffirmed 2017) and IS 4656-1968(Reaffirmed 2007). To prevent segregation, over vibration shall be avoided.

Compaction shall be completed before the initial setting starts. For the items where mechanical vibrators are not to be used, the contractor shall take permission of the Engineer-in- Charge in writing before the start of the work. After compaction the top surface shall be finished even and smooth with wooden trowel before the concrete begins to set.

Curing:

Immediately after compaction, concrete weather, including rain, running water, shock vibration, traffic, rapid temperature changes, frost and drying out process will start. It shall be covered with wet sacking hassian or other similar absorbent material approved, soon after the initial set, and shall be kept continuously wet for period of not less than 7 days from the date of placement. Curing work over foundation concrete may be started after 10 hours of its laying out of concrete shall be continued for a minimum period of 7 days.

Membrane Curing : Approved curing compounds may be used in lieu of moist curing with the permission of the Engineer-in- Charge. Such compound shall be applied to all exposed surfaces of the concrete as soon as possible after the concrete has set. Impermeable membrane such as polythene sheet covering the concrete surface may also be used to provide effective barrier against the evaporation.

Freshly laid concrete shall be protected from rain by suitable covering.

Sampling and testing of concrete

Samples from fresh concrete shall be taken as per IS 1199-1959 (Reaffirmed 2018) and cubes shall be made, cured and tested at 7 days as per requirements in accordance with IS 516-1959 (Reaffirmed 2018). A random sampling procedure shall be adopted to ensure that each concrete batch shall have a reasonable chance of being tested i.e. the sampling should be spread over the entire period of concreting and cover all mixing units. The minimum frequency of sampling of concrete of each grade shall be accordance with following.

Quantity of concrete in the work, m3	No. of samples
1-5 cmt	1
6-15 cmt	2
16-30 cmt.	3
31-50 cmt.	4
51 and above	4 + one additional for each additional 50 cmt Or part there of.

NOTE: At least one sample shall be taken from each shift. One sample consists of six cubes. Six test specimens shall be made from each sample, three for testing at 7 days and the remaining three for 28 days. Samples of concrete shall be taken on each day of concreting as per above frequency. The number of specimens may be suitably increased as deemed necessary by the Engineer in charge when procedure of test give above reveals a poor quality of concrete and in other special cases.

The average strength of the group of cubes cast for each day shall not be less than the specified cube strength as per IS 456-2000 (Reaffirmed 2021) table no. 11, page no. 30 and its amendment no. 4, May 2013 or its relevant and latest edition. If the concrete made in accordance with the proportions give for a particular grade does not yield the specified strength, such concrete shall be classified as belonging to the appropriate lower grade. Concrete made in accordance with the proportion given for a particular grade shall not, however, be placed in a higher grade on the ground that the test strength are higher than the minimum specified.

Stripping

The Engineer in charge shall be informed in advanced by the contractor of his intention to strike the form work. While fixing the item for remove of form work, due consideration shall be given to local conditions, character of the structure, the weather and other conditions that influence the setting of concrete and of the materials used in the mix. In normal circumstances (generally where temperatures are above 20° C) and where ordinary concrete is used, forms may be struck after expiry of periods specified in Section-5 of item No. 9.1 (A) for respective item of form work.

All form work shall be removed without causing any shock or vibration as would damage concrete. Before the soffit and struts are removed, the concrete surface shall be gradually exposed, where necessary in order to ascertain that concrete has sufficiently hardened. Centering shall be gradually and uniformly lowered in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually. Where internal metal ties are permitted they or their removable parts shall be extracted without causing any damage to the concrete and remaining holes filled with mortar. No permanently embedded metal part shall have less than 25 mm. cover to the finished concrete surface. Where it is intended to re-use the form work, it shall be cleaned and made good to the satisfaction of the Engineer in charge. After removal of form work and shuttering, the Executive Engineer shall inspect the work and satisfy by random checks that concrete produced is good quality.

Immediately after the removal of forms, all exposed bolts etc., passing through the cement concrete member and used for shuttering or any other purpose shall be cut inside the cement concrete member to a depth of at least 25 mm below the surface of the concrete and the resulting holes be filed by cement mortar by pressure grouting. All fins caused by form joints, all cavities produced by the removal of form ties and all other holes and depressions honeycomb sports, broken edges or corner and other defects, shall be thoroughly cleaned saturated with water and carefully pointed and rendered true with mortar of Micro concreting in proportion use in the grade of concrete that is being finished and of as dry consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure thorough filling in all voids. Surfaces which are pointed shall be kept moist for a period of 24 hours. If rock pockets/honeycomb in the opinion of the Engineer in charge are of such an extent or character as to effect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of the portion of structure affected.

Mode of measurement & payment:

The consolidated cubical contents of concrete work as specified in item shall be measured. The concrete laid in excess of sections shown on drawing or as directed shall not be measured. No deduction shall be made for –(a) Ends of dis-similar materials such as joints, beams, posts, girders, rafters, purline trusses, corbels and steps etc. up to 500 cm.2 in section. (b) Opening up to 0.1 m.2

The rate includes cost of all materials labour, tools and plant required for mixing, placing in position, vibrating and compacting, finishing as directed, curing and all other incidental expenses for producing concrete of specified strength. The rate excludes the cost of form work.

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

- 12 [5.4.13(A)]: Providing and laying cement concrete 1:2:4 (1 cement: 2 coarse sand:4 stone aggregate 20 mm. nominal size) and curing complete excluding the cost of form work in (A) Foundations, footing base of columns and mass concrete (B) Slabs, landings shelves, balconies, lintels, beams, girders and cantilever up to floor two level, (C) Columns, pillars, posts and struts up to floor two level, (D) Staircase up to floor two level, (E) Vertical and horizontal fins up to floor two level.**

Materials and workmanship

The relevant specification of item no. 5.4.12(A) shall be followed except that the work shall be carried out for reinforced concrete work for work as specified in item, the following stipulations shall further be followed:

(a) The bars shall be kept in position by the following methods:

(i) In case of beam and slab construction, sufficient number of precast concrete cover block of suitable size & concerned concrete grade shall be used between the bars and shutters so as to secure and maintain the requisite cover of concrete over the reinforcement. In case of cantilever or doubly reinforced beams or slabs, the main

reinforcing bars shall be held in position by introducing chain spacers of supports bars at 1.0 to 1.2 meters centers.

(ii) In case of columns and walls, the vertical bars shall be kept in position by means of timber template with slots accurately cut in them. The templates shall be removed after concreting has been done below it. The bars may also be suitably tied by means of annealed steel wires to the shuttering to maintain their position during concreting. All bars projecting from pillars, columns, beams slabs etc. to which other bars and concrete are to be attached or bounded to later on, shall be protected with a coat of thin neat cement grout, if the bars are not likely to be incorporated with succeeding mass of concrete within the following 10 days. This coat of thin neat cement shall be removed before concreting.

Mode of measurement & payment

The relevant specifications of item No. 5.4.12(A) shall be followed.

The volume occupied by reinforcement shall not be deducted from R.C.C. work.

The rate shall be for unit of one cubic meter.

13[5.4.14(A)] Providing and laying cement 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm nominal size) for reinforced concrete chhajjas up to floor two level including finishing the exposed surface with cement mortar 1:3 (1 cement : 3 fine sand) to give a smooth and even surface, centering and form work and curing complete excluding cost of reinforcement.

Materials & Workmanship

The cement mortar shall conform to M-11.

The relevant specification of item No. 5.4.12(A) and 5.4.13(A) shall be followed except that the work shall be carried out for reinforced concrete chhajjas. Thickness of the chhajjas shall be as per structural drawing.

The specifications for form work and centering shall be as per item No. 9.1(A).

The finishing work in cement mortar 1:3 (1 cement: 3 fine sand) shall be carried out as per specifications of item No. 17.59(1). Before the plastering is done the surface of the concrete shall be raked for proper bond.

Mode of measurements & payment

The relevant specification of item No. 5.4.12(A) and 5.4.13(A) shall be followed except that the work of chhajjas shall be carried out including centering form work and finishing the surface with cement mortar 1:3 (1 cement : 3 fine sand).

14[5.4.15] Providing and fixing Mild steel reinforcement for R.C.C. work including bending binding and placing in position etc. complete upto floor two level.

Materials

Mild steel bars shall conform to M-18. Mild steel binding wires shall conform to M-20.

Workmanship

The work shall consist of furnishing and placing reinforcement to the shape and dimension shown as on the drawings or as directed.

Steel shall be clean and free from rust and loose mill scale at the time of fixing in position and subsequent concreting.

Reinforcing steel shall conform accurate to the dimensions given in the bar bending schedules shown on relevant drawings. Bars shall be bent cold to specified shape and dimensions or as directed, using a proper bar bender, operated by hand or power to attain proper radius of bends. Bars shall not be bent or straightened before being used on the work. They shall not be heated to facilitate bending.

All the reinforcement bars shall be accurately placed in exact position shown on the drawings and shall be securely held in position during placing of concrete by annealed binding wire not less than 1.22 mm in thick, and by using stay blocks or metal chair spacers metal hangers, supporting wires or other approved devices at sufficiently close intervals. Bars shall not be allowed to sag between supports nor displace during concreting or any other operations of the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed. Pieces of broken stone or brick and wooden blocks shall not be used. Layers of bars shall be separated by spacer bars, pin and chair only. Reinforcement after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement from corrosion, concrete cover shall be provided as indicated on drawings. Concrete cover shall be of specified shape, size and grade of precast cover shall be of concerned concrete grade of the member. All the bars protruding from concrete and to which other bars are to be spliced and which are likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout.

Bars crossing each other where required shall be secured by binding wire (annealed) of size not less than

1.22 mm in such a manner that they do not slip over each other at the time of fixing and concreting.

As far possible, bars of full length shall be use. In case this is not possible. Overlapping of bars shall be done as directed. When practicable, overlapping bars shall not touch each other, but be kept apart by 25 mm or 1.25 times the maximum size of the coarse aggregate whichever is greater by concrete between twisted tight. The overlaps shall be staggered for different bars and located at points, along the span where neither shear nor bending moment is maximum.

Whenever indicated on the drawings or desired by the Engineer-in-Charge, bars shall be joined by couplings which shall have a cross-section sufficient to transmit the full stresses of bars. The ends of the bar that are joined by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than the normal cross section of the bar. Threads shall be standard threads. Steel for coupling shall conform to I.S. 2062-2011 (Reaffirmed 2016).

When permitted or specified on the drawings, joints of reinforcement bars shall be butt-welded so as to transmit their full stresses. Welded joints shall preferably be located at points when steel will not be subject to more than 75 percent of the maximum permissible stresses and welds so staggered that at any one section not more than 20 percent of the rods welded. Only electric arc welding using a process which excludes air from the molten metal and conforms to any or all other special provisions for the work shall be accepted. Suitable means shall be provided for holding bars securely in position during welding. It shall be ensured that no voids are left in welding and when welding is done in two or three stages, previous surface shall be cleaned properly. Ends of the bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before welding. Only competent welders shall be employed on the work. The M.S. electrodes used for welding shall conform to I.S. 814-2004 (Reaffirmed 2021), welded pieces of reinforcement shall be tested. Specimen shall be taken from the actual site and their number and frequency of test shall be as directed.

Mode of measurements & Payment

Reinforcement shall be measured in length including hooks, if any separately for different diameter as actually used in the work excluding overlaps. From the length so measured the weight of the reinforcement shall be calculated in Kg on the basis of IS 1786-2008 (Reaffirmed 2018). Wastage, overlaps, couplings, welded joints, spacer bars, chairs, stage, hangers, pin and annealed steel wire or other methods for binding and placing shall not be measured and the cost of these items shall be deemed to be included in the rates for the reinforcement.

The rate of reinforcement includes the cost of steel binding wire, cutting, bending, binding, placing and fixing in position as shown in the drawing and as directed. It shall also include all devices for keeping reinforcement in approved position, cost of joining as per approved method, wastage and spacer bars.

The rate shall be inclusive for work at any floor and at any height and also for all lead and lift.

The rate shall be for a unit of One Kg.

15[5.4.16]: High yield deform bars/thermo mechanically treated steel reinforcement/CRS for R.C.C work including bending, binding and placing in position complete up to floor two level.

Materials

Cold twisted steel bars (high yield strength steel deformed bars)/TMT/CRS shall conform to M-19, Mild steel binding wires shall conform to M-20.

Workmanship

The specifications of item No. 5.4.15 shall be followed except that the High yield deform bars/TMT/CRS bars shall be used with or without hooks at the ends. Deformed bars without hooks shall however, comply with relevant anchorage requirements.

Mode of measurements & payment

The relevant specifications of item No. 5.4.15 shall be followed.

The rate shall be for a unit of One Kg.

16[5.4.17]: Extra for additional lift of reinforcement steel for all R.C.C. work above floor two level.

Materials & Workmanship

The relevant specifications of item No. 5.4.15 or 5.4.16 as may be applicable shall be followed except that the work shall be carried out above floor two level for each floor.

Mode of measurement & payment

The relevant specifications of item No. 5.4.15 or 5.4.16 as may be applicable shall be followed except that the work shall be carried out above floor two level.

The rate shall be for a unit of one Kg. per floor.

- 17[5.4.18] Providing up to floor two level precast cement concrete jali or grill 1:2:4(1 cement :2 coarse sand: 4 graded stone aggregate 6 mm : nominal size) reinforced with 1.6 mm. dia mild steel wire including roughening, cleaning, fixing and finishing in cement mortar 1:3 and curing complete.**
(A) 50 mm. thick. (B) 40 mm. thick. (C) 25 mm. thick. (D) 75 mm. thick. (E) 100 mm. thick.

Materials

Water shall conform to M-1 cement shall conform to M-3. Sand shall conform to M-6. Mortar shall conform to M-11. Aggregates shall conform to M-12. Mild steel wire shall conform to M-20. Shuttering shall conform to M-21.

2.0 Workmanship

It shall be of cement concrete 1:2:4(1 cement :2 coarse sand :4 graded stone aggregate 6mm nominal size) reinforced with 1.6mm dia. mild steel wire unless otherwise specified. The thickness of the jali shall be as specified in the item. The jali shall be set in position true to line and level before the jambs sills and soffits of the opening are plastered. It shall then be properly cemented with cement mortar 1:3 (1 cement :3 sand) and rechecked for levels. Finally the jambs sills and soffits shall be plastered gripping the jali uniformly on all sides.

Mode of measurement & Payment

The item shall be measured in square meter.

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

- 18[5.8.1] Providing and laying controlled concrete M-15 and curing complete excluding the cost of form work and reinforcement for reinforced concrete work in: (A) Foundations, footings, base of columns, and mass concrete, (B) Walls from top of foundation / level up to floor two level, (C) Slabs, landing, shelves, Balconies, lintels, beams, girders and cantilever, up to floor two level, (D) Columns, pillars, posts and struts, up to floor two level, (E) Staircase up to floor two level. (F) Vertical and horizontal fins up to floor two level.**

Materials

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Grit shall conform to M-8. Coarse aggregate shall conform to M-12.

General

The relevant specification of item No. [5.4.13(A)] of ordinary concrete shall be followed except that the concrete mix shall be designed from preliminary tests. The proportioning of cement and aggregates shall be done by weight and necessary precautions shall be taken in production to ensure that the required work cube strength is attained and maintained. The controlled concrete shall be in grades of M-15, M-20, M-25, M-30, M-35 & M-40 with prefix controlled added to it. The letter 'M' refers to mix and the numbers specify 28 days works cube compressive strength of 150 mm cubes of the mix expressed in N/mm².

The proportion of cement, sand and coarse aggregates shall be determined by weight. The digital weight batch machine shall be used for maintaining proper control over the proportion of cement, water and aggregates as per mix design. The strength requirements of different grades of concrete shall be as per I.S. 456-2000 (Reaffirmed 2021) Table 11 Amendment 4 May 2013 Page No.4 or its relevant and latest edition.

Workmanship

The proportions for ingredients chosen shall be such that concrete has adequate workability for conditions prevailing on the work in question and can be properly compacted with means available except where it can be shown to the satisfaction of the Engineer-in-charge, that supply of properly graded aggregate of uniform quality can be maintained till the completion of work, grading of aggregate shall be controlled by obtaining the coarse aggregates in different sizes and blending them in the right proportions. Aggregate of different sizes shall be stocked in separate stock piles. The required quantity of material shall be stock piled several hours, preferably a day before use. The grading of coarse and fine aggregate shall be checked as frequently as possible the frequency for a given job being determined by Engineer-in-charge to ensure that the suppliers are maintained, the uniform grading as approved for samples used in the preliminary tests.

In proportioning concrete the quantity of both cement and aggregate shall be determined by weight as per mix design. Where the weight of cement is determined by accepting the maker's weight per bag, a reasonable number a bags shall be weighted separately to check the net weight. Where cement is weighted from bulk stocks at site and not by bags, it shall be weighted separately from the aggregates. Water shall either be measured by volume in calibrators & tanks. All measuring equipment shall be maintained in clean and serviceable condition. Their accuracy shall be periodically checked.

The concrete shall be sourced from ready mixed concrete plant or from captive on site or off site automatic batching and mixing plants. The concrete produced and supplied by ready mixed concrete plants shall be in accordance with IS 4926-2003 (Reaffirmed 2017). In case of concrete from captive on site or off site automatic batching and mixing plants, similar quality control shall be followed. Ready-mixed concrete supplied by ready-mixed concrete plant shall be preferred. For large and medium project sites the concrete shall be sourced from ready-mixed concrete plants or from on site or off site batching and mixing plants (see IS 4926-2003 (Reaffirmed 2017)).

The accuracy of the measuring equipment shall be within + 2 percent of the quantity of cement and mineral admixtures being measured and within + 3 percent of the quantity of aggregate, chemical admixtures and water being measured. In a batching plant, the concrete production equipment shall be calibrated initially at the time of installation or reconditioning of the equipment and subsequently at the following intervals:

- a) Mechanical/knife edge system: At least once every two months
- b) Electrical/load cell system: At least once every three months

It is most important to keep the specified water cement ratio constant and at its correct value. To this end moisture content in both fine and coarse aggregates shall be determined by the Engineer-in-Charge according to the weather conditions. The amounts of mixing water shall then be adjusted to compensation for variations in the moisture content. For the determination of moisture content in the aggregates. I.S. 2386(Part-III)-1963 (Reaffirmed 2021) shall be referred to suitable adjustments shall also be made in the weights of aggregates due to variation in their moisture content. Minimum quantity of cement to be used in controlled concrete shall not be less than 290 Kg/Cum. for M-15, 360 Kg/Cum. for M-20, 380 Kg/Cum. for M-25, 410 Kg/Cum. for M-30 and 425 Kg/Cum. for M-35 at moderate condition and for above grades refer IS Code 456-2000 (Reaffirmed 2021) or its relevant and latest edition.

Mode of measurements & payment

The relevant specifications of item no. [5.4.13(A)] shall be followed except that the controlled concrete R.C.C work as specified in item shall be measured under this item. The rate excludes cost of form work.

- 19[5.8.2] Providing and laying controlled cement concrete M-20 and curing complete excluding the cost of form work and reinforcement of reinforced concrete work in:**
(A) Foundations, footings, bases of columns, and the like and mass concrete, (B) Walls from top of foundation level up to floor two level, (C) Slabs, landings shelves, balconies, beams, girders and cantilever up to floor two level, (D) columns pillars, struts up to floor two level (E) Stair cases up to floor two level. (K) Vertical and horizontal fins up to floor two level.

Materials & workmanship

The relevant specifications of item no. [5.8.1] shall be followed except that the grading of concrete shall be controlled concrete M-20 grades for works as specified in item.

Mode of measurements and payment

The relevant specifications of item no. [5.8.1] shall be followed.
 The rate shall be for one cubic meter.

- 20[5.8.3] Providing and laying controlled cement concrete M-25 and curing complete excluding the cost of reinforcement of reinforced concrete work in:**
(A) Foundations, footings, bases of columns, and the like and mass concrete, (B) Walls from top of foundation level up to floor two level, (C) Slabs, landings shelves, balconies, beams, girders and cantilever up to floor two level, (D) columns pillars, struts up to floor two level.

Materials & workmanship

The relevant specifications of item no. [5.8.1] shall be followed except that the grading of concrete shall be controlled concrete M-250 grades for works as specified in item.

Mode of measurements and payment

The relevant specifications of item no. [5.8.1] shall be followed.
 The rate shall be for one cubic meter.

- 21[5.00.1] Providing and laying ordinary cement concrete 1:2:4 (1 cement :2 coarse sand:4 gradesstone aggregates 20 mm. nominal size) and finishing smooth with curing etc., complete including the cost of form work but excluding the cost of reinforcement for R.C.C. work in: (I) slabs up to 8 cms. thickness. (II)slabs having more than 8 cms. and up to 10 cms. (III) slabs having more than 10 cms. and 13 cms. thickness (IV) slabs having more than 13 cms. and up to 15 cms. thickness.**

Materials & workmanship

The relevant specifications for item no [5.4.13(A)] shall be followed for concrete work and relevant specifications of item no [9.1(A)] shall be followed for form work and centering. The thickness shall be specified in the item.

Mode of measurements & payment

The relevant specifications for item no [5.4.13(A)] shall be followed except that item shall include the item providing form work and centering work as directed and reinforcements placed simultaneously.

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

- 22[5.00.2] Providing and laying controlled cement concrete M-15 and finishing smooth with curing etc., complete including the cost of form work but excluding the cost of reinforcement for R.C.C work in:**
(I) Slabs up to 8 cms. thickness.(II) slabs more than 8 cms. and up to 10 cms. (III) Slabs more than 10 cms. and up to 13 cms. (IV) Slabs more than 13 cms and up to 15 cms.

Materials & workmanship

The relevant specifications of item no [5.8.1] shall be followed for concrete work and item no [9.1(A)] shall be followed for form work and centering. The thickness shall be as specified in the item.

Mode of measurements & payment

The relevant specifications of item no [5.8.1] shall be followed except that the item shall include the cost and form work and centering.

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

- 23[5.00.3] Providing and laying ordinary cement concrete 1:2:4 (1 cement :2 coarse sand:4 gradedstone aggregates 20 mm. nominal size) exposed work with curing etc. complete including the cost of work but excluding the cost of reinforcement for R.C.C work in: (I)Slabs up to 8 cms. thickness. (II) Slabs more than 8 cms. and up to 10 cms. (III) Slabs more than 10 cms. and up to 13 cms. (IV) Slabs more than 13 cms and up to 15 cms.**

Materials & workmanship

The relevant specification of item no [5.4.13(A)] shall be followed for controlled concrete and relevant specification of item no [9.1(A)] and [9.7] shall be followed for exposed concrete form work and centring work. The thickness of the slabs shall be as specified in the item.

Mode of measurements & payment

The relevant specifications of item no [5.4.13(A)] shall be followed except that the item shall include the cost and form work and centering.

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

- 24[5.00.4] Providing and laying controlled cement concrete M-15 exposed work with curing etc., complete including the cost of form work but excluding the cost of reinforcement for R.C.C work in : (I) Slabs up to 8 cms. thickness.(II) slabs more than 8 cms. and up to 10 cms. (III) Slabs more than 10 cms. and up to 13 cms. (IV) Slabs more than 13 cms and up to 15 cms.**

Materials & workmanship

The relevant specification of item no [5.8.1] shall be followed for controlled concrete work and that of form work and centring work shall be followed as per item no. [9.1(A)] and [9.7]. The thickness of the slabs shall be as specified in the item.

Mode of measurements & payment

The relevant specifications of item no [5.8.1] shall be followed except that the item shall include the cost of form work and centering.

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

- 25[5.00.5] Providing and laying ordinary cement concrete 1:2:4 (1 cement:2 coarse sand :4 gradesstone**

aggregate 20 mm nominal size) for R.C.C. lintel including the cost of form work but excluding the cost of reinforcement.

Materials & workmanship

The relevant specification of item no [5.4.13(A)] shall be followed for concrete work relevant specifications of item no [9.1(A)] shall be followed for form work and centering work.

Mode of measurements & payment

The relevant specifications of item no [5.4.13(A)] shall be followed except that the item shall include the cost and form work, centring and reinforcements carried out simultaneously as required to be provided together.

- 26[5.00.6] Providing and laying ordinary cement concrete 1:2:4 (1 cement:2 coarse sand :4 grades stone aggregate 20 mm nominal size) and finishing smooth with curing etc., complete, including the cost, of form work but excluding reinforcement for R.C.C. Work in:**
(A) Beams: (I) Having cross sectional areas 0.05 to 0.08 sq. meter. (II) having cross sectional area more than 0.08 sq. mt. up to 0.12 sq. mt. (III) having cross sectional area more than 0.12 sq. mt. and up to 0.18 sq. mt. (B) columns; (I) having cross sectional area of 0.05 to 0.08 sq. mt. (II) having cross sectional area more than 0.08 sq. mt. and up to 0.12 sq. mt. (III) having cross sectional area more than 0.12 sq. mt. and up to 0.18 sq. mt.

Material & workmanship

The relevant specification of item no [5.4.13(A)] shall be followed for concrete work and item no [9.1(A)] shall be followed for form work and centring work.

Mode of measurements & payment

The relevant specifications of item no [5.4.13(A)] shall be followed but the form work and reinforcing works shall be carried out simultaneously as provided together.

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

- 27[5.00.7] Providing and laying controlled cement concrete M-15 exposed work with curing etc. complete, including the cost of form work but excluding the cost of reinforcement for R.C.C work in :**
(A) Beams: (I) Having cross sectional areas 0.05 to 0.08 sq. meter. (II) having cross sectional area more than 0.08 sq. mt. up to 0.12 sq. mt. (III) having cross sectional area more than 0.12 sq. mt. and up to 0.18 sq. mt. (B) columns; (I) having cross sectional area of 0.05 to 0.08 sq. mt. (II) having cross sectional area more than 0.08 sq. mt. and up to 0.12 sq. mt. (III) having cross sectional area more than 0.12 sq. mt. and up to 0.18 sq. mt.

Material & workmanship

The relevant specifications of item no [5.8.1] shall be followed for controlled concrete work as specified in item for M-15 and relevant specifications of item [9.1(A)] and [9.7] shall be followed for the form work and centring work for exposed cement work.

Mode of measurements & payment

The relevant specifications of item no [5.8.1] shall be followed but the form work and centering work shall be included in the item.

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

- 28[5.00.8] Providing and laying controlled cement M-20 exposed work with curing etc. complete, including the cost of form work but excluding the cost of reinforcement for R.C.C. work in :**
(A) Beams: (I) Having cross sectional areas 0.05 to 0.08 sq. meter. (II) having cross sectional area more than 0.08 sq. mt. up to 0.12 sq. mt. (III) having cross sectional area more than 0.12 sq. mt. and up to 0.18 sq. mt. (B) columns; (I) having cross sectional area of 0.05 to 0.08 sq. mt. (II) having cross sectional area more than 0.08 sq. mt. and up to 0.12 sq. mt. (III) having cross sectional area more than 0.12 sq. mt. and up to 0.18 sq. mt.

Material & workmanship

The relevant specifications of item no [5.8.1] shall be followed for controlled concrete work as specified in item for M-20 and relevant specifications of item [9.1(A)] and [9.7] shall be followed for the form work and centering work for exposed cement work.

Mode of measurements & payment

The relevant specifications of item no [5.8.1] shall be followed but the form work and centering work shall be included in the item.

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

- 29[5.00.9] Providing and laying controlled cement M-25 exposed work with curing etc. complete, including the cost of form work but excluding the cost of reinforcement for R.C.C. work In : (A) Beams: (I) Having cross sectional areas 0.05 to 0.08 sq. meter. (II) having cross sectional are more than 0.08 sq. mt. up to 0.12 sq. mt. (III) having cross sectional are more than 0.12 sq. mt. and up to 0.18 sq. mt. (B) columns; (I) having cross sectional area of 0.05 to 0.08 sq. mt. (II) having cross sectional are more than 0.08 sq. mt. and up to 0.12 sq. mt. (III) having cross sectional are more than 0.12 sq. mt. and up to 0.18 sq. mt.**

Material & workmanship

The relevant specifications of item no [5.8.1] shall be followed for controlled concrete work as specified in item for M-25 and relevant specifications of item [9.1(A)] and [9.7] shall be followed for the form work and centering work for exposed cement work.

Mode of measurements & payment

The relevant specifications of item no [5.8.1] shall be followed but the form work finishing and centering work shall be included in the item.

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

- 30 Providing and laying cement concrete 1:2:4 (1 cement: 2 coarse sand :4 stone aggregate 20 mm. nominal size) including cost of form work for independent piers, columns and pillars of any size at all floors.**

Material & workmanship

The relevant specifications of item no [5.4.13(A)] shall be followed for concrete work and item no [9.1(A)] shall be followed for form work and centring work.

Mode of measurements & payment

The relevant specifications of item no [5.4.13(A)] shall be followed but the rates of the item shall be inclusive of rate for form work finishing and centering.

The rate shall be for a unit of one cubic meter for work done for all floors.

- 31 Providing and laying cement concrete 1:1½:3 (1 cement : 1½ coarsesand : 3 stone aggregate 20 mm. nominal size) including cost of formwork but excluding the cost of reinforcement for all the floors etc. complete for BED BLOCK.**

The relevant specification of item [5.4.13(A)] shall be followed except that grade of concrete shall be C.C. 1:1½:3 for concrete work and item no [9.1(A)] shall be followed for form work and centring work.

Mode of measurement shall be followed as per item no [5.4.13(A)] and rate is for the one cubic meter for all floors but the rates of item shall be inclusive of rate for formwork finishing and centering.

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SECTION 3
Masonry Work

1[6.13(B)] Brick work using common burnt clay building bricks having crushing strength not less than 35 Kg/Sq. Cm. in foundations and plinth in cement mortar 1:6 (1 Cement : 6 coarse sand) conventional bricks.

Materials

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6, screened, graded & clean. Brick shall conform to M-15 (Conventional Bricks). Cement mortar shall conform to M-11.

Workmanship

Proportion :

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

Wetting of bricks :

Bricks shall be soaked in water before use for a period for the water to just penetrate the whole depth of the bricks. Alternatively bricks may be adequately soaked in stacks by profusely spraying with clean water at regular intervals for a period not less than twenty four hours. The bricks required for masonry work using mud mortar shall not be soaked. When the bricks are soaked they shall be removed from the tank sufficiently early so that at the time of laying they are skin-dry. Such soaked bricks shall be stacked on a clean place where they are not again spoiled by dirt earth etc.

Note I: The period of soaking may be easily found at site by a field test in which the bricks are soaked in water for different periods and then broken to find the extent of water penetration. The least period that corresponds to complete soaking will be the one to be allowed for in construction work.

Note II : If the bricks are soaked for the required time in water that is frequently changed the soluble salt in the bricks will be leached out, and subsequently efflorescence will be reduced.

Laying :

Bricks shall be laid in English bond unless directed otherwise. Half of cut bricks shall not be used except when necessary to complete to bond; closers in such case shall be cut to required size and used near the ends of walls. Header bond shall be used preferably in all courses in curved plan for ensuring for batter alignment.

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

The walls shall be taken up truly in plumb. All courses shall be laid truly horizontal and all vertical joint shall be truly vertical. Vertical joints in alternate course shall generally be directly one over the other. The thickness of brick course shall be kept uniform.

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

Both the faces of walls of thickness greater than 23cms shall be kept in truly plumb in both faces. No part of the wall during its construction shall rise more than one metre above the general construction level. Parts of wall left at different levels shall be raked back at an angle of 45 degrees or less with the horizontal. Toothing shall not be permitted as an alternative to raking back. For half brick partition to be keyed into main walls, indents shall be left in the main walls.

All pipe fittings and specials, spouts, hold fasts and other fixtures which are required to be built into the walls shall be embedded in cement concrete 1:2:4 (1 Cement : 2 Fine aggregate : 4 Coarse aggregate (Stone grit- 10mm)), as specified, in their correct position as the work proceeds unless otherwise directed by the Engineer-in-Charge.

Joints :

Bricks shall be so laid that all joints are quite flush with mortar. Thickness of horizontal bed joints shall not exceed 12mm and vertical joints shall not be exceed 10mm. The face joints shall be raked out as directed by raking tools daily during the progress of work, when the mortar is still green so as to provide key for plaster or pointing to done.

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

Curing :

Green work shall be protected from rain suitably. Masonry work shall be kept moist on all the faces for a period of seven days. The top of masonry work shall be kept well wetted at the close of the day.

Preparation of foundation bed :

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

Mode of measurements & payment

The measurements of this item shall be taken for the brick masonry fully completed in foundation up to plinth. The limiting dimensions not exceeding those shown on the plans or as directed shall be final. Battered tapered and curved portions shall be measured net.

No deductions or additions shall be done and no extra payment made for the following :

Note : Where minimum area is defined for deduction of an opening, void or both, such areas shall refer only to opening or void within the space measured.

- (a) Ends of dissimilar materials (that is, joists, beams, lintels, posts, girders, rafters, purlins, trusses, corbels, steps, etc.); up to 0.1 m² in section;
- (b) Opening up to 0.1 m² in area
- (c) Wall plates, bed plates, and bearing of slabs, chajjas and the like, where thickness does not exceed 10 cm and bearing does not extend over the full thickness of wall;
- (d) Cement concrete blocks as for hold fasts and holding down bolts;
- (e) Iron fixtures, such as wall ties, pipes upto 300 mm diameter and hold fasts for doors and windows; and
- (f) Chases of section not exceeding 50 cm in girth.
- (g) Bearing portion of drip course, bearing of moulding and cornice.

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

The rate shall be for a unit of one cubic metre.

2[6.14(B)] Brick work using common burnt clay building bricks having crushing strength not less than 35 Kg/ Sq. cm in foundations and plinth in cement mortar 1:5 (1 cement : 5 coarse sand) with conventional bricks.

Materials

Water shall conform to M-1. Cement shall conform to M-3, Cement mortar shall conform to M-11, Sand shall conform to M-6, screened, graded & clean, Bricks shall conform to M-15 (Conventional Bricks).

Workmanship

The relevant specification of item No. [6.13.(B)] shall be followed except that the bricks to be used shall be conventional bricks and proportion of cement mortar shall in C.M. 1:5.

Mode of measurement & payment

The relevant specification of item No. [6.13.(B)] shall be followed.

The rate shall be for a unit of one cubic metre.

3[6.15(B)] Brick work using common burnt clay building brick having crushing strength not less than 35 Kg./Sq. cm. for super structure above plinth level up to floor two level in cement mortar 1:6 (1 cement : 6 coarse sand) conventional bricks.

Materials

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6, screened, graded & clean. Brick shall conform to M-15 (Conventional Bricks). Cement mortar shall conform to M-11.

Workmanship

The relevant specification of item No. [6.13.(B)] shall be followed except that the masonry work shall be carried out above plinth level to floor two level i.e. for ground floor.

The frames of doors, windows, cupboards etc. shall be housed into the brick work at the correct location and level as directed. The heavy steel doors, window frames etc., shall be left in the wall and frame embedded later on in order to avoid damage to the frames.

Necessary scaffolding shall be provided. Scaffolding shall be strong to withstand dead, live and impact loads which are likely to come on them. Scaffolding shall be provided to allow easy approach to every part of the work. The supports of the scaffolding shall be sound and strong tied together with horizontal pieces over which the scaffolding planks shall be fixed. Simple scaffolding shall be allowed normally. In no case scaffolding hole shall be allowed in brick masonry.

For the face of brick work, where plastering is to be done, joints shall be raked out to a depth not less than thickness of joints. The face of brick work shall be cleaned and mortar dropping removed on very same day that brick work is laid.

Mode of measurements & payment

The masonry work of G.F. i.e. above plinth level to floor two levels shall be measured and paid under this item. Brick work in parapet wall, water tank, constructed on the roof up to 1.20m height above the roof shall be measured together with the corresponding work of the floor next below.

No deductions or additions shall be done and no extra payment made for the following :

Note : Where minimum area is defined for deduction of an opening, void or both, such areas shall refer only to opening or void within the space measured.

- (a) Ends of dissimilar materials (that is, joists, beams, lintels, posts, girders, rafters, purlins, trusses, corbels, steps, etc.); up to 0.1 m² in section;
- (b) Opening up to 0.1 m² in area;
- (c) Wall plates, bed plates, and bearing of slabs, chajjas and the like, where thickness does not exceed 10 cm and bearing does not extend over the full thickness of wall;
- (d) Cement concrete blocks as for hold fasts and holding down bolts;
- (e) Iron fixtures, such as wall ties, pipes upto 300 mm diameter and hold fasts for doors and windows; and
- (f) Chases of section not exceeding 50 cm in girth.
- (g) Bearing portion of drip course, bearing of moulding and cornice.

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

The rate shall be for a unit of one cubic metre.

4[6.16(B)] Brick work using common burnt clay building brick having crushing strength not less than 35 Kg./Sq. cm. for super structure above plinth level upto floor two level in cement mortar 1:5 (1 cement : 5 coarse sand) conventional bricks.

Materials & workmanship

The relevant specification of item No. [6.15(B)] shall be followed except that brick masonry work shall be laid in cement mortar 1:5 (1 cement : 5 coarse sand) and carried out with conventional bricks.

Mode of measurement & payment

The relevant specification of item No. [6.15(B)] shall be followed.

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

5[6.17] Extra for brick work in super structure above floor two level.

Materials and workmanship

The relevant specifications of item masonry work to be carried out shall be followed except that this work is for additional lift of one floor above two level.

Mode of measurements and payment

The relevant specification of item No. [6.15(B)] masonry work shall be followed except that this work is for additional lift of one floor above two level.

The extra payment shall be made for additional lift above floor two level to each additional floor over and above the rate of masonry work.

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

6[6.30.1(A)] Half brick masonry in common burnt clay building brick having crushing strength not less than 35 Kg./Sq. cm. in cement mortar 1:4 (1 cement : 4 coarse sand) in foundation & plinth level with conventional bricks.

Materials

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6, screened, graded & clean. Brick shall conform to M-15 (Conventional Bricks). Cement mortar shall conform to M-11.

Workmanship

Relevant specifications of bricks, wetting and laying of bricks, joints, curing etc. shall conform to item No.

[6.13(B)] except that the brick work of half bricks shall be carried out. For brick work in half brick wall brick shall be laid in stretcher bond. Half or cut bricks shall not be used except as closer where necessary to complete the bond. Closer in such cases shall be cut to the required size and used near the end of the wall.

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

The wall shall be taken truly plumb. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. The bricks shall be laid with frogs upwards. A set of mason's tools shall be maintained on work as required for frequent checking.

No part of the wall during its construction shall rise more than one metre above the general construction level. Parts of wall left at different levels shall be raked back at an angle of 45 degrees or less with the horizontal.

Mode of measurements and payment

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

The relevant specifications of item No. 6.13(B) shall be followed except the cement mortar to be used in CM 1:4. The length shall be measured nearest to one cm.

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

7[6.30.1(B)] Half brick masonry in common burnt clay building brick having crushing strength not less than 35 Kg./Sq. cm. in cement mortar 1:4 (1 cement : 4 coarse sand) for superstructure above plinth level upto floor two level with conventional bricks.

Material and workmanship

The relevant specifications of item No. [6.30.1(A)] shall be followed for bricks, wetting, laying of bricks, joints, curing.

Mode of measurements and payment

The relevant specifications of item No. [6.30.1(A)] shall be followed for super structure instead of foundation & plinth.

The rate shall be for a unit of One Sq. Meter.

The limiting dimension shall not exceed those shown in the plan or as directed. Any work done extra over specified dimensions shall be ignored.

8[6.30.1(C)] Half brick masonry in common burnt clay building brick having crushing strength not less than 35 Kg./Sq. cm. in cement mortar 1:5 (1 cement : 5 coarse sand) with bricks in foundation and plinth.

Material and workmanship

The relevant specifications of item No. [6.30.1(A)] shall be followed except the half bricks masonry work shall be carried out in cement mortar 1:5 (1 cement : 5 coarse sand) with modular bricks in foundation and plinth.

Mode of measurements and payment

The relevant specifications of item No. [6.30.1(A)] shall be followed except the cement mortar to be used in CM 1:5.

The rate shall be for a unit of one Sq. m.

9[6.30.1(D)] Half brick masonry in common burnt clay building brick having crushing strength not less than 35 Kg./Sq. cm. in cement mortar 1:5 (1 cement : 5 coarse sand) for superstructure above plinth level up to floor two level with conventional bricks.

Material and workmanship

The relevant specifications of item No. [6.30.1(A)] shall be followed except that the half bricks work shall be carried out in cement mortar 1:5 (1 cement : 5 coarse sand) for superstructure above plinth level up to floor two level with conventional bricks.

Mode of measurements and payment

The relevant specifications of item No. [6.30.1(A)] shall be followed.

The rate shall be for a unit of one Sq. m.

10[6.30.1(E)] Half brick masonry in common burnt clay building bricks having crushing strength not less than 35 Kg./Sq. cm. in cement mortar 1:5 (1 cement : 5 coarse sand) with hoop iron 25mm or equivalent reinforcement at every third coarse embedded in cement mortar in foundation and plinth with conventional bricks.

Materials

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6, screened, graded & clean. Brick shall conform to M-15 (Conventional Bricks). Cement mortar shall conform to M-11. M. S. reinforcement shall conform to M-18.

Workmanship

Relevant specifications of bricks, wetting and laying of bricks, joints, curing, scaffolding etc. shall conform to item No. [6.30.1(C)] except the following:

Cement mortar used in masonry work shall be in proportion to 1 part of cement and 5 parts of sand by volume and shall conform to M-11 and this work is for half bricks thickness for partition walls.

The hoop iron 25 mm X 1.6 mm or equivalent reinforcement shall be provided at every third course. The ends of reinforcement shall be fully embedded in main walls on both sides as directed. Reinforcement shall be placed on the top of the bottom most course. Laps shall be of 15cm of mild steel bars or hoop iron respectively.

The joints in the course where reinforcement is placed shall admit of mortar cover to the reinforcement.

Mode of measurements and payment

The rate shall be for half brick masonry work including providing specified reinforcement, the limiting dimensions not exceeding those in the plan or as directed. The length shall be measured nearest to one cm.

Any work done extra over specified dimensions shall be ignored.

The rate shall be for a unit of one Sq. m.

11 [6.30.1(F)] Extra for half brick masonry in superstructure above floor two level. Conventional bricks.

Materials & workmanship

The relevant specifications of item No. [6.30.1(B)] shall be followed except that this work is for additional lift of each floor two level using conventional bricks.

Mode of measurements and payment

The payment shall be made for the half brick masonry work carried out above floor two level for each additional lift over and above the payment of work up to floor two level.

The rate shall be for a unit of one Sq. mtr.

12 [6.55 (1)] Half brick thick Honey-comb brick work with burnt clay building bricks crushing strength not less than 35 kg. / sq.cm. in C. M. 1:4 (1 Cement : 4 coarse sand)

Materials

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6, screened, graded & clean. Brick shall conform to M-15 (Conventional Bricks). Cement mortar shall conform to M-11.

2.0 Workmanship

The relevant specifications of item No. [6.30.1(B)] shall be followed except that the masonry work shall be carried out Honey-comb in thickness of half bricks in cement mortar 1:4 (1 cement : 4 coarse sand) and as & where directed with all lifts.

Mode of measurements and payment

The honey-comb work shall be measured in Sq. m. The full area of honey comb work shall be measured without deduction for openings.

The rate shall be for a unit one sq. m. of wall surface.

13[6.56] Brick on edge masonry (7.5 cm. thick) in common burnt clay building bricks having crushing strength not less than 35 kg/cm² in cement mortar 1:3 with 2 Nos. of 6mm dia. Mild steel roundbars after every 3 course embedded in cement mortar for all floors in stair.

Materials and workmanship

The relevant specifications of item No. [6.30.1(B)] except bricks shall be on edge. Mild steel round bar confirm to M-18.

Cement mortar used in masonry work shall be in proportion to 1 part of cement and 3 parts of sand by volume and shall conform to M-11 and this work is for brick on edge wall.

2 nos. of 6mm dia. MS bar reinforcement shall be embedded in every third course. The ends of reinforcement shall be fully embedded in main walls on both sides as directed. Reinforcement shall be placed on the top of the bottom most course. Laps shall be of 30cm of mild steel bars. These shall be securely anchored at their end where the wall end. The free ends of the reinforcement shall be keyed into the mortar of the main brick work to which the brick work is joined. The joints in the course where reinforcement is placed shall admit of mortar cover to the reinforcement.

Mode of measurements and payment

Rate shall be for half brick on edge work, including providing specified reinforcement, the limiting dimensions not exceeding those shown in the plan or as directed. The length shall be measured nearest to one cm.

Rate shall be for a unit of one Sq. m. of work done.

14[6.57] Honey comb masonry with using common burnt clay building bricks having crushing strength not less than 35 kg/sqm in C.M. 1:6 (1 cement : 6 coarse sand) including curing etc. complete.

Materials :

Bricks shall conform to M-15, cement mortar of proportion shall conform to M-11, water shall conform to M-1 of general specification booklet.

Workmanship :

The relevant specification of Item No. 6.13(B) of general specification booklet shall be followed except that the bricks to be used shall be conventional bricks and proportion of cement mortar shall be 1:6 masonry carried out Honey combed as and where directed with all lifts/depth.

3.0 Mode of measurements :

- 3.1 The Honey combed work shall be measured in cum the full area of honey comb masonry work and width shall be measured without deduction for openings.
- 3.2 The rate shall be for a unit of one cum.

SECTION - 4

RUBBLE MASONRY WORK

1[7.6(1)] **Uncoursed rubble masonry with hard stone approved quality in foundations and plinth in cement mortar 1:6 (1 cement : 6 coarse sand) including leveling etc. complete.**

Materials:

The cement mortar shall conform to M-11. Stone shall conform to M-16.

Size of Stones

Normally stones used should be small enough to be lifted and placed by hand. Unless otherwise indicated, the length of stones for stone masonry shall not exceed three times the height and the breadth on base shall not be greater than three-fourth of the thickness of wall, or not less than 150 mm. The height of stone for rubble masonry may be upto 300 mm.

The selection and grading of stones for rubble masonry is largely done at site and the smaller stones are used in the hearting of wall.

Random rubble masonry brought to the course is similar to uncoursed random rubble masonry except that the courses are roughly levelled at intervals varying from 300 mm to 900 mm in height according to the size of stones used.

Dressing

Each stone shall be hammer dressed on the face, the sides and the beds. Hammer dressing shall enable the stones to be laid close to neighbouring stones such that the bushing in the face shall not project more than 40 mm on the exposed face.

- (i) **Face stone:** At least 25% stones shall be headers tailing into the work at least 2/3rd the thickness of wall in super structure masonry. Such stones shall not be less than 200 sq. cm in cross sections.
- (ii) **Hearting Stones:** The hearting or interior filling of a wall face shall consist of rubble stones not less than 150 mm in any direction, carefully laid, hammered down with a wooden mallet into position and solidly bedded in mortar. The hearting should be laid nearly level with facing and backing.
- (iii) **Quoin Stone:** Quoin stone shall be less than 0.03 cum in volume.
- (iv) **Jamb stones:** The jambs shall not be made with stones specified for quoins except that the stones which were required to be provided at 1 metre centre to centre on both the exposed faces shall here be provided only on the jamb and the length shall be equal to the thickness of the wall

for wall upto 60 cm and a line of headers shall be provided for walls thicker than 60 cm as specified for bond.

Thickness of Joints

The joint thickness shall not exceed 30 mm at any point on the face. Chips of the stone and spalls shall be wedged into seating bed of face stones to avoid excessive bed thickness. No pinning shall be allowed to avoid excessive joint thickness.

Laying

All the stone shall be sufficiently wetted before laying to prevent absorption of water from mortar. The wall shall be built true to plumb (of true to required batter when so specified). All connected walls in a structure shall be raised up uniformly and regularly. However if for any specific reason, one part of masonry is required to be left behind, the wall shall be racked back at an angle not steeper than 45°. Vertical toothed joints in masonry shall not be allowed. The work shall be carried out regularly and masonry of any day wall not be raised by more than 1 mtr. in height.

The stone shall be laid in an uncoursed fashion or random facing etc. However, the masonry is required to be brought to level at various stages viz. plinth level window sill level, roof level and any other level specifically shown in the drawings. This may be done first by adjusting the laying of stone to one level and then by providing leveling course of cement concrete 1:6:12 (1 cement : 6 sand : 12 graded stone aggregate 20 mm. nominal size) or as otherwise specified.

Proper bonding shall be achieved by closely filling in adjacent stones as well as by using bond stones or through stones as described herein below. Face stones shall extend back sufficiently, and bond well with the masonry. The stone shall be carefully set so as to break joints and avoid formation of vertical joints. The depth of stone from the face of wall inwards shall not be less than weight or breadth at the face. The hearting or interior filling of the wall shall consist of rubble stones which may be of any shape. Neither the face stone nor the hearting stone shall be so small to pass through circular ring of 150 mm. internal diameter in any direction nor shall any of them shall have minimum thickness 100 mm.

All stone shall be carefully laid, hammered down by a wooden mallet into position and solidly embedded in mortar, chips and spalls of stone may be used wherever necessary to avoid thick mortar beds or joints at the same time ensuring that no hollow space is left anywhere in the masonry. The chips used shall not be more than 20% by volume of masonry. The hearting shall be laid nearly level with face stone except that at about one metre intervals vertical bond stone or plumes projecting about 150 to 200 mm. shall be firmly embedded to from vertical bonding in masonry.

(A) Raking out joints

All the joints on the faces to be pointed or plastered shall be raked out with racking tool to a depth of 20mm while the mortar is still green.

Bond Stones

Though bond stones shall be provided in walls upto 600 mm thickness, a set of two or more bond stones overlapping each other by at least 150 mm shall be provided in a line from face to back. In case of highly absorbent types of stones (porous lime stone and sand stone etc.) the bond stone shall extend about two-third into the wall, as through stones in such walls a set of two or more bond stones overlapping each other by at least 150 mm shall be provided. Each bond stone or a set of bond stones shall be provided for every 0.5 m² of the wall surface and shall be provided at 1.5 m to 1.8 m apart clear in every course.

In case of highly absorbent types of stones (porous lime stone and sand stone etc.) single piece bond stones may give rise to dampness. For all thicknesses of such walls a set of two or more bond stones overlapping each other by at least 15 cm shall be provided. Length of each such bond stone shall not be less than two-third of the thickness of the wall.

Where bond stones of suitable lengths are not available pre-cast cement concrete block of 1:3:6 mix (1 cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) of cross section not less than 225 square centimeters and length equal to the thickness.

At least one bond stone or a set of bond stones shall be provided at 1.5 m to 1.8 m apart clear in every course. (Bond stones shall be marked suitably with paint as directed by the Engineer-in- Charge).

Quoin and Jamb Stones

The quoin and jamb stones shall be of selected stones neatly dressed with hammer or chisel to form the required angle. Quoin stones shall not be less than 0.01 cum in volume. Height of quoins and jamb stones shall not be less than 15 cm. Quoins shall be laid header and stretcher alternatively.

Joints

Stones shall be so laid that all joints are fully packed with mortar and chips. Face joints shall not be more than 20 mm thick.

The joints shall be struck flush and finished at the time of laying when plastering or pointing is not to be done. For the surfaces to be plastered or pointed, the joints shall be raked to a minimum depth of 20 mm when the mortar is still green.

Scaffolding

Single scaffolding having one set of vertical support shall be allowed. The supports shall be sound and strong, tied together by horizontal pieces, over which the scaffolding planks shall be fixed. The inner end of the horizontal scaffolding member may rest in a hole provided in the masonry. Such holes, however, shall not be allowed in pillars under one metre in width or near the skew back of arches. The holes left in masonry work for supporting scaffolding shall be filled and made good with cement concrete 1 : 3 : 6 (1 cement : 3 coarse sand : 6 stone aggregate 20 mm nominal size).

Curing

Green work shall be protected from rain by suitably covering the same. Masonry shall be kept constantly moist on all the faces for a period of at least 7 days. The top of masonry shall be flooded at close of the day.

Mode of measurements and payment

All work shall be measured on the basis of finished dimensions and measured net except where otherwise specified. Only specified dimensions shall be allowed. Anything extra shall be ignored. The masonry work in foundation and plinth shall be measured under this item. No deduction shall be made, nor extra payment made for the following:

- (a) Ends of joints, posts, girders rafters, purlins trusses, corbel etc. each upto 500 sq. cm. in section.
- (b) Opening each upto 0.1 sq. m.
- (c) Wall plates and bed plates, bearing of chhaja and like upto 10 cm. depth (bearing of floor and roof slabs shall be deducted from masonry).
- (d) Drain holes and recesses for cement concrete blocks to embed hold fasts for doors windows.
- (e) Building in the masonry iron fixtures pipes upto 300 mm. dia. hold fasts of doors and windows.
- (f) Forming chases in masonry upto section of 350 sq. cm.

The rate shall be for a unit of one cubic metre.

2[7.6(2)] Uncoursed rubble masonry with hard stone of approved quality in foundations and plinth cement mortar 1 : 5 (1 cement : 5 coarse sand) including leveling up etc. complete.

Materials and workmanship

The relevant specification of item No. 7.6 (1) shall be followed except that the proportion of cement mortar shall be in C. M. 1:5 (1 cement : 5 coarse sand)

Mode of measurements and payments

The relevant specification of item No. 7.6 (1) shall be followed.

The rate shall be for unit of one cubic meter.

3[7.6(3)] White stone bela masonry block in coarse in superstructure with stone of approved quality in lime mortar 1:1.5 (1 lime putty : 1.5 fine sand) including raking out joints etc. complete.

Materials:

The stone or bela shall be white hard sand stone or block. The stone shall be sound hard rough and durable. It shall be free from skin. The thickness of bela or block shall not be less than 15 cms. or as directed. The mortar used shall consist one part of lime putty and 1.50 parts of fine sand. Lime mortar shall conform to M-10.

Workmanship**Dressing of stone:**

Stone shall be chiseled on all the sides so that all six sides (Including top & bottom) shall be in a rectangular shape and all the stones shall be so dressed that the bushing of the exposed face shall not project nor depression for the general wall surfaces. The size of bela or block shall be as per thickness of the wall to be constructed or as directed.

Laying

All the stone shall be sufficiently wetted before laying to prevent absorption of water from mortar. All connected walls in a structure shall normally be raised up uniformly and regularly. The vertical joint shall not be allowed and also it shall not be more than 12 mm. in thickness.

Proper bonding shall be made by laying bela or block side by side each other with lime mortar on bed as well as in between two bela or block vertically.

Bond Stones:

Bond stones or through stones running right across the thickness of the wall shall be provided in walls upto 450 mm thick. In thicker walls two-bela or blocks or laying each other by atleast 150mm each other shall be provided across the thickness of the wall to bond stone. Such bond stone shall be atleast one for every 1.0 sq. m. area of the wall surface.

Joints:

All the joints shall be completely filled up with mortar and their thickness shall not exceed by 12mm When plastering or pointing is not required to be done, the joints shall be struck flush and finished, simultaneously while laying the stone. Otherwise the joints shall be raked to a minimum depth of 20 mm. during process of laying while mortar is still green.

Scaffolding:

Single or double scaffolding shall be used. It shall be strong and sound. The holes left in masonry for supporting shall be made good before plastering.

Curing:

Green work shall be cured for a period of 7 days continuously.

Mode of measurement & payment

The work shall be measured on the basis of finished dimensions. No deduction shall be made for extra payment shall be made for the following :

- (a) Ends of joints, beams, posts, girders, rafters, purlins, corbel etc. each upto 0.10 sq. m. in section.
- (b) Opening each upto 0.10 sq. m.
- (c) Wall plates and bed plates, bearing of chhajjas and like upto 10 cms. depth (bearing or floor and slabs shall be deducted from masonry).
- (d) Drain holes and recesses for cement concrete blocks to embedded hold fasts for doors and windows etc.

The rate shall be for a unit of one cubic metre.

4[7.6(4)] White stone bela masonry work in partition upto 15 cms. thickness in C.M. 1:4(1 cement : 4 coarse sand)

Materials and workmanship

The relevant specifications of item No. 7.6(3) as above shall be followed except that the proportion of mortar shall be in C. M. 1:4 (1 cement : 4 coarse sand)

Mode of measurement & payment

The relevant specifications of item No. 7.6(1) shall be followed.

The rate shall be for a unit of one Sq. metre.

5[7.6(5)] White stone bela masonry block in coarse in superstructure with stone of approved quality in C.M. 1:5 (1 cement : 5 coarse sand) including raking the joints etc. complete.

Materials & workmanship

The relevant specifications of item No. 7.6(3) as above, except that the proportion of cement mortar shall be in C. M. 1:5 (1 cement : 5 coarse sand)

Mode of measurement & payment

The relevant specifications of item No. 7.6(1) shall be followed.

The rate shall be for a unit of one cubic metre.

6[7.6(6)] White stone bela masonry block in coarse in superstructure with stone of approved quality in C.M. 1:6 (1 cement : 6 coarse sand) including raking the joints etc. complete.

Materials & workmanship

The relevant specifications of item No. 7.6(3) as above, except that the proportion of cement mortar shall be in C. M. 1:6 (1 cement : 6 coarse sand)

Mode of measurement & payment

The relevant specifications of item No. 7.6(1) shall be followed.

The rate shall be for a unit of one cubic metre.

7[7.6(7)] Precast concrete block masonry (including quoin block, jamb block, closer etc. with solid concrete blocks of approved sizes(31cm. X 20cm X 19cm. And 31cm X 15cm X 19cm) made of cement concrete 1:3:6 mix. (1 cement : 3 coarse sand : 6 graded stone aggregate of 20mm) in foundation and plinth in cement mortar 1:6.

Materials:

Aggregate shall confirm to M-12, (B) sand shall confirm to M-6 and (C) Cement shall confirm to M-3

The solid cement concrete block Grade C(5.0) shall be precast with concrete of 1:3:6 mix (1 cement : 3 coarse sand : 6 graded stone aggregate of 20mm. Nominal size)

A block shall be deemed to be solid and the solid material is 100% of the total volume of the block calculated from overall dimension.

The concrete mix used for block shall not richer than one part by volume of cement to six parts by volume of

combined aggregate.

The actual size of the block shall be 31cm X 20cm X 19cm and 31cm X 15cm X 19cm.

The blocks shall be machine made only. The concrete block manufacturing & physical requirement shall be in accordance with IS 2185 (part I) – 2005 (Reaffirmed 2020)

The maximum variation in length shall be ± 5 mm and in width & height shall be ± 3 mm. Face of blocks shall be flat & rectangular.

Concrete blocks shall be stored and stacked properly in such a way as to avoid any contact with moisture at site. They shall be stock piled on planks or other supports free from contact with ground and covered to protect against wetting.

Cement mortar proportion 1:6 shall conform to M-11.

Testing of block shall be carried out as described in IS 2185 (Part 1) – 2005 (Reaffirmed 2020). A sample of 20 Nos of blocks shall be taken from every consignment of 5000 blocks.

Sampling for testing and number of tests shall be carried out as mentioned in IS 2185 (part 1) – 2005 (Reaffirmed 2020)

Workmanship:

Operation of laying Precast cement concrete block masonry shall be carried out in accordance with instruction detailed IS 6042-1969 (Reaffirmed 2020). The mortar shall not be spread so much ahead of the actual laying of the units that intends to stiffen and lose plasticity, thereby resulting in poor bond. For most of the work, the joints both horizontal & vertical shall be 10mm thick except in case of extended joint construction. The mortar joint shall be struck off flush with wall surface and when the mortar has started stiffening, it shall be compressed with rounded or U shaped tool. The mortar shall be pressed against the units with a jointing tool after the mortar has stiffen in effect intimate contact between the mortar and the masonry unit and obtain a weather tight joint.

Quoins and closers: Special quoins blocks (with a return face equal to half of the length of normal face) shall be cast for all building blocks and slabs for external work. Proper half length closures shall be cast and not cut from full sized blocks. The returned ends of blocks for doors and windows reveals and quoins shall be finished with a fair face of mould.

Only double scaffolding shall be used. The scaffolding shall be strong and sound. No holes in masonry for supporting shall be allowed.

Curing

The curing of concrete block masonry shall be carried out minimum for 7 days.

Mode of measurements & payments :-

The relevant specification of item no. 7.6(1) in accordance with the general specification booklet for building work should be followed.

The work of concrete block masonry in foundation & plinth shall be measured under this item.

The rate shall be for a unit of one cu. mtr.

The rate are inclusive of filling up gap between work soffit of beam/slab with 1:3:6 concrete using expensive grout admixture "CICO Grant-" C" or equal approved etc. complete as specified.

8[7.6(8)] Precast concrete block masonry in partition walls 10cm. Thick with solid block of approve size (20cm X 10cm X 19cm) (Including quoins block, jamb block, closures, etc.) made of C.C. 1:3:6 mix. (1 cement : 3 coarse sand : 6 graded stone aggregate of 20mm. and down gauge) in cement mortar 1:4.

Materials:

(a) Aggregate shall confirm to M-12, (b) sand shall confirm to M-6, (c) Cement shall confirm to M-3. The proportions of cement mortar shall be in cement mortar 1:4 (1 cement : 4 coarse sand).

The proportion of cement mortar shall be in cement mortar 1:4 (1 cement: 4 coarse sand) The solid cement concrete block grade C(5.0) shall be precast with concrete of 1:3:6 mix (1 cement: 3 coarse sand : 6 graded stone aggregate up to 20mm grade size.)

Workmanship :-

The relevant specification of item 7.6(7) shall be followed.

Operation of laying Precast cement concrete block masonry shall be carried out in accordance with instruction detailed IS 6042-1969 (Reaffirmed 2020). The mortar shall not be spread so much ahead of the actual laying of the units that intends to stiffen and lose plasticity, thereby resulting in poor bond. For most of the work, the joints both horizontal & vertical shall be 10mm thick except in case of extended joint construction. The mortar joint shall be struck off flush with wall surface and when the mortar has started stiffening, it shall be compressed with rounded or U shaped tool. The mortar shall be pressed against the units with a jointing tool after the mortar has stiffen in effect intimate contact between the mortar and the masonry unit and obtain a weather tight joint.

Quoins and closers special quoins blocks (with a return face equal to half of the length of normal face) shall be cast for all building blocks and slabs for external work. Proper half length closures shall be cast and not cut from full sized blocks. The returned ends of blocks for doors and windows reveals and quoins shall be finished with a fair face of mould.

Only double scaffolding shall be used. The scaffolding shall be strong and sound. No holes in masonry for supporting shall be allowed.

Curing

The curing of concrete block masonry shall be carried out minimum for 7 days

Mode of measurements & payments:

The relevant specification of item no. 6.30.1(A) in accordance with the general specification booklet for building work should be followed.

The rate shall be for a unit of one Sq. mtr.

The rate are inclusive of filling up gap between work soffit of beam/slab with 1:3:6 concrete using expensive grout admixture "CICO Grant-" C" or equal approved etc. complete as specified.

9[7.6(9)] Providing & laying AUTOCLAVED AERATED CONCRETE BLOCK MASONRY WORK in cement mortar 1:4 or polymer modified adhesive mortar as specified in tender item.

Terminology

For the purpose of, Autoclave Aerated Concrete Block masonry work, the following definitions shall apply

1. **Autoclaved** - Steam curing of concrete Products, sand lime bricks, asbestos cement products, hydrous calcium silicate insulation Products, or cement in an autoclave at maximum ambient temperatures generally between 170°C to 215°C.
2. **Block** - A concrete masonry unit, any one of the external dimensions of which is greater than the corresponding dimension of a brick as specified in IS : 3952-2013 (Reaffirmed 2019) and of such size and mass as to permit it to be handled by one man. Further more, to avoid confusion with slabs and Panels, the height of the block shall not exceed either its length or six times its width.
3. **Block Density** - The density calculated by dividing the mass of a block by the overall volume, including holes or cavities and end recesses..
4. **Drying Shrinkage** - The difference between the length of specimen which has been immersed in water and then subsequently dried to constant length, all under specified conditions; expressed as a percentage of the dry length of the specimen.
5. **Gross Area** - The total area occupied by a block on its loading face, including areas of the cavities and end recesses.
6. **Height** - The vertical dimension of the exposed face of a block, excluding any tongue or other device designed to provide mechanical keying
7. **Length** - The horizontal dimension of the exposed face of a block excluding any tongue or other device designed to provide mechanical keying.
8. **Width** - The external dimension of a block at the bedding plane, measured at right angles to the length and height of the block.

Dimensions & Tolerances:

Autoclave Aerated Concrete Block shall be made in sizes and shapes to fit different concrete needs. They include stretcher, corner, double corner or pier, jamb, header, bull nose, partition block and concrete floor units.

Autoclave Aerated Concrete Block shall be referred to by its normal dimension the term 'normal' means that the dimension includes the thickness of the mortar joints. The actual dimension shall be 10mm short of the normal dimension (or 6mm short in special areas finer joints as specified).

The normal dimension of the concrete block shall be as follows:-

Length	:	400, 500 or 600 mm
Height	:	200, 250 or 300 mm
Width	:	100, 150, 200 or 250 mm

In addition, Autoclave Aerated Concrete Block shall be manufactured in half length of 200, 250 or 300 mm correspond to the full lengths.

The nominal dimensions of the units are so designed that taking account of the thickness of mortar joints, they will produce wall length and heights which will conform to the principles of modular co-ordination.

Block of sizes other than those specified above, may also be used if so specified in the case of special Autoclave Aerated Concrete Block such as jallie or screen wall and ornamental block, the specified size may not necessarily apply.

The maximum variation in the length of the Autoclave Aerated Concrete Block shall not be more than plus/minus 5mm and maximum variation in the height and width of Autoclave Aerated Concrete Block, not more than plus/minus 3mm.

The faces of Autoclave Aerated Concrete Block shall be flat & Rectangular, opposite faces shall be parallel and all arises shall be square. The bedding surfaces shall be at right angle to the face of the Blocks.

The Autoclave Aerated Concrete Block with special faces shall be manufactured and supplied if so specified.

The autoclaved Autoclave Aerated Concrete Block shall be classified in two grades according to their compressive strength as indicated in table:

S. No.	Density in oven dry condition (Kg/m ²)	Compressive Strength (Min)		Thermal Condition in Air dry condition (W/m.k)
		Grade-I (N/mm ²)	Grade-II (N/mm ²)	
1	451 to 550	2.00	1.50	0.21
2	551 to 650	4.00	3.00	0.24
3	651 to 750	5.00	4.00	0.30
4	751 to 850	6.00	5.00	0.37
5	851 to 1000	7.00	6.00	0.42

Materials

Cement complying with any of the Indian Standard may be used as per the direction of the manufacturer.

Use of Fly ash conforming to IS 3812-2013 (Reaffirmed 2017) may be permitted to a limit of 20% in cement conforming to IS 269-2015 (Reaffirmed 2020).

The lime shall satisfy the requirement for class C lime specified as IS 712-1984 (Reaffirmed 2019).

The aggregate used for the manufacture of Autoclave Aerated Concrete Block shall conform to the following requirements

- (a) **Sand**-Conforming to IS 383-2016 except for the grading which may be made to suit the product and silica content shall not be less than 80%.
- (b) **Fly ash** – Conforming to IS 3812-2013 (Reaffirmed 2017) with loss on ignition not more than 6%.

The water used in the manufacture of Autoclave Aerated Concrete Block shall be free from matter harmful to concrete or reinforcement or matter likely to cause efflorescence in the block and shall meet the requirements of IS 456-2000 (Reaffirmed 2021).

Additives and Admixtures may be added either as additives to the cement during manufacturing or as additive or admixtures to the concrete mix. Additive or admixtures used in the manufacture of concrete block may be

- (c) Accelerating, water reducing and air –entraining admixtures conforming to IS 9103-1999 (Reaffirmed 2018)
- (d) Water proofing agent conforming to IS 2645-2003 (Reaffirmed 2017)
- (e) Colouring pigments

Physical requirements

All Autoclave Aerated Concrete Block shall be sound, free of cracks or other defects which interfere with the proper placing of block units, impair the strength or performance of the construction.

Where block units are to be used in exposed wall construction, the face or faces that are to be exposed

shall be free of chips, cracks or other imperfections except that if not more than 5% of a consignment contains slight cracks or small chippings not larger than 25mm, this shall not be deemed grounds for rejection.

Dimensions- The overall dimension of the block units when measured shall be in accordance with para 6.14.2.1 subjected to the tolerances mentioned in para 6.14.2.4

Block Density - The Block density shall conform to the requirements specified in table of para 6.14.3, when tested accordance with para 6.14.6 (1)

Compressive Strength - The min. compressive strength being the average of twelve block units shall be as prescribed in table of para 6.14.3, when tested accordance with para 6.14.6(2)

Thermal Conductivity - The thermal conductivity shall be not exceed the values specified in table of para 6.14.3 when tested accordance with para 6.14.6(3)

Drying Shrinkage – the drying shrinkage shall be not more than 0.05% for grade –1 block and 0.10% for grade-2 block when tested accordance with para 6.14.6(4)

Tests

Block Density- The block density shall be determined in the manner described in IS 6441(Part-1)-1972 (Reaffirmed 2017)

Compressive Strength- The compressive strength of block shall be determined in accordance with IS 6441(Part-5)-1972 (Reaffirmed 2017)

Thermal Conductivity- The thermal conductivity of block shall be determined in accordance with IS 3346 -1980 (Reaffirmed 2017)

Drying Shrinkages- The drying shrinkage of block shall be determined in the manner described in IS 6441(Part-2)-1972 (Reaffirmed 2017)

Sampling

Lot - In any consignment, all the blocks of the same size and from the same batch of manufacture shall be grouped together into a minimum number of groups of 10000 blocks or less. Each such group shall constitute a lot.

From each lot, a sample of 24 blocks shall be selected at random. The required numbers of Blocks shall be taken at regular intervals during the loading of the vehicle or unloading the vehicles depending on whether sample is taken before delivery or after delivery. When this is not practicable, sample shall be taken from the stack in which case the required number of blocks shall be taken at random from across the top of the stacks, the sides accessible and from the interior of the stacks by opening trenches from the top.

The sample of blocks shall be marked for future identification of the consignment it represents. The blocks shall be kept under cover and protected from extreme conditions of temperature, relative humidity and wind until they are required for test. The tests shall be undertaken as soon as practicable after the sample has been taken.

Number of tests

All the 24 Blocks shall be checked for dimensions and inspected for visual defects.

Out of the 24 blocks, 12 blocks shall be subjected to the test for compressive strength, 3 blocks to the test for density, 3 blocks to the test for thermal conductivity and 3 blocks to the test for drying shrinkage. The remaining 3 blocks shall be reserved for re-test for drying shrinkage if a need arises.

The samples of AAC blocks (each sample consisting of 6 specimen) shall be chosen randomly from the lot procured and tested for various parameters specified in para 6 above. One samples shall be tested for every **100 cum** or part thereof. However, minimum one sample shall be tested from each lot received at site if the quantity procured in the lot is less than 100 cum. If required, Engineer-in-Charge or his authorized representative shall inspect the factory during production of the material for this work and also collect samples (of materials used for making AAC blocks and precast AAC blocks) from the factory itself. The contractor shall consider this contingency also while placing the order with one of the approved

firms. Nothing extra shall be payable on this account.

Criteria for conformity

The number of blocks with dimensions outside the tolerance limit and or with visual defects, among those inspected, shall not be more than two.

For density, the mean value shall be within the range specified in Table of para3

For compressive strength, the mean value, say X shall be determined. The test results shall be grouped into groups of 4, individual values of ranges shall be determined, the average range a calculated from these values and shall satisfy the following condition:

$\bar{X} - 0.6 R > \text{minimum value specified in Table of para3.}$

For thermal conductivity, the mean value shall be equal to or less than the value specified in Table of para3.

For drying shrinkage, all the test specimens shall satisfy the requirements of the test. If one or more specimens fail to satisfy the requirements, the remaining 3 blocks shall be subjected to these tests. All these blocks shall satisfy the requirements.

Manufacturer's Certificate

The manufacturer shall satisfy himself that the masonry units conform to the requirements of this specification and, if requested, shall supply a certificate to this effect to the purchaser or his representative.

Independent Tests

If the purchaser or his representative requires independent tests, the samples shall be taken before or immediately after delivery, at the option of the purchaser or his representative and the tests shall be carried out in accordance with this specification.

The manufacturer shall supply free of charge the units required for testing.

Storage

General requirements of storage of autoclaved cellular (aerated) concrete blocks shall be as described in IS : 4082-1996 (Reaffirmed 2018).

Marking

Each lot of concrete masonry units manufactured in accordance with this specification shall be suitably marked with information-

- (i) The identification of the manufacture
- (ii) The grade and block density of the unit
- (iii) The month and year of manufacturing

Each block may also be marked with the ISI Certification mark.

The R.C C bend shall be provided on **150mm /230mm/300mm** thick masonry to increase the strength and compatibility . The RCC bend shall be provided at sill level and lintel level over throughout the wall. This thickness of the bend shall be approved by the Engineer in charge or as specified in drawing. The payment of RCC bend and reinforcement shall be paid separately.

Autoclave Aerated Concrete Block masonry shall be provided with polymer modified adhesive mortar. The polymer modified adhesive mortar shall be provided @ 30 kg per cum or with cement mortar 1:4 (1 cement : 4 coarse sand).

Autoclave Aerated Concrete Block with **100 mm thick** masonry shall be provided with two number 6mm dia. reinforcement steel bar at every third course. The payment of reinforcement shall be paid separately.

Autoclaved Aerated Concrete Block confirming the IS 2185(Part-3)-1984 (Reaffirmed 2020)

Measurements

Autoclave Aerated Concrete Block Masonry shall be measured in cubic metres unless otherwise specified.

Any extra work over the specified dimensions shall be ignored. Dimensions shall be measured correct to the nearest 0.01 metre. ie. 1 cm. Areas shall be calculated to the nearest 0.01 sqm and the cubic contents shall

be worked out to the nearest 0.01 cubic metres.

Note : (i) Autoclave Aerated Concrete Block work in parapet walls, mumty, lift machine room and water tanks constructed on the roof upto 1.2 m height above roof shall be measured together with the corresponding work of the floor next below.

No deductions or additions shall be done and no extra payment made for the following:

Note: Where minimum area is defined for deduction of an opening, void or both, such areas shall refer only to opening or void within the space measured.

- (a) Ends of dissimilar materials (that is, joists, beams, lintels, posts, girders, rafters, purlins, trusses, corbels, steps etc.); up to 0.1 m² in section;
- (b) Opening up to 0.1 m² in area (see Note);
- (c) Wall plates, bed plates, and bearing of slabs, chajjas and the like, where thickness does not exceed 10 cm and bearing does not extend over the full thickness of wall;
- (d) Cement concrete blocks as for hold fasts and holding down bolts;
- (e) Iron fixtures, such as wall ties, pipes upto 300 mm diameter and hold fasts for doors and windows;
- (f) Chases of section not exceeding 50 cm in girth; and
- (g) Bearing portion of drip course, bearing of moulding and cornice.

Note: In calculating area of an opening, any separate lintel or sills shall be included with the size of the opening but end portions of lintel shall be excluded. Extra width of rebated reveals, if any, shall also be excluded.

String courses, projecting pilasters, aprons, sills and other projections shall be fully described and measured separately in running metres stating dimensions of each projection.

Square or rectangular pillars shall be measured separately in cubic metres

Circular pillars shall be measured separately in cubic metres as per actual dimensions.

Autoclave Aerated Concrete Block work curved on plan shall be measured like the block work in straight walls and shall include all cutting and wastage of blocks, tapered vertical joints and use of extra mortar, if any. Block work curved on plan to a mean radius not exceeding six metres shall be measured separately and extra shall be payable over the rates for block work in straight walls. Nothing extra shall be payable if the mean radius of the block work curved in plan exceeds six metres.

Tapered walls shall be measured net as walls and extra payment shall be allowed for making tapered surface for block work in walls.

SECTION 5

Centering & Form Work

- 1[9.1 (A)] Providing form work of ordinary timber planking so as to give a rough finish including centering strutting and steel propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m., and removal of the same for in situ reinforced concrete and plain concrete work in foundation, footings, bases of columns, and mass concrete.**

Materials

It shall be strong enough to withstand the dead and live loads and forces caused by ramming and vibrations of concrete and other incidental loads, imposed upon it during and after casting of concrete. It shall be made sufficiently rigid by using adequate number of ties and braces, screw jacks or hard board wedges where required shall be provided to make up any settlement in the form work either before or during the placing of concrete.

Form shall be so constructed as to be removable in sections in the desired sequence, without damaging the surface of concrete or disturbing other sections, care shall be taken to see that no piece is keyed into the concrete.

Material for Form Work

Formwork for timber planking shall be of smooth finish and to be use for beam bottoms only. All side of the beam/slab/lintel/chajja/footing/stair must be of ply shuttering. Thickness of the ply must be appropriate to withstand all suitable loads. Shuttering of column/shear wall/RCC wall must be in ply/steel shuttering. Steel plates(Farma) is strictly prohibited in column & beam shuttering. Steel plates to be used in slab shuttering unless otherwise specified.

Propping and Centering :

All propping and centering should be either of steel tubes with extension pieces or built up sections of rolled steel or H-frame as per site requirement.

(a) **Centering/Staging** : Staging should be as designed with required extension pieces as approved by Engineer-in-Charge to ensure proper slopes, as per design for slabs/ beams etc. and as per levels as shown in drawing. All the staging to be either of Tubular steel structure with adequate bracings as approved or made of built up structural sections made from rolled structural steel sections or H-frame as per site requirement.

(b) In case of structures with two or more floors, the weight of concrete, centering and shuttering of any upper floor being cast shall be suitably supported on one floor below the top most floor already cast.

(c) Concreting of upper floor shall not be done until concrete of lower floor has set at least for 14 days.

Shuttering: Shuttering used shall be of sufficient stiffness to avoid any deflection and joints shall be tightly butted to avoid leakage of slurry. If required, rubberized lining of material as approved by the Engineer-in-Charge shall be provided in the joints. Steel/ply shuttering used for concreting should be sufficiently stiffened. The steel/ply shuttering should also be properly repaired before use and properly cleaned to avoid stains, honey combing, seepage of slurry through joints etc.

(a) Assembly of beam head over props. Beam head is an adopter that fits snugly on the head plates of props to provide wider support under beam bottoms.

(b) Steel/Ply shuttering shall be used as mention above,

Form work shall be properly designed for self weight, weight of reinforcement, weight of fresh concrete, and in addition, the various live loads likely to be imposed during the construction process (such as workmen, materials and equipment). In case the height of centering exceeds 4.0 metres, the prop may be provided in multi-stages.

Camber: Suitable camber shall be provided in horizontal members of structure, especially in cantilever spans to counteract the effect of deflection. The form work shall be so assembled as to provide for camber. The camber for beams and slabs shall be 4 mm per metre (1 to 250) or as directed by the Engineer-in-Charge, so as to offset the subsequent deflection, for cantilevers the camber at free end shall be 1/50th of the projected length or as directed by the Engineer-in-Charge. The shuttering shall conform to M-21

The dimensions of scantlings and battens shall conform to the design. The strength of the steel props shall not be less than that assumed in the design.

Workmanship

The form work shall conform to the shape lines and dimensions as shown on the plans and be so constructed as to remain sufficiently rigid during the placing and compacting of the concrete. Adequate arrangements shall be made by the contractor to safe-guard against any settlement of the form-work during the course of concreting and after concreting. The form work of shuttering, centering, scaffolding, bracing etc. shall be as per design.

Clearing and Treatment of forms

All rubbish, particularly chipping shaving and saw dust shall be removed from the interior of the form before the concrete work is placed and the form in contact with concrete shall be cleaned and thoroughly wetted or treated. The surface shall be then coated with soap solution applied before concreting is done. Soap solution for the purpose shall prepared by dissolving yellow soap in water to get consistency of paint. Alternatively a coat of raw linseed oil shall be applied after thoroughly cleaning the surface. Care shall be taken that the coating does not get on construction joint surface and reinforced bars.

Surface Treatment

Oiling the Surface : Shuttering gives much longer service life if the surfaces are coated with suitable mould oil which acts both as a parting agent and also gives surface protections.

A typical mould oil is heavy mineral oil or purified cylinder oil containing not less than 5% pentachlorophenol conforming to IS 716 well mixed to a viscosity of 70-80 centipoises.

After 3-4 uses and also in cases when shuttering has been stored for a long time, it should be recoated with mould oil before the next use.

The second categories of shuttering oils / leavening agents are Polymer based water soluble Compounds. They are available as concentrates and when used diluted with water in the ratio of 1:20 or as per manufacturer specifications. The diluted solution is applied by brush applications on the shuttering both of steel as well as ply wood. The solution is applied after every use.

The design of form work shall conform to sound Engineering practices and relevant IS codes.

Inspection of Form Work

The completed form work shall be inspected and approved by the Engineer-in-Charge before the reinforcement bars are placed in position.

Proper form work should be adopted for concreting so as to avoid honey combing, blow holes, grout loss, stains or discoloration of concrete etc. Proper and accurate alignment and profile of finished concrete surface will be ensured by proper designing and erection of form work which will be approved by Engineer-in-Charge.

Shuttering surface before concreting should be free from any defect/ deposits and full cleaned so as to give perfectly straight smooth concrete surface. Shuttering surface should be therefore checked for any damage to its surface and excessive roughness before use.

Stripping time :

In normal circumstances and where ordinary cement is used form may be struck after expiry of following periods or mentioned in concerned structure drawing of the work.

- | | |
|--|----------------|
| (a) Sides of walls columns and vertical faces of beams | 16 to 24 hours |
| (b) Beam soffits (props. left under)..... | 7 days |
| (c) Removal of props slabs | |
| (i) Slabs spanning up to 4.5 m..... | 7 days |
| (ii) Spanning over 4.5 m..... | 14 days |
| (d) Removal of props to beams and arches: | |
| (i) Spanning upto 6 m | 14 days |
| (ii) Spanning over 6 m..... | 21 days |

Procedure when removing the form work :

All form work shall be removed without such shock or vibrations as would not damage the reinforced concrete surface. Before the soffits form work and struts are removed, the soffits and the concrete surface shall be exposed where necessary in order to ascertain that the concrete has sufficiently hardened.

Scaffolding:

All scaffolding, hoisting arrangements and ladders etc. required for the facilitating of concreting shall be provided and removed on completion of work by contractor at his own expense. The scaffolding, hoisting arrangements and ladders etc. shall be strong enough to withstand all live, dead and impact loads expected to act and shall be subject to the approval of the engineer-in-charge. However contractor shall be solely responsible for the safety of the scaffolding hoisting arrangement, ladders, work and workman etc.

The scaffolding hoisting, arrangements and ladders shall allow easy approach to the work spot and afford easy inspection.

The rate is applicable to all condition of working and height up to 4m The rate shall include the cost of materials and labour for various operations involved such as :

- (a) Splayed edges, notching, allowance for over laps and passing at angles, battens centering, shuttering, propping, bolting, welding easing, striking and removal.
- (b) Filleting to form stop chamfered edges or splayed external angles not exceeding 20 mm widths to beams, column and the like.
- (c) Temporary openings in the forms for pouring concrete, if required removing rubbish etc.
- (d) Dressing with oil to prevent adhesion of concrete with shuttering and
- (e) Ranking or circular cutting.

Mode of measurements and payment

Form work shall be measured as the area in square meters of shuttering in contact with concrete except in the case of inclined member and portion of curved profile and upper side in which case on area of underside shall be measured for payment.

From work to secondary beams shall be measured up to the sides of main beams but no deduction shall be made from the work of the main beam at the inter section point. No deduction shall be made from the form work of a column at inter section of beams.

The rate is for the complete item.

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

- 2[9.1 (B)] Providing form work of ordinary timber planking so as to give a rough finish including centering shuttering and steel propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same for in situ reinforced and plain concrete in small surface such as cantilevers ends, brackets and ends of the steps, caps, and bases of pilasters and columns and the like.**

Materials and workmanship :

The relevant specifications of item No. [9.1(A)] shall be followed except that work is for small as cantilever ends, brackets and ends of steps, caps and bases of pilasters and columns and the like.

Mode of measurement and payment

The relevant specifications of item No. [9.1(A)] shall be followed.

The rate shall be unit of one sq. metre.

- 3[9.1(C)] Providing form work of ordinary timber planking so as to give a rough finish including centering shuttering and steel propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same for in situ reinforced and plain concrete in chullah hoods, weather sheds, chhajjas, corbels etc. including edges.**

Materials and workmanship :

The relevant specifications of item No. [9.1(A)] shall be followed except that work is for chullah hoods, weather sheds, chhajjas, corbels etc. including edges of the same.

Mode of measurement and payment

The relevant specifications of item No. [9.1(A)] shall be followed.

The rate shall be unit of one sq. metre.

- 4[9.1(D)] Providing form work of ordinary timber planking so as to give a rough finish including centering shuttering and steel propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same for in situ**

reinforced and plain concrete work in staircase with slopping or stepped soffits including risers and stringers excluding landing.

Materials and workmanship :

The relevant specifications of item No. [9.1(A)] shall be followed except that the work is for staircases with slopping or stepped soffits including risers and stringers excluding landing

Mode of measurement and payment

The relevant specifications of item No. [9.1(A)] shall be followed.

The rate shall be unit of one sq. metre.

- 5[9.1(E)] Providing form work of ordinary timber planking so as to give a rough finish including centering shuttering and steel propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 m. and removal of the same for in situ reinforced and plain concrete work in vertical fins and vertical sub-breakers.**

Materials and workmanship :

The relevant specifications of item No. [9.1(A)] shall be followed except that the work is for in vertical fins and vertical sub-breakers.

Mode of measurement and payment

The relevant specifications of item No. [9.1(A)] shall be followed.

The rate shall be unit of one sq. metre.

- 6[9.1(F)] Extra for providing form work with sheathing of steel sheets so as to give a fair finish in :**

(A) Foundation, footings, base of columns etc. mass concrete.

(B) Flat surface such as soffits of slab landing and the like.

(i) Floors etc. upto 200 mm. in thickness.

(ii) Floors etc. above 200 mm. in thickness.

(C) Vertical surfaces such as (any thickness) partitions.

(D) Columns, pillars, posts and struts.

1. Square, rectangular, breassumers and lintels not exceeding 1 mm. depth.

2. Sides and soffits of beams, beam haunchings, cantilevers, girders, breassumers and lintels exceeding 1 mm. in depth.

(I) Edges of slabs and breaks in floors and walls

(K) Small surfaces such as cantilever ends, brackets and ends of steps, caps and bases to pillars and columns including edges.

(L) Chollar woods, weather sheds chajjas, coroeds etc. and the like.

(M) Stair case with sloping or stepped soffits, including risers, stringers excluding landing.

(Q) Vertical fins and vertical sun breakers.

Materials and workmanship

The relevant specifications of item No. 9.1(A) to (E) shall be followed except that the extra rate shall be paid for using sheathing of steel and plates of steel or plywood instead of ordinary timber plank, to obtain a desired smooth exposed finish of surface. The surface shall be presentable without further treatment.

Mode of measurements and payment

The measurement of form work shall be taken for the form work done with steel sheathing extra over and above the rate of form work of the respective item of form work done. The relevant specification of respective item No. 9.1(A) to (E) shall be followed.

The rate shall be for a unit of one sq. metre.

SECTION 6

Wood Work, Doors & Windows

1[10.1(A)] Providing wood work in frames of doors, windows, clerestory windows and other similar work, wrought, framed and fixed in position, Indian Teak wood.

Materials:

Wood in frames shall conform to M-22.

Workmanship

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

Seasoning of Timber

The process of drying timber under controlled conditions is called seasoning of timber. Timber shall be either air seasoned or kiln seasoned and in both cases moisture content of the seasoned timber shall be as specified in below Table unless otherwise specified, air seasoned timber shall be used. Kiln seasoning of timber, where specified, shall be done as per IS 1141-1993 (Reaffirmed 2020) in a plant approved by Engineer-in-Charge.

TABLE
Maximum Permissible Moisture Content of Timber

Sr. No.	Use	Max Moisture Content Percent			
		Zone I	Zone II	Zone III	Zone IV
1.	Beams, Rafters & Posts	12	14	17	20
2.	Doors and windows				
	(a) 50 mm and above thickness	10	12	14	16
	(b) Thinner than 50 mm	8	10	12	14
3.	Flooring strips	8	10	10	12
4.	Furniture & Cabinet making	10	12	14	15

Preservation of Timber

Preservative treatment does not improve basic properties of timber but gives varying degree of protection against deterioration due to attacks by fungi, termites, borers and marine organisms. Preservative treatment, where specified, shall be done using Oil type, Organic solvent type or Water-soluble type preservative. Oil type preservatives shall be used if the timber is not required to be polished or painted. Before preservative treatment, the timber shall be sawn and seasoned. All surfaces exposed after treatment, except due to planing, shall be thoroughly brushed with the preservative before jointing. Preservative treatment of timber shall be done as per IS 401-2001 (Reaffirmed 2016) in a plant approved by the Engineer-in-Charge.

Frames :

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

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

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

Tolerance :

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

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

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

Minimum number of three hold-fasts shall be fixed on each side of door and windows frames, one at the centre point and the other two at 30 cm from the top and the bottom of the frames. In case of windows and ventilators frames whose height is less than 1 M. two hold fasts, in each side shall be fixed at quarter points of the frames. The size of each hold fast shall be 150x25x6 mm. and of mild steel with split end. The hold fasts shall be with screws to frames.

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

Mode of measurements and payment

The linear dimensions shall be measured correct upto 1 cm. The quality shall be worked out correct to 2 places of decimals of cu. m.

The rate shall be for a unit of 1 cu. m.

2[10.1 (B)] Providing and fixing 35 mm. thick fully panelled, shutter of doors, windows and clearstory windows including S. S. fixtures & fastenings with necessary screws, Indian Teak Wood.

Materials and Workmanship

Relevant specifications of item No. 10.1(A) shall be followed except that the hinges and other fixtures & fastening shall be of S. S. 304 grade only as per drawing or as specified in tender item.

Mode of measurements and payment

The relevant specifications of item No. 10.1(A) shall be followed

The rate shall be for unit of One sq. m.

3[10.1 (C)] Providing and fixing 35 mm. thick fully glazed shutter for doors, windows and clearstory windows including S. S. fixtures & fastenings with necessary screws, Indian Teak Wood.

Materials and Workmanship

Relevant specifications of item No. 10.1(A) shall be followed except that the hinges and other fixtures & fastening shall be of S. S. 304 grade only as per drawing or as specified in tender item.

Mode of measurements and payment

The relevant specifications of item No. 10.1(A) shall be followed

The rate shall be for a unit of one sq. metre.

4[10.1(D)] Providing and fixing 35 mm. thick partly paneled and partly glazed shutter for doors, windows and clearstory windows including S. S. fixtures & fastenings with necessary screws, Indian Teak Wood.

Materials & with necessary screws, Indian Teak Wood

The relevant specification of item No. [10.1(A)] shall be followed except that the hinges and other fixtures & fastening shall be of S. S. 304 grade only as per drawing or as specified in tender item.

Mode of measurements and payment

The relevant specifications of item No. [10.1(A)] shall be followed.

The rate shall be for a unit of one sq. metre.

5[10.1(E)] Providing, Supplying and Fixing of 32MM (Total) Thick Flush Door Shutter with 1 mm Thick Laminates on Both Side of Shutter (Laminates Shall be Century, Signature or Royal Touch Brand Only) Making/ Construction of Flush Door is with Pine or Southern Yellow Pine Filler and 2.5mm Core Veneer Both Side and 0.4mm Face Veneer on Both Side with Lock rail on Centre. Flush Door Provide with Teak wood beading Patti (32mm X 12mm) on Peripheries of Flush Door with Matching Laminate Paint with Door Frame of 90mm x 45mm, 90mm x 55mm & 112mm x 68mm or as per drawing. Finger Jointed Solid Meranti Wood Including Paint Matching with Laminates. Door Frame having 25 Years warranty against biological Agent like Termite, Borers, Decay, Fungi, and harmful Insects also Warranty against Seasoning Related Issues like Crack, Bending, Twisting, Warping, and Joint Related Issues Like joint Failure or Adhesion Failure and Flush Door

Shutter having 05 Years Warranty against Attack of biological Agent like Termite, Borers, Decay, Fungi, and harmful Insects also Warranty against Seasoning Related Issues like Crack, Bending, Twisting, Warping. Laminates On shutter shall be Press by Cold Press Method. Door Frame and Shutter Shall be brought to Site in Packed PVC Bags & PVC Coating shall be Removed on Completion of Work in such a way that Shutter & Frame is free from nail mark & any damages etc.

Rates are also inclusive of 15 cm Long 6 Nos. of Hold Fast (25x5mm MS flat) Per frame including using S.S. butt hinges, S.S. Screws and Providing & Fixing following S.S. 304 grade Fixtures and Fastening shall confirm to M-29.

(1) Aldrops.	2 Nos. - 250 mm × 16 mm (For External Door)
(2) Aldrops.	1 Nos. - 250 mm × 16 mm (For Internal Door)
(3) Tower bolt	1 Nos. - 200 mm × 10 mm (For All Door)
(4) Tadi	1 Nos. - 200 mm × 16 mm (For Internal Door)
(5) Handle	2 Nos. - 150 mm long x 10mm thick (For All Door)
(6) Door Stopper/Door Catch	1 Nos. - 100 mm Long (Door stopper)(For All Door)/Size of the door catches as per drawing or as directed by engineer in charge.
(7) S.S. butt hinges	4 Nos. - 100 mm x 75 mm x 3mm thick (Per shutter)

Materials

Meranti Finger Jointed Solid Wood for Door Frame

Density - 680kg/m³ to 760kg/m³

Moisture Content – 12% to 14%

Modulus of Rupture – 90Mpa

Tensile Strength – Parallel 45.4Mpa / Perpendicular 5.03Mpa

Modulus of Elasticity, Air Dry 13.90Mpa

Chemical Treatment - Chemical Treatment with CCA (Copper Chrome Arsenic) as per IS-10013(Part-2)-1981 (Reaffirmed 2020) & Treated under Pressure Impregnation method

Seasoning –As per IS 1141-1993 (Reaffirmed 2020)

(A) Laminated Flush Door Shutter

Filler Material – Indian Pine / SYP

Core Veneer – 2.5mm on Both Sides

Face Veneer – 0.4mm on Both Sides

Laminate – Century / Signature / Royal Touch Brands Only

Workmanship

- 1.1 The solid core type flush door shutter shall be decorative or non-decorative type as specified in the drawing. The size and thickness of the shutter shall be specified in the drawing or as directed. The timber species for core shall be used as per IS 2202(Part-1) 1999(Reaffirmed 2017). The timber shall be free from decay and insect attack. Knots and knot holes shall less than half the width of cross section of the member in which they occur may permitted
- 1.2 The face panel of shutter shall be formed by gluing by the hot press process on both faces of 2.5mm thick core veneer on both faces of 2.5 mm thick core veneer on both side and 0.4 mm thick faces veneer on both faces
- 1.3 All edges of the door shutter shall be square. The shutter shall be free twist or warp in its plane
- 1.4 The tolerance in size of solid core type flush door shall be as under in normal thickness ± 1.2 mm in normal height ± 3 mm

Mode of measurement & payment

The rate includes cost of all materials, tools, plants and labour involved in satisfactory completion of work.

The rate shall be for unit of one Sq.mt.

The work shall be carried out as per detailed drawings and directed by Engineer in charge.

Measurement shall be in Sq.mt.

6[10.1(F)] Providing and fixing 35 mm thick shutter for door fully paneled with chemically treated seasoned non teak wood the frame of 10 cm. x 7 cm. including S.S. fixtures and fastening with necessary screw with two coats of oil paint & one coat of primer etc. complete.

Materials

The chemically treated seasoned non teak wood doors with frame & shutters shall be supplied by the contractor at site of work. The size of the frame shall be 10 cm x 7 cm. The shutters shall be 35 mm thick M- 23 shall be referred only for specifications except quality & trade name of wood.

Workmanship

The finished doors with frame & shutter shall be procured & brought to site of work by the contractor & damage during transportation and/or stacking shall have to be made good or replaced at contractors cost. Doors shall be stacked in proper manner as directed by Engineer-in-charge. Fixing of doors shall be done in proper position on line and level as per instruction given by the Engineer-in-charge.

Timber Panelling :

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

The faces of the panel as well as various pieces of the panel shall be closely fitted to the sizes of the grooves. Finishing of the corners of raised panel edges shall be done as shown in drawing or as directed. The thickness specified shall be finished thickness and no tolerance will be permitted.

Fixtures and Fastening :

Fixtures and fastening shall conform to M-29 as per table given below :

Rates are also inclusive of 15 cm Long 6 Nos. of Hold Fast (25x5mm MS flat) Per frame including using S.S. butt hinges, S.S. Screws and Providing & Fixing following S.S. 304 grade Fixtures and Fastening shall confirm to M-29.

(1) Aldrops.	2 Nos. - 250 mm × 16 mm (For External Door)
(2) Aldrops.	1 Nos. - 250 mm × 16 mm (For Internal Door)
(3) Tower bolt	1 Nos. - 200 mm × 10 mm (For All Door)
(4) Tadi	1 Nos. - 200 mm × 16 mm (For Internal Door)
(5) Handle	2 Nos. - 150 mm long x 10mm thick (For All Door)
(6) Door Stopper/Door Catch	1 Nos. - 100 mm Long (Door stopper)(For All Door)/Size of the door catches as per drawing or as directed by engineer in charge.
(7) S.S. butt hinges	4 Nos. - 100 mm x 75 mm x 3mm thick (Per shutter)

All the wood work shall be finished well rubbing with sand paper so as to have smooth surface for painting.

Painting

Paint shall confirm to M-30. The wood work in contact with masonry shall be painted with two coats of coal tar and exposed surface of wood work shall be painted with one coat of primer and two coats of synthetic enamel paint of specified shade as approved by the engineer-in-charge shall be applied as detailed under :

The surface shall be well cleaned and rubbed with sand paper, holes cracks, open joints and similar other defects in wood work shall be made good by filling them with appropriate putty, one coat of primer as approved by the engineer-in-charge shall be applied over the surface prepared as above.

The primer coat shall be allowed to dry and the two coats of synthetic enamel paint of approved quality and shade shall be applied. Each coat of paint shall be allowed to dry before laying of next coat.

Finished surface shall not show any hair lines shabbiness and patches etc. if it is shown, it shall be made good as directed by the engineer-in-charge.

Mode of measurement & payment

The rates include all material and labour charges for manufacturing of door frame and Door shutter and labour chages for fixing doors with frame, fixtures and fastenings and synthetic enamel paint etc. complete as above including the cost of the door with frame. Rate are also inclusive of all Taxes.

The measurements shall be taken out to out of the frame.

The rate shall be for unit of one sq. m.

- 7[10.1(G)] Providing and fixing 32 mm. thick partly paneled and partly glazed shutter for door chemically treated seasoned non-teak woods frame of 10 cm. x 7 cm. including S.S. fixtures and fastening with necessary screw with two coats of all paint & one coat of primer etc. complete.**

Materials & Workmanship :

Relevant specification of item no. 10.1(F) shall be followed except partly panelled and partly glazed shutter.
Glass shall confirm to M-27.

Glazing :

The glass panels shall be embodied in putty and secured to the rebate by wooden heads or mouldings shape and size as approved with counter sunk screws of suitable size.

The glass panels shall be properly cut to fit the rebates of the frames and sashes fully with a slight minus margin of about 1.5 mm. on all sides. Before glazing, the frame shall be primed and prepared for painting so that wood may not draw oil out of putty.

The rebate shall be putted to an extent to provide beading all round the glass.

The glass shall then be bedded in putty and fitted to frames with wooden beads or mouldings as directed and secured with counter sunk screw. The screw shall be spaced not more than 100 mm. from each corner and not more than 200 mm apart.

The size of the rebate in the frame and size and shape of beads of moulding shall be as directed.

The thickness of glass panel shall be 6mm.

Mode of measurement & payment :

The relevant specification of item no. 10.1(F) shall be followed.

The rate shall be for unit of one sq. m.

SECTION - 7

PAVING & FLOOR FINISHING

- 1[14.2(A)] Ceramic glazed tiles 8 to 10mm thick in flooring, treads of steps and landings laid on a bed of 12 mm thick cement mortar 1:3 (1 cement : 3 coarse sand) finished with flush pointing in white cement with required pigment. Size of the tiles shall be as mentioned in specified tender item. Brand of the tiles shall be as per approved make list of GSPHCL.**

Materials

Water shall conform to M-1. Cement mortar shall conform to M-11. Ceramic glazed tiles shall conform to M-35.

The tiles shall be of approved make and shall conform to IS 15622-2017. The tiles shall be pressed ceramic covered by a glaze thoroughly matured and fitted to the body. The tiles shall be sound, true to shape, flat and free from flaws and other manufacturing defects affecting their utility.

The top surface of the tiles shall be glazed. The underside of the tiles shall not have glaze on more than 5% of the area in order that the tile may adhere properly to the base. The edges of the tiles shall be free from glaze, however, any glaze if unavoidable shall be permissible on only up to 50 percent of the surface area of edges.

The glaze shall be free from welts, chips, craze, specks, crawlings or other imperfections detracting from the appearance when viewed from a distance of one metre. The glaze shall be either glossy or matt as specified. The glaze shall be white or of any colour as directed by the Engineer-in-Charge. There may be more than one colour on a tile.

Preparation of Surface and laying

Base concrete or the RCC slab on which the tiles are to be laid shall be cleaned, wetted and mopped. The bedding for the tile shall be with cement mortar 1:3 (1 cement : 3 coarse sand) or as specified. The average thickness of the bedding shall be 12 mm or as specified. The mortar shall be spread in thickness not less than 10mm at any place and average 12mm thickness.

Mortar shall be spread, tamped and corrected to proper levels and allowed to harden sufficiently to offer a fairly rigid cushion for the tiles to be set and to enable the mason to place wooden plank across and squat on it.

Over this mortar bedding neat grey cement slurry of honey like consistency shall be spread at the rate of 3.3 kg of cement per square metre over an area up to one square metre. Tiles shall be soaked in water, washed clean and shall be fixed in this grout one after another, each tile gently being tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern.

The surface of the flooring during laying shall be frequently checked with a straight edge about 2 m long, so as to obtain a true surface with the required slope. In bath, toilet W.C. kitchen and balcony/verandah flooring, suitable tile drop or as shown in drawing will be given in addition to required slope to avoid spread of water. Further tile drop will also be provided near floor trap for which if the thickness of bed exceeds than 12mm, no extra payment shall be made for extra thickness.

Where full size tiles cannot be fixed these shall be cut (sawn) to the required size, and their edge rubbed smooth to ensure straight and true joints.

Tiles which are fixed in the floor adjoining the wall shall enter not less than 10 mm under the plaster, skirting or dado.

After tiles have been laid surplus cement slurry shall be cleaned off.

Pointing and Finishing

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

Mode of Measurements

Length and breadth shall be measured correct to a cm after laying skirting, dado or wall plaster and the area calculated in square metre correct to two places of decimal. Where coves are used at the junctions, the length and breadth shall be measured between the lower edges of the coves.

No deduction shall be made nor extra paid for voids not exceeding 0.10 square metre. Deductions for ends of dissimilar materials or other articles embedded shall not be made for areas not exceeding 0.10 square metre.

The rate shall be of unit of One sq. meter.

2[14.2(B)] Ceramic glazed tiles 8 to 10mm thick In skirting, risers of steps and dado on 10 mm thick cement plaster 1:3 (1 cement : 3 coarse sand) and jointed with white cement slurry with required pigment. Size of the tiles shall be as mentioned in specified tender item. Brand of the tiles shall be as per approved make list of GSPHCL.

Materials

Water shall conform to M-1. Cement mortar shall conform to M-11. Ceramic glazed tiles shall conform to M-35.

The tiles shall be of approved make and shall generally conform to IS 15622-2017. The tiles shall be pressed ceramic covered by a glaze thoroughly matured and fitted to the body. The tiles shall be sound, true to shape, flat and free from flaws and other manufacturing defects affecting their utility.

The top surface of the tiles shall be glazed. The underside of the tiles shall not have glaze on more than 5% of the area in order that the tile may adhere properly to the base. The edges of the tiles shall be free from glaze, however, any glaze if unavoidable shall be permissible on only upto 50 percent of the surface area of edges.

The glaze shall be free from welts, chips, craze, specks, crawlings or other imperfections detracting from the appearance when viewed from a distance of one metre. The glaze shall be either glossy or matt as specified. The glaze shall be white in colour except in the case of coloured tiles when colours shall be specified by the Engineer-in-Charge. There may be more than one colour on a tile.

Workmanship

The joints shall be raked out to a depth of at least 15 mm in masonry walls.

In case of concrete walls, the surface shall be hacked and roughened with wire brushes. The surface shall be cleaned thoroughly, washed with water and kept wet before skirting is commenced.

Laying

10 mm thick plaster of cement mortar 1:3 (1 cement : 3 coarse sand) mix of as specified shall be applied and allowed to harden. The plaster shall be roughened with wire brushes or by scratching diagonal at closed intervals.

The tiles should be soaked in water, washed clean, and a coat of cement slurry (i.e. Cement paste) applied liberally at the back of tiles and set in the bedding mortar. The tiles shall be tamped and corrected to proper plane and lines. The tiles shall be set in the required pattern and jointed. The joints shall be as fine as possible. Top of skirting or dado shall be truly horizontal and joints truly vertical except where otherwise indicated. Odd size/cut size of tile shall be adjusted at bottom to take care of slope of the flooring. Skirting and dado shall rest on the top of the flooring. Where full size tiles cannot be fixed these shall be cut (sawn) to the required size and their edges rubbed smooth. Skirting /dado shall not project from the finished "surface of wall" by more than the tile thickness, undulations if any shall be adjusted in wall.

Curing and Finishing

The joints shall be cleaned off the grey cement grout with wire/coir brush or trowel to a depth of 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement added with pigments if required to match the colour of tiles. The work shall then be kept wet for 7 days.

After curing, the surface shall be washed and finished clean. The finished work shall not sound hollow when tapped with a wooden mallet.

Measurements

Length shall be measured correct to a cm. Height shall be measured correct to a cm in the case of dado and mm in the case of riser and skirting. The area shall be calculated in square metre, correct to two places of decimal. Length and height shall be measured along the finished face of the skirting or dado including curves where specials such as coves, internal and external angles and beads are used. Where cornices are used the area of dado shall be measured excluding the cornices. Nothing extra will be paid for cutting (sawn) the tiles to sizes.

Mode of measurement & payment

The rate shall include the cost of all material and labour involved in all the operations described above, for tiles of sizes specified in the description of the item. Rate also inclusive of the specials such as coves, internal

and external angles and beading. Rates are inclusive of 10mm thick cement plaster (backing coat) in C.M. 1:3.

The rate shall be for a unit of one Sq. Meter.

3[14.3(A)] Kotah stone slab (Polished, Green color, all edge of kotah stone slab should be chiseled dressed) flooring over 20 mm (average) thick base of cement mortar 1:6 (1 cement: 6 coarse sand over and jointed with grey cement slurry including rubbing and polishing complete 25 mm thick.

Materials

Water shall conform to M-1. Cement mortar shall conform to M-11. Polished kotah stone shall conform to M-34 & shall be of uniform colour.

Dressing

Every slab shall be cut to the required size and shape and fine chisel dressed on the sides to the full depth so that a straight edge laid along the side of the stone shall be in full contact with it. The sides (edges) shall be table rubbed with coarse sand or machine rubbed before paving. All angles and edges of the slabs shall be true, square and free from chippings and the surface shall be true and plane.

The thickness of the slab after it is dressed shall be 25mm or as specified in the description of the item. Tolerance of ± 2 mm shall be allowed for the thickness. In respect of length and breadth of slabs Tolerance of ± 5 mm for hand cut slabs and ± 2 mm for machine cut slabs shall be allowed.

Necessary nosing shall be made when the kotah stone are used in treads of steps or as & when required, exposed edges shall be molded / chamfered to full / half depth and cut to the uniform thickness as directed by engineer in charge.

Preparation of Surface and Laying

Base concrete or the RCC slab on which the slabs are to be laid shall be cleaned, wetted and mopped. The bedding for the slabs shall be 20mm thick with cement mortar 1:6 (1 cement : 6 coarse sand) or as given in the description of the item.

The average thickness of the bedding mortar under the slab shall be 20 mm and the thickness at any place under the slab shall be not less than 18 mm.

The slabs shall be laid in the following manner:

Mortar of the specified mix shall be spread under the area of each slab, roughly to the average thickness specified in the item. The slab shall be washed clean before laying. It shall be laid on top, pressed, tapped with wooden mallet and brought to level with the adjoining slabs. It shall be lifted and laid a side. The top surface of the mortar shall then 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 at the rate of 4.4 kg of cement per sq. m. The edges of the slab already paved shall be buttered with grey cement with or without admixture of pigment to match the shade of the kotah stone slabs as given in the description of the item.

The slab to be paved shall then be lowered gently back in position and tapped with wooden mallet till it is properly bedded in level with and close to the adjoining slabs with as fine a joint as possible. Subsequent slabs shall be laid in the same manner. After each slab has been laid, surplus cement on the surface of the slabs shall be cleaned off. The flooring shall be cured for a minimum period of seven days. The surface of the flooring as laid shall be true to levels, and, slopes as instructed by the Engineer-in-Charge. Joint thickness shall not be more than 1 mm.

The slabs shall be matched as shown in drawings or as instructed by the Engineer-in-Charge.

Slabs which are fixed in the floor adjoining the wall shall not less than 12 mm under the plaster, skirting or dado. The junction between wall plaster and floor shall be finished neatly and without waviness.

Kota stone slabs flooring shall also be laid in combination with other stones and/or in simple regular pattern/design as described in item of work and/or drawing.

In bath, toilet W.C. kitchen and balcony/verandah flooring, suitable tile drop or as shown in drawing will be given in addition to required slope to avoid spread of water. Further required drop will also be provided near floor trap for which if the thickness of bed exceeds more than 20mm, no extra payment shall be made for extra thickness.

The floor shall be kept wet for a minimum period of 7 days so that bedding and joints set properly.

Polishing & Finishing

Polishing shall be normally commence after 14 days of laying the stone slab. First polishing shall be done with carborundum, stones of 120 grade grit fitted in the heavy machine and then second polishing shall be done with carborundum stone 220 to 350 grade grit fitted in heavy machine and then third polishing shall be done with carborundum stone 500 grade fitted in heavy machine and there must not be any visibility of circles or lumps on the kotah stone slab surface. Water shall be properly used during polishing. The stone shall then be washed clean with water. When directed by the Engineer in charge, wax polish of approved quality shall be applied on the surface with the help of soft cloth over a clean and dry surface. Then the polishing machine fitted with bobs shall be run over it. If specified in tender item, mirror polishing shall be done with the use of carborundum stone of concerned grade without any extra cost.

The holes required for nahnai traps, pipes and any other fittings shall be made without any extra cost.

Mode of measurement & payment

The rate shall include the cost of all materials and labour involved in the operations described above. The kotah stone flooring shall be measured in square meters correct to two places of decimal, length and breadth shall be measured correct to centimeter and between the finished face of skirting dado or wall plaster and no deduction shall be made nor extra pay for any opening in floor of areas up to 0.1 sq. mt.

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

- 4[14.3(B)] Kota stone slab 20 mm. thick in dado and pillars laid on 10 mm. thick cement mortar 1:3 (1 cement: 3 coarse sand) and jointed with grey cement slurry including rubbing and polishing etc. complete.**

Materials

Water shall conform to M-1. Cement mortar shall conform to M-11. Polished kotah stone shall conform to M-34.

Workmanship

The relevant specifications of item No. [14.3(A)] shall be followed except that the kotah stone shall be fixed for risers of steps, dado or skirting, thickness of the kotah stone shall be 20mm instead of 25mm, thickness of the bedding shall be 10mm instead of 20mm and cement mortar shall be in C.M. 1:3 instead of 1:6. The skirting must be laid in true line and level with the adjoining wall as directed by engineer in charge. Projection of the skirting from the wall shall not be more than 12mm. When kotah stone is used in steps the stone shall be in single piece.

Mode of measurement and payment

The risers of steps, skirting or dado shall be measured in Sq. meter. Length shall be measured along the finished faces of risers, skirting or dado. Height shall be measured from finished level of treads or floor to top. Lining of pillars shall be measured under this item.

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

- 5[14.3(C)] Rough chiseled dressed (Kotah stone green) stone flooring over 20 mm. thick base of cement mortar 1:5 (1 cement: 5 coarse sand), including pointing with cement mortar 1:2 (1 cement: 2 stone dust) etc. complete 25 mm. thick.**

Materials

Water shall conform to M-1. Cement mortar shall conform to M-11. Rough chisel dressed stone shall conform to M-33.

Workmanship

The relevant specifications of item No. [14.3(A)] shall be followed except that the rough chisel dressed stone of 25 mm. thickness of approved quality are to be fixed on cement mortar bedding in CM 1:5 of 25 mm average thickness.

Dressing of stone slab:

Every stone slab shall be cut to the required size and shape and rough chisel-dressed on top, if required, so that the dressed surface shall not be more than 6 mm. from straight edge placed on it. The sides shall also be chisel- dressed to a minimum depth of 20 mm so that the dressed edge shall at no place be more than 30 mm from straight edge butted against it. Beyond this depth, the sides may be dressed slightly splayed so as to form an inverted 'V' shaped joint with adjoining slab. The surface shall be reasonable true and plane and all the angles and edges shall be square and free from chippings. Where the stone slabs are

to be used for nosing, exposed edges shall be fine chisel-dressed and molded/chamfered to full/half depth and cut to the uniform thickness.

Thickness of the stone slab shall be 25 mm. with permissible tolerance of ± 2 mm. In case of machine cut slab are used fine chisel dressing of machine cut surface need not to be done provided a straight edge at any where along the machine cut surface within contact with every point only.

Laying

The surface of the sub-grade concrete shall be cleaned, wetted and mopped. The bedding of specified mortar mix shall be spread under each slab to the specified thickness. The slab shall be washed clean before laying. It shall be then laid on top, pressed and so that all hollows underneath filled surplus mortar works up through the joints. The top shall be tapped and brought level to the adjoining slab.

The thickness of the joints shall not exceed 5 mm. Subsequent slabs shall be laid in the same manner.

Curing & Finishing

Any surplus mortar on the surface of the slab shall be cleaned off and joints finished flush. The joints shall be raked out uniformly to a minimum depth of 12 mm when the mortar is still green. The slabs which are fixed in the floor adjoining the wall shall enter not less than 12 mm under the plaster, skirting or dado.

The junctions between wall plasters and floor shall be finished neatly and without waviness. The pointing shall be done with C.M. 1:2 if specified in tender item. The pointing shall be cured of a minimum period of seven days. The finished floor shall not sound hollow when tapped with wooden mallet and the finished surface shall be true to level and slopes as directed.

Mode of measurements & payments

The relevant specification of item no [14.3(A)] shall be followed.

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

6[14.4(A)] Cement concrete flooring for I.P.S. 1:2:4 (for Indian Patent Stones)(1 Cement :2 coarse sand : 4 graded stone grit aggregate 10 mm nominal size) laid in one layer finished with a floating coat of neat cement 50 mm thick.

Materials

Water shall conform to M-1, Cement shall conform to M-3, Sand shall conform to M6, Stone grit aggregate 10 mm nominal size shall conform to M-8, Cement concrete of 1:2:4 proportion measured by volume shall conform to relevant specifications of ordinary grade 1:2:4 concrete relevant specification of item no. 5.4.12(A).

Workmanship

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

After the final set, the concrete shall be kept continuously wet for minimum period of 7 days, if required ponding is done for a minimum period of 7 days from the date of placement.

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

Mode of measurement & payment

The rate shall include the cost of all materials and labour involved in all the operations described above. No deduction shall be made nor extra paid for any opening up to 0.1 sq. mt. in area in the floor, nothing extra shall be paid for laying the floor at different levels in the same rooms or the court yard.

The rate shall be for a unit of one sq. metre.

7[14.5] Providing and laying brick on edge flooring laid dry, grouted with C.M. 1:6 (1 cement : 6coarse sand) including finishing the joints flush, curing etc. complete.

Materials

Water shall conform to M-1, cement mortar shall conform to M-11. Burnt bricks shall conform to M-15.

Base Concrete

Flooring shall be laid on base concrete where so provided. The base concrete shall be provided with the slope required for the flooring. Floors in verandah, courtyard kitchens, baths shall have slope ranging from 1:36 to 1:48 depending upon locations as decided by the Engineer-in-Charge. Floors in water closet portion shall have slope of 1 : 30 or as decided by the Engineer-in-Charge to drain off washingwater. Plinth masonry off-set shall be depressed so as to allow the base concrete to rest on it.

If the base is of lean cement concrete, the flooring shall commence within 48 hours of the laying of base, failing which, the surface of base shall be roughened with steel wire brushes without disturbing the concrete. Before laying the flooring the base shall be wetted and smeared with a coat of cement slurry at 2 kg of cement spread over an area of one sqm so as to get a good bond between sub-grade and flooring. Where base concrete is not provided, the earth below shall be properly sloped, watered, rammed and consolidated. Before laying the flooring, it shall be moistened.

Soaking of Bricks

Bricks required for flooring shall be perfectly soaked in stacks before use, by profusely spraying clean water at regular intervals for a period of not less than six hours so as to keep them wet to the satisfaction of the Engineer-in-Charge. (In case the joints are to be filled with sand, the bricks need not be soaked).

Laying

The bricks shall be laid on the edge, diagonal herring bone bond, or other pattern as specified or directed by the Engineer-in-Charge.

Bricks shall be laid on edge on 12 mm thick mortar of specified ratio bed and each brick shall be properly bedded and set home by gentle tapping with trowel handle or wooden mallet. Its inside face shall be buttered with mortar, before the next brick is laid and pressed against it.

On completion of a portion of flooring, the vertical joints shall be fully filled from the top with mortar. During laying, the surface of the flooring shall be frequently checked with a straight edge of length at least 2 m, so as to obtain a true plain surface with the required slope.

Joints

Bricks shall be so laid that all joints are full of mortar. The thickness of joints shall not exceed 1.0 cm for brick work with bricks of any class designation. All face joints shall be raked to a minimum depth of 15 mm by raking tool during the progress of work when the mortar is still green so as to provide proper key for the plaster or pointing to be done. Where plastering or pointing is not required to be done, the joints shall be struck flush and finished at the time of laying. The face of brick work shall be cleaned on the same day on which brick work is done and all mortar droppings removed promptly.

Curing

Brick work shall be protected from rain by suitable covering when the mortar is green. Brick work in cement mortar, shall be kept constantly moist on all faces for a minimum period of seven days. Brick work carried out shall be suitably marked indicating the date on which the work is done so as to keep watch on the curing period.

Mode of Measurements

Length and breadth of the flooring shall be measured correct to a cm and area shall be calculated in square metres correct to two places of decimal. Length and breadth shall be measured before laying skirting, dado or wall plaster. No deduction shall be made nor extra paid for voids not exceeding 0.20 sq.m. Deduction for ends of dissimilar materials or other articles embedded shall not be made for areas not exceeding 0.10 sq.m.

Brick flooring when laid in diagonal herring bone bond or other pattern as specified or directed by the Engineer-in-Charge shall be measured separately.

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

- 8[14.6(A)] Providing & Laying Double Charge vitrified 8 to 10 mm thick tile flooring over 20 mm (average) base of cement mortar 1:6 (1 cement: 6 coarse sand) on new surface jointed with color cement slurry including finished with flush pointing & cleaning the surface etc. complete. Brand of the tiles shall be as per approved make list of GSPHCL. Shade & Size of tiles shall be as specified in tender item.**

Materials :-

Water shall confirm to M – 1, Cement mortar shall be confirm to M – 11, Vitrified Tiles shall be confirm to M-35.

Workmanship :-

The relavent specification of Item no.14.2(A) shall be followed except tiles shall be double charge vitrified instead of ceramic tiles, thickness of bedding shall be 20mm (Average) in C.M. 1:6 instead of 10mm bedding in C.M. 1:3., The average thickness of the bedding mortar under the slab shall be 20 mm and the thickness at any place under the slab shall be not less than 18 mm. instead of 12mm & 10mm.

If the thickness of bedding exceed above 20mm due to uneven surface, electrical junction box or any other condition, then the bedding must be laid in layers in 20mm each for which no extra payment shall be made for thickness exceed above 20mm.

The top surface after laying the tiles shall be protected by floor guard or laying a good quality of thin layer of POP & all joints shall be protected with adhesive tape or as directed by engineer in charge to avoid any scratches or damage the flooring.

Mode of measurement :-

The relavent specification of item no.14.2(A) shall be followed.

The rates shall be for a unit of One Sq.mt.

- 9[14.6(B)] Providing and laying Double Charge vitrified tiles 8mm to 10 mm thick in skirting , risers of steps and dado on 10 mm thick cement plaster 1:3 (1Cement : 3 Coarse Sand) & jointed with color cement slurry including finished with flush pointing & cleaning the surface etc. complete. Brand of the tiles shall be as per approved make list of GSPHCL. Shade & Size of tiles shall be as specified in tender item.**

Materials :-

Water shall confirm to M – 1, Cement mortar shall be confirm to M – 11, Vitrified Tiles shall be confirm to M-35, High polymer modified quick set adhesive(Water based) shall confirm IS 15477-2019.

Workmanship:

The relavent specification of item no.14.3(B) shall be followed except material shall be double charge vitrified tiles having 8mm to 10mm thickness instead of 20mm kotah stone. Projection from finish surface shall be 5mm instead of 12mm, flush point with white cement instead of grey cement. If vitrified tiles shall be laid for dado, when tiles used for dado or for any cladding tiles shall be laid /fix with cement based high polymer modified quick set adhesive (Water base) on backing coat having 10mm thick cement plaster in C.M. 1:3 for which no extra payment shall be made.

Fixing of dado with cement based high polymer quick set adhesive (Water base)

High polymer modified quick set tile adhesive (conforming to IS 15477-2019) shall be thoroughly mixed with water and a paste of zero slump shall be prepared so that it can be used within 1.5 to 2 hours. It shall be spread over an area not more than one sq.m. at one time. Average thickness of adhesive shall be 3 mm. The adhesive so spreaded shall be combed using suitable trowel. Tiles shall be pressed firmly in to the position with slight twisting action checking it simultaneously to ensure good contact gently being tapped with woodenmallet till it is properly backed with adjoining tiles. The tiles shall be fixed within 20 minutes of application of adhesive. The surplus adhesive from the joints, surface of the tiles shall be immediately cleaned.

The surface of the dado shall be frequently checked during laying with plumb and true in line & level to attend true surface.

Where spacer lugs tiles are provided these shall be filled with grout with lugs remaining exposed. For which no extra payment will be made.

Where full size tile cannot be fixed these shall be cut (sawn) to the required size and edges rubbed smooth to ensure straight and true joints.

Mode of measurement :

The relavent specification of item no.14.3(B) shall be followed.

The rate shall be for unit of one Sq meter.

- 10[14.6(C)] Kotah stone slab (Polished, Green color, all edge of kotah stone slab should be Diamond machine cut) flooring over 20 mm (average) thick base of cement mortar 1:6 (1 cement: 6 coarse sand over and jointed with grey cement slurry including rubbing and polishing complete 25 mm thick for Tread.**

Materials

Water shall conform to M-1. Cement mortar shall conform to M-11. Polished kotah stone shall conform to M-34.

Workmanship

The relevant specification of item no.14.3(A) shall be followed except the kotah stone shall be in a single piece, the exposed faces/surface shall be fully moulded with pre-polished and making 3 horizontal diamond cut groove/line in front face of tread.

The nosing of the tread shall be minimum 5mm or as per drawing. The size of the groove/line shall be as per drawing or as directed by Engineer in charge.

Mode of measurement

The relevant specification of item no.14.3(A) shall be followed.

The rate shall be for a unit of one Sq. m.

- 11[14.6(D)] Kota stone slab 20 mm. thick in riser of steps laid on 10 mm. thick cement mortar 1:3 (1 cement: 3 coarse sand) and jointed with grey cement slurry including rubbing and polishing etc. complete.**

Materials

Water shall conform to M-1. Cement mortar shall conform to M-11. Polished kotah stone shall conform to M-34.

Workmanship

The relevant specification of item no.14.3(B) shall be followed except the kotah stone shall be in a single piece and shall be prepolished.

Mode of measurement

The relevant specification of item no.14.3(A) shall be followed.

The rate shall be for a unit of one Sq. m.

- 12[14.7(A)] Granite stone slab flooring over 20 mm (average) thick base of cement mortar 1:6 (1 cement: 6 coarse sand over and jointed with grey cement slurry including rubbing and polishing complete 15mm to 18mm thick telephonic black or as specified in tender item.**

Materials

Water shall conform to M-1. Cement mortar shall conform to M-11. Granite stone shall conform to M- 57.

Dressing

The slab shall be rectangular or square and specified dimensions. The tolerance of the length and width shall be ± 2 mm and on thickness ± 1 mm. The bottom face may be rough but the top surface shall be fine polished and joint shall be dressed with the top surface without hollowness and spalling of. Every slab shall be cut to the required size and shape and fine chisel dressed on the sides to the full depth so that a straight edge laid along the side of the stone shall be in full contact with it. The sides (edges) shall be table rubbed with coarse sand or machine rubbed before paving. All angles and edges of the slabs shall be true, square and free from chippings and the surface shall be true and plane.

The thickness of the slab shall be 15 to 18mm or specified in description of the item.

If the granite stone slabs are to be used for tread, exposed edges shall be molded / chamfered to full / half depth and cut to the uniform thickness and sufficient nosing and groove/line shall be provided on the top of the tread as directed by engineer in charge.

Preparation of Surface and Laying

Base concrete or the RCC slab on which the slabs are to be laid shall be cleaned, wetted and mopped.

The bedding for the slabs shall be 20mm thick with cement mortar 1:6 (1 cement : 6 coarse sand) or as given in the description of the item.

The average thickness of the bedding mortar under the slab shall be 20 mm and the thickness at any place under the slab shall be not less than 18 mm.

The slabs shall be laid in the following manner:

Mortar of the specified mix shall be spread under the area of each slab, roughly to the average thickness specified in the item. The slab shall be washed clean before laying. It shall be laid on top, pressed, tapped with wooden mallet and brought to level with the adjoining slabs. It shall be lifted and laid a side. The top surface of the mortar shall then 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 at the rate of 4.4 kg of cement per sq. m. The edges of the slab already paved shall be buttered with grey cement with or without admixture of pigment to match the shade of the granite stone slabs as given in the description of the item.

The slab to be paved shall then be lowered gently back in position and tapped with wooden mallet till it is properly bedded in level with and close to the adjoining slabs with as fine a joint as possible. Subsequent slabs shall be laid in the same manner. After each slab has been laid, surplus cement on the surface of the slabs shall be cleaned off. The flooring shall be cured for a minimum period of seven days. The surface of the flooring as laid shall be true to levels, and, slopes as instructed by the Engineer-in-Charge. Joint thickness shall not be more than 0.5mm.

The slabs shall be matched as shown in drawings or as instructed by the Engineer-in-Charge.

Slabs which are fixed in the floor adjoining the wall shall not less than 12 mm under the plaster, skirting or dado. The junction between wall plaster and floor shall be finished neatly and without waviness.

Granite stone slabs flooring shall also be laid in combination with other stones and/or in simple regular pattern/design as described in item of work and/or drawing.

The floor shall be kept wet for a minimum period of 7 days so that bedding and joints set properly.

Polishing & Finishing

The surface of the polished granite shall be mirror finished without any crack. The polish on the surface shall be checked with glassometer instrument and shall not be less than 95%.

Mode of measurement & payment

The rate shall include the cost of all materials and labour involved in the operations described above. The granite stone flooring shall be measured in square meters correct to two places of decimal, length and breadth shall be measured correct to centimeter and between the finished face of skirting dado or wall plaster and no deduction shall be made nor extra pay for any opening in floor of areas up to 0.1 sq. mt.

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

- 13[14.7(B)] Granite stone slab 15mm to 18mm thick in skirting laid on 10 mm thick cement mortar 1:3 (1 cement: 3 coarse sand) and jointed with grey cement slurry including rubbing and polishing etc. complete. Telephonic black granite or as specified in tender item.**

Materials

Water shall conform to M-1. Cement mortar shall conform to M-11. Granite stone shall conform to M- 57.

Workmanship

The relevant specifications of item No. [14.3(B)] shall be followed except that the granite stone shall be fixed for skirting, thickness of the granite stone shall be 15mm to 18mm instead of 20mm. The skirting must be laid in true line and level with the adjoining wall as directed by engineer in charge. Projection of the skirting from the wall shall not be more than 8mm.

Mode of measurement and payment

The relevant specifications of item No. [14.3(B)] shall be followed.

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

- 14[14.7(C)] Granite stone slab 15mm to 18mm thick in skirting and riser laid on 10 mm thick cement mortar 1:3 (1 cement: 3 coarse sand) and jointed with grey cement slurry including rubbing and polishing etc. complete. Telephonic black granite or as specified in tender item.**

Materials

Water shall conform to M-1. Cement mortar shall conform to M-11. Granite stone shall conform to M- 57.

Workmanship

The relevant specifications of item No. [14.3(B)] shall be followed except that the granite stone shall be fixed for skirting and riser, thickness of the granite stone shall be 15mm to 18mm instead of 20mm. The skirting must be laid in true line and level with the adjoining wall as directed by engineer in charge. Projection of the skirting from the wall shall not be more than 8mm. when granite used for dado or any cladding the granite shall be laid or fixed with cement based high polymer modified quick set adhesive (Water base) on backing coat having 10mm thick cement plaster in C.M. 1:3 for which no extra payment shall be made.

Mode of measurement and payment

The relevant specifications of item No. [14.3(B)] shall be followed.

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

- 15[14.7(D)] Granite stone slab 15mm to 18mm thick in dado and jambs laid on 10 mm thick cement mortar 1:3 (1 cement: 3 coarse sand) and jointed with high polymer modified quick set adhesive (water based) including rubbing and polishing etc. complete. Telephonic black granite or as specified in tender item.**

Materials

Water shall conform to M-1, Cement mortar shall conform to M-11, Granite stone shall conform to M- 57, High polymer modified quick set adhesive(Water based) shall confirm IS 15477-2019.

Workmanship

The relevant specifications of item No. [14.6(B)] shall be followed except that the granite stone shall be fixed for dado on wall and jambs, sill and soffit of window/openings, thickness of the granite stone shall be used 15mm to 18mm. Dado / Jambs, sill and soffits shall be laid /fix with cement based high polymer modified quick set adhesive (Water base) on backing coat having 10mm thick cement plaster in C.M. 1:3 for which no extra payment shall be made.

Fixing of dado / Jambs, sill and soffits with cement based high polymer quick set adhesive (Water base)

High polymer modified quick set tile adhesive (conforming to IS 15477-2019) shall be thoroughly mixed with water and a paste of zero slump shall be prepared so that it can be used within 1.5 to 2 hours. It shall be spread over an area not more than one sq.m. at one time. Average thickness of adhesive shall be 3 mm. The adhesive so spreaded shall be combed using suitable trowel. Stone shall be pressed firmly in to the position with slight twisting action checking it simultaneously to ensure good contact gently being tapped with woodenmallet till it is properly backed with adjoining tiles. The stone shall be fixed within 20 minutes of application of adhesive. The surplus adhesive from the joints, surface of the tiles shall be immediately cleaned.

The surface of the dado shall be frequently checked during laying with plumb and true in line & level to attend true surface.

Where spacer lugs tiles are provided these shall be filled with grout with lugs remaining exposed.

Where full size tile cannot be fixed these shall be cut (sawn) to the required size and edges rubbed smooth to ensure straight and true joints.

The exposed edges of Dado / Jambs, sill and soffits shall be chamfer/moulded as specified in drawing or as directed by Engineer in charge. Chamfered/moulded faces shall be fine polished. Also nosing shall be kept as specified in drawing or as directed by Engineer in charge.

Mode of measurement and payment

The relevant specifications of item No. [14.6(B)] shall be followed.

No extra payment shall be made for chamfered/moulded/nosing.

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

- 16[14.8] Providing and fixing pre-cast Rubber Dye inter locking concrete cement block with pneumatic compressed by mechanically pressed and as per approved design including 75mm sand layer for levelling and filling the joint with sand in proper line and level etc. complete. Thickness and grade of concrete for paver block shall be as described in tender item. Shape & Shade for paver block shall be as directed by Engineer in charge.**

Material:

Water shall conform to M-1, Cement mortar shall conform to M-11, Sand shall conform to M-6, Paver block confirm to M-56.

Workmanship:

Thickness of the bedding sand shall be describe in tender item. The quality and thickness of bedding sand are of utmost important for ensuring good riding quality and service life of block pavements. Non-uniform thickness of bedding sand layer results in serious irregularities in surface profile that may include excessive differential deformation and uneven surface ridding quality of the block pavement. The desired gradation of bedding sand shall be as given in Table 1.

Use of single-sized or gap graded sand or sand with excessive amount of fines or plastic fines shall be avoided. Sand particles with sharp edge shall preferable be used as this sand possess a higher strength and resists the migration of sand particles under the block to less frequently trafficked areas. Even though sharp sand is relatively more difficult to compact than rounded one. The use of sharp sand is preferred for the heavily trafficked pavements. The bedding sand shall be free from deleterious materials.

Table 1

Sr. No.	IS Sieve Size	Percent Passing
1)	9.52 mm	100
2)	4.75 mm	95-100
3)	2.36 mm	80-100
4)	1.18 mm	50-95
5)	600 micron	25-60
6)	300 micron	10-30
7)	150 micron	0-15
8)	75 micron	0-10

Joint filling Sand

The gap between two paving blocks (preferably 3mm and not more than 4mm wide) needs to be filled with a dry sand, relatively finer than the bedding sand. The gradation of the joint filling sand shall be as given in Table 2. It is necessary to restrict the fines (silt and/or clay passing 75micron sieve) to 10 percent, since excessive fines make joint filling very difficult. It is not advisable to use cement in the joint filling sand as it adversely affects the desired flexibility characteristics of the paving block layer. The joint filling sand shall be as dry a possible, otherwise complete filling of joints will be difficult. To overcome the problem of efflorescence on the surface of paving block layer, the joint filling sand should be washed to remove soluble salts.

Table 2

Sr.No.	IS Sieve Size	Percent Passing
1)	2.36 mm	100
2)	1.18 mm	90-100
3)	600 micron	60-90
4)	300 micron	30-60
5)	150 micron	15-30
6)	75 micron	0-10

In the traditional manual method, the sand is screeded and a skilled worker (called a pavior) levels the sand and then embeds the block using a hammer: he works backwards so as to have a continuous view of the completed pavement in order to obtain a good finish.

Care must be taken to see that paving blocks are not tightly butted against each other, otherwise there could be non-uniformity in the laying patterns and the blocks may spall or even crack. Since each workman may produce slightly different joints widths, it is desirable to rotate workman along the workface, and also periodically interchange the personnel laying and transporting blocks. If required to cut the block, block shall be cut with machine only.

The sequencing of operation for construction of block pavement should be as follows:

- Installation of sub-surface drainage structures.
- Levelling and compaction of sub-grade and profile checking.
- Provision and compaction of sub-base course (where needed)
- Provision and compaction of base-course and checking for correct profile.
- Installation of edge restraints.

- f) Provision and compaction of coarse bedding sand and profile checking.
- g) Paving of blocks and construction.
- h) Application of joint sealing sand and compaction.
- i) Cleaning of surface.
- j) Filling any remaining empty portions in the block layer especially near edge restraint blocks with in-situ concrete in C.C.1:2:4 (1 Cement : 2 Coarse sand : 4 Graded grit (10mm grit)).

The following are some of the key factors to be consider during the laying of concrete block:

- a) Ensure that edge restraints are properly located to minimize cutting of blocks.
- b) Use cut blocks and end blocks, wherever needed.
- c) Spread bedding sand mechanically, when possible.
- d) Locate pavement start lines and subsequent development of the laying face to ensure that a laying face continue in one general direction.
- e) Use guidelines to control regularity of bond.
- f) Anticipate and plan detailing of the pavement at perimeters and obstructions and aprons of manholes, drainage pits, etc.
- g) Placing of bedding sand, joint sealing sand and concrete block deliveries so as to minimize repeated handling.
- h) Use suitable trolleys or buggies to ease transport of blocks from delivery points to the laying face.
- i) Locate and phase paving and compaction teams to facilitate orderly progress of work. Use light weight wooden hammer or poles for positioning of blocks or layers and Use Mechanical Compactor to compact the layers of Paver Block.

Do not allow traffic or pedestrian movement on block paved surface until compaction is completed.

Mode of measurement:

Length and breadth shall be measured correct to a cm. and the area calculated in square metre correct to two places of decimal.

No deduction shall be made nor extra paid for voids not exceeding 0.10 square metre. Deductions for ends of dissimilar materials or other articles embedded shall not be made for areas not exceeding 0.10 square metre.

The rate shall be of unit of One sq. meter.

17[14.9] Providing and laying Integrated cement based proprietary water proofing treatment of required thickness over the roof incl.10mm thick waterproofing cement plaster in cement mortar 1:3 and china mosaic fitting and finally finishing the surface with white cement slurry and sloping out terrace slab with following specification laid to required slope not flatter than 1:80 (the thickness of water proofing treatment near rainwater outlet or the lowest point of the finished slop shall not be less than 45mm incl. treating the vertical surface of the parapet wall upto 20 cms. height above finished level of terracing incl. finishing the top with joint less water proofing plaster, curing testing etc. complete.) Rate is including ten years performance of guarantee bond to be given on stamp paper. (No. extra shall be paid for increase in thickness for proper slope.)

(a)Applying and grouting a slurry coat of neat cement using 2.75 kg/sqm. of cement admixed with proprietary water proofing compound conforming to IS-2645 and 10mm thick water proofing cement plaster in Cement mortar 1:3 over the R.C.C slab including cleaning the surface before treatments.

(b)Laying cement concrete using broken brick bats 25 mm to 40 mm size with 50% of cement mortar 1:4(1 cement : 4 coarse sand) over 10mm thick water proofing cement mortar 1:3 (1 cement : 3 coarse sand) admixed with proprietary water proofing compound conforming to IS -2645 to required slope and treating similarly the adjoining walls upto 200mm height including rounding of junction of walls.

(c) After two day of proper curing applying a second coat of cement slurry.

(d)Finishing the surface with china mosaic pieces laid on 10mm thick joint less cement plaster of mix 1:3 (1 cement : 3 coarse sand) admixed with proprietary water proofing compound conforming to IS-2645 and finally finishing the surface with trowel with neat slurry.

(e)The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing for final test all above operation to be done in order and as directed and specified by the Engineer in charge.

Materials:

Sand M-6 Cement M-3 White cement M-4 Cement Mortar M -11, Brick bats confirming to M-14. China Mosaic of best quality and uniform in colour.

WORKMANSHIP :**Preparing the Surface**

The surface of the slab should be roughened by scrapping when the slab concrete is still green, however, the surface need not be hacked. In case the slab is already cast and surface fairly finished, the same shall be cleaned neatly of all mortar droppings, loose materials etc with brooms/cloth.

Providing and Laying of Slurry under Base Coat

The quantity of water required to prepare the slurry with 2.75 kg. of blended cement to be painted over an area of 1 sq.m. Shall be calculated exactly as described below.

The consistency of the slurry should be such as to cover the desired area by using 0.488 kg of blended cement per sqm of area.

On deciding the correct quantity of water required per sqm. area the required quantity of slurry should be prepared which can be applied over the desired surface within half an hour of mixing with 0.488 kg. of grey cement + 0.253 kg. water proofing compound as per manufacturer specifications + x litres of water per sqm. area and the required quantity of slurry thus prepared should only be used for first application.

The first layer shall be applied with painting brushes over the specified and dampened area carefully including the corners, holes on the surfaces and joints of pipes in concrete etc. and the application should continue at least upto 150 mm height of fixtures of pipes from the surface. The surface on application shall be air cured for 4 hours.

Depending upon the area of surface that has to be covered, the required quantity of slurry should be prepared using 2.75 kg. blended cement + water per sq.m. area to be covered, taking particular care to see that only that much quantity of slurry shall be prepared which can be used within half an hour of preparation i.e. before the initial setting time of cement.

The prepared slurry shall be applied over the dampened surface with brushes very carefully, including the joints between the floor slab and the parapet wall, holes on the surfaces, joints of pipes, masonry/concrete etc.

The application of the slurry should continue up to a height of 300 mm on the parapet wall. The slurry should also be applied up to a height of 150mm over pipe projections etc.

Laying Base Coat 10mm thick

Immediately after the application of slurry and when the application is still green, 10 mm thick waterproofing cement plaster as base coat with cement mortar 1:3 (1 cement: 3 coarse sand) shall be evenly applied over the concrete surface taking particular care to see that all the corners and joints are properly packed and the application of the base coat shall be continued up to a height of 300mm over the parapet wall.

Laying Brick Bat Coba

Brick bat of size 25 mm to 40 mm out of well burnt bricks shall be used for the purpose of brickbat coba. The brick bats shall be properly dampened for six hours before laying.

Brick bats shall be laid to required slope/gradient over the base coat of mortar leaving 15-25 mm gap between two bats. Cement mortar 1:4 (1 blended cement: 4 coarse sand) admixed with proprietary waterproofing compound confirming to IS 2645-2003 (Reaffirmed 2017) shall be poured over the brick bats and joints filled properly. Under no circumstances dry brick bats should be laid over the base coat.

The haunches/gola at the junction of parapet wall and the roof shall be formed only with brick bat coba.

In case the brick bat coba is laid on the base coat immediately on initial set there will be nonnecessity of applying cement slurry over the base coat before laying the brick bat coba. However, if the brick bat coba is to be laid on the subsequent day, cement slurry prepared as described in above shall be applied over the top surface of the base coat, then only the brick bat coba shall be laid.

Application of Slurry over Brick Bat Coba

After three days of curing, cement slurry prepared as per above shall be applied on the surface of brick bat coba. The application of slurry shall be the same as described above which should cover the haunches/gola, and the remaining small portion of parapet wall and also inside the groove. Then after 10mm thick waterproofing cement plaster in C.M. 1:3 (1 cement: 3 coarse sand) shall be evenly applied over the brick bat coba surface taking particular care to see that all the corners and joints are properly packed and the application of the second coat shall be continued up to a height of 230mm over the parapet wall. After three days of curing, fix waterproof glazed tiles of maximum size 25x25mm over cement

mortar 1:1 and finally finishing the surface with towel with white cement slurry.

The whole terrace so finished shall be flooded with water for a minimum period of two weeks of curing and for ponding test. All above operations to be done in order and as directed and specified by the Engineer in charge.

MODE OF MEASUREMENT AND PAYMENT :

The flooring shall be measured in Sq.mt, for visible area of work done. It inclusive the rounding of junction and corner of walls.

The rate shall include the cost of all materials and labour involved in all operations described above, hire charges of all machinery, scaffolding, curing for complete above items.

The rate shall be for a Unit of one Sq.mt.

- 18[14.10] Constructing of cooking platform (sandwich type) 68cm width and 84cm high resting on sandwiched polish Granite Slab in C.M 1:3. With providing and fixing 25 mm thick single side polished kota stone at bottom(Polish side shall be laid at bottom and rough side shall be at top) and 18 to 20mm thick Polish Granite stone (single piece / telephonic Black or color as directed) on top. Vertical polished granite stone (single piece) shall be fixed at the end of platform as per drawing. Half rounded moulded fascia patti of 25mm width shall be fixed at the front edge on top of platform as per drawing. With necessary cutting of stones for fixing of Sink & making hole for gas line, providing & fixing PVC bend of 25mm dia. as directed. The numbers of vertical support/ partition either single or sandwich type of polished kota stone (Polished on exposed sides) shall be provided as per detailed drawing.**

Material

Water shall conform to M-1, Cement shall conform to M-3. Sand shall conform to M-6 Polish kotah stone conform to M-34, Granite shall conform to I.S.-14223(Part-1)-1995 (Reaffirmed 2017) or its latest edition.

Workmanship

The cooking platform must be of 18 to 20mm thick polished granite stone fixed on 25mm thick polished kotah stone slab in cement mortar 1:1. The bearing between granite and polish kotah stone must be of 12mm thick in cement mortar 1:1.

The granite fascia patti must be 25mm wide and fixed with adhesive material.

The fascia patti shall be chamfered / half chamfered / half rounded on both sides as directed.

At the end of platform, a vertical round moulded granite must be fixed. The exposed surface of vertical granite shall be double polished and minimum 300mm high from the top of the platform. Number of vertical partitions (either single or sandwich) shall be of polished kota stone (polished on exposed sides) and as per drawing or as per the direction of engineer in charge.

Mode of measurements and payment

The rate includes cost of all material & labour required for satisfactory completion of this item. The rate for kitchen sink shall be paid separately.

The rate shall be for a unit one running Meter for visible length & width of platform provided (The visible width of platform must be 68cm and the height of platform shall be 84cm from finished floor surface to top of the fascia patti.

- 19[14.11] Providing and fixing both side prepolished single piece machine cut 25mm thick KOTA STONE shelf/ partition, 20mm to 25mm embedded in to wall at support including racking and finishing smooth the surface including cutting the stone as and where required etc. complete including moulding of exposed edges etc. complete.**

Materials

Water shall conform to M-1, cement mortar shall conform to M-11, polish kotah stone shall conform to M-34

Workmanship

25mm thick Polish kotah stone shall cut to the required size and shape as per the drawing or instruction given by engineer in charge. The Kotah stone shall be prepolished on both the sides and the open edge is machine polished and moulded if directed.

The stone shall be fixed in wall by making groove of sufficient width and 25mm deep groove and as per the instruction.

The grooves left must be fair finish with cement mortar 1:3.

The thickness of kotah stone in shelves of single cupboard must be uniform and of single size.

Mode of measurements and payment

The rate shall include the cost of all material and labour involved in all the operations described above. The measurement shall be paid on for unit of one square meter for the visible stone.

SECTION -8

Plastering and Paints

1[17.58(1)] 10 mm thick cement plaster in single coat on fair side of brick/concrete wall for interior plastering up to floor two level and finished even and smooth in (I) C.M. 1:3.

Materials:

Water shall be conform to M-1. The cement mortar shall conform to M-11.

Workmanship

Scaffolding:

For all plaster work H-frame or double scaffolding independent of the work having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed. In no case scaffolding hole shall be allowed in brick masonry.

Preparation of Back-Ground:

The joints shall be raked out properly. Dust and loose mortar shall be brushed out. Efflorescence if any shall be removed by brushing and scrapping. The surface shall then be thoroughly washed with water, cleaned and kept wet before plastering is commenced. Smooth surface shall be toughened by wire brushing, if it is not hard and by hacking, if it is hard. In case of concrete surface, if a chemical retarder has been applied to the form work, the surface shall be roughened by wire brushing and all the resulting dust and loose particles cleaned off and care shall be taken that none of the retarders is left on the surface. Trimming of projections on brick/concrete surface where necessary shall be carried out to get an even surface.

The raking of joints in case of masonry where necessary shall be allowed to dry out for sufficient period before carrying out plaster work.

The work shall be not soaked but only damped evenly before applying the plaster. If the surface become dry, such area shall be moistened again.

For external plaster, the plastering operation shall be started from top floor and carried down wards. For internal plaster, the plastering operations may be started wherever the building frame and cladding work are ready and the temporary supports of the ceiling resting on the walls of the floor have been removed. Ceiling plaster shall be completed before starting plaster to walls.

Application plaster:

The plaster about 50 x 50 mm shall be first applied horizontally and vertically at not more than 2 meters intervals over the entire surface to serve as gauge. The surface of these gauge shall be truly in plane of the finished plaster surface. The mortar shall then be applied in uniform surface slightly more than the specified thickness, then brought to a true surface by working a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally the surface shall be finished off true with a trowel or wooden float according as a smooth texture is required. Excessive trowelling or overworking the float shall be avoided. All corners, arrises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished.

Rounding or chamfering, corners, arriser junctions etc. shall be carried out with proper templates to the size required.

Cement mortar shall be used within half an hour after addition of water and mortar or plaster which is partially set shall be rejected and removed forthwith from the site.

In suspending the work at the end of the day, the plaster shall be left out clean to the line both horizontally and vertically. When recommencing the plaster, the edges of the old work shall be scraped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of the wall and nearer than 15 cm to any corners or arrises. It shall not be closed on the body of features such as plaster bands and cornices nor at the corners or arrises. Horizontal joints in plaster work shall not also occur on parapet top and copings as these invariably lead to leakage. No portion of the surface shall be left out initially to be packed up to later on.

Each coat shall be kept damp continuously till the next coat is applied or for a minimum period of 7 days. Moistening shall commence as soon as plaster is hardened sufficiently. Soaking of walls shall be avoided and only as much water as can be readily absorbed shall be used, excessive evaporation on the sunny or windward side of building in hot air or dry weather shall be prevented by hanging matting or gunny bags on the outside of the plaster and keeping them wet.

Any cracks which appear in the surface and all portion which sound hollow when tapped or found to be soft otherwise defective, shall be cut out in rectangular shape and redone as directed by engineer in charge. No extra payment shall be made for this redone the plaster work.

To prevent surface cracks appearing between junctions of column/beam and walls, 180 mm wide chicken wire mesh or fiber mesh (145 GSM) should be fixed with U nails 150 mm centre to

centre before plastering the junction. The plastering of walls and beam/column in one vertical plane should be carried out in one go. For providing and fixing chicken wire mesh or fiber mesh (145 GSM) with U nails payment shall be made separately.

Mode of measurement & payments:

The rate shall include the cost of all materials, labour and scaffolding etc. involved in the operations described under workmanship as well as Plaster work includes all grooves, pattas, pattis, Tapak (Plaster Drip) as may be directed by the engineer in charge and GSPHCL Ltd.

All the plastering shall be measured in square meter unless otherwise specified. Length, breadth or height shall be measured correct to a centimeter.

Thickness of the plaster shall be exclusive of the thickness of key i.e. grooves or open joints in brick work, stone etc. or space between laths. Thickness of plaster shall be average thickness with minimum 10 mm at any point on this surface.

This item includes plastering up to floor two level.

The measurement of wall plastering shall be taken between the walls or partition (dimensions before plastering being taken) for length and from the top of floor or skirting to ceiling for height. Depth of cover of cornices if any shall be deducted.

Soffits of stairs shall be measured as plastering on ceilings. Flying soffits shall be measured separately.

For jambs, soffits, sills etc. for openings not exceeding 0.5 sq.mt. each in area for ends of joints, beams, posts, girders, steps etc. not exceeding 0.5 sq. mt. each in area and for openings exceeding 0.5 sq. mt. and not exceeding 3.00 sq.mt. in each area deductions and additions shall be made in the following manner:

- (a) No deduction shall be made for ends of joints, beams, posts etc. and openings not exceeding 0.5 sq.mt. each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings. For finishing to plaster around ends of joints beams and posts etc.
- (b) Deduction for openings exceeding 0.5 sq. mt. But not exceeding 3 sq. mt. each shall be made as follows and no deduction shall be made for reveals, jambs, soffits, sills etc. of these openings.
- (c) When both faces of the all wall are plastered with same plaster, deduction shall be made for one side only.
- (d) When two faces of wall are plastered with different types of plasters or if one face is plastered and the other pointed deductions shall be made from the plaster or pointing on the side of frame for door, window etc. on which width of reveals is less than that on the other side but no deductions shall be made on the other side. Where width of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from areas of plaster and/or pointing as the case may be.
- (e) For openings having door frames equal to or projecting beyond the thickness of wall, full deduction for opening shall be made each plastered face of the wall.
- (f) In case of openings of area above 3sq.mt. each deduction shall be made for openings but jambs, soffits and sills shall be measured.

The rate shall be for unit of one Sq. Mt.

2[17.58(2)] 15 mm cement plaster in single coat on fair side of brick/concrete walls for interior plastering up to floor two level and finished even and smooth in C.M. 1:4.

Materials & Workmanship

The relevant specifications of item No.[17.58 (1)] shall be followed except the proportion of mortar is C.M. 1:4 instead of C.M.1:3

Mode of Measurements & Payment

The Mode of Measurements & Payment shall be the same as for item no [17.58 (1)]. The rate shall be for a unit of one sq. metre.

3[17.58(3)] 20 mm thick cement plaster in single coat on rough side of single or half brick wall for interior plastering up to floor two level, finished even smooth in cement mortar 1:3 (1 cement : 3 sand)

Materials & Workmanship

The relevant specifications of item No. [17.58 (1)] shall be followed except the thickness of cement plaster shall be 20 mm. The plastering work shall be in single coat on rough side of half brick wall for interior plastering up to floor two level.

Mode of Measurements & Payment

The relevant specifications of item No. [17.58 (1)] shall be followed

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

- 4[17.58(4)] 20mm thick plaster in single coat on rough side of single or half brick wall for interior plastering up to floor two level, finished even and smooth in cement mortar 1:4 (1 cement :4 sand)**

Materials & Workmanship

The relevant specifications of item No. [17.58 (3)] shall be followed except cement plaster shall be in C.M. 1:4 Instead of C.M. 1:3.

Mode of Measurements & Payment

The relevant specifications of item No. [17.58 (3)] shall be followed.
The rate shall be for a unit of one sq. metre.

- 5[17.59] Extra over item 17.58(1) to 17.58(4) for finishing with a floating coat of neat cement slurry.**

Materials & Workmanship

The relevant specifications of item No. [17.58 (1)], [17.58 (2)], [17.58 (3)] and [17.58 (4)] shall be followed for materials and workmanship except that this work is only for providing smooth cement finish with floating coat of neat cement slurry.

Floating coat of neat cement slurry means cement and fine sand mortar of proportion 1:1 and thickness of floating coat of neat cement slurry shall be 1.5mm thick and shall be applied to the plastered surface with a trowel to provide uniform texture while the base coat is still plastic.

In any continuous face of wall the finishing treatment should be carried out continuously and day to day breaks made to coincide with architectural breaks in order to avoid unsightly junctions.

Curing :

All the plaster work shall be kept damp continuously for a period of 7 days.

Mode of Measurements & Payment

The payment shall be made for a unit of 1.0 sq. mt. of work be done over and above the finishing of work of base coat

The relevant specifications of item of base coat shall be followed for measurements and payment.

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

- 6[17.60] Extra over items 17.58(1) to 17.58(4) for providing and mixing water proofing materials in cement mortar in proportion recommended by the manufacturers.**

Materials and workmanship

The relevant specification of item No. [17.58 (1)], [17.58 (2)], [17.58 (3)] and [17.58 (4)] shall be followed except that the water proofing materials of approved make shall be added to the cement at the rate as specified or directed by the manufactures of the water proofing materials. Integral cement water proofing compound conforming to IS 2645- and approved brand and manufacture, enlisted by the engineer in charge from time to time shall be used. The contractor shall bring the waterproofing materials to the site in their original packaging. Container will be opened and the material mixed with dry cement in proportion by weight, recommended by manufacturer. Care shall be taken in mixing, to see the waterproofing material gets well and integrally mixed with the cement and does not run out separately when water are added.

Mode of measurements and payment

The payment shall be made extra for this work over and above the plaster work.

The rate shall be for a unit of 1 kg of water proofing materials used in 1 bag of weighing 50 Kg. cement.

- 7[17.61] Extra over item No 17.58(1) to 17.58(4) for plastering on ceiling and soffits of stair upto floor two level instead of plastering on walls.**

Materials and workmanship

The relevant specification of item No. [17.58 (1)], [17.58 (2)], [17.58 (3)] and [17.58 (4)] shall be followed except that this work is for ceiling/ soffits of stairs up to two floor level instead of plaster on walls.

The smooth concrete surface shall be suitably roughened to provide necessary bond before plastering.

Mode of measurements and payment

The payment shall be made extra for this work over and above the plaster work on wall surfaces.

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

- 8[17.62(1)] Extra over item 17.58(1) to 17.58(4) and 17.61 for interior plastering above floor two level for every additional storey height (I) single coat plaster.**

Materials and workmanship

The relevant specifications of item no. [17.58(1)] and [17.61] shall be followed except that the whole work is to be carried out above floor two level.

Mode of measurements and payment

The mode of measurements and payment shall be same as item, no. [17.58(1)] and [17.61]. The extra payment shall be made over and above the floor two level rate for every additional floor height. The rate shall be for a unit of one sq. metre.

- 9[17.62(2)] Extra over item 17.58(1) to 17.58(4) for interior plastering above floor two level for every additional storey height. (II) Two coat plaster.**

Materials and workmanship

The relevant specification of item no [17.62(1)] shall be followed except that extra payment for work shall be for a two coat plaster.

Mode of measurements and payment

The relevant specifications of item no [17.62(1)] shall be followed. The rate shall be for a unit of one sq. meter.

- 10[17.94(III)] Extra over item 17.58(1) to 17.58(4) for interior plastering above floor two level for every additional storey height. Floating coat of neat cement.**

Materials and workmanship

The relevant specifications of item no [17.59] shall be followed except that the extra payment shall be made for work of floating coat of neat cement slurry.

Mode of measurements and payment

The relevant specification of item No. [17.59] shall be followed. The rate shall be for a unit of one sq. meter.

- 11[17.95] 20 mm. thick sand face cement plaster on walls up to any height above ground level consisting of 12 mm. thick backing coat in C.M. 1:3 (1 cement : 3 sand) and 8 mm thick finishing coat in C.M. 1:1 (1 cement : 1 sand) etc. complete.**

Materials

Water shall conform to M-1, cement mortar shall conform to M-11.

Workmanship

The work shall be carried out in two coats. The backing coat (base coat) shall be 12 mm thick in C.M. 1:3. The relevant specifications of item No [17.58(1)] shall be followed except that the thickness of back coat shall be 12 mm. average. Before the first coat hardens its surface shall be beaten up by edges of wooden tappers and close dents shall be made on the surface. The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days, depending upon the weather conditions. The surface shall not be allowed to dry during this period.

The second coat shall be 8mm thickness in C.M. 1:1 as described above, including raising sand facing by Gutka Only. The samples of raising sand face shall be got approved from the engineer in charge before the work is started. The whole work shall be carried out uniformly as per sample approved. If the raising sand facing is done by other than gutka, the written permission of engineer in charge must be obtain prior to start the work.

Curing

The curing be started overnight after finishing of plaster. The plaster shall be kept wet for a minimum period of 7 days. During this period, it shall be protected from all damages.

Mode of measurements and payment

The relevant specifications of item [17.58(1)] shall be followed except that the sand-face plaster on outside for all heights above ground level shall be measured under this item. Necessary grooves shall be made as mention in drawing as directed by engineer in charge. Finishing of the grooves shall be in workman like manner as directed by engineer in charge. No extra payment shall be made for making of the grooves or

any tapak, patta etc.

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

12[17.96(A)] Pointing on brick work with cement mortar 1:3 (1 cement : 3 coarse sand) flush pointing.

Materials

Water shall conform to M-1, Cement mortar shall conform to M-11.

Workmanship

The flush pointing work shall be carried out with cement mortar of proportion 1:3 (1 part of cement and 3 part of coarse sand) by volume.

Scaffolding:

For all exposed brick work or tile work H-frame or double scaffolding independent of the work having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed. In no case scaffolding hole shall be allowed in brick masonry.

Preparation of surface

The joints shall be raked out properly. Dust and loose mortar shall be brushed out. Efflorescence if any shall be removed by brushing and scraping. The surface shall then be thoroughly washed with water, cleaned and kept wet before pointing is commenced.

In case of concrete surface if a chemical retarder has been applied to the form work, the surface shall be roughened by wire brushing and all the resulting dust and loose particles cleaned off and care shall be taken that none of the retarders is left on the surface.

The joints shall be raked to such a depth that the minimum depth of the new mortar measured from either the sunk surface of the finished pointing or from the edge of the brick shall not be less than 12 mm.

Application and Finishing :

The mortar shall be pressed into the raked out joints, with a pointing trowel, either flush, sunk or raised, according to the type of pointing required. The mortar shall not spread over the corner, edges or surface of the masonry. The pointing shall then be finished with the proper tool, in the manner described below:

Flush Pointing:

The mortar shall be pressed into the joints and shall be finished off flush and level with the edges of the bricks, tiles or stones so as to give a smooth appearance. The edges shall be neatly trimmed with a trowel and straight edge.

Curing

The pointing shall be kept wet for 7 days. During this period, it shall be suitably protected from all damages.

Mode of measurements and payment

No deduction shall be made for end of joints, beams and posts etc. and openings not exceeding 0.5 sq. mt each and no addition shall be made for reveals, jambs, soffits, sills etc of these openings

Deductions for openings exceeding 0.5 sq mt. but not exceeding 3 sq. mt. each shall be paid as follows and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings :

- (I) When both faces of walls are pointed with same type of pointing, deduction shall be made for one face only.
- (II) When two faces of walls are pointed with different type of pointing or if one face is plastered and the other is pointed deduction shall be made in the plaster or pointing on the side of frame for door, windows etc. on which the width of reveals is less than that on the other side but no deduction shall be made from plaster or pointing on the other side.
- (III) When only one face is treated and the other face is not treated, full deduction shall be made, if the width of the reveals on the treated side is less than on the untreated side, but if the width of the reveal is more, then no deduction shall be made nor any addition shall be made for reveals, jambs, soffits, sills etc. In case of openings of area above 3 sq. mt. each deduction shall be made for opening but jambs, sills and soffits, shall be measured.

The rate shall be for a unit of one sq. mete

13[17.96(B)] Pointing on brick with cement mortar 1:3 (1 cement : 3 coarse sand) Ruled pointing.**Materials and workmanship**

The relevant specifications of item [17.96(A)] shall be followed except that the pointing to be done rules pointing as under:

The joints shall be initially formed as for flush pointing and then while the mortar is still green, a groove of shape and size as instructed, shall be formed by running a forming tool, straight along the centre line of the joints. This operation shall be continued till a smooth and hard surface is obtained. The vertical joints shall also be finished in a similar way. The vertical lines shall make true right angles at their junctions with the horizontal lines and shall not project beyond the same.

Mode of measurements and payment

The Mode of measurements and payment shall be the same as per item No. [17.96(A)].

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

14[17.97(C)] Pointing on brick work with cement mortar 1:4 (1 cement : 4 sand) flush pointing.**Materials and workmanship**

The relevant specifications of item no. [17.96(A)] shall be followed except that the pointing work shall be carried out with C.M. 1:4

Mode of measurements and payment

The relevant specifications of item no. [17.96(A)] shall be followed

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

15[17.98(D)] Pointing on uncoursed store masonry with cement mortar 1:3 (1 cement : 3 sand) Flush pointing.**Materials and workmanship**

The relevant specifications of item No. [17.96(A)] shall be followed except that the flush pointing shall be done on uncoursed rubble masonry work in C.M. 1:3, and the mortar shall be simply struck off with a trowel and the work left showing the natural regularities in line and the surface of the stone themselves.

Mode of measurements and payment

The relevant specifications of item no [17.96(A)] shall be followed

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

16[17.99] Providing cement vata (10 cms x 10 cms) size quarter round in cement mortar 1:1 including neat cement finishing, watering etc. complete for all floors.**Materials**

Water shall conform to M-1. Cement mortar shall conform to M-11.

Workmanship

The work of cement vata of 10 cms x 10 cms size shall be carried out at junctions of parapets, chhajjas, bathroom, toilets, sunk slabs and terraces as directed. The vata shall be finished in quarter round shape. The work shall be carried out in the best workman like manner. The inner portion of rain water pipe shall be

rounded off properly during construction the vata. The work shall be cured for 7 days.

Mode of measurements and payment

The work shall be measured for finished item in running meter.

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

SECTION – 9

WHITE WASHING & DISTEMPERING

- 1[18.11] White washing with lime on undecorated wall surfaces (two coats) to give an even shade including thoroughly brooming the surface to remove all dirt, dust, mortar drops and other foreign matter.**

Materials

The clearcolle shall be made for glue and boiling water by mixing 1 Kg. mixture shall be suitably tinted where required for use under coloured distemper if directed. Glue shall conform to IS 852-1994 (Reaffirmed 2014) or its relevant and latest edition (Specifications for annual glue). And / or DDL Fevicol shall also be used as directed.

Lime used shall be freshly burnt class 'C' Lime (fat lime) and white in colour conforming to IS 712-1984 (Reaffirmed 2019) or its relevant and latest edition. Water shall conform to M-1. Best quality of gum shall be used in the preparations of white wash. Ultramarine blue or Indigo : This shall conform to I.S. 55-1970 (Reaffirmed 2019) or its relevant and latest edition for paints and shall be used for preparation of white wash. Pigments : Mineral colours not affected by lime shall be used in preparing colour wash.

Scaffolding

Wherever scaffolding is necessary, it shall be erected on double supports tied together by horizontal pieces, over which scaffolding planks shall be fixed. No ballies, bamboos or planks shall rest on or touch the surface which is being white washed.

For all exposed brick work or tile work, double scaffolding having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed.

Note: In case of special type of brick work, scaffolding shall be got approved from Engineer-in- Charge in advance.

Where ladders are used, pieces of old gunny bags shall be tied on their tops to avoid damage or scratches to walls.

For white washing the ceiling, proper stage scaffolding shall be erected.

Preparation of Surface

Before new work is white washed, the surface shall be thoroughly brushed free from mortar droppings an foreign matter.

In case of old work, all loose particles and scales shall be scrapped off and holes in plaster as well as patches of less than 50 cm area shall be filled up with mortar of the same mix. Where so specifically ordered by the Engineer -in- Charge, the entire surface of old white wash shall be thoroughly removed by scrapping and this shall be paid for separately. Where efflorescence is observed the deposits may be brushed clean and washed. The surface shall then be allowed to dry for atleast 48 hours before white washing is done.

Preparation of Lime Wash

The lime wash shall be prepared from fresh stone white lime (Narnaul or Dehradun quality). The lime shall be thoroughly slaked on the spot, mixed and stirred with sufficient water to make a thin cream. This shall be allowed to stand for a period of 24 hours and then shall be screened through a clean coarse cloth. 40 gm of gum dissolved in hot water, shall be added to each 10 cubic dicimetre of the cream. The approximate quantity of water to be added in making the cream will be 5 litres of water to one kg of lime.

Indigo (Neel) upto 3 gm per kg of lime dissolved in water, shall then be added and stirred well. Water shall then be added at the rate of about 5 litres per kg. of lime to produce a milky solution.

Application

The white wash shall be applied with moonj brushes to the specified number of coats. The operation for each coat shall consist of a stroke of the brush given from the top downwards, another from the bottom upwards over the first stroke, and similarly one stroke horizontally from the right and another from the left before it dries.

Each coat shall be allowed to dry before the next one is applied. Further each coat shall be inspected and

approved by the Engineer-in-Charge before the subsequent coat is applied. No portion of the surface shall be left out initially to be patched up later on.

For new work, three or more coats shall be applied till the surface presents a smooth and uniform finish through which the plaster does not show. The finished dry surface shall not show any signs of cracking and peeling nor shall it come off readily on the hand when rubbed.

For old work, after the surface has been prepared as described in para 13.14.2 a coat of white wash shall be applied over the patches and repairs. Then a single coat or two or more coats of white wash as stipulated in the description of the item shall be applied over the entire surface. The white washed surfaces should present a uniform finish through which the plaster patches do not appear. The washing on ceiling should be done prior to that on walls.

Note : In case of Hessian ceiling, on no account, lime shall be used as it rots cloth and hessian.

Protective Measures

Doors, windows, floors, articles of furniture etc. and such other parts of the building not to be white washed, shall be protected from being splashed upon. Splashings and droppings, if any shall be removed by the contractor at his own cost and the surfaces cleaned. Damages if any to furniture or fittings and fixtures shall be recoverable from the contractor.

Mode of measurements & payment

All the work shall be measured in the decimal system as under :

- (a) Dimensions shall be measured to the nearest 0.01 M.
- (b) Area in individual items shall be worked out to the nearest 0.01 sq. m.

All the works shall be measured in sq. mt. Deductions for jambs, soffits, sills etc. for openings not exceeding 0.5 sq. mt. each in area, for ends of joists, posts, beams, girders, steps etc. not exceeding 0.5 sq. mt. each in area and for openings exceeding 0.5 sq. mt. and not exceeding 3.0 sq. mt. each in area, deductions and additions shall be made as under :

No deductions shall be made for ends of joists, beams, posts etc. and openings not exceeding 0.5 sq. mt. each. No addition shall be made for reveals, jambs, soffits, sills etc. of these openings nor for finish around ends, joists, beams, posts etc.

Deductions for openings exceeding 0.5 sq. mt. but not exceeding 3 sq. mt. each shall be made as follows and no addition shall be made for reveals, jambs, soffits etc. of these openings.

- (a) When both the faces of walls are provided with finish, deduction shall be made for one face only.
- (b) When each face of wall is provided with a different finish, deduction shall be made for that side of frame for door, windows etc. on which width of reveals is less than that of the other side.

Where width of reveals on both faces of wall are equal, deduction of 50% of area of opening on each face shall be made from total area of finish.

- (c) When only one face of wall is treated and the other face is not treated, full deduction shall be made if the width of reveal on the treated side is less than that on the untreated side, but if the width of the reveal is equal or more than on the untreated side neither deductions for additions to be made for reveals, jambs, soffits, sills etc.

In case of area of openings exceeding 3 sq. mt. each, deduction shall be made for openings but jambs, soffits, sills shall be measured.

No deductions shall be made for attachment such as casing, conducts, pipe, electric wiring and the like.

Corrugated surfaces shall be measured flat as fixed and not girth. The quantities so measured shall be increased by the following percentage and the resultant shall be included with the general areas :

(a)	Corrugated steel sheets.....	14%
(b)	Corrugated A.C. sheets.....(with rolls)	10%
(c)	Semi corrugated A.C. sheets	10%
(d)	Nainital pattern roof (plain sheeting with rolls).....	20%
	Nainital pattern roof (with corrugated sheet).....	25%

Cornices and other wall features, when they are not picked out in a different finish/colour shall be girthed and included in the general area.

The rate shall include the cost of all materials, labour, scaffolding, protective measures etc. involved in all the operations described above & this also includes for any height and any floor.

The rate shall be for a unit of one sq. metre.

2[18.12] Extra over item 18.11 for every subsequent coat of white washing with lime on wall surfaces.

Materials and workmanship