GUJARAT STATE POLICE HOUSING CORPORATION LTD.

(Govt. of Gujarat Undertaking)

GENERAL TECHNICAL SPECIFICATIONS FOR BUILDING WORKS

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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. Thecontractor 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.SOO (five hundred) per unit or Rs. 1,00,000/- whichever more as may be decided by Engineer in charge for satisfactory commissioning of thequarters 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 betaken 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 constructthe 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 furnitureshall 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 andsame 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 and 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 or 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 changeor

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 form Plinth Level.

(8). Up to "floor two level" means actual height of floor (Max.4.0m) up to 3m. 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 thecontactor 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 form the site ofwork.

(16). No materials shall be stored prior to during and after execution of structure in such a way as to causethe 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 andspecifications.

(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 Satcher must be used in all Controlled Cement Concrete works.

(30). All Types of Structural Steei/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 any dampnessor 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 8bags 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 theirremoval and use in the order in which they are received; a lable 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 anytime 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 thestacks shall be 50 bricks long, 10 bricks high and not more than 4 bricks in width, the bricks being placed onedge, 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 asgiven 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 insuch 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 preventscaling and rusting.

Structural steel of different classification, sizes and lengths shall be stored separately. It shall bestored above ground level by at least 150 mm upon platforms, skids or any other suitable supports toavoid 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 slided 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, metaland plastic door and window frames and shutters, care shall be taken that the material is not draggedone 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 levelground 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 asand when required for the work.

Metal and plastic frames of doors, windows and ventilators shall be stacked upside down withthe 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 looselyon 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 dryand clean covered space away from any infestation and dampness. The storage shall preferably be inwell ventilated dry rooms. The frames shall be stacked one over the other in vertical stacks with crossbattens 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 theform 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 battensshall 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 ofthe 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 beas 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 thepipe 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 reasonablyflat 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 stacksto 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 ofPVC is reduced making it brittle and more care in handling shall be exercised in wintry condition.

If due to unsatisfactory storage of 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

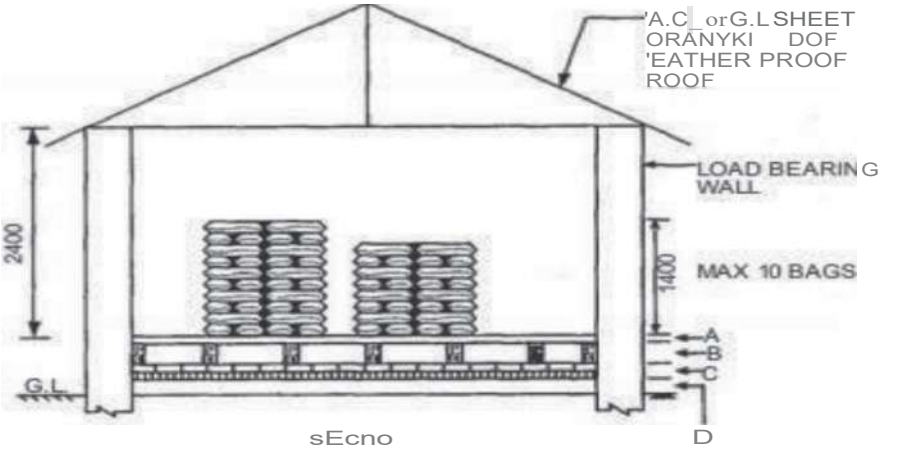
Wherever water is to be stored for construction purposes this shall be done in proper storage tanks to prevent any organic impurities getting mixed up with it.

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 fittedwith lid and shall not be kept open except while using. The containers of paints have expiry date marked bythe 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



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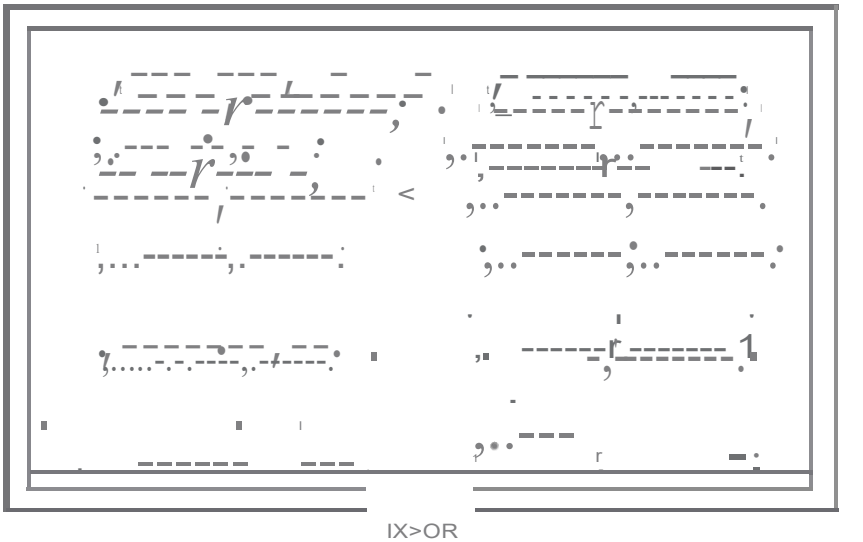


IX>OR

PLAN

A= Planks

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

Drawing not to scale
All Dimensions in millimetres

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 sub sequantly in case of Doubt.	Chemical Analysis	PH Value	Not less than 6	IS :456 - 2000 (Reaffirmed 2021)
				Suspended Matter	Max. 2000 mg/1	IS: 3025- Part-17 (Reaffirmed)
				Sulphate (as SO_4^{2-})	Max. 400 mg/1	IS: 3025-Part-24 (Reafirrmed 2019)
				Chloride (as Cl)	Max. 2000 mg/1 for Concrete not containing ambeded steel	IS: 3025-Part-32 (Reafirmed 2019)
					Max. 500 mg/1 for Reinforce concrete Work	
				Organic Matter	Max. 200 mg/1	IS: 3025-Part-18 (Reaffirmed 2012)
				Inorganic Matter	Max. 3000 mg/1	IS: 3025-Part-18 (Reaffirmed 2012)

				0.02 N, NaOH Required to Neutralize 100 ml of water sample using Phenophthelein 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/1			
				Mangnesium	100 mg/1			
				Alkanity (As Caco3)	600 mg/1			
2	Cement	One Test for every SO M.T and or change of brand	(1) Setting Time	OPC-33	OPC-43	OPC-53	IS: 269-2015 (Reaffirmed 2020)	
			(I) Intial in Minute (Min.)	30	30	30	IS: 4031-2016	
			(II) Final in Minute (Max.)	600	600	600	IS: 4031-2016	
			(2) Finess (m^2 kg) Min.	225	225	225	IS: 4031-2016	
			(3) Compressive Strength N/mm^2 Not less than					

			(I) 3 days (72 ±1 h.) Min.	16	23		27	IS: 4031-2016
			(II) 7 days {168 ± 2 h.) Min.	23	33		37	IS: 4031-2016
			(III) 28 days (672 ± 4 h.)Min	33	43		53	IS: 4031-2016
			(4) Soundness by le-chatelier method in mm (Max.)	10	10		10	IS: 4031-2016
			(5) Consistency	About 30%				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 150m3 of Material used)	Silt Content (Max.)	3% by Weight or 8% by Volume				IS :383- 2016
			Gradation	IS Sieve Designation	Percentage Passing			
					Zone I	Zone II	Zone III	Zone IV
				10mm	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 m	15-34	35-59	60-79	80-100
				300 m	5-20.	8-30.	12-40.	15-50.
				150 m	0-10	0-10	0-10	0-15
				Grading Zone IV should not be used in Reinforce Concrete Work				As per MORTH
			Zoning Tests	As Above				
			Specific Gravity	Min. 2.60				
			Water Absorption (%)	Max. 2%				

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	Not More than 5 % by weight	IS: 1542-1992 (Reaffirmed 2019)
			Fineness Modulas	Not less than 1.4 in case of Crushed stone Sand Not less than 1.5 in case of naturally accouring sand	
			Gradation	IS Sieve Designation — Percentage Passing 10mm — 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	IS: 2386-1973 (Part-1) (Reaffirmed 2021)
			Specific Gravity	Min. 2.60	As per MORTH
			Water Absorption (%)	Max. 2%	
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	IS :2116-1980 (Reaffirmed 2017)
			Fineness Modulas		

			Gradation	IS Sieve Designation Percentage Passing 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	Min. 2.60	
			Water Absorption (%)	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	Up to 3.00	IS :383- 2016
			Water Absorption %	Up to 1.5%	IS : 2386-1963 (Reaffirmed 2021)
			Impact Value %	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%	(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	

<table>
<tr><td></td><td></td><td></td><td>Abrasion Value%

Gradation Percent passing of IS Sieve</td><td>In Concerete 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</td><td></td></tr>
<tr><td>7</td><td>Bricks</td><td>One set to test every 50,000 bricks and or change of brand /mark</td><td>Water Absorption

Efflorescence

Compressive Strength
Dimension</td><td>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</td><td>IS: 1077-1992 (Reaffirmed 2016) (3.5 class Table-1)</td></tr>
<tr><td>8</td><td>Reinforcement HYSD/TMT/ CRS</td><td>Each set to test for each diameter of bars for every 20 M.T or part thereof.</td><td>Diameter in mm (Chemical composition and tolerance in unit weight)</td><td>Tolerance of nominal Mass
<table><tr><th>Sr.No</th><th>Nominal Size</th><th colspan="3">Tolerance on the Nominal Mass, Percent</th></tr><tr><td></td><td></td><td>Batch</td><td>Individual Sample</td><td>Individual Sample for Coils only</td></tr></table></td><td>IS : 1786-2008(Reaffirmed 2018) Table No.2 Clause No. 6.2 & 7.2.2</td></tr>
</table>

				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.) Grade Fe 500- 545 N/mm^2 (Min.) Grade Fe 500 D- 565 N/mm^2 (Min.)				Table No.3, Clause 8.1 Page No.6
			Yield Stress {0.2% Proof Stress) (TMT/CRS)	Grade Fe 415-415 N/mm^2 (Min.) Grade Fe 500- 500 N/mm^2 (Min.) Grade Fe 500 D- 500 N/mm^2 (Min.)				Table No.3, Clause 8.1 Page No.6
			Elongation % (TMT/CRS)	Grade Fe 415- 14.5% (Min.) Grade Fe 500- 12% (Min.) Grade Fe 500 D -16% (Min.)				Table No.3, Clause 8.1 Page No.6
			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.

<table>
<tr>
<td>9</td>
<td>C.C. Cubes</td>
<td>Quanti ty Cmt.
1-5.
6-15.
16-30
31-50
51 & Above</td>
<td>No of Samples
1
2
3
4
4 Plus one addition al sample for each addition alSO m3 or part thereof.</td>
<td>Compressive Strength (N/mm2)</td>
<td>Acceptance Criteria for strength of CC Cubes at 28 Days (IS: 456-2000 and Amendment 2013)
Grade | Established Standard deviation (N/mm^2) | Acceptance Value (N/mm^2) For all grade of Concrete
MIO | 3.5
MIS | 3.5
M20 | 4
M25 | 4
M30 | 5
M35 | 5
M40 | 5
M45 | 5
MSO | 5
Fck+0.85 X SD Rounded up to nearer 0.5 N/mm2 or Fck+3 (N/mm2) Whichever is Greater
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 1N/mm2</td>
<td>IS :456 -2000 (Reaffirmed 2021) Table No.II Clause No 16.1 & 16.3</td>
</tr>
<tr>
<td>10</td>
<td>Flooring Tiles/ Mosaic/Plain</td>
<td>One Test for every 10,000 Nos. of tiles used and Change of Brand Mark and per Batch lot</td>
<td></td>
<td>Water Absorption %
Transerver Strength
Abrasion</td>
<td>Average Percentage of Water Absorption Shall not Exceed 10
The Average Wet Transerver Strength Shall not be less than 3 N/mm^2
For General Purpose Floor Tiles</td>
<td>IS : 1237-2012 (Reaffirmed 2017) Clause N0.12.5, Page No.3</td>
</tr>
</table>

				Average Wear Not Exceed 3.5 mm Wear on individual Specimen Not Exceed 4 mm **For heavy duty floor tiles** Average Wear Not Exceed 2 mm Wear on individual Specimen Not Exceed 2.5 mm	
			Size Tolerance	length - ±1 mm width- ±1 mm Thickness- +15% Negative size not permitted	
11	Bela Stone	2 Sets of test per Working Seasons to i.e Prior and after Monsoon	Water Absorption Crushing Strength Specific Gravity	0.15% by Weight IS: 1123-1975 (Reaffirmed 2017) Table No.1, Page No.4	IS : 1123-1975 (Reaffirmed 2017)
12	Teak Wood / Non Teak Wood		Color Hardness Weight Feature Density Porosity Cross Grain Sound Knots & Live Knots	IS :4970-1973 & IS: 1708-1969 (Reaffirmed 2020) as per Trade name of teak wood or Botanical name Not steeper than 1in 15 size (Max) = 20mm No. per meter= 1	IS: 4021-1995 (Reaffirmed 2000) Table

			Decayed Knots, dead Knots and knots holes	Not more than 10 mm Size Centerally located and not more than 1knot 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	I'<IO *1*, uause 4.1.5, Page No.5
13	Seasoned & Chemically treated wood		Moisture Content	Door & Windows / Zone I / Zone II / Zone III / Zone IV SO mm and Above in thickness / 10 / 12 / 14 / 16 Thinner than 50 mm / 8 / 10 / 12 / 14 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.1Clause No.4 & 5	IS :287-1993 (Reaffirmed 2017) Table No. 1, Clause 4 & 5, Page No.2
		One samples for the lots	Absorption of Presentative Windows	For Zone refer Map given in IS :287-1993 (Reaffirmed 2017) Preservation / Recommended Absorption Kg/m CTC/LTC / 80 CCA / 4 ACA / 4 CCB/BCCA / 6.5	IS : 401-2001 (Reaffirmed 2016) Table No. 2, Clause 8.2

				Copper naptha-nate/abietate	0.5			
				Zinc abietate	0.8			
				TCP	4			
				Boric Acid Borax	5			
14 (a)	Coarse Aggeregate forWBM		(A) Coarse Aggeregate	Grading Number	Size Range and Compacted thickness for layer	Sieve Designation (IS 460)	Percent by Weight Passing the Sieve	IRC: 19-2005
		1 Test for 100 cu.m	Gradation	1	90 mmto45 mm (100mm)	125 mm	100	
						90mm	90-100	
						63mm	25-60	
						45mm	0-15	
						22.4 mm	0-5	
				2	63 mmto45 mm (75 mm)	90mm	100	
						63mm	90-100	
						53mm	25-75	
						45mm	0-15	
						22.4 mm	0-5	
				3	53 mm to 22.4 mm (75 mm)	63mm	100	

						53mm	90-100	
						45mm	65-90	
						22.4 mm	0-10	
						11.2 mm	0-5	
				<u>For Sub base</u>		**For Surfacing**		
			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 forWBM					
		1 Test for 100 cu.m	Gradation	Gradation Claasification	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	
						5.6mm	15-35	

						180 micron	0-10	
				B	11.2 mm	11.2 mm	100	
						5.6mm	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					IS: 1239 (Part-1)- 2004 (Reaffirmed 2019} Table No. 4, Clause No. Table No.3- For light Table No.4-
			15 mm dia	1.22 Kg/m				
			20mm dia	1.57 Kg/m				
			25 mm dia	2.43 Kg/m				
			32 mm dia	3.13 Kg/m				
			40 mm dia	3.60 Kg/m				
			50 mm dia	5.10 Kg/m				

			65 mm dia 80 mm dia 100 mm dia 125 mm dia 150 mm dia	6.54 Kg/m 8.53 Kg/m 12.5 Kg/m 16.4 Kg/m 19.5 Kg/m	for Medium Table No.5- For heavy
			(2) Tolerance in thickness & mass	As per IS: 1239 (Part-1)- 2004 (Reaffirmed 2016) , Clause No. 9.00	IS: 4736-1986 (Reaffirmed 2021)
			(3) Galvanizing	As per IS: 4736-1986 (Reaffirmed 2021)	
			(4) Leak proof test	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	
16	Admixtures		pHValue	7--8	IS: 9103-1999 (Reaffirmed 2018) Table No. 2, Clause No. 9, Page No.5 (Annexture-E for Test)
			Chloride Iron Content(%)	Within 10% of the value or 0.2% whichever is greater as stated by Manufactures	
			Relative Density	Within 0.02 of the value stated by Manufactures	
			Dry Material Content(%) For Liquid :- For solid Admixture_	Within 3 percent of the value stated by the manufacture	

17	C.C Blocks of Grade (C.5.0)	Per 10000- 1 set of Sample 20000- 1set of Sample	Block Density Water Absorption % Compressive Strength (N/mm2) {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 Wall Thickness and Outside Diameter Density	As per mentioned in IS Code The Density of pipe shall be between 1450 Kg/m^3 to 1650 Kg/m^3	IS: 15778-2007 (Reaffirmed 2012) Table No.1, Page No.2 IS: 15778-2007 (Reaffirmed 2012) Table No. 2, Clause No.7, 7.1, 7.2 and 7.1.2.1 Page No.4

19	UPVC Pipe Type A: Rain Water Type B : Soil & Waste Water	One Sample From each lot of each Dia of Pipe	Color	Surface color of the pipe shall be Dark Shade of Grey	IS: 13592-2013 (Reaffirmed 2018)
			Wall Thickness and Outside Diameter	IS: 13592 -2013 , Table No 1& Table No.2 Clause 7.1 Page No.2	
			Resistance to Sulphuric Acid	Neither Increase by more than 0.032 g nor Decrease by more than 0.13 g	
			Tensile Strength	Strength at Break shall Not be less than 45 Mpa	
			Water Tightness of a Joint	Apply Pressure of 0.05 Mpa for a Period of 15 min and there should be no leakage at any Joint	
20	(Cohesive Non swelling) Soil	Once for Approval of Each Source of soil and sub Sequently in case of Doubt	Grain size analysis	Clay- 15-25 % Silt - 35-50 % Sand - 30-40 % Gravel - < 10%	IS: 2720 (Part-IV)-1985 (Reaffirmed 2020)
			Consistency Limit	Liquid Limit- 30-50% Plastic Limit- 20-50% Plasticity Index- 10-25 % Shrinkage Limit- 15 % and Above	IS: 2720 (Part-5)-1985 (Reaffirmed 2020)
			Swelling Pressure	Swelling Pressure when compacted to maximum dry density corresponding to Standarad Proctor Compaction with Zero Intial Compaction Moisture Constant For no Volume Change Condition. Less than 0.1 Kg/cm^2 (10 KN/m^2)	IS :2720 (Part-XLI) -1977 (Reaffirmed-

				Swelling Pressure when compacted to maximum dry density corresponding to Standarad Proctor Compaction and intial Compaction moisture corresponding to optimum Moisture Content for no Volume Change Condition. Less than 0.5 Kg/cm^2 (10 KN/m^2)	2016)
			Clay Minerals	Preferable Kaolinite and Ilite	
			Shear Strength	Shear Strength of Sample Compacted to maximum dry density Correspond to Standard Proctor Compaction and Intia l Moisture Content Corresponding to Optimum Moisture Content, but sample tested on saturation	IS: 2720 (Part- 13)-1986 (Reaffirmed-2016)
			(a) From Unconfined Compression	Cu 0.15 - 0.35 Kg/cm^2 (15 to 35 KN/m^2)	
			(b) From Consolidated Undrained direct shear test	Cu 0.1- 0.35 Kg/cm^2 (10 to 30 KN/m^2)	
				0 Cu 8" -15"	
21(a)	AAC Block(Autoclaved cellular Aerated Concrete block)	Per 10000 Nos.- 1 set of Sample and each Batch	Compressive Strength	Minimum 4.00 N/mm^2 (Grade-I) 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 determinedand the average range R Calculated from thes value and shall satisfy the following Condition X - 0.6 R Minimum Value specified in Table No. 1	IS: 2185 (Part-3)-1984 (Reaffirmed-2020) Table No.1, Clause No. 4.1, 8.3, 8.4, 8.5, 11.2, 11.3, 11.41 Page No.7
			Average Block Dry Density	551to 650 Kg/m^3	
			Thermal Conductivity	Shall not exceed 0.24 W/m-k	
			Drying Shrinkage	Not more than 0.05%	
			Tolerance in dimension	Length - Not more than ± 5 mm Width & Height } Not more than ± 3 mm	

21 (b)	AAC Block Jointing Mortar		Color	Grey	
			Pot Life	1to 2 Hours.	
			Tensile Spilting Strength	0.30 to 0.80 or more N/mm^2	
22	Paver Block	One Sample From lot	Dimension Tolerance	Thickness< 100mm length - ± 2 mm Width-± 2 mm Thickness-± 3 mm	IS: 15658-2021 Table No.2, Clause No. 7.2, Page No.4
				Individual / **Average**	IS: 15658-2021 Table No. 3, Clause No 7.3 and 9.1.4, Page No 5
			Water Absorption (Max.) in%	Individual: 7% Average: 6% AnnexC	
			Compressive Strength, Mpa (Min.)	Individual: fck-3 Average: fck-0.825 X Established Standard Deviation AnnexD 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	Annexure F	
				3.0 Mpa for grades M40	3.6 Mpa for grades M40		
			Flexural Strength, Mpa (Min.)	0.10 fck	0.11fck	Annexure G	
			Abrasion Resistance mm^3 per 5000 mm^2 (Max.)				
			Dry	20000	18000	Annexure E	
			Wet	22000	20000		
			Thickness of Wearing Layer	Minimum 6mm			
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 Steel Institute) {2) IS Code: 6913-1973 (Reaffirmed 2013)
			Chromium(Cr)	17.00- 20.00 %			
			Nickel (Ni)	9-13%			
			Manganese(Mn)	Max.2%			
			Silicon (Si)	Max.1%			
			Carbon (C)	Max. 0.08%			
			Phosphorus (P)	Max. 0.045%			
			Tensile Strength {Mpa)	510-705 N/mm^2			

24	Structural Steel	One Sample From Lot for each shape		**Structural Steel**	**Steel Tubes (Structural Steel)**	IS : 1161-2014 (Reaffirmed 2019)
			Chemical Composition	C Mn S P	Si CE	IS :2062 (Reaffirmed 2016)1 Table No.1 Clause 5.8.1
				Acceptance as per IS code 2062 Table No.1 Clause 5.8.1/5.8.2		
			Tollerence	IS : 2062-2011 (Reaffirmed 2016) Clause No. 16 Page No. 8	IS : 1161-2014 (Reaffirmed 2019) Clause 6.2 , Page No. 3	
			Tensile Strength Mpa (Min.)	IS : 2062-2011 (Reaffirmed 2016) Table No.21 Clause No. 51 10.31 10.3.11 11.3.11 12.21 12.41 Page No.4	IS: 1161-2014 (Reaffirmed 2019) Table No. 21 Clause No. 3.11 11.21 page No.4	
			Yield Strength Mpa (Min.)			
			Elongation in Gauage Length (Min.)			
			Weight of Steel	IS: 808 (Reaffirmed 2021)		

25	Tiles			Test Req. for tiles with W.B E S 0.08% **(Group B** Ia) Table No.9	Test Req. for tiles with W.B 0.08 < E S **3(Grou p B Ib)** Table No.8	Test Req. for tiles with W.B3< ES **6(Grou p B IIa)** Table No.7	Test Req. for tiles with W.B6< E S 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 %	!verage s 0.08, Individual 0.1 Max.	Average 0.08< E S 3, Individu al3.3 Max.	Average 3<ES 6, Individu al6.2 Max.	Average 6<ES 10, Individu al10.5 Max.	Average> 10% (When the Value exceed 20 %shall be indicated by the manufactu re	
			Modulas of Rupture N/mm2	Average 35, Indivudual 32, Min.	Average 30, individu al27 Min.	Average 22, individu al20 Min.	Average 18, individu al16 Min.	12, Min. for Thickness 7.5 mm 15, Min. for Thickness < 7.5 mm	

			Breaking Strength (N)	1700Min. for Thickness < 7.5mm 1300 Min. for Thickness 7.5 mm	700 Min. for Thickness < 7.5mm 1100 Min. for Thickness 7.5 mm	600 Min. for Thickness < 7.5mm 1000 Min. for Thickness 7.5 mm	500 Min. for Thickness < 7.5mm 800 Min. for Thickness 7.5 mm	200, Min. for Thickness < 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 1to v[3]	Min.Ciass II	Min.Cia ss II	Min.Cia ss II	Min.Cia ss II	Min.Ciass II
			Coefficient of linear thermal expansion from ambient temperature to 100 c	Max 6 X 10-6	Max7 X 10^{-6}	Max9 X 10^{-6}	Max9 X 10^{-6}	Max9X 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.Min. 0.55 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	Min5	Min4	Min4 Min. 3
			Bulk Density	Min. 2.2 g/cc	Min. 2.2 g/cc	-	
			Dimension				
			(a) The Deviation , in percent of the average size for each tile (4 side)from the work size	NS 20 em ± 0.3 N>20 em- ± 0.1	NS 20 em ± 0.3 N>20 em-± 0.1	NS 20 em ± 0.3 N>20 em-± 0.1	NS 20 em ± 0.3 N>20 em-± 0.1 NS 15 em ± 0.2 N > 15 em- ± 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)	NS 20 em ± 0.2 N>20 em- ± 0.1	NS 20 em ± 0.2 N>20 em-± 0.1	NS 20 em ± 0.2 N>20 em-± 0.1	NS 20 em ± 0.2 N>20 em-± 0.1 NS 15 em ±0.3 N > 15 em- ±0.2

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

			(b) Edge of curvature related to corresponding Work Size	Ns 20 em ± 0.75 N>20 em- ± 0.5	NS 20 em ± 0.75 N>20 em-± 0.5	NS 20 em ± 0.75 N>20 em-± 0.5	NS 20 em ± 0.75 N>20 em-± 0.5	± 0.3
			(c) Warpage, related to the Diagonal Calculated From the Work Size	Ns 20 em ± 0.75 N>20 em- ± 0.5	NS 20 em ± 0.75 N>20 em-± 0.5	NS 20 em ± 0.75 N>20 em-± 0.5	NS 20 em ± 0.75 N>20 em-± 0.5	± 0.3
			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 cleanung agent containing Hydrofluroic acid and its Compounds	Class AA Min.	Class AA Min.	Class AA Min.	Class AA Min.	Class AA Min.	
			Resistance to acid and alkali with the exception of hydrofluroic acid and its Compound	I 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 confirm 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 Pozzolona 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.**

U} 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+2hrs	22	33	**37**
672 + 4 hrs	33	**43**	**53**

3.1.1 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 **HOPE** 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 consists 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 in a space of atleast 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 Colored 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*
10mm	100	100	100	100
4.75mm	90-100	90-100	90-100	95-100
2.36mm	60-95	75-100	85-100	95-100
1.18mm	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

IS Sieve	*Percentage Passing*
10mm	**100**
4.75mm	**95-100**
2.36mm	**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 11)-1963 (Reaffiremed-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 (Reaffiremed-2021)	Colour of the liquid shall be lighter than that indicated by the standard specified in IS 2386 (Part II) -1963 (Reaffiremed-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

Grading of sand for use in masonry mortar (IS *2116-1980, Reaffirmed 2017)*		*Grading of sand for use in plaster* ns 1542-1992 Reaffirmed-2019))	
/S *Sieve Designation*	*Percentage passing by mass*	/S *Sieve Designation*	*Pecentage passing by mass*
10mm	100	10mm	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).

APPENDIX '8'

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 forth is 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.

APPENDIX 'C'

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. Thevolume 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 offthe 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 ofthe height of sand below. The sand containing more than the above allowable percentage of silt, shallbe 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
20mm	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: sandshall confirm to specification M-6.

PROPORTION OF M1x:

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 mil in an even layer and ground for 180 revolutions with sufficient water. Water shall be added as required during grinding (carebeing 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 asdecided 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 theuse of mechanical mixers or where item involving small quantities are to be done or if in his opinion theuse 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 mixtureof 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 form the best black trap of equivalent hard stone as approved. Aggregate shall have no deterious 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 1Omm 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 Smm less than the minimum clear distance between the main bars or Smm less than the minimum cover to the reinforcement whichever is smaller.

Table

IS Sieve Designation	Percentage passing for single sized aggregate of Nominal size.		
	40mm	20mm	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 form 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 ofparticularquarries are mentioned, aggregates shall be machine crushed form 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 toensure 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 brunt 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 form 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 form 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 ± 80mm,
Width 2200 ± 40mm,
Height 1400 ± 40 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 itsstrength and appearance. As far as possible stones shall be of uniform colour, quality or texture. Generally stone shall not contain crypst crystalline silica or chart, mica and other deleterious materialslike 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 percentageof 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 Percentage by weight*	*Minimum Compressive Strength kg.lsq.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 1)-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/Cm^2 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 form 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 TMTshall be cold twist or rolled and shall conform to IS1786-2008 (Reaffirmed 2018) or its relevant and latest edition respectively.

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

First Class teak wood shall have no individual hard and sound knots, more than 6 sq. em. 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. em. 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.

Forthis 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 of 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 1)-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 1)-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 halfthe 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-l)-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-l)-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-l)-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 indepth 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 ofthe 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 togetherthin 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 fussily 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 befurtherclassified into sixtypesnamelyAA,AB,AC, BB, BCand 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 of in the special provision or as shown in the detailed drawings. The thickness of glass panels shall be uniform. The specification ford ifferent 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 lessthan 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 oras 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 that 6 mm. Wired glass shall be of type and thickness as specified.

M-28 Particle Board: 1.5. 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 ofthe metal as specified in the item of its specification.

They shall be S.S.304grade, 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 framewith screws. At the other end the holdfast shall be forked and bent at right angles in oppositedirection.

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 form 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 of 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) 01L PAINTs: IS 2933(Part-1)-2013 (Reaffirmed 2018)

Oil paints shall be of the specified colour and shade and as approved. The ready mixed paintsshall 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 redispressed 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 (8) 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

3.5.1The 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,Piastered 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 manufactureofwhich no pigments are used cement inthe manufacture oftiles 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 1:3by 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 tilesbe three parts of cement to one parts of chips by weight. The minimum thickness ofwearinglayer 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 continuouslyat least for seven days and subsequently, it necessary, for such long period as would ensuretheir 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 andshall be reasonable parallel to the back face of the tile. all angles shall be right and all edgesshall be sharp and true.

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

Tolerance if length and breadth shall be plus or minus one millimeter. Tolerance on thicknessshall 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(8) 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 toi.S. 1237-2012 (Reaffirmed 2017).

The pigments used for colouring cement shall not exceed 10 percent by weight of cement usedin the mix. The pigments synthetic or otherwise, 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 wearingface a few samples with or without their full size photographs as directed shall be presented tothe Engineer-in-charge for approval.

Any particular samples it 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 Portlandcement generally depending upon the colour of tiles to be used or as directed.

32.4(0) 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 inthe 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 form the top of the chequers shall not be less than 6 mm. the tiles shall be given the first grinding with machine before delivery to site.

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 infollowing 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 includingthe 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 of 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/CeramicNitrified Tiles (Pressed Ceramic Tiles)

The above tiles shall confirm 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-Ciamps, 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-1)-1994 (Reaffirmed 2017), IS 2556 (Part-IV)-2004 (Reaffirmed 2019) and IS 771(Part-1)-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 overflow 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-1)-1994 (Reaffirmed 2017), IS 2556 (Part-11)-2004 (Reaffirmed 2019) and IS 771(Part-1)-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 confirm 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 though 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 offirst quality shall conform to IS 2556 (Part- 1)-1994 (Reaffirmed 2017) & IS 2556 (Part 111)-2004 (Reaffirmed 2019) and IS 771(Part-1)-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-1)-1979 (Reaffirmed 2017) and IS2556 (Part 111)-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. Panshall 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 shallbe provided with the water closet.

M – 44 Flush Cock:

44.1 Halfturn flush cock (heavy weight) shall be of chromium plated bass 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 antisyphonage 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.	2m 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 1Omm.

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 form 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 deepseal 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 stuckwith 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 Cl cover with frame inside dimensions 300 mm x 300 mm the cover weighing not less than 4.53 Kg and the fame 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 beless 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 (MOD) 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 is 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:

Nominal1000 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 inperfections. 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.

GENERAL SPECIFICATIONS FoR THE ITEMS To BE ExECUTED

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 be build 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 bepaid.

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 then 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.Sm depth shall be measured under this item.

5.1 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 scarifies 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 pneumaticdrills or any other suitable means.If contractor desires to resort to blasting, he can do so with permission of the Engineer in charge butnothing 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 suchas 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 wherethe 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 ofexplosive 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 firingwarning 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 todepths greater then 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 isdone with powder, the fuse cut to the required length shall be inserted in the holes and the powderdropped in. The powder shall be gently tamped with copper rod with rounded ends. Theexplosion 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 openends. 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 andexplosive 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 berequired 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 bedrilled at about 45 em. from the old and fired. This should blast the old charge the procedureshall be repeated till the old charge is blasted.

In case of charge of gelatin, dynamite etc., the man in charge shall gently remove the tampingand 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 stickin the hole. Another hole may then be drilled 15 em. away and parallel to it. The man in chargeshall report to the office all cases of misfire and cause of the same and what steps were takenin 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 inspectionto 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 entitledfor 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. Rateof 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 willnot 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 theparticular classification and will be paid to as extra work at rate to be decided underthe 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 em. thickness including watering, ramming and consolidating etc., complete. For (A) In foundation & plinth, (B) In campus.

1.1 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 our 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 thebore 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 aggregate40 mm. nominal size shall conform to M-12.

2.1 Workmanship

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

2.3 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.

2.4 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 washedwith 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 oras 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 watertight 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 showlling 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), IS2514-1963(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 inwriting 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 periodof 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 workin 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 brickaggregate 40 mm. nominal size) and curing complete excluding the cost of form workin 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(8)] 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 chhajas.

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/mm2)	Total quantity of dry aggregate by volume per 50 Kg. of cement to be taken as the sum of individual volume affine 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 1:1% and lower limit 1: 2%	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 (1:1% :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 isjust 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 ofthe minimum thickness of the member, provided that the concrete can be placedwithout 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 em 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 bases of its dry volume and in case of dampness allowances for bulkage 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 orfor certain other reasons, it shall be done on the smooth watertight platform large enough to allow efficient turning over the ingredients of concrete before and after adding water. Mixing platform shall be so arranged that no foreign material gets mixed with concrete nor does the mixing water flow out. Cement in required number of bags shall be 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 3times 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 mixtureshall 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.

Placing Conditions	*Degree of Workability*	*Slump (mm)*
(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 be 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 flowwill 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 form 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 of 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 comers 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 (Reaffrimed 2018). A random sampling procedure shall beadopted 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-S 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 be means of timber template with slots accurately out 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 fo 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 not 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 place. 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 not 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 transit the full stresses of bars. The ends of the bar that arejoined by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is notless 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 butt-welded so as to transit 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 ofthe 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 this 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 workincluding 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 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 strusts, 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 toM-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 offoundation level up to floor two level, (C) Stabs, 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 ofform work but excluding the cost of reinforcement for R.C.C. work in: (I) slabs up to 8 ems. thickness. (II)slabs having more than 8 ems. and up to 10 ems. (III) slabs having more than 10 ems. and 13 ems. thickness (IV) slabs having more than 13 ems. and up to 15 ems. 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 ems. thickness.(II) slabs more than 8 ems. and up to 10 ems. (III) Slabs more than 10 ems. and up to 13 ems. (IV) Slabs more than 13 ems and up to 15 ems.

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)Siabs up to 8 ems. thickness. (II) Slabs more than 8 ems. and up to 10 ems. (III) Slabs more than 10 ems. and up to 13 ems. (IV) Slabs more than 13 ems and up to 15 ems.

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 ems. thickness.(II) slabs more than 8 ems. and up to 10 ems. (III) Slabs more than 10 ems. and up to 13 ems. (IV) Slabs more than 13 ems and up to 15 ems.

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 gradesstone 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 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 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 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-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 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-200 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 aggregate20 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 1:1%:3 (1 cement : 1% 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. 1:1%: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.

SECTION 3
Masonry Work

1[6.13(8)] 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 ofthe 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 1: 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 leastperiod that corresponds to complete soaking will be the one to be allowed for in construction work.

Note II : Ifthe 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. It's 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'sspirit 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 ofthickness greater than 23cms shall be kept in truly plumb in both faces. No part ofthe 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 otherwisedirected 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 1Omm. 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 referonly 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 m^2 in section;
(b) Opening up to 0.1 m^2 in area
(c) Wall plates, bed plates, and bearing of slabs, chajjas and the like, where thickness does not exceed 10 em 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 em 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(8)] Brick work using common burnt clay building bricks having crushing strength not less than 35 Kg/ Sq. em 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 confirm 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(8)] Brick work using common burnt clay building brick having crushing strength not less than 35 Kg./Sq. em. 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.(8)] 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 m^2 in section;
(b) Opening up to 0.1 m^2 in area;
(c) Wall plates, bed plates, and bearing of slabs, chajjas and the like, where thickness does not exceed 10 em 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 em 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(8)] Brick work using common burnt clay building brick having crushing strength not less than 35 Kg./Sq. em. 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(8)] shall be followed except that brick masonry work shall be laid in cement mortar1 :5 (1 cement: 5 coarse sand) and carried out with conventional bricks.

Mode of measurement & payment

The relevant specification of item No. [6.15(8)] 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(8)] 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. em. 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 em.

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. em. 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. em. 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(0)] Half brick masonry in common burnt clay building brick having crushing strength not less than 35 Kg./Sq. em. 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. em. 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 em.

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 brickwork 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 em. 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. of6mm 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 em.

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.

3.1 Mode of measurements :

3.2 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.

3.3 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 otherwiseindicated, 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. em 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 em and a line of headers shall be provided for walls thicker than 60 em 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 still level, roof level and any other level specifically shown in the drawings. This may be done first by adjusting the laying of stone to one level and then by providing leveling coarse of cement concrete 1:6:12 (1 cement : 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 any where 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 racked 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 piecebond stones may give rise to dampness. For all thicknesses of such walls a set of two or more bondstones overlapping each other by at least 15 em 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 than225 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 em. 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. Theholes 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, purllins trusses, corbel etc. each upto 500 sq. em. in section.
(b) Opening each upto 0.1 sq. m.
(c) Wall plates and bed plates, bearing of chhaja and like upto 10 em. 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 cheses in masonry upto section of 350 sq. em.

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 plinthin 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 sking. The thickness of bela or block shall not be less than 15 ems. 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 stonesshall 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 all 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 chhajas and like upto 10 ems. 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 ems. 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 mansonry (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 concrete1:3:6 mix. (1 cement: 3coarse sand: 6graded 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 shallconfirm to M-3
The solid cement concrete block Grade C(5.0) shall be precast with concrete of 1:3:6 mix (1cement : 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 partsby volume of

combined aggregate.
The actual size of the block shall be 31em X 20cm X 19cm and 31em X 15cm X 19cm.
The blocks shall be machine made only. The concrete block manufacturing & physicalrequirement shall be in accordance with IS 2185 (part I)-2005 (Reaffirmed 2020)
The maximum variation in length shall be± 5mm and in width & height shall be ± 3mm 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 plied on planks or other supports free from contact with ground and covered to protect against wetting.
Cement mortar proportion 1:6 shall confirm 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 masonary 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 loose opts plasticity, thereby resulting in poor bond. For most of the work, the joints both horizontal & vertical shall be 1Omm thick except in case of extended the 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 masonary 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 masonary for supporting shall be allowed.

Curing
The curing of concrete block masonary 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 bookletfor 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 usingexpensive grout admixture" CICO Grant-" C" or equal approved etc. complete as specified.

8[7.6(8)] Precast concrete block masonary in partition walls 10cm. Thick with solid block of approve size (20cm X 1Ocm 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 confirmto 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 masonary 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 loose opts plasticity, thereby resulting in poor bond. For most of the work, the joints both horizontal & vertical shall be 1Omm thick except in case of extended the 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 masonary unit and obtain a weather tight joint.

Quoins and closers special quoins blocks (with a return face equal to half of the length of normalface) 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 masonary for supporting shall be allowed.

Curing
The curing of concrete block masonary 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 bookletfor 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 usingexpensive 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 ofthe 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 frt 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 1Ommshort 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 ofmortar joints, they will produce wall length sand 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 accordingto 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 Clime specified as IS 712-1984 (Reaffirmed 2019).

The aggregate used for the manufacture of Autoclave Aerated Concrete Block shall conformto 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 frommatter 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 tobe 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 twelveblock 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 -1block 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 of6 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 averagerange a calculated from these values and shall satisfy the following condition:

X- 0.6 R> 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 oneor more specimens fail to satisfy the requirements, the remaining 3 blocks shall be subjected tothese 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 atlintel 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 reinforcementshall 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 em. 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 m^2 in section;

(b) Opening up to 0.1 m^2 in area (see Note);

(c) Wall plates, bed plates, and bearing of slabs, chajjas and the like, where thickness does not exceed 10 em 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 em 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 andmeasured 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 ofthe same for in situ reinforced concreteand 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. Itshall 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 waii/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 madeform 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 incantilever 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 ofthe 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 sawdust 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 ofform work which will be approved by Engineer-in-Charge.

Shuttering surface before concreting should be free from any defect/ deposits and full cleaned soas 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 ..... 16to 24 hours
(b) Beam soffits (props. left under) ....7 days
(c) Removal of props slabs
(i) Slabs spanning up to4.5 m..... .....7 days
(ii) Spanning over4.5 m..... ..... 14days
(d) Removal of props to beams and arches:
(i) Spanning upto 6 m 14days
(ii) Spanning over6 m..... ..... 21days

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 sufficiency hardened.

Scaffolding:
All scaffolding, hoisting arrangements and ladders etc. required for the facilitating of concerting 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 ofthe 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 , strinking 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 inthe 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 supportingfloor 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 ofthe same for in situ reinforced and plain concrete in chullah hoods, weather sheds, chhajas, 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, chhajas, 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(0)] 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 stringersexcluding 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 sheating 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 ofform work ofthe respective item ofform 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 shallbe 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 preservation before jointing. Preservative treatment of timber shall be done as per IS 401-2001 (Reaffirmed 2016) in aplant approved by the Engineer-in-Charge.

Frames:

All members offrames 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 verticalposts of the frame in the ground floor shall be embedded in the sill masonry for 10 em. 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 em 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 em. 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 TeakWood.

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 em 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 x 16 mm (For External Door)
(2) Aldrops.	1 Nos. - 250 mm x 16 mm (For Internal Door)
(3) Tower bolt	1 Nos. - 200 mm x 10 mm (For All Door)
(4) Tadi	1 Nos. - 200 mm x 16 mm (For Internal Door)
(5) Handle	2 Nos. - 150 mm long x 1Omm 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 wrap in its plane

1.4 The tolerance in size of solid core type flush door shall be as under in normal thickness ± 1.2mm in normal height ± 3mm

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 be 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 em. x 7 em. 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 em x 7 em. 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 em 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 x 16 mm (For External Door)
(2) Aldrops.	1 Nos. - 250 mm x 16 mm (For Internal Door)
(3) Tower bolt	1 Nos. - 200 mm x 10 mm (For All Door)
(4) Tadi	1 Nos. - 200 mm x 16 mm (For Internal Door)
(5) Handle	2 Nos. - 150 mm long x 1Omm 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 em. x 7 em. 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 of12 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 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 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 1Omm 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 upto 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 andbalcony/verandah flooring, suitable tile drop or as shown in drawing will be given in addition to requiredslope 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 theiredge 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 em 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(8)] Ceramic glazed tiles 8 to 1Omm 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 oftile 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 em. Height shall be measured correct to a em 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 1Omm 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 ofcement 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 nahni 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(8)] 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 1Omm 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 form straight edge butted against it. Beyond this depth, the sides may be dressed slightly splayed so as to from 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. Itshall be than laid on top, pressed and so that all hollows underneath filled surplus mortar works up through the joints. The top shall be tapped and brought level to the adjoining slab.
The thickness of the joints shall not exceed 5 mm. Subsequent slabs shall be laid in the same manner.

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 shallstart 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 of7 days, if required ponding is done for a minimum period of7 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 ofcement 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 notbe 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 em 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 incement 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 awatch on the curing period.

Mode of Measurements

Length and breadth of the flooring shall be measured correct to a em 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 bythe 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 toM-1, Cement mortar shall be confirm toM-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 1Omm 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 & 1Omm.

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 toM- 1, Cement mortar shall be confirm toM- 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 1Omm 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 1Omm 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 wooden mallet 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 ofcement 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 Smm 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(0)] 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 toM- 57.

Dressing

The slab shall be rectangular or square and specified dimensions. The tolerance of the length and width shall be ± 2mm and on thickness ± 1mm. 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 O.Smm.

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(8)] 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 toM- 57.

Workmanship
The relevant specifications of item No. [14.3(8)] 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(8)] 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 toM- 57.

Workmanship

The relevant specifications of item No. [14.3(8)] 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 1Omm 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(8)] shall be followed.

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

15[14.7(0)] 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 toM- 57, High polymer modified quick set adhesive(Water based) shall confirm IS 15477-2019.

Workmanship

The relevant specifications of item No. [14.6(8)] 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 1Omm 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 quicksettile 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(8)] 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 pnumatic 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 confirm to M-6, Paver block confirm toM-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:

a) Installation of sub-surface drainage structures.
b) Levelling and compaction of sub-grade and profile checking.
c) Provision and compaction of sub-base course (where needed)
d) Provision and compaction of base-course and checking for correct profile.
e) 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 (1Omm 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 em. 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.1Omm 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 that 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 unto 20 ems. 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 15-2645 and 1Omm 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 1Omm 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 1Omm thick joint less cement plaster of mix 1:3 (1 cement : 3 coarse sand) admixed with proprietary water proofing compound conforming to 15-2645 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 change.

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 1Omm 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/gala 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 nonecessity 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/gala, and the remaining small portion of parapet wall and also inside the groove. Then after 1Omm 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 ofcuring 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 facia 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 facia patti must be 25mm wide and fixed with adhesive material.
The facia 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 facia patti.

19[14.11] Providing and fixing both side prepolished single piece machine cut 25mm thick KOTA STONE shelve/ 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 masonary.

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 aneven 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 sideway 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 form 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 that 15 em to any corners of arises. It shall not be closed on the body of features such as plaster bands and cornices nor at the corners or arises. 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 thejunction. The plastering of walls and beam/column in one vertical plane should be carried out inone 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. Flewing 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 followings 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 tow 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 confirming 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(111)] Extra over item 17.58(1) to 17.58(4) for interior plastering above floor two level forevery 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 then 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 masonary.

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 andcare 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 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(8)] 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(0)] 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 atrowel 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 ems x 10 ems) 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 ems x 10 ems 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 DOL 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 em 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 observedthe 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 andanother 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 surfaceshould 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 fixturesshall 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

The relevant specifications of item No. [18.11] shall be followed except that this work is for extra coat over and above two coats on wall surface.

Mode of measurements & payment
The relevant specifications of item No. [18.11] shall be followed except that the payment of subsequent coat shall be made extra over and above the item No. [18.11] for every subsequent coat applied.

3[18.13] Colour washing with lime on undecorated wall surfaces (two coats) over and including priming coat of white washing to give even shade including thoroughly brooming the surface to remove all dirt, dust, mortar drops and other foreign matter. The relevant specifications forthe materials 18.11 shall be followed except that it shall be for colour wash.

Materials
The relavent specification of item no.[18.11] shall be followed except colour pigment shall be added as specified.

Workmanship
Preparation of the colour wash with pigment shall be as under:

(a) With Yellow and Red Ochre:
Solid lumps if any in the powder shall be crushed to powder and solution in water prepared and then added to white wash sieving it through a coarse cloth, mixed evenly and thoroughly to white wash in small quantities till the required shade is obtained.

(b) With Blue Vitriol:
Fresh crystals of hydrous copper sulphate (i.e. blue vitriol) shall be ground to fine powder and dissolved in small quantity of water. Sufficient quantity of solution enough to produce the colour wash of required shade shall be strained through a clean cloth, the filtrate being mixed evenly and thoroughly to the white wash.

(c) Colour wash from other colouring pigment shall be prepared in accordance with the instructions of the manufacturer.

Mode of measurements and payment :
The relevant specifications of item No. [18.11.] shall be followed.
The rate shall be for a unit of one sq. meter.

4[18.14] Extra over item No. 18.13 for every subsequent coat of colour wash with lime on wall surfaces.

Materials and workmanship
The relevant specifications of item No. [18.13] shall be followed except that this work is for extra coat of colour wash over and above two coats on wall surface.

Mode of measurements & payment
The relevant specifications of item No. [18.13] shall be followed except that the extra payment for every subsequent coat of white wash shall be made over and above the rate of item no. [18.13].
The rate shall be for a unit of one sq. meter.

5[18.15] Distempering with dry (water bound) distemper of approved brand and manufacture (two coats) and of required shade on undecorated wall surfaces to give an even shade, over and including a priming coat of white washing after thoroughly brooming the surface free from mortar droppings and other foreign matters.

Materials
The dry distemper and primer shall be of approved brand and manufacture. The dry distemper shall be of required colour and shade and the same conform to I.S. 427-2013 (Reaffirmed 2018) or its relevant and latest edition. Whiting shall conform to I.S. 63-2006 (Reaffirmed 2021) or its relevant and latest edition. The shade shall be got approved from engineer in charge before application of the distemper. Dry distemper colour as required shall be stirred slowly in clean water using 6 decilitres (0.6 litre) of water per Kg of distemper or as specified by the makers. Warm water shall preferably be used. It shall be allowed to stand for at least 30minutes (or if practicable overnight) before use. The mixture shall be well stirred before and during use to maintain an even consistency. Distemper shall not be mixed in larger quantity than is actually required for one day's work.

Preparation of Surface

Before new work is distempered, the surface shall be thoroughly brushed free from mortar droppings and other foreign matter and sand papered smooth.

New plastered surfaces shall be allowed to dry completely, before applying, distemper.

In the case of old work, all loose pieces and scales shall be removed by sand papering. The surface shall be cleaned of all grease, dirt, etc.

Pitting in plaster shall be made good with plaster of paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of the distemper shall be applied over the patches.The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied.

Priming Coat

A priming coat of whiting (see 18.11) shall be applied over the prepared surface in case of new work, if so stipulated in the description of the item. No white washing coat shall be used as a priming coat for distemper.

The treated surface be allowed to dry before distemper coat is given.

Application

In the case of new work, the treatment shall consist of a pnm1ng coat of whiting (As per 18.11) followed by the application of two or more coats of distemper till the surface shows an even colour.

For old work, the surface prepared as described in para 18.11 shall be applied one ormore coats of distemper till the surface attains an even colour.

The application of each coat shall be as follows:

The entire surface shall be coated with the mixture uniformly, with proper distemper brushes (ordinary white wash brushed shall not be allowed) in horizontal strokes followed immediately by vertical ones which together shall constitute one coat.

The subsequent coats shall be applied only after the previous coat has dried.

The finished surface shall be even and uniform and shall show no brush marks.

Enough distemper shall be mixed to finish one room at a time. The application of a coat in each room shall be finished in one operation and no work shall be started in any room, which cannot be completed the same day.

After each day's work, the brushes shall be washed in hot water and hung down to dry. Old brushes which are dirty or caked with distemper shall not be used.

The specifications in respect of scaffolding, protective measures, measurements and rate shall be as described under 18.11.

Mode of measurements and payment

Priming coat of distemper primer, scraping of surface spoiled by smoke soot, removal of oil and grease spots, treatment for infection of efflorescences, mouldmoss, fungi, algee and litchens and patch repairs to plaster shall be included in this item for which nothing extra shall be paid.

All the work shall be measured net in the decimal system as in places subject to the following limits unless otherwise stated hereinafter:

(a) Dimensions shall be measured to the nearest 0.01 m.

(b) Area in individual items shall be worked out to the nearest 0.01 sq. m. All work shall be measured in sq. metre. No deductions shall be made for ends of joints, beams, posts etc., and openings not exceeding 0.5 sq. mt. each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings nor for finish around the ends of joints, beams, posts etc.

Deductions or openings exceeding 0.5 Sq. m. but not exceeding 3 sq. m. each shall be made as follows and no addition shall be made for reveals, jambs, soffits etc. of these openings:

(a) When both the faces of walls are provided with the same finish deductions shall be made for one face only.

(b) When each face of wall is provided with different finish, deduction shall be made for that of frame for door, windows etc., on which width of reveal is less than that of the other side but no deductions shall be made on the other side. Where the width of reveals on the both the faces of wall are equal, deduction of 50% of area of opening on each face shall be made from area of finish.

(c) When only one face of wall is treated and the other face is not treated, full deductions shall be made if the width of the reveal on treated side is less than that on untreated side but if the width of the reveals is equal or

more than that of untreated side neither deductions nor additions to be made for reveals, jambs, soffits, sills etc.

In case of openings of area exceeding 3 sq. m. each, deduction shall be made for openings, but jambs, sill sand soffits shall be measured.

No deduction shall be made for attachments such as casing, conduits, pipes, electric wiring and the like.

Item includes removing nails, making good holes, cracks, patches with materials similar in composition to the distemper.

The rate includes cost of all materials, labour, scaffolding, protective measures etc. involved in all the operations described above. This shall also include conveyance, delivery, handling, unloading, storing etc. & also include for any height & floor.

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

6[18.16] Extra over item 18.15 for every subsequent coat of distemper with dry distemper of approved brand and manufacture.

Materials & workmanship

The relevant specifications of item No. [18.15] shall be followed except that the extra work for applying subsequent coat of dry distemper is to be carried out over and above the work of item No. [18.15]

Mode of measurements and payment

The relevant specifications of item No. [18.15] shall be followed except that extra rate shall be paid for every subsequent coat applied over and above the rate of item No. [18.15].
The rate shall be for a unit of one sq. meter.

7[18.17] Extra over item 18.15 for distempering with dry distemper on ceiling and sloping roofs.

Materials & workmanship

The relevant specifications of item No. [18.15] shall be followed except that extra rate shall be paid for carrying out work on ceiling / sloping roofs of undecorated surface.

Mode of measurements and payment

The relevant specifications of item No. [18.15] shall be followed except that extra rate shall be paid for carrying out work on ceiling / sloping roof on undecorated surface over and above the rate of item no. [18.15].
The rate shall be for a unit of one sq. meter.

8[18.18] Distempering (two coats) with oil bound distemper of approved brand and manufacture and of required shade on undecorated wall surfaces to give an even shade, over and including a priming coat with distemper primer of approved brand and manufacture after thoroughly brushing the surface free from mortar droppings and other foreign matterand also including preparing the surface even and sand papered smooth.

Materials

Oil bound washable distemper and primer shall be approved brand and manufacture. The distemper shall be required colour and shade and the same shall conform to I.S. : 428-2013(Reaffirmed 2018) or its relevant and latest edition.
Oil emulsion (Oil Bound) washable distemper (IS 428-2013(Reaffirmed 2018)) of approved brand and manufacture shall be used. The primer where used as on new work shall be cement primer or distemper primer as described in the item. These shall be of the same manufacture as distemper. The distemper shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer.Only sufficient quantity of distemper required for day's work shall be prepared.

The distemper and primer shall be brought by the contractor in sealed tins in sufficient quantities at a time to suffice for a fortnight's work, and the same shall be kept in the joint custody of thecontractor and the Engineer-in-Charge. The empty tins shall not be removed from the site of work,till this item of work has been completed and passed by the Engineer-in-Charge.

Preparation of the Surface

For new work the surface shall be thoroughly cleaned of dust, old white or colour wash by washing and scrubbing. The surface shall then be allowed to dry for at least 48 hours. It shall then be sand papered to give a smooth and even surface. Any unevenness shall be made good by applying putty, made

of plaster of paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry.

In the case of old work, all loose pieces and scales shall be removed by sand papering.The surface shall be cleaned of all grease, dirt etc.

Pitting in plaster shall be made good with plaster of paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of the distemper shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied.

Application

Priming *Coat:* The priming coat shall be with distemper primer or cement primer, as required in the description of the item. The application of the distemper primer shall be as described in [18.15]

Note: If the wall surface plaster has not dried completely, cement primer shall be applied before distempering the walls. But if distempering is done after the wall surface is dried completely, distemper primer shall be applied.

Oil bound distemper is not recommended to be applied, within six months of the completion of wall plaster. However, newly plastered surfaces if required to be distempered before a period of six months shall be given a coat of alkali resistant priming Paint conforming to IS 109: 2017 and allowed to dryfor at least 48 hours before distempering is commenced.

For old work no primer coat is necessary.

Distemper *Coat:* For new work, after the primer coat has dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the distemper, taking care not to rub out the priming coat. All loose particles shall be dusted off after rubbing. One coat of distemper properly diluted with thinner (water or other liquid as stipulated by the manufacturer) shall be applied with brushes in horizontal strokes followed immediately by vertical ones which together constitutes one coat.

The subsequent coats shall be applied in the same way. Two or more coats of distemper as are found necessary shall be applied over the primer coat to obtain an even shade.

A time interval of at least 24 hours shall be allowed between successive coats to permit proper drying of the preceding coat.

For old work the distemper shall be applied over the prepared surface in the same manner as in new work. One or more coats of distemper as are found necessary shall be applied to obtain an even and uniform shade.

15 em double bristled distemper brushes shall be used. After each days work, brushes shall be thoroughly washed in hot water with soap solution and hung down to dry. Old brushes which are dirty and caked with distemper shall not be used on the work.

The specifications in respect of scaffolding, protective measures and measurements shall be as described under [18.11].

Mode of measurements and payment

Priming coat of distemper primer, scraping of surface spoiled by stuck shoots, removal of oil and grease spots, treatment of infection of efflorescence, mould moss, fungi, algae and litchen and patch repairs to plaster shall be included in this item for which nothing extra shall be paid.

All the work shall be measured net in the decimal system as in place subject to the following limits unless otherwise stated here in after:

(a) Dimensions shall be measured to the nearest 0.01 m.

(b) Area in individual item shall be worked out to the nearest 0.01 sq. m. all work shall be measured in sq. metre. No deductions shall be made for ends of joints, beams, posts etc. and openings, not exceeding 0.5 sq. mt. each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings nor for finish around ends of joints, beams, posts etc.

Deductions of opening exceeding 0.5 sq. m. but not exceeding 3 sq. m. each shall be made as follows and net addition shall be made for reveals, jambs , soffits etc. of these openings:

(a) When both the faces of walls are provided with same finish, deductions shall be made for one face only.

(b) When each face of wall is provided with different finish , deduction shall be made for that side of frame for doors, windows etc. on which width of reveal is less than that of the other side but no deduction shall be made on the other side. Where the width of reveals on the both the faces of wall are equal, deduction of 50% of area of opening on each face shall be made from area of finish.

(c) When only one face of wall is treated and the other face is not treated , full deductions shall be made if the width of the reveal on treated side is less than that on untreated side but if the width of the reveal is equal or more than that on untreated side neither deductions nor additions to be made for reveals, jambs, soffits , sills etc.

In case of opening of area exceeding 3 sq. m. each deduction shall be made for openings but jambs , sills and soffits shall be measured.

No deduction shall be made for attachments such as casings , conduits, pipes, electric wiring and the like.

Item includes removing nails, making good holes, cracks, patches with materials similar in composition of distemper.

The rates includes cost of all materials, labours, scaffolding , protective measures etc. involved in all the operations described above. This shall also include conveyance, delivery, handing, unloading , storing work etc. & also include for any height & floor.

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

9[18.19] Extra over item [18.18] for every subsequent coal of distempering with oil bound washable distemper of approved brand and manufacture.

Materials and workmanship

The relevant specifications of item No. [18.18] shall be followed except that this work is for providing extra coat of oil bound distempering over and above two coats of distempering.

Mode of measurements and payment

The relevant specification of item No. [18.18] shall be followed except that the extra rate shall be paid over and above the rate for every subsequent coats over two coats of item no. [18.18].

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

10[18.20] Extra over item no. [18.18]for distempering with oil bound washable distemper on ceiling and sloping roofs.

Materials and workmanship

The relevant specifications of item No. [18.18] shall be followed except that the distempering shall be carried out on ceiling / sloping roofs.

Mode of measurement and payment

The relevant specifications of item No. [18.18] shall be followed except that the extra rate shall be paid for carrying out distempering work on ceiling / sloping roofs over and above the rate of item No. [18.18].
The rate shall be for a unit of one sq. meter.

11[18.21] Finishing wall with plastic emulsion paint including applying two coats of lapi, one coat of primer and two coats of plastic emulsion paint of an undecorated wall surfaces to give an approved brand and manufacture and of required shade after thoroughly brushing the surface to remove all dirt, dust, mortar drops and other foreign material.

Materials

The water shall conform to M-1. Plastic emulsion paint shall confirm to I.S. : 15489-2013 (Reaffirmed 2018) or its relevant and latest edition, Lapi shall confirm to I.S. : 63-2006 (Reaffirmed 2021) or its relevant and latest

edition and primer shall confirm to I.S. : 15489-2013 (Reaffirmed 2018) or its relevant and latest edition. Plastic emulsion paint, Primer and Lapi must be of a single or same brand of approved make of GSPHCL. The plastic emulsion paint shall be of required colour and shade.

Workmanship

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 and bottom to avoid damage or scratches to wall and flooring.

For Plastic emulsion paint, the ceiling, proper stage scaffolding shall be erected.

Where scaffolding is required, it shall be erected in such a way that as far as possible no part of scaffolding shall rest against the surface to be painted. A properly secured strong and well tied suspended platform (joola) may also be used for painting.

Preparation of surface:

The undecorated surface to be painted shall be thoroughly brushed from dust, dirt, grease, mortar dropping and other foreign matter and sand papered smooth. New plaster surface shall be allowed to dry for at least 15 to 20 days before applications of Lapi (Putty).

All necessary nails shall be removed. Pitting in plaster shall be made good with plaster again with a fine grade sand paper and made smooth. A coat of Lapi (Putty) shall be applied over the patches. The surface shall be allowed to dry thoroughly before the regular coat of Lapi (Putty) is allowed. The surface affected by moulds, moss, fungi, algae lichens, efflorescence etc. shall be treated in accordance with I.S. 2395 (Part-1)-1994 (Reaffirmed 2019) or its relevant & latest edition. Before applying Plastic emulsion paint followed by primer, any unevenness shall be made good by applying Lapi (Putty) mixed with water on entire surface including filling up the undulation and then sand papering the same after it is dry.

Lapi (Putty) :

Lapi (Putty) must be machine mixed and free from all type of lumps. The lapi (Putty) paste must be of uniform consistency. Application of Lapi (Putty) shall be done with the iron float / trowel on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards which together shall constitute one coat. This entire operation will constitute for two coats. Before applying second coat of lapi surface shall be made smooth with a fine grade sand paper. Second coat shall be allowed to dry for at least 24 hours before first coat of primer is applied.

Priming coat:

Application of primer shall be done as under.

Before starting primer lapi (putty) surface must be made smooth with a fine grade sand paper. The surface must be fare finished as uniformly possible leaving no trowel marks (Putty applicator marks). The primer shall be applied with a brush on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards which together shall constitute one coat. This entire operation will constitute one coat. The surface shall be finished as uniformly possible leaving no brush marks. It shall be allowed to dry for at least 48 hours before plastic emulsion paint is applied.

Application of plastic emulsion paint:

For undecorated surfaces, after the primer coat is dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the plastic paint, taking care not to rub out the priming coat. All loose particles shall be dusted off after rubbing. Minimum two coats of plastic emulsion paint shall be

applied with brushes in horizontal strokes followed immediately by vertical strokes which together shall constitute one coat. The subsequent coats shall be applied after a time interval of at least 48 hours between consecutive coats to permit proper drying of the preceding coat. The finished surface shall be even and uniform without patches, brush marks, paint drops etc.

Sufficient quantity of plastic emulsion paint shall be mixed to finish one room at a time. The application of a coat in each room shall be finished in one operation and no work shall be started in any room which cannot be completed on the same day.

15 em double bristled plastic emulsion brush shall be used. In the application of final coat a roller must be used to make the painted surface smooth and uniform. After day's work brushes and roller shall be thoroughly washed in hot water with soap solution and hung down to dry. Old brushes & roller which are dirty and caked with plastic emulsion paint shall not be used on the work.

Protective measurements :

The surfaces of doors, windows, floors, articles of furniture etc. and such other parts of the buildings as are to be protected from being splashed upon.

Splashes on floors etc. shall be cleaned out without delay as they will be difficult to remove after hardening.

Washing of surface treated with emulsion paints shall not be done within 3 to 4 weeks of application.

In preparation of wall for plastic emulsion paint, no oil base putty shall be used in filling cracks, holes, etc.

Mode of measurements and payment

Two coats of Lapi (Putty), One coat of primer, scraping of surface spoiled by stuck shoots, removal of oil and grease spots, treatment of infection of effloresces, mould moss, fungi, algae and litchen and patch repairs to plaster shall be included in this item for which nothing extra shall be paid.

All the work shall be measured net in the decimal system as in place subject to the following limits unless otherwise stated herein after :

Dimensions shall be measured to the nearest 0.01 m.

Area in individual item shall be worked out to the nearest 0.01 sq. m. all work shall be measured in sq. metre. No deductions shall be made for ends of joints, beams, posts etc. and openings, not exceeding 0.5 sq. m. each and no addition shall be made for reveals, jambs , soffits, sills etc. of these openings nor for finish around ends of joints, beams, posts etc.

Deductions of opening exceeding 0.5 sq. m. but not exceeding 3 sq. m. each shall be made as follows and net addition shall be made for reveals, jambs, soffits etc. of these openings:

When both the faces of walls are provided with same finish, deductions shall be made for one face only. When each face of wall is provided with different finish, deduction shall be made for that side of frame for doors, windows etc. on which width of reveal is less than that of the other side but no deduction shall be made on the other side. Where the width of reveals on the both the faces of wall are equal, deduction of 50% of area of opening on each face shall be made from area of finish.

When only one face of wall is treated and the other face is not treated, full deductions shall be made if the width of the reveal on treated side is less than that on untreated side but if the width of the reveal is equal or more than that on untreated side neither deductions nor additions to be made for reveals, jambs, soffits, sills etc.

In case of opening of area exceeding 3 sq. m. each deduction shall be made for openings but jambs, sills and soffits shall be measured.

No deduction shall be made for attachments such as casings, conduits, pipes, electric wiring and the like.

Item includes removing nails, making good holes, cracks, patches with materials similar in composition of distemper.

The rates includes cost of all materials, labours, scaffolding, protective measures etc. involved in all the operations described above. This shall also include conveyance, delivery, handing, unloading, storing work etc. & also include for any height & floor.

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

12[18.22] Finishing wall with Acrylic weather proof exterior emulsion paint (two coats) of approved make of GSPHCL and one coat of primer paint on undecorated wall surface to give of required shade after thoroughly brushing the surface to remove all dirt, dust, mortar drops and other foreign matter etc. to any height.

Material

The water shall conform to M-1. Acrylic weather proof exterior paint and Primer must be of a single or same brand of approved brand and manufacture as approved by GSPHCL.

The paint shall be (Textured exterior paint/Acrylic smooth exterior paint/premium acrylic smooth exterior painU100% premium acrylic emulsion paint) of approved brand and manufacture as approved by GSPHCL.

The material shall be brought in at a time in adequate quantities to suffice for the whole work. The materials shall be kept in the joint custody of the contractor and the Engineer-in-Charge. The empty containers shall not be removed from the site of work till therelevant item of work has been completed and permission obtained from the Engineer-in-Charge.

Workmanship

Preparation of surface:

The surface shall be thoroughly cleaned of all dust, dirt, mortar droppings and other foreign matter before Acrylic paint is to be applied.

Oil or grease spots shall be removed by suitable chemical.

All mortar lumps from the surface plaster shall be removed. All unnecessary nails shall be removed, holes, patches etc. shall be made good with material similar in composition to the surface to be prepared. Cracks must be filled with polymer based crack filler material not with cement mortar. The prepared surface shall receive the approval of the engineer in charge after inspection before painting is commenced.

Scaffolding

Wherever scaffolding is necessary, it shall be erected in such a way that so far as possible no part of scaffolding shall rest on the surface to be colored. A properly secured strong and well-tied suspended platform (Zoola) may be used for color work. Where ladders are used pieces of old gunny bags shall be tied at top and to bottom to prevent scratches to the floors and wall. For color work of ceilings, proper stage scaffolding shall be erected where necessary.

Priming coat:

Application of primer shall be done as under:

The primer shall be applied with a brush on the clean dry surface. One coat means horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly possible leaving no brush marks. It shall be allowed to dry for at least 48 hours before paint is applied.

The Acrylic paint shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer only. Sufficient quantity of acrylic paint required for a day's work shall be prepared.

Application of Acrylic paint :

For undecorated surfaces, after the primer coat is dried for at least 48 hours. All loose particles shall be dusted off. Minimum two coats of acrylic paint shall be applied with brushes in horizontal strokes followed immediately by vertical strokes which together shall constitute one coat. The subsequent coats shall be applied after a time interval of at least 24 hours between consecutive coats to permit proper drying of the preceding coat. The finished surface shall be even and uniform without patches, brush marks, acrylic paint drops etc.

Water proof cement paint shall not be applied directly on surface already treated with white wash, colour wash,distemper dry or oil bound varnishes, paint etc. Such surface shall be scrapped first and prepared for application of paint as per manufacturers specifications.

Sufficient quantity of acrylic paint shall be mixed to finish in a single day. The application of a coat in each face shall be finished in one operation and no work shall be started in any face of the building which cannot be completed on the same day.

15 em double bristled brush shall be used. After day's work brushes shall be thoroughly washed in hot water with soap solution and hung down to dry. Old brushes which are dirty and caked with painted shall not be used on the work.

Protective measurements: The surfaces of doors, windows, floors, articles of furniture etc. and such other

parts of the buildings as are not to be painted shall be protected from being splashed upon. Such surfaces shall be cleaned of acrylic splashes, if any.

Mode of Measurements & Payment :

All the work shall be measured in the decimal system as under:

a) Dimensions shall be measured to nearest 0.01M.
b) Area in individual items shall be worked out to the nearest 0.01 Sq.mt.

All the works shall be measured in Sq. m. Deductions for jambs, soffits, sills etc. for openings not exceeding 0.5 sq.m. each in area, for ends of joists, posts, beams, girders, steps etc. not exceeding 0.5 sq.m. each in area and for opening exceeding 0.5 sq.m. not exceeding 3.0 sq.m. each in are. Deduction and additions shall be made as under:

No deduction shall be made for ends of joists, beams, posts etc. and openings not exceeding 1.5 sq.m. each. No addition shall be made for reveals, jambs, soffits, sills etc. of these openings or for finish around ends, joists, beams, posts etc.

Deductions for openings exceeding O.S sq.m. but not exceeding 3 sq.m. each shall be made asfollows 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 oneface only.
b) When each face of wall is provided with a different finish, deduction shall be made forthat side of frame for door, windows etc. on which width of reveals is less than that ofthe other side.
c) When widths 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.
d) 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 untreatedside, but if the width of the reveal is equal or more than on the untreated side neitherdeductions 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 opening butjambs, soffits, sills shall be measured.

No deduction shall be made for attachment such as casing, conducts, pipe, electric wiring andthe like.

The Contractor has to provide OS years warranty card from the manufacturer with the final bill for acrylic paint. At the same time the contractor has also to provide undertaking on Rs.300/- notarized stamp paper in this regard. No payment for acrylic paint and concerned related items shall be made on account of failure to submit OS years warranty card by contractor.

The rate shall be for unit of one Sq. metre and for any height of the building.

SECTION -10
PAINTINGS & POLISHING

1[19.7] Painting two coats (excluding priming coat) on new steel and other metal surface with enamel paints, brushing, interior to give an even shade including cleaning the surface of alldirt, dust and other foreign matter.

Materials

The enamel paint shall conform to M-30

Workmanship

General:

The required material for work of painting work shall be obtained directly from approved manufactures or approved dealer and brought to the site in maker's drums kegs etc. with seal unbroken.

All materials not in actual use shall be kept properly protected, lids of container shall be kept closed and surface of paint in open or partially open containers covered with a thin layer of turpentine to prevent formation of skin. The materials which have become state or flat due to improper and long storage shall not be used. The paint shall be stirred thoroughly in its container before pouring into small containers. While applying also, the paint shall be continuously stirred in smaller container, No left over paint shall be put back into stock tins. When not in use the containers shall be kept properly closed.

If for any reasons, thinning is necessary, the brand of thinner recommended by the manufacture shall be used.

The surface to be painted shall be thoroughly cleaned and dusted. All rust, dirt and grease shall be thoroughly removed before painting is started. No painting on exterior or other exposed part of the work shall be carried out in wet, damp or otherwise unfavorable weather and all the surface shall be thoroughly dry before painting work is started.

Application of Paint:

Brushing operations are to be adjusted to the spreading capacity advised by the manufacture of particular paint. The paint shall be applied evenly and smoothly by means of crossing and laying off. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing lightly in a direction at right angles to the same. In the process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying off will constitute one coat.

Each coat shall be allowed to dry completely and lightly rubbed with very fine grade of sand paper and loose particles brushed off before next coat is applied. Each coat shall vary slightly un shape and shall be got approved form engineer-in-charge before next coat is started.

Each coat except the last coat shall be lightly rubbed down with sand-paper of fine pumice stone and cleaned of dust before the next coat is applied. No hair marks from the brushing or clogging of paint puddles in corners of panels, angles of moulding etc. shall be left on the work.

Special care shall be taken while painting over bolts, nuts, rivets, overlaps etc. Approved best quality brushes shall be used.

Mode of measurement and payment

The new steel and the other metal surface shall be measured under this item.

All the work shall be measured net in the decimal system as executed subject to the following limits unless other wise stated herein after.

(a) Dimensions shall be measured to the nearest 0.01 metre.

(b) Areas shall be worked out to the nearest 0.01 Sq. metre.

No deductions shall be made for openings not exceeding 0.5 sq.mt. each and no addition shall be made for painting to beadings, mouldings, edges, jambs, soffits, etc. of such opening.

In case of fabricated structural steel and iron work, priming coat of paint shall be included with fabrication.

In case of trusses if measured in sq. m. compound girders, stanchions, lattices, girder and similar work, actual area shall be measured in sq. m. and no extra shall be paid for painting on bolts, heads, nuts, washers, etc. No addition shall be made to the weight calculated for the purpose of measurements of steel and iron works for paint applied on shop or at site.

The different surfaces shall be grouped into one general item, areas of uneven surface being converted into equivalent plain areas in accordance with the table given as per Annexure-A for payment.

The rate shall be for a unit of one sq. meter. For any height & any floor.

2[19.8] Painting one coats (excluding priming coat) on previously painted steel and other metal surface with enamel paints, brushing, interior to give an even shade including cleaning the surface of alldirt, dust and other foreign matter.

Materials & Workmanship
The relevant specification of item no [19.7] shall be followed except that painting shall be carried out in one coat with enamel paint on previously painted steel and metal surface.

Mode of measurement and paymen
The relevant specification of item No [19.7] shall be followed.
The rate shall be for a unit of one sq. meter.

3[19.9] Extra over item No. [19.7] & [19.8] for every subsequent coat of paint

Materials and workmanship
The relevant specifications of item No [19.7] shall be followed except that the work of painting shall be carried out for subsequent coat.

Mode of measurement and Payment
The relevant specification of item No [19.7] & [19.8] shall be followed for mode of measurement and payment.
Therate is excluding priming coat.
The rate shall be for a unit of one sq. meter.

4[19.10] Painting two coats (excluding priming coat) on new steel and other metal surfaces with synthetic enamel paint, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.

Materials
Synthetic enamel paint shall conform to I.S. 2932(Part-1)-2013 (Reaffirmed 2018) or its relevant and latest edition.

Workmanship
The relevant specifications of item No. [19.7] shall be followed except that the painting shall be carried out with synthetic enamel paint.

Mode of measurement & payment
The relevant specifications of item No. [19.7] shall be followed.
The rate shall be for a unit of one sq. meter.

5[19.11] Painting one coats (excluding priming coat) on previously painted steel and other metal surfaces with synthetic enamel paint, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.

Material and Workmanship
The relevant specifications of item No [19.10] shall be followed except that the painting shall be carried out on previously painted steel and other metal surface using synthetic enamel paint in one coat.

Mode of measurement & payment
The relevant specifications of item No [19.10] shall be followed.
The rate shall be for a unit of one sq. metre.

6[19.12] Extra over item No [19.10] and [19.11] for every subsequent coat of paint.

Material and Workmanship
The relevant specifications of item No [19.10] shall be followed except that the work shall be carried out for subsequent coat of paint

Mode of measurement & payment
The relevant specifications of item No [19.10] shall be followed except that the extra rate shall be paid for applying subsequent coat of oil paint over and above the item No [19.10] and [19.11].
The rate shall be for a unit of one sq. metre.

7[19.13(A)] Applying pnmmg coat over new steel and other metal surfaces after and including preparing the surface by thoroughly cleaning oil, grease, dirt and other foreign matter and secured with brushes, fine steel, wood scrapes and sand paper, with ready mixed priming paint, brushing red lead.

Materials

The ready mixed primer, brushing red lead shall conform to M-30 & shall be of approved brand and manufacture as per make list of GSPHCL.

The thinner (linsed oil) shall conform to I.S. 75-1973 (Reaffirmed 2020). If for reason, thinning is necessary in case of ready mix paint, the brand of thinner recommended by manufacturer shall be used.

Workmanship

Preparation of surfaces :

The surfaces to be painted shall be cleaned of all rust, scale, dirt and other foreign matter sticking to it with wire brushes, steel wool, scrapers, sand paper etc. This surface shall then be wiped finally with mineral turpentine which shall also removed grease and perspiration of hand marks. The surface shall then be allowed to dry. If the surface is wet, it shall be dry before priming coat in under taken.

Application of primer :

After the preparation of the surface, the priming coat shall be applied immediately. The brushing operations are to be adjusted to the spreading capacity advised by the manufacturer of the particular primer. The paint shall be applied evenly and smoothly by means of crossing and laying off. The crossing and allying off consists of covering the area over with paint, brushing alternately in opposite directions, two or three times and then finally brushing lightly in a direction at right angles to the same. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying off will constitute one coat.

During painting, every time after the priming coat has been worked out of the brush bristles or after the brush has been unloaded of the bristles of the brush shall be opened up by striking the brush against portion of the unpainted surface with the end of the bristles, held at right angles to the surface, so that bristles thereafter will be allowed to dry completely before painting is started.

No hair marks from the brush or clogging at paint puddles in the corner or panels angles of mouldings etc. shall be left on the work.

Special care shall be taken while painting over bolts, nuts, rivets overlaps etc.

The container when not in use shall be kept close and free from air so that paint does not thicken and also shall be kept guarded from dust.

Mode of measurements & Payment

The new steel and the other metal surface shall be measured under this item.

All the work shall be measured net in the decimal system as executed subject to the following limits unless otherwise stated hereinafter.

(a) Dimensions shall be measured to the nearest 0.01 meter.

(b) Areas shall be worked out to the nearest 0.01 Sq. meter.

No deductions shall be made for openings not exceeding 0.5 sq.mt. each and no addition shall be made for painting to beadings, mouldings, edges, jambs, soffits, etc. of such opening.

In case of fabricated structural steel and iron work, priming coat of paint shall be included with fabrication. In case of trusses if measured in sq. m. compound girders, stanchions, lattices, girder and similar work, actual area shall be measured in sq. m. and no extra shall be paid for painting on bolts, heads, nuts, washers, etc. No addition shall be made to the weight calculated for the purpose of measurements of steel and iron works for paint applied on shop or at site.

The different surfaces shall be grouped into one general item, areas of uneven surface being converted into equivalent plain areas in accordance with the table given as per Annexure-A for payment.

The rate shall be for a unit of one sq. meter. For any height & any floor.

8[19.13(8)] Applying priming coat over new wood and wood based surface after and including preparing the surface by thoroughly cleaning oil, grease, dirt and other foreign matter, sand paperingand knotting : Ready mixed paint, brushing wood primer pink.

Materials

The ready mixed paint, brushing, wood primer pink shall conform to M-30 and shall be as per the approved make list of GSPHCL.

Preparation of Surface:

All wood work shall be dry and free form any foreign matter incidental to building operations. Nails shall be punched well below the surface to provide a firm key for stopping. Mouldings shall be carefully smoothened with abrasive paper and projection fibres shall be removed. Flat portions shall be smoothened off with abrasive paper used

across the grain prior to painting and with the grain prior to staining or if the wood is to left in its natural colour, wood work which is to be stained may be smoothened by scraping instead of by glass papering if so required.
Any knots, resinous, streaks or bluish sap wood that are not large enough to justify cutting out shall be treated with two coats of pure shellac knotting applied thinly and extended about 25mm beyond the actual area required treatment.

Application of Primer.
The relevant specification of item No.[19.13(A)] shall be followed for application or primer.

Mode of measurements & Payment
The relevant specifications of item No [19.13(A)] shall be followed except that work done on wood and wood based surfaces shall be paid under this item.
The rate shall be for a unit of one sq. meter

9[19.13(C)] Applying priming coat over new wood and wood based surface after and including preparing the surface by thoroughly cleaning oil, grease, dirt and other foreign matter sand paperingand knotting : Ready mixed paint brushing priming, for enamel.

Materials
The ready mixed paint for brushing priming for enamels wood shall conform to I.S. 106-1962 or its relevant and latest edition.

Workmanship
The relevant specification of item No. [19.13(8)] shall be followed except that ready mixed paint brushing priming for enamel shall be used instead of ready mixed paint brushing wood primer pink.

Mode of measurement and Payment
The relevant specification of item No. [19.13(A)] shall be followed.
The rate shall be for a unit of one sq. meter.

10[19.14(0)] Extra over item No. [19.13(8)] for every subsequent coat of priming coat. Ready mix paint brushing wood primer pink.

Materials and workmanship
The relevant specification of item No. [19.13(8)] shall be followed except that the painting work shall be carried out with ready mix paint, brushing wood pink for subsequent coat.

Mode of measurement and Payment
The relevant specification of item No.[19.13(8)] shall be followed except that paidforeverysubsequentcoat applied with ready mix paint, brushing wood primer pink over and above the rate of item no. [19.13(8)].

11[19.15(E)] Extra over item No. [19.13(C)] for every subsequent coat of priming coat ready mix paint brushing priming for enamel.

Materials & Workmanship
The relevant specification of item No. [19.13(C)] shall be followed except that the painting work shall be paid for every subsequent coats of priming coat with ready mixed paint, brushing priming for enamel.
The rate shall be for a unit of one sq. meter.

12[19.16] Painting two coats (excluding priming coat) on new wood based surface with enamel paintinterior to give an even shade including cleaning the surface off all dirt, dust and other foreign matter sand papering and stopping.

Materials
The enamel paint shall conform to IS 133(Part-1)-2013 (Reaffirmed Year 2018) or its relevant and latest edition.

Workmanship
The relevant specifications of [19.7] shall be followed for general and application of paint except that the enamel paint shall be used for painting on new wood/wood based surfaces.
In painting doors and windows, the putty round the glass panes also be painted but care shall be takento see that no paint, stain etc. are left on the glass. Top of shutters and surface in similar hidden locations shall not be left out in painting.

Mode of measurements and Payment.
The relevant specification of item No. [19.7] shall be followed, for mode of measurements and payments. The rate excludes coat of priming coat.
The rate shall be for a unit One sq. meter.

13[19.17] Painting one coat (excluding priming coat) on previously painted wood and wood based surface with enamel paint to given even shade including cleaning of all dirt, dust and other foreign matter.

Materials and workmanship
The relevant specification of item [19.16] shall be followed except that the painting work shall be carried out on previously painted wood and wood based surfaces with enamel paint to given even shade in one coat.

Mode of measurements and payment
The relevant specifications of item No. [19.16] shall be followed.
The rate shall be for a unit One sq. meter.

14[19.18] Extra over item [19.16] and [19.17] for every subsequent coat of paint.

Materials and workmanship
The relevant specifications of item No. [19.16] shall be followed except that painting work shall be for subsequent coat with paint.

Mode of measurements and payment
The relevant specifications of item No. [19.16] shall be followed except that the extra rate shall be paid for every subsequent coat applied over and above the item no [19.16] and [19.17]
The rate shall be for a unit One sq. meter.

15[19.19] Painting two coats (excluding priming coat) on new wood and wood based surfaces with ready mixed paint brushing, oil gloss, semi-gloss, to give an even shade including cleaning of all dust, dirt and other foreign matter sand papering and stopping,

Materials
The ready mixed paint shall conform to M-30. The ready mixed paint brushing gloss, semi-gloss shall conform to I.S. 129-1962 and I.S. 13607-1992(Reaffirmed 2019).

Workmanship
The relevant specification of item [19.16] shall be followed for general and application of paint, exceptthat ready mixed paint brushing, oil gloss and semi-gloss shall be used of approved colour and shade instead of enamel paint.

Mode of measurements and payment
The relevant specification of item [19.16] shall be followed for measurements and payment. The rate excludes cost of priming coat.
The rate shall be for a unit One sq. meter.

16[19.20] Polishing with French polish on new wood and wood based surface to give an even surface including cleaning the surface of all dirt, dust and sand paper smooth and including a coat of wood filler.

Material:
The French polish of required tint and shade shall be prepared with below mention in gradient and other necessary materials.
Denatured spirit of approved quality
Chadras,
Shellac shall be confirm to IS 16
Pigment
French polish readymade polish confirming to IS 348 can also to be used.

Workmanship:
Preparation of Surface :
The surface shall be cleaned. All unevenness shall be rubbed down smooth with sand paper and well dusted. Knots if visible shall be covered with a preparation ofred lead and glue size laid on while hot. Holes and indentations on the surface shall be stopped with glazier's putty. The surface shall then be

given a coat of wood filler made by mixing whiting (ground chalk) in methylated spirit at the rate of 1.5 Kg of whiting per litre of spirit. The surface shall again be rubbed down perfectly smooth with glass paper and wiped clean.

Application :
The number of coats of polish to be applied shall be as described in the item.
A pad of woolen cloth covered by a fine cloth shall be used to apply the polish. The pad shall be moistened with the polish and rubbed hard on the wood, in a series of overlapping circles applying the mixture sparingly but uniformly over the entire area to give an even level surface. A trace of linseed oil on the face of the padfacilitates this operation. The surface shall be allowed to dry and the remaining coats applied in the same way. To finish off, the pad shall be covered with a fresh piece of clean fine cotton cloth slightly damped with methylated spirit and rubbed lightly and quickly with circular motions. The finished surface shall have a uniform texture and high gloss.

Mode of measurements and payment
The rate includes cost of wood filler etc. completed.
The rate shall be for a unit one sq. meter.

17[19.21] Polishing with French polish on previously polished wood and wood based surface to give an even surface including cleaning the surface of all dirt, dust and sand paper smooth and including a coat of wood filler.

Material:
The relavent specification of item no. 19.20 shall be follow except the French polish will be applied on previously polished wood and wood base surface.

Mode of measurements and payment
The rate includes cost of wood filler etc. completed.
The rate shall be for a unit one sq. meter.

18[19.22] Polishing with Melamine polish on new wood and wood based surface to give an even surface including cleaning the surface of all dirt, dust and sand paper smooth and including a coat of wood filler.

Material:
Melamine is an organic compound that is often combined with formaldehyde to produce melamine resin, a synthetic polymer that is fire resistant and heat tolerant. The resin is a versatile material that has a highly stable structure. It is a closed pore polish i.e. it makes the wood non-breathable product that protects wood from mainly hot and cold surfaces placed over it.

Workmanship:
Preparation of Surface :
The surface shall be thoroughly cleaned. All unevenness shall be rubbed down smooth with sand paper and shall be well dusted. Surface must be dry, free from dust, oil, wax, greases etc.

Application :
Mix melamine (matt or gloss) base with the catalyst in the specified ratio as per manufacturers specification. Add melamine thinner upto 30% (as specified by the manufacturer) by volume of mixture. Stir it and allow it to mature for 2-3 minutes. The melamine is sprayed, using spray gun pressure of 45-55 psi, from a distance of 7"-10" from substrate.
Precaution :Avoid eye contact, use of mask is mandatory during whole process.

Mode of measurements and payment:
The rate includes cost of wood filler etc. completed.
The rate shall be for a unit one sq. meter.

SECTION-11
WATER SUPPLY, PLUMBING AND SANITARY FITTINGS

1[23.2] Providing and fixing to wall, ceiling and floor galvanized mild steel tube (Medium grade) of the following nominal bore, tube fittings and Z & U clamps including making good the wall ceiling and floor (A) 15 mm. dia. (B) 20 mm. dia. (C) 25 mm. (D) 32 mm. (E) 40 mm. (F) 50 mm. All exposed visible pipes shall be oil painted.

Materials

Galvanised mild steel tubes of specified dia. nominal bore shall conform to I.S. 1239-2004 (Reaffirmed 2014) or its relevant and latest edition. Galvanized shall confirm to IS 4736-1986 (Reaffirmed 2021). The galvanised fittings, clamps, etc. required for specified dia. bore pipes shall be of best quality and make as approved by the Engineer-in-Charge.

Workmanship

Cutting, Laying & Jointing

When the tubes are to be cut of re-threaded, the ends shall be carefully filed out so that no obstruction to bore in offered. The ends of the tubes shall then be threaded conforming to the requirements of I.S. 554-1999 or its relevant and latest edition with pipe dies and taps carefully in such a manner as will not result in slackness of joints when the two pieces are screwed together.

The taps and dies shall be used only for straightening screw threads which have becoming bent or damaged and shall not be used for turning of the threads so as to make them slack as the latter procedure may not result in the watertight joint. The screw threads for tube and fitting shall be protected from edge until they are fitted.

In jointing tubes, the inside of the socket and the screwed end of the tubes shall be oiled and smeared with white or red and wrapping around with a few turns of Teflon Tape round the screwed end of thetube. The end shall then be tightly screwed in the socket, tees, etc. with a pipe wrench. Care shall be taken that all pipes and fittings are properly jointed so as to make the joints completely water tight and pipes are kept at all times free from dust and ends during fixing. Burr from the joints shall be removed after screwing. After laying the open ends of the pipes shall be temporarily plugged to prevent access of water, soil, or any other foreign matter.

Any threads exposed after jointing shall be painted or in the case of underground piping thickly coated with approved anti-corrosive paint to prevent corrosion.

Fixing of tube fittings to wall ceiling & floors

In case affixing of tubes and fittings to the walls or ceilings, these shall run on the surface ofthe wall or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern, holder clamps for inside and z & u clamp for outside keeping the pipes about 50 mm, clear of the wall for inside minimum SOmm for outside the wall. When it is found necessary to conceal the pipes and when specified so, chasing may be adopted or pipe fixed in ducts or recesses etc. provided that there is sufficient space to work on the pipe with usual tools. The pipe shall not ordinarily be buried in walls or solid floors, where unavoidable, pipes may be buried for short distances provided that adequate protection is given against damage and where so required joints are not buried. Where required M.S. tube sleeve shall be fixed at a place a pipe is passing through a wall or floor for expansion and contraction and other movements. In case the pipe is embedded in walls or floors, it should be painted with anti-corrosive bitumastic paint of approved quality. The pipe should not come in contract with lime mortar or lime concrete as the pipe is affected by lime. Under the floors, the pipe, shall be laid in layer of sand filling.

All pipes and fittings shall be fixed truly vertical and horizontal unless unavoidable. The pipes shall be fixed to walls with standard pattern clamps of required size and shape, one end of which shall be properly plugged or cemented into walls with cement mortar 1:3 (1 cement: 3 coarse sand) and the other tightened round the pipes to hold it securely. These clamps shall be spaced at regular intervals in straight lengths at 1.Sm C/C interval in horizontal run and 1.5 m. interval in vertical run. For pipe of any dia the holes in the walls and floors shall be made by drilling with electric core cut machine and not by dismantling the brick work or concrete. However, for bigger diameter pipes the holes shall be carefully made of the smallest required size. After fixing the pipe, the holes shall be made good with cement mortar 1:1 (1 cement : 1 coarse sand) and properly finished to match the adjacent surface.

Testing of joints :

After laying and jointing the pipes and fittings shall be inspected under working conditions or pressure and flow. Any joints found leaking shall be redone, and all leaking pipes removed and replaced without extra cost.

The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 Kg./sq.cm. The pipe shall be slowly and carefully changed with water allowing all air to escape and avoiding all shock and water hammer. The draw off takes and stop cock shall then be closed and specified hydraulic pressure shall be

applied gradually. The pressure gauge must be accurate. The pipes and fittings shall be tested in sections as the work of laying proceeds, keeping the joints exposed for inspection during the testing.

Mode of measurements and payment

The description of each item shall, unless otherwise stated, be held to include where necessary, conveyance, and delivery, handling, unloading, storing, fabrication, hoisting, all labour for finishing to required shape and size setting, fitting in position, straight, cutting and waste, return of packing's, clamps etc.

The length shall be measured on running meter basis of finishing work. The length shall be taken along the centre line of the pipe and fittings. The pipes fixed to walls, ceilings, floors etc. shall be measured and paid under this item.

All the work shall be measured in decimal system as fixed in its place, subject to tolerance given below unless otherwise stated.

(0 Dimension shall be measured to the nearest 0.01 metre.

(iO Area shall be worked out to the nearest 0.01 sq. metre.

All measurements of cutting shall unless otherwise stated be held to include the consequent waste.

In case of fitting of unequal bore, the largest bore shall be measured for the test.

Testing of pipe lines, fittings, and joints include for providing all plant and appliances necessary for obtaining access to the-work to be tested and carrying out the tests.

The rate includes galvanized steel tubing with screwed socket joints, together with all fittings (such as bends, sockets, springs, elbows, tees, crosses, short pieces, clamps and plugs union etc.) and fixing complete with clamping wall-hooks, Z & U Clamps, roll plugs etc. and also cutting, screwing and waste and for making forged (or handmade) bends on piping as required. Connector shall be inserted, where required or directed. The rate also includes cutting through walls, floors, etc. and their making good and painting exposed threads with anti-corrosive paint as above and testing. Where tubes are to be fixed to wall, ceiling and flooring, the rate shall include painting of pipes, providing sleeves and sand filling under floor.

The rate shall be for a unit of one running meter including painting, steel holder clamps as per details.

2[23.3] Providing and laying trenches galvanized mild steel tubes (Medium grade) of the following nominal bore and tube fittings-earthwork in trenches to be measured and paid for separately : (A) 15 mm. dia. (B) 20 mm. (C) 25 mm. (D) 40 mm. (E) 50 mm. (F) 65 mm. (G) 80 mm.

Materials

Galvanized mild steel tube specified dia. nominal bore and fittings shall conform to I.S. 1239-2004 (Reaffirmed 2014) or its relevant and latest edition. Galvanized shall confirm to IS 4736-1986 (Reaffirmed 2021).

Workmanship

The relevant specification of item 23.2 shall be followed for cutting, laying and jointing testing of joints except that the fixing of tube shall be done in trenches.

The width and depth of the trenches for different diameters of the tubes shall be as under: For 15 to 80 mm, dia. tube width of trenches shall be 30 ems and depth of trenches 60 ems.

At joints, the trench width shall be widened where necessary. The work of excavation and refilling shall be done true to line, and gradient in accordance with general specifications of earth work in trenches.

The pipes shall be painted with two coats of anti-corrosive bitumastic paint of approved quality. The pipe shall be laid on a layer of 75 mm. sand filled upto150 mm. above the pipe if so specified. The remaining portion of trench shall be then filled with excavated earth. The surplus earth shall be disposed of as directed.

When the excavation is done in rock the bottom shall be cut deep enough to permit the pipe to be laid and cushion of sand 75 mm. In case of bigger diameter of tube where the pressure is very high, thrust block of cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 grade stone aggregate of 20 mm. nominal size) shall be constructed on all bends to transmit the hydraulic thrust without impairing the ground and spreading itover a sufficient area if so specified.

Mode of measurements and payment

The relevant specifications of item No.23.2 shall be followed. The authorized quantities shall be measured.

For purpose of calculating cubic content cross section shall normally be taken at suitable intervals i.e. at manhole or valve chamber intervals except in abnormal cases like sudden change in strata or undulating ground etc., when they may be taken at closer intervals as approved by the Engineer-in-charge whose decision shall be final, conclusive and binding.

Authorized width :

(a) Up to 1 meter depth, the width of the trenches for the purpose of measurements of excavation shall be arrived at by adding 40 ems to external diameter of the tube (not the socket) where a pipe is laid on concrete bed/cushioning layer, the authorized width shall be the external diameter of tube plus 40 ems. orthewidth ofthe concrete bed cushioning layerwhicheveris more.

(b) For depths exceeding one meter and allowance of 5 ems. per metre of depth for each side of the trench shall be added to the authorized width (i.e. external diameter of pipe plus 40 ems). This allowance

shall apply to the entire depth of the trench. The authorized width in such cases shall thereof be, equal to the depth of trench, plus external diameter of tube plus 40 ems.

(c) Where more than one tube is laid, the diameter shall be reckoned as the horizontal distance for outside to outside of the outer most pipes.

(d) Where sheeting etc. has been provided the authorized width of the trenches at bottom shall be increased to accommodate for sheeting etc. so that the clear width available between faces of sheeting is as per provisions (a), (b) & (c) above.

If the sides of the trench are not vertical, the toes of the side slopes shall end at the top of the pipe and vertical sided trench of authorized width as per (a), (b), (c) and (d) above shall be excavated from these down to the bed of trenches.

Where the tubes are laid in trenches, the work of excavation and refilling shall all round tubes for which separate payment shall be made, the length shall be measured on running meter basis.

The rate shall be for a unit of One running meter.

3[23.3] Making connection of galvanized M.S. distribution branch with galvanized mild steel main to any dia. nominal bore by providing and fixing tee including cutting and threading the pipes etc. complete.

Materials

The fittings required of specified dia. of pipe shall conform to I.S. 1237-2012 (Reaffirmed 2017) or its relevant and latest edition. Galvanized shall confirm to IS 4736-1986 (Reaffirmed 2021).

Workmanship

A pit of suitable dimensions shall be dug at the point where the connections to be made with the main and earth removed up to 150 mm below the main. The flow of water in water main shall also be disconnected byclosing the sluice or wheel valves on the mains. The main shall first be cut. Water if any, collected in the pit shall be bailed out an ends of the pipe threaded.

The connections of distribution pipe shall be made by fixing malleable galvanized mild steel tee of the required size and fittings such as jam nut, socket, connecting piece etc.

The testing of the joints shall be done as per relevant specifications of item No.23.2.

Connection shall be carried out through licensed plumber register with concerned local authority.

After laying and jointing, the pipes and fittings shall be inspected under working condition of pressure and flow. Any joint found leaking shall be redone and all leaking pipes removed and replaced without extra payment.

Mode of measurement and payment

The rate includes cost of all labour, materials, tools and plant required for satisfactory completion of this item towards, excavation, sand filling, laying and providing of pipes duly painted.

4[23.4] Providing and fixing to wall ceiling and floor 6 kg/cm^2 working pressure polythene pipes of the following outside diameter, low density complete with special flange compression type fittings wall clips etc. including making good the wall/ceiling and floor. (A) 20 mm. dia. (B) 25 mm. dia. (C) 32 mm. dia. (D) 40 mm dia. (E) 50 mm. dia.

1.1 Materials

1.2 The low density polythene pipe of specified diameter with 6 kg/cm^2 working pressure shall conform to I.S.3076-1985(R2003) or its relevant and latest edition. The specials and fittings required shall be of best quality.

2.1 Workmanship

2.2 The P.V.C. pipes of specified diameter shall be fixed as directed. Due to thermal expansion of rigid P.V.C. pipes, due allowance shall be made particularly in over ground pipe lines for any change in length of pipe line which may occur during installation or when pipe line is in service.

2.3 Above ground installation of rigid P.V.C. pipe should be undertaken after preparations are observed for their protection against direct sun rays and mechanical damage.

2.4 The rigid P.V.C. pipe lines should not be kept exposed above ground when it passes through public places, railway lines, road side and foot paths.

2.5 P.V.C. pipes shall be supported at the following intervals:

-20 mm. dia. 500 mm

-25 mm dia. 750 mm.

-32 mm dia. 900 mm.

2.6 Closer support spacing shall be provided if recommended by the manufacture.

2.7 The guide lines indicated by the manufacturer regarding handling, transportation, storing, laying and jointing of pipes shall be kept in view during execution.

2.8 P.V.C. pipes shall be fixed on wall with roll plugs and suitable Z & U clamps and/or with steel holder clamps.

2.9 Jointing the pipes :

2.9.1 The pipes and sockets shall be accurately cut. The ends of the pipes and fittings should be absolutely free from dirt and dust. The outside surface of the pipes and the inside of the fittings shall then be roughened with emery paper, and then solvent cement joint. Since solvent is aggressive to P.V.C. care must be taken to avoid applying excessive solvent to the inside of pipe sockets as any surplus solvent cannot be wiped off after jointing. Empty solvent cement tins, brushes, rags, or paper impregnated with cement should not be buried in the trenches. They should be gathered not left scattered about, as they can prove to be a hazard to animals, which may chew them.

2.9.2 2 If any manufacturer recommends its own methods of jointing the same shall be adopted after necessary approval from the Engineer-in-charge.

2.10 Laying pipes in Trenches:

2.10.1 The pipes shall be laid over uniform relative soft line grained soil found to be free of presence of hard objects such as large flints, rocky projections, large tree roots etc. The width of the trenches shall be minimum width required for working.

2.10.2 The pipes laid underground shall not be less than one meter from the ground level. The pipe shall be positioned in the trenches so as to avoid any induced stressed due to deflection. Any deviation required shall be obtained by using proper type of rubber ring joints.

3.1 Mode of measurements & payments

3.2 The relevant specifications of item 23.2 shall be followed except that the P.V.C. pipes of specified dia. shall be paid under this item.

3.3 The unit rate shall be for a unit of one running metre.

5[23.5] Providing and fixing water closet squatting pan (Orissa type W.C. Pan) size 580 mm x 440 mm, Earth work, bed concrete and trap to included) Vitreous china. Long pattern white color.

1.1 Materials

1.2 Water closet squatting pan (Orissa type W.C. Pan) shall conform to M-41. Cement mortar shall conform to M-11.

2.1 Workmanship

Any damage caused to the building, or to electric, sanitary, water supply or other, installations etc. therein, either due to negligence on the part of the contractor, or due to actual requirements of the work, shall be made good and the building or the installation shall be restored to its original condition by the contractor. Nothing extra shall be paid for such restoration works except where otherwise specified.

2.2 The pan shall be sunk into the floor and embedded in a cushion of average 15 em. cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate or brick aggregate 40 mm nominal size) or as specified. This concrete shall be left 115 mm. below the top level of the pan so as to allow for flooring and its bed concrete. The floor should be suitably sloped so that the waste water is drained into the pan. The pan shall be provided with 100 mm. 'P' or'S' trap as specified in the IS Code 5219-2013 (Reaffirmed 2018) with approximately 50 mm. seal the joints between the pan and the trap shall be made leak-proof with cement mortar 1:1 (1 cement: 1 finesand).

3.1 Mode of measurements and payments

3.2 The rate shall include the cost of all materials and labours involved in the operations described under workmanship.

3.3 The rate shall be for a unit of one number for a completely commissioned unit.

6[23.6] Providing and fixing wash down water closet (European type W.C. Pan) with integral 'P' or'S' trap including jointing the trap with soil pipe in C.M. 1:1 (1 cement : 1fine sand) : Vitreous china pattern : In white colour including seat cover.

Materials

Wash down water closet (European type W.C. Pan) shall conform to M-40. Cement mortar shall conform toM-11.

Workmanship

The work shall be carried cut, complying in all respects with the requirements of relevant bye- laws of the local body in whose jurisdiction the work is situated.

Any damage caused to the building, or to electric, sanitary, water supply or other, installations etc. therein,

either due to negligence on the part of the contractor, or due to actual requirements of the work, shall be made good and the building or the installation shall be restored to its original condition by the contractor. Nothing extra shall be paid for such restoration works except where otherwise specified .The closet shall be fixed to the floor by means of 75 mm. long 6.5 mm. diameter counter sunk bolts and nuts embedded in the floor concrete using rubber or fiber washers so as not to allow any lateral displacement. The joint between the trap ofW.C. and soil pipe shall be made with C.M. 1:1 (1 cement: 1 fine sand).

3.1 Mode of measurements and payment
3.2 The rate shall include the cost of all materials and labour involved in all the operations described under workmanship.
3.3 The rate includes cost of all labour for fixing pans and seat and cover, inlet outlet connection for flushing etc. complete including testing the same of a completely commissioned W.C.
3.4 The rate shall be for a unit of one number.

7[23.7] Providing and fixing 100 mm. size 'P' or's' trap for water closet squatting pan including jointing the trap with the pan and soil pipe in cement mortar 1:1 (1 cement : 1 fine sand) Vitreous China.

1.0 Materials
The 100 mm. size 'P' or 'S' trap for water closet shall conform to IS: 5219-2013 (Reaffirmed 2018) or its relevant and latest edition. Cement mortar shall conform to M-11.

2.1 Workmanship
2.2 The 'P' or 'S' trap shall be fixed with pan sewer pipe with C.M. 1:1. The pan shall be provided with a 100 mm, 'P' or'S' trap as specified in the item with an approximately 50 mm. seal. The joint between the pan and the trap shall be made leak-proof with cement mortar 1:1 (1 cement: 1 fine sand).

3.0 Mode of measurements & payment.
The rate shall include the cost of all materials and labour involved in the operations described under workmanship including testing.
The rate shall be for a unit of one number of complete commissioned unit.

8[23.8] Providing and fixing in C.M. 1:3 (1 cement: 3 coarse sand) a pair of white vitreous china250 mm. x 130 mm. x 20 mm. foot rest for long pattern squatting pan water closet.

1.0 Materials
The pair of white vitreous china foot-rests shall conform to M-43. Cement mortar shall conform to M-11.

2.0 Workmanship
After laying the floor, the floor shall be suitably sloped so that the waste water is drained into the pan, a pair of foot-rests of size 250 mm. x 130 mm. x 20 mm. of white vitreous china shall be set in cement mortar 1:3 (1 cement : 3 coarse sand). The foot-rests shall be fixed at a distance of 175 mm. from the inner edge of the back side of the pan and shall be fixed at convenient angle.

3.1 Mode of measurements & payment
3.2 The rate shall include the cost of all materials and labours involved in all the operations described under workmanship.
3.3 The rate shall be for a unit of one pair.

9[23.9] Providing and fixing G. I. Inlet connection for flush pipe with W.C. Pan.

1.1 Materials
1.2 The G. I. inlet connection for flush pipe shall conform to M-36.

2.1 Workmanship
2.2 The flush pipe from the cistern shall be connected to the closet by means of cement or red-lead.

3.1 Mode of measurements & payment
3.2 The rate shall include the cost of all materials, fittings, and labour involved in all the operations described under workmanship including testing.
3.3 The rate shall be for a unit of one number.

10[23.10] Providing and fixing wash basin of approved make by G5PHCL with single hole for pillar tap with C.I. or 5.5. bolts including cutting holes, and making good the same but including fittings, vitreous china flat back wash basin 550 mm x 400 mm in white colour (pillar cock, stop cock, 5. 5. Bottle trap waste coupling and Connecting UPVC pipe to concerned NT with all fittings ,outlets, inlets all included as directed).

1.0 Materials

1.1 The white glazed earthenware wash basin shall be 550 mm x 400 mm of 1st quality and make as approved by GSPHCL. The wash basin shall conform to M-39.

2.0 Workmanship

2.1 The wash basin shall be fixed on the wall as and where directed. The wash basin shall be supported on a pair of S.S. Bolts. The S. S. Bolts shall conform to I.S. 1367(Part-14/Sec2)-2018 or its relevant and special edition. The top edge of the wash basin shall rest on the wall plaster. After fixing the basin plaster the joints shall be filled with white cement.

2.2 The C.P. brass trap and union shall be connected to 32mm dia. solid UPVC waste pipe which shall be suitably laid towards the wall and which shall discharge into concerned NT as shown in drawings or as directed by GSPHCL.

2.3 The height of the front edge of the wash basin from the floor level shall be 80 Cms.

2.4 The necessary inlet, outlet, connections and fittings such as pillar cocks, CP brass waste trap, Waste Coupling, UPVC waste pipe, stop cock, PVC connection pipe from stop cock to bib cock, S. S. Bolts, S.S. bottle trap and rigid UPVC pipe up to bath N.T. etc. shall be provided.

3.0 Mode of measurements & payment

3.1 The rate includes cost of all labour, materials, tools and plant etc. required for satisfactory completion of this item as specified in workmanship.

3.2 The rate shall be for a unit of one number of the completely commissioned unit.

11[23.11] Providing and fixing 32 mm. dia. C.P. brass waste for wash basin or sink.

1.0 Materials

1.1 The C.P. brass trap and unions shall be 32 mm dia and of best quality and make as approved by the Enginner-in-charge.

2.0 Workmanship

2.1 C.P. brass waste trap and union shall be connected to PVC *IS.* S. Bottle Trap and 32 mm. dia. UPVC waste pipe which shall be suitably bent towards the wall and which shall discharge into drain through a floor trap. The C.P. brass waste trap shall be provided for wash basin or sink as the case may be.

3.0 Mode of measurements & payment

3.1 The rate includes all labours and providing C.P. brass waste trap and union including waste couplings of 32 mm. dia. The rate excludes the cost of waste pipe of 32 mm. dia.

3.2 The rate shall be for a unit of one number.

12[23.12] Providing and fixing 40 mm. dia. C.P. brass waste for wash basin or sink.

1.0 Materials & Workmanship

1.1 The relevant specifications of item 23.11 shall be followed except that the diameter of C.P. brass waste is 40 mm. dia.

2.0 Mode of measurements & payment

2.1 The rate shall be for a unit if one number.

13[23.13] Providing and fixing 32 mm. dia. M.I. fisher union for wash basin or sink.

1.0 Materials

1.1 The 32 mm. dia. M.I. fisher union shall be best quality and make as approved by the Engineer-in-charge.

2.0 Workmanship.

2.1 The 32 mm. dia. M.I. fisher union shall be fixed to wash basin or sink in best workman like manner.

3.0 Mode of measurements and payment

3.1 The rate includes all labours and materials, tools and plants etc. required for satisfactory completion of the item.

14[23.14] Providing and fixing 40 mm. dia. M.I. fisher union for wash basin or sink.

1.1 Materials and Workmanship
1.2 The relevant specifications of item No. 23.13 shall be followed except that the diameter of M.I. fisher union shall be 40 mm. dia.

2.1 Mode of measurements and payment
2.2 The rate shall be for a unit of one number.

15[23.15] Providing and fixing PVC IS. S. Bottle trap.

1.1 Materials
1.2 The PVC IS. S. Bottle Trap shall be of best quality and make as approved.
Bottle Trap 32mm dia. with 300mm & 125mm Long Wall Connection Pipes.

2.0Workmanship
2.1 After jointing the pipes and fitting shall be inspected under working conditions or pressure flow of any joints found leakaging shall be redone and all leakage removed and replaced without any extra cost.

3.1 Mode of measurements and payment
3.2The rate includes cost of all labour, materials, tools and plants, etc. required for satisfactory completion of this item.
3.3 The rate shall be for a unit of one number.

16[23.16] Providing and fixing C.P. brass shower rose with 15 mm or 20 mm inlet and Arm of minimum 150mm of approved make & model of GSPHCL make list.

1.1 Materials
1.2 C.P. brass shower rose shall conform I.S. 2556 (Part-Xi) and relevant and latest edition and of best quality and make asapproved by the GSPHCL. The inlet of shower rose shall be 15 mm dia or 20 mm dia. as directed. The arm must be of minimum 150mm.

2.1 Workmanship
2.2 The C.P. brass shower rose shall be fixed as directed with 15 mm dia. or20 mm dia. inlet pipe as thecase may be.

3.1 Mode of measurements and payment
3.2 The rate includes all labour and materials, tools and plant etc. required for satisfactory completion of this item.
3.3 The rate shall be for a unit of one number.

17[23.17] Providing and fixing 600 mm x 450 mm bevelled edge mirror of superior glass mounted on wall with S. S. Studs (Mouthless) as directed by GSPHCL.

1.1 Materials
1.2 Mirror shall be of superior glass with edge rounded off or beveled as specified. It shall be free from flaws specks, or bubbles and the size of the mirror shall be 600mmx450mm and thickness shall not be less than 6 mm or as specified. The glass for the mirror shall be uniformly silver plated at the back and shall be free from silvering defects. Silvering shall have a protective uniform covering of red lead paint.

2.0 Workmanship
2.1 The mirror of 600 mm. x 450 mm. size mounted on wall with S. S. Studs (Mouthless). The work shall be carried out in best workman like manner.

3.1 Mode of measurements & payment
3.2 The rate includes cost of all labour and materials, tools and plant etc. required for satisfactory completion of this item. The rate shall be for a unit of one number.

18[23.18] Providing and fixing C.P. brass towel rail complete with C.P. brass bracketsfixed on wall with screws as per approved make & model of GSPHCL make list.

1.1 Materials
1.2 The C.P. brass towel rail shall be of best quality as per approved make & model of GSPHCL make list.. The rail shall conform to IS 1068-1993 (Reaffirmed 2021) and its relevant and latest edition.

2.1 Workmanship
2.2 Towel rail shall be fixed by means of C.P. brass screws with S. S. Cap(katori) and S. S. Cap(katori) must be of L & Key firmly fixed to the wall. The towel rail shall be fixed at the location as shown in the drawing or as directed by engineer in charge.

3.1 Mode of measurement and payment
3.2 The rate includes cost of all labour and materials, tools and plant etc. required for satisfactory completion of this item.
3.3 The rate shall be for a unit of one number.

19[23.19] Providing and fixing 600 mm x 120 mm glass shelf with 5. 5. Studs.

1.1 Materials
1.2 The glass shelf of 600 mm x 120 mm size shall be of 12 mm thick plain glass. The edge of the glass shall be grounded. The S. S. Studs shall be of best quality and make.

2.1 Workmanship
2.2 The glass shelf 600 mm x 120 mm shall be fixed with S.S.Studs firmly embedded in the wall.

3.1 Mode of measurements and payment
3.2 The rate includes cost of all labour and materials, tools and plant etc. required for satisfactory completion of this item.
3.3 The rate shall be for a unit of one number.

20[23.20(A)] Providing and fixing brass screw down bib taps of following size. Polished bright: 15 mm dia. as per approved make & model of GSPHCL make list.

1.1 Materials
1.2 Bib tap shall confirm to M-37. The bib tap shall be of approved make & model of GSPHCL make list.

2.1 Workmanship
2.2 The screw down bib tap 15 mm. dia. as specified above shall be fixed as directed. The threaded portion shall be smeared with white or red lead and around with as few turns of Teflon tape round the screwed end of the pipe. The bib cock shall be then screwed and fixed to water tight position.

3.1 Mode of measurements and payment
3.2 The rate includes cost of all labour and materials, tools and plant etc. required for satisfactory completion of this item.
3.3 The rate shall be for a unit of one number.

21[23.20(8)] Providing and fixing brass screw down bib taps offollowing size : Polished bright : 20 mm. dia. as per approved make & model of GSPHCL make list.

1.0 Materials and workmanship
The relevant specifications of item 23.20(A) shall be followed except that the bib taps of 20 mm. dia. shall be fixed.

2.1 Mode of measurements & payment
2.2 1 The relevant specifications of item 23.20(A) shall be followed. 2.2 The rate shall be for a unit of one number.

22[23.20(C)] Providing and fixing chromium plated brass screw down bib taps of the following size: 15 mm. dia. as per approved make & model of GSPHCL make list.

1.0 Materials and workmanship
The relevant specifications of item 23.20(A) shall be followed except that the brass chromium screw down tap of 15 mm dia. shall be fixed.

2.1 Mode of measurements & payment
2.2 The rate shall be for a unit of one number.

23[23.20(0)] Providing and laying chromium plated brass screw down bib taps offollowing size : 20 mm. dia. as per approved make & model of GSPHCL make list.

1.0 Materials and workmanship
The relevant specifications of item 23.20(A) shall be followed except that the brass chromium screw down tap of 20 mm dia. shall be fixed.

2.1 Mode of measurements & payment
2.2 The rate shall be for a unit of one number.

24[23.20(E)] Providing and fixing gun metal screw down bib taps of the following size: 15 mm. dia. as per approved make & model of GSPHCL make list.

1.0 Materials and workmanship
The relevant specifications of item 23.20(A) shall be followed except that the 15 mm dia. gun metal screw down bib tap shall be fixed.

2.1 Mode of measurements & payment
2.2 The rate shall be for a unit of one number.

25[23.20(F)] Providing and fixing gun metal screw down bib taps of the following size: 20 mm dia. as per approved make & model of GSPHCL make list.

1.0 Materials and workmanship
The relevant specifications of item 23.20(A) shall be followed except that the 20 mm. dia. gun metal screw down bib tap shall be fixed.

2.1 Mode of measurements & payment
2.2 The rate shall be for a unit of one number.

26[23.21] Providing and fixing brass screw down stop cock (A) 15 mm. dia. (B) 20 mm. dia. (C) 25 mm. dia. as per approved make & model of GSPHCL make list.

1.0 Materials
The brass screw down stop cock of specified dia. shall conform to M-37.

2.0 Workmanship
The stop cock shall be fixed as directed the treated portions shall be smeared with white or red or lead and turned around with few turns of Teflon Tape. The cock shall than be screwed and fixed to the water tight position.

3.0 Mode of measurements and payment
3.1 The rate includes cost of all labours, materials, tools and paint etc. required for satisfactory completion of this item.
3.2 The rate shall be for a unit of one number.

27[23.22] Providing and fixing gun metal check or non-return valve. (A) 15 mm. dia. (B) 20 mm. dia. (C) 25 mm. dia. (D) 32 mm. dia. (E) 40 mm. dia.

1.0 Materials
1.1 The gun metal check or not return full way wheel valve of specified dia. shall conform to I.S: 778-1984 (Reaffirmed 2020) or its relevant and latest edition. The non-return valve shall be tested quality and approved make by GSPHCL.

2.1 Workmanship
2.2 The gun metal check or non return valve shall be fully cleared of all foreign matter before fixing. The fixing of shall be done by means of bolts nuts and 3 mm. rubber insertions with flanges of spigot and socketed tail pieces, drilled to the same specification as in case of socket and spigot flanges in case of flanged pipes. The joining shall be done leak proof.

3.1 Mode of measurements and payment
3.2 The rate includes all labours, materials, tools and plants etc. required for satisfactory completion of this item.
3.3 The rate shall be for a unit on one number.

28[23.23] Providing and fixing chromium plated brass half turn flush cock of approved quality including fixing in pipe line etc. complete. (i) 25 mm. dia.

1.1 Materials
1.2 Chromium plated brass half turn flush cock shall conform to M-44.

2.1 Workmanship
2.2 The hall turn flush cock of specified diameter shall be fixed as directed. The flush cock shall be fixed in G.I. pipe/CPVC/PVC/UPVC Pipe line with necessary fittings. The joints shall be made leak proof by using Teflon Tape. The fixing work shall be carried out in best workman like manner.

3.1 Mode of measurements and payment
3.2 The rate includes cost of all materials and labour required for satisfactory completion of this item including fittings.
3.3 The rate shall be for a unit of one number.

29[23.24(A)] Providing and fixing ball cock approved quality as directed (Copper metal) (I) 25 mm. dia. (II) 50 mm. dia.

1.1 Materials
1.2 The ball cock of specified diameter shall conform toM-52.

2.1 Workmanship
2.2 The ball cock of specified diameter shall be fixed as directed. The fixing of ball cock shall be carried out as in best workman like manner.

3.1 Mode of measurements and payment
3.2 The rate includes cost of all materials and labour involved for carrying out satisfactory work.
3.3 The rate shall be for a unit of one number.

30[23.24(8)] Providing and fixing ball cock approved quality as directed : Ebonite (1) 25 mm. dia. (2) 50 mm. dia.

1.0 Materials & Workmanship :
The relevant specifications of item No.23.24(A) shall be followed except that the boll cock of specified dia of Ebonite shall be fixed.

2.1 Mode of measurements & payment
2.2 The relevant specifications of item No. 23.24(A) shall be followed.
2.3 The rate shall be for a unit of one number.

31[23.25] Providing and fixing C.I. Manhole cover 0.60 M. x 0.45 M. size having weight notless than 35 kg.

1.1 Materials
1.2 C.I. Manhole cover of 0.60 x 0.45 m. size shall be of best quality. The weight of C.I. cover and frame shall not be less than 35 kg. The C.I. manhole shall be of light duty and conform relevant I.S 1726-1991 (Reaffirmed 2017) and its relevant and latest edition.

2.1 Workmanship
2.2 The C.I. Manhole cover shall be fixed in best workman like manner.

3.1 Mode of measurements & payment
3.2 The rate includes cost of all labour and materials required for satisfactory completion of this item.
3.3 The rate shall be for a unit of one number.

32[23.26] Providing and fixing G.I. rain water spout of 50 mm dia. and 30 em length.

1.0 Materials

1.1 G.I.M.S. tube of 50 mm. dia. shall conform to M-36.

2.1 Workmanship
2.2 The G.I. pipe of 30 em fixed as rain water pipe as directed. The pipe shall be fixed about% dia. below the floor level so as to make approach of water easy. The inlet of pipe shall be rounded off easy entry of rain water pipe. The pipe shall be fixed in C.M. 1:3. The outlet shall be champhered as directed.

3.1 Mode of measurements & payment.
3.2 The rate includes of all labour and materials required for satisfactory completion of this item.
3.3 The rate shall be for a unit of one number.

33[23.27] Providing and fixing pillar tap capstan head screw down high pressure, with screw shank andback nute. (A) 15mm. dia. 20mm. dia. as per approved make & model of GSPHCL make list.

1.1 Materials
1.2 The capstan head pillar tap of specified dia. of C.P. over brass shall be of best quality and shall conform to I.S. : 1795-1982 (Reaffirmed 2020) and its relevant and latest edition. The pillar taps shall be tested.

2.1 Workmanship
2.2 The capstan head pillar tap of specified dia. shall be fixed as directed with required washers of selected leather or rubber asbestos composition or of plastic as directed. The cock shall fixed with pipeline with white zinc and Teflon tape to make joint water tight. The work shall be carried out in best workman like manner.

3.1 Mode of measurement and payment
3.2 The rate includes cost of all labour, materials, tools and plant etc. required for satisfactory completion ofthis item.
3.3 The rate shall be for a unit of one number.

34[23.28] Providing and fixing concealed or open center point to wall ceiling & floor CPVC (SDR 13.5) PIPE having National Sanitation Foundation (NSF) seal for potable water of following dia. nominal bore tube fittings and clamps including making good the wall, ceiling and floor etc. complete. Pipe shall be concealed or open as mention in tender description. Pipe shall be as per approved make of GSPHCL make list.

(A)) 15.00mm nominal dia.
(B) 20.00mm nominal dia.
(C) 25.00 mm nominal dia.
(D) 32.00mm nominal dia.
(E) 40.00mm nominal dia.
(F) 50.00mm nominal dia.
(G) 65.00 mm nominal dia.
(H) 80.00 mm nominal dia.
(I) 100.00 mm nominal dia.
(J) 150.00 mm nominal dia.

1.0 MATERIALS:

CPVC pipes & fittings used in hot & cold potable water distribution system shall conform to requirement of IS 15778-2007 (Reaffirmed 2017). The material from which the pipe is produced shall consist of chlorinated polyvinyl chlorides. The polymer from which the pipe compounds are to be manufactured shall have chlorine content not less than 66.5%.

The internal and external surfaces of the pipe shall be smooth, clean and free from grooving and other defects. The pipes shall not have any detrimental effect on the composition of the water flowing through it.

Diameter and wall thickness of CPVC pipes are as per given in Table below.

TABLE

Sl.No	Nominal size	Nominal outer diameter	Mean Outside Diameter		Outer diameter at any point		Wall Thickness					
							Class 2, SDR 13.5			Class 3, SDR 17		
			Max	Min	Max	Min	Avg. Max	Min	Max	Avg. Max	Min	Max
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*	*(13)*
(i)	15	15.9	15.8	16.0	15.8	16.0	1.9	1.4	1.9	-	-	-
(ii)	20	22.2	22.1	22.3	22.0	22.4	2.2	1.7	2.2	-	-	-
(iii)	25	28.6	28.5	28.7	28.4	28.8	2.6	2.1	2.6	-	-	-
(iv)	32	34.9	34.8	35.0	34.7	35.1	3.1	2.6	3.1	-	-	-
(v)	40	41.3	41.2	41.4	41.1	41.5	3.6	3.1	3.6	-	-	-
(vi)	50	54.0	53.9	54.1	53.7	54.3	4.6	4	4.6	-	-	-
(vii)	65	73.0	72.8	73.2	72.2	73.8	-	-	-	4.8	4.3	4.8
(viii)	80	88.9	88.7	89.1	88.1	89.7	-	-	-	5.9	5.2	5.9
(ix)	100	114.3	114.1	114.5	113.5	115.1	-	-	-	7.5	6.7	7.5
(x)	150	168.3	168.0	168.6	166.5	170.1	-	-	-	11.1	9.9	11.1

Notes

1. For CPVC pipes SDR is calculated by dividing the average outer diameter of the pipe in mm by the minimum wall thickness in mm. If the wall thickness calculated by this formula is less than 1.52 mm, it shall be increased to 1.52 mm. The SDR values shall be rounded to the nearest 0.5.

Dimensions of Pipes

The outside diameter, at any point and wall thickness shall be as given in abo\ieTable.

Diameter : The outside diameter and outside diameter at any point as given in abo\ie Table shall be measured according to the method given in IS 12235 (part 1)-2004 (Reaffirmed 2019).

Diameter at any point: The difference between the measured maximum outside diameter and measured minimum outside diameter in the same cross-section of pipe (also called tolerance on ovality) shall not exceed the greater of the following two values:

(a) 0.5 mm, and

(b) 0.012 dn rounded off to the next higher 0.1 mm.

Wall Thickness: The wall thickness of the pipes shall be as given in above Table. Wall thickness shall be measured byanyofthethree methods given in IS 12235 (part 1) 2004 (Reaffirmed 2019).

To check the conformity of the wall thickness of the pipe throughout its entire length, it is necessary to measure the wall thickness ofthe pipe atany point along its length. This shall be done by cutting the pipe at any point along its length and measuring the wall thickness as above. Alternatively , to avoid destruction of the pipe, nondestructive testing methodssuch as the use of ultrasonic wall thickness measurement gauges shall be used at any four points along the length of the pipe.

Tolerance on Wall Thickness

(a) For pipes of minimum wall thickness 6 mm or less, the permissible variation between the minimum wall thickness (eMin) and the wall thickness at any point (e), (e - eMin) shall be positive in the form of +y, where y=0.1 eMin+0.2 mm.

(b) For pipes of minimum wall thickness greater than 6mm, the permissible variation of wall thickness shall again be positive in the form of +y, where y would be applied in two parts.

(c) The average wall thickness shall be determined by taking at least six measurements of wall thickness round the pipe and including both the absolute minimum and absolute maximum measured values. The tolerance applied to this average wall thickness from these measurements shall be within the range 0.1 eMin+0.2 mm (see above Table).

(d) The maximum wall thickness at any point shall be within the range 0.15eMin (see above Table).

(e) The results of these calculations for checking tolerance shall be rounded off to the next higher 0.1 mm.

Effective Length (Le): Ifthe length of a pipe is specified, the effective length shall not be less than that specified. The preferred effective length of pipes shall be 3, 5 or 6 m. The pipes may be supplied in other lengths where so agreed upon between the manufacturer and the purchaser.

Pipe Ends

The ends of the pipes meant for solvent cementing shall be cleanly cut and shall be reasonably square to the axis of the pipe or may be chamfered at the plain end.

Marking:

Each pipe shall be clearly and indelibly marked in ink/paint or hot embossed on white base at intervals of not more than 3m. The marking shall show the following:

(a) Manufacturers name or trade mark.
(b) Outside diameter
(c) Class of pipe and pressure rating
(d) Batch and lot number.

2.0 Workmansh;p:

Pipe Can be concealed in chases or open as described in item or as directed. The Pipe and fitting are to be pressure tested prior to concealing with chases. To maintain alignment of CP Fittings while joining, all alignments of fittings and pipe shall be done correctly. Do not use nails for holding of pipes in the chases. For Pipes fixed in the shaft/Duct etc. there should be sufficient space to work on the pipe. Pipe sleeves shall be fixed at a place the pipe is passing through a wall or floor so as to allow freedom for expansion and contraction. Required size of Z & U clamps is to be provided at 1.5m c/c to support the pipe. The projection of pipe must be 50mm from wall surface. All joints of Pipe shall be fitted with the use of chemical solvents.

All water Supply system shall be tested to Hydrostatic pressure test. The Pressure test are similar to test pressure used for other plastic/metal pipes. hydrostatic Pressure test shall be in accordance with IS 12335(Part 8 sec 1):2004(Reaffirmed-2019) . Network (Water Supply system) may be tested in sections and such section shall be entirely checked on completion of connection to the water tank or pumping system or mains. If any joint found leaking shall be redone and all leaking pipes removed and replaced by contractor without any extra payment.

All pipes and fitting shall be fixed truly vertical and horizontal unless unavoidable.

3.0 Mode of Measurements and payment

The description of each item shall unless otherwise stated be held to include where necessary conveyance, and delivery, handling , unloading sorting, fornication, hoisting, cutting and waste, return of packing etc.

The length shall be measured on running meter basis of finishing work the length shall be taken along the center line of the pipe and fittings the pies fixed to walls, ceilings, floors. Etc. shall be measured and paid under this item.

All the work shall be measured in decimal system as fixed in its place, subject to tolerance given below unless otherwise stated.

Dimension shall be measured to the nearest 0.01 meter.

All measurement of cutting shall unless otherwise stated be held to include to consequent water.

In case of fitting of unequal bore, the largest bore shall be measured for the test.

Testing of pipe lines, fittings and joint include for providing all plant and appliances necessary for obtaining access to the work to be tested and carrying out the tests.

The rate included CPVC piping with screwed socket joints, together with all fittings (such as bends, socket, elbows, tees, cresses , short pieces, clamps, and plugs union etc.) & fixing complete with clamping wall hooks, roll plug etc., and also cutting, screwing and waste and for making forged (or handmade) bends on piping as required . Connectors hall be inserted, where required or directed. The rate also includes cutting through wall, holes in wall to be provided by using core cutter machine floors etc. and finish the holes, floors etc. by cement mortar (1:3).Rates are also inclusive of making required width of jari and also filling those jaris in cement mortar (1:3).

The rate shall be for a unit of one running meter including all types of fittings, materials, labour etc complete. No extra payment for fittings shall be paid separately.

35[23.29] Labour charges for placing fixing in position PVC water tank as supplied by corporation and size including making inlet and outlet. Over flow and washout arrangement with G.I. connection including using necessary M.H. for connection etc. complete with closed cover including applying two coats of oil painting outside the tank etc. complete.

1.1 Material:

1.2 Water tank shall be installed on perfectly plained and smooth surface.
1.3 Outlet pipe shall be 7.5 em high than bottom surface.
1.4 Diameter of overflow pipe shall be bigger than inlet pipe diameter.
1.5 Unions shall be used in inlet and outlet pipe.
1.6 For connection in water tank required washer and check nut shall be used.
1.7 Two coats of oil paint on external surface of tank shall be applied.

All damage during lifting, placing, operating will be borne by contractor.

2.0 Mode of measurement and payment :

2.1 The rate include for all labour, for installing PVC water tank in position, two coats of oil paints, and P&F all necessary fittings if required etc. completed. This shall be measured in and rates are of per litre basis.

36[23.30] Providing, supplying & fixing ISI marked Rotational moulded polyethylene double layer cylindrical vertical storage tank.

Material

PVC tanks shall be made of best virgin raw materials and latest technology bearing mm1mum 1Oyears guarantee. The PVC tank shall be with white coating inner side. They shall be cylindrical vertical with closed top. The material of construction of tank, lid and fittings which come in contact with water such that it does not impart any taste, colour or odour to water, nor have any toxic effect, and it shall not contaminate water their by making it unpotable.

The density of resin (base material at 23 Degree Celsius when tested shall confirm to IS 7328-2020.

The percentage of carbon black content in polyethylene shall be 2.5 ± 0.5 percent and it shall be uniformly distributed. All tanks supplied shall bear brand name and valid ISI mark. i.e. IS 12701-1996 (Reaffirmed 2017). The dimensions of the tank shall be as per Table 1, Clause 5.1 of IS 12701-1996 (Reaffirmed 2017).

Installation and Fittings

The flat base ofthetankshall be fully supported over its whole bottom area on a durable rigid flat and level platform sufficiently strong to stand without deflection the weight of the tank when fully filled with water. For inlet, outlet and other connections fully threaded GI orCPVC connections with hexagonal check nuts and washers on either side of the tank wall shall be provided. Holes for threaded connections shall be drilled and not punched. Pipes entering of leaving the tank shall be provided with unions and suitably supported on a firm base to avoid damage to the tank walls.

Manhole Lid

The lid shall rest evenly and fit over the rim of the manhole so as to prevent the ingress of any foreign matter into the tank. The lid shall be provided with suitable arrangement for locking it with the tank.

The tank and its components shall conform to the local bye-laws for preventions of mosquito menace.

Rates

The rate shall include the cost of the tank, manhole lid, carriage and delivery at the place specified.
Rate inclusive of cost of tank, hoisting at any height/floor, all fittings (Like Inlet, Outlet, Washout & Overflow etc.), one coat of primer and two coat of white oil paint at outside of the tank etc. complete. Making of platform/Base to rest the tank shall be paid separately.

The rate shall be paid for a unit per liter for the item completed as above.

The agency/contractor has to provide 10 years guarantee certificate against any manufacturing defects for water tank. During the final bill agency has to produce guarantee bond on Rs. 300/- stamp paper with notarized.

37[23.31] Providing and fixing C.P. Brass Towel Ring shall be model & make as per approved make list of GSPHCL. Providing at wash basin fixed to wall with C.P. brass screws.

1.0 General

1.1 C. Plated brass towel ring shall be model & make as per approved make list of GSPHCL.

2.0 Mode of measurements and payment

2.1 The rate shall be paid for a unit of one number.

38[23.32] Providing and fixing C.P. Brass Towel Rack shall be model & make as per approved make list of GSPHCL.

1.0 General

1.1 C. Plated brass towel rack shall be model & make as per approved make list of GSPHCL.

2.0 Mode of measurements and payment

2.1 The rate shall be paid for a unit of one number.

39[23.33] Wall Hung Type WC Pan

Providing and fixing wash down white vitreous china WALL HUNG Approved Make and Model by GSPHCL with integral "P" trap including jointing the trap with pan and soil pipe in vitreous china white color. Rate inclusive of providing and fixing PVC Flush Tank Approved Make and Model by GSPHCL & Soft seat cover of the same make. Rate are inclusive of all necessary fittings required for installation of flushing tank and wall hung. Wall Hung Shall be fixed on S.S. heavy Duty rack bolt having 16mm dia., 165mm Length Using Plastic Sleeve. Make by Using Drill built only.

Wash down water closet (European type W.C. Pan) shall conform to M-40 white vitreous china Wall Hung European type W.C. pan of Approved Make and Model by GSPHCL. Water Closet with integral "P" trap. PVC Flush Tank and Seat Cover of Approved Make and Model by GSPHCL.

Workmanship

Wall mounting water closet shall be of white vitreous China confirming to IS 2556 (Part-16)-2002 (Reaffirmed 2017). For general requirement relating to terminology, materials, manufacture, glazing, defects, minimum thickness, tolerances, performance and methods of tests shall confirm to IS 2556 (Part-1)-1994 (Reaffirmed 2017). Wall mounted water closet shall be of one piece construction. Each wall mounted water closet shall be provided with fixing arrangement and shall have an integral flushing rim of suitable type. It shall have an inlet for connecting theflushing pipe of dimension confirming to IS 2556. The flushing rim may be box oropen rimtype or a combination of both. In case of box rim, adequate number of holes and slot be provided. Theflushing rim and the inlet shall be of the self-draining type and weep hole shall be provided at the flushing inlet ofthe wall mounted water closet.

Each wall mounted water closet shall have an integral trap and P type outlet confirming to IS 2556 (Part-16)-2002 (Reaffirmed 2017). Inside surface of water closet and trap shall be uniform andsmooth in order to ensure an efficient flushing. The outlet if without serration, shall be glazed and if same iswith serration, may not be glazed.

Wall hung WC shall be Fixed On Wall Hung Using S.S rack bolt with Plastic Sleeve (Gripper) make a hole with drill built in wall, then place a Plastic Sleeve (Gripper) in the Hole then insert the S.S. rack bolt in plastic sleeve. The Rack bolt shall be Heavy duty Minimum 16mm dia., 165mm Length. Then turn the rack bolt with Spanner & place the wall hung W.C. on Rack bolt, Insert the Grip, Washer, Unit & Cap on the rack bolt. Which shall be fixed in a manner as approved by the Engineer.

The WC Outlet shall be fixed to Drain Pipe with necessary PVC/Rubber gasket or Ring.

Each WC set shall be provided with approved quality of seat, rubber buffers and chromium-plated hinges. Seat shall be so fixed that it remains absolutely stationary in vertical position without falling down on the WC. Approved PVC Flush Tank Shall Be Fixing and Jointing with Proper Connection to WC Pan with all Necessary Fittings as approved by engineer in charge.

Plastic Seat and Covers for Water Closet

The seat and cover shall be of thermosetting or thermoplastic conforming to IS 2548 (Part-1)-1996 (Reaffirmed 2017) or of thermoplastic confirming to IS 2548 (Part-2)-1996 (Reaffirmed 2017) as specified. Unless otherwise specified these shall be of closed pattern.

Thermosetting plastic used shall conform to grade 2 or 3 of IS 1300 when it is phenolic plastic or IS3389 when of urea formaldehyde.

Thermo plastic materials used may be of Polystyrene conforming to type 2 or3 ofiS2267-1995 (Reaffirmed 2020) or of polypropylene, Appendix A of IS 2548-1996 (Reaffirmed 2017). In public buildings where rough and heavy use of seats and covers are common, plastic seats shall be moulded out of thermosetting materials, phenolic or urea formaldehyde only and theunderside of the seat shall be flat with solid moulding.

The hinging device shall be bronze or brass with nickel chromium plating confirming to IS 1068 andthe seat shall have not less than three rubber or plastic buffers of size 25 mm x 40 mm x 10 mm for closed front seats and not less than four for open front seats, which shall be securely fixed to the underside of theseat unless otherwise specified. The cover shall be fitted with the same number of buffers as provided for the seat.

Seats shall have a smooth finish and shall be non absorptive and free from cracks and crevices. They shall be capable of being easily cleaned and shall not be adversely affected by common solvents or household cleanser.

Strength: The seats shall withstand without permanent distortion of the seat or hinge fittings or damage to any finish, a load of 1150 N for 30 minutes applied in the manner prescribed in IS 2548-1996 (Reaffirmed 2017).

Mode of measurements and payment:-

The rate shall include the cost of all materials and labour involved in all the operations described under workmanship.

The rate includes cost of all labour for fixing pans and seat and cover, inlet outlet connection for flushing etc. Complete including testing the same of a completely commissioned w.c.

The rate shall be for a unit of one number.

SECTION -12
DRAINAGE & SEWERAGE

1[24.1(A)] Providing and laying (two level or slopes) and jointing with stiff mixture of cement mortar in proportion 1:1 salt glazed stone-ware pipes, following nominal internal diameters including testing of pipes and joints complete : 100 mm. dia.

1.1 Materials

1.2 Water shall conform to M-1, cement mortar of proportion 1:1 shall conform to M-11, glazed stonewarepipe shall conform to M-48. The glaze of the pipes shall be free from crazing. The pipes shall give a sharp clear tone when struck with a light hammer. There shall be no broken blisters. The thickness of pipes shall be as given in the below Table.

TABLE

Stoneware Pipes

Internal Diameter (mm)	*Mean Thickness ofthe Barrel and Socket (mm)*
100	12
150	15
200	16
230	19
250	20
300	25
350	30
400	35
450	37

The length of pipes shall be 60, 75, 90 em exclusive of the internal depth of the socket. The pipes shall be handled with sufficient care to avoid damage to them.

2.1 Workmanship

2.2 The trenches for stoneware pipe drains shall be carried out as per relevant specifications of item No. 2[23.3] except that the work is for stoneware pipes of 100 mm.

2.3 Laying:

2.2.1 The pipes shall be laid accurately and perfectly true to line, levels and gradients, Great care shall be taken to prevent sand etc. from entering the pipes. The pipes between two manholes shall be laid truly in a straight line without vertical or horizontal undulation. All junctions and changes in direction and diameter shall be made inside manholes by means of curved tampered channels formed in Cement concrete finished smooth and benched on both sides. The body of the pipe shall rest for its entire length, on an even level bed grips being made or left on the bed to receive the sockets of the pipes. The pipes shall be laid with socket ends facing upstream.

Where pipes are not bedded on concrete, the trench floor shall be left slightly high and carefully bottomed up as pipe laying proceeds, so that the pipe barrels rest on firm and undisturbed ground. If the excavation has been carried too low, the desired levels shall be made up with concrete 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40 mm nominal size) for which no extra payment shall be made.

2.3 Jointing:

2.3.1 Tarred gaskin or yarn soaked in neat cement slurry shall first be placed around the spigot of each pipe and the spigot shall then be placed well home into the socket of the pipe previously laid. The pipe shall then be adjusted and fixed in the correct position and gaskin caulked home so as to fill not more than 1/4 of the total depth or (13 mm in depth) of the socket.

2.3.2 The remainder of the sockets shall be filled with stiff mixture of cement mortar in proportion of one part of cement and one part of sharp sand. When the socket is filed, a filled shall be formed round the joints with a towel, forming an angle of 45° with the barrel of the pipe.

2.3.3 The mortar shall be mixed as necessary for immediate use.

2.3.4 After the joint is made, any extraneous materials shall be removed from the inside of the joints with a suitable scraper or badger. The newly made joints shall be protected, until set, from the sun, dry winds, rain or frost, sacking or other suitable materials which shall be used for the purpose.

2.3.5 The mortar shall be cured for 10 days.

2.4 Testing of Joints :

Stoneware pipes used for sewers shall be subjected to a test pressure of2.5 m. head of water at the highest point of the section under test. Before commencing test, the pipe line shall be filled with water and maintained full for 24 hours under head of 0.6 m of water. The test shall be carried out by suitably

plugging the lower end of the drain and the ends of the connection if anyand filling the system with water. A knuckle bend shall be temporarily jointed in at the top end anda sufficient length of vertical pipejointed to it so as to provide the required test head, or the top may be plugged with a connection to a hose ending in a funnel which could be raised or lowered till the required head is obtained and fixed suitable for observation. The tolerance of two liters per centimeterof diameter per kilometer may be allowed during a period of 10 minutes.

If any leakage is visible, the defective part of the work shall be cut out and made good.Aslight amountof sweating which is uniform may be overlooked, but excessive sweating from a particular pipe orjointshall be watched for and taken as indicating a defect to be made good.

Any joint found leaking or sweating, shall be rectified or embedded into 15 em layer of cement concrete (1:2:4) 30 em in length and the section retested.

Refilling : In cases where pipes are not bedded on concrete special care shall be taken in refilling trenches to prevent the displacement and subsequent settlement at the surface resulting in uneven street surfaces and dangers to foundations etc. The backfilling materials shall be packed by hand under and around the pipe, and rammed with a shovel and light tamper. This method of filling will be continued up to the top of pipe. The refilling shall rise evenly on both sides of the pipe continued up to 60 em above the top of pipe so as not to disturb the pipe. No tamping should be done within 15 em of the top of pipe.

3.1 Mode of measurements and payment
3.2 Pounding or watering of the trenches bed to fit the lower part of the pipe and "Grips" dug to take socket, collars etc. are included in the rate of laying the pipes.
3.3 The measurements shall be net without any allowance for cutting, and waste. The length of bends, junctions, and other connections shall be included in the total length of the drain pipes. Nothing extra shall be paid for the same. The rate includes necessary excavation, refilling trenches etc. complete.
The length of the pipe shall be measured in running metre nearest to a em has laid or fixed, from inside of one manhole/chamber to inside of another manhole/chamber.
The length shall be taken along the centre line of the pipes over all fittings such as bends, junctions etc. which shall not be measured separately. The rate shall include cost of material, labour etc.
The rate shall be for a unit of one running metre.

2[24.1(8)] Providing and laying (two level or slopes) and jointing with stiff mixture of cement mortar in proportion 1:1 salt glazed stone-ware pipes, following nominal internal diameters including testing of pipes and joints complete: 150mm dia.

Material and workmanship:
The relavent specification of item no.24.1(A) shall be followed except that the diameter of pipe shall be 150mm dia.

Mode of measurement & payment:
The relavent specification of item 24.1(A) shall be followed.
The rate shall be for a unit of One running metre.

3[24.2(A)] Providing and laying cement concrete 1:5:10 (1 cement: 5 fine sand : 10 graded stone aggregate 40 mm. nominal size) bedding for stoneware pipe of following internal diameter with necessary form work and curing complete : 100 mm. dia. 300 mm. width (112 mm. average bed thickness).

1.0 Materials: (1) Water shall conform to M-1. (2) Cement shall conform M-3. (3) Sand shall conform to M-6. (4) Stone aggregate 40 mm nominal size shall conform to M-12.
2.1 Workmanship
2.2 The relevant specifications of item 5.3.6(A) shall be followed except that the concrete work shall be carried out in trenches as bedding for stoneware pipes. The width of concrete shall be 300 mm. and average thickness of bedding shall be 112 mm. The concrete shall be brought up at least to the invert level of the pipe to form a cradle and to avoid line contact between the pipe and the bed.

3.1 Mode of measurements & payment
3.2 The rate includes cost of all labour and materials required for satisfactory completion of this item.
3.3 The rate includes cost of necessary form work required if any.
3.4 The rate shall be for a unit of one running metre.

4[24.2(B)] Providing and laying cement concrete 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40 mm. nominal size) bedding for stoneware pipe of following internal diameters with necessary form work and curing complete 150 mm. dia. 450 mm. width (166 mm. average bed thickness).

1.1 Materials & Workmanship :
1.2 The relevant specifications of item 24.2(A) shall be followed except that the cement concrete work shall be carried out for bedding of stoneware pipe of 150 mm. dia. The average thickness of bedding shall be 166 mm. and width shall be 450 mm.

2.1 Mode of measurements & payment
2.2 The relevant specifications of item 24.2 (A) shall be followed.
2.2 The rate shall be for a unit of one running metre.

5[24.3] Providing and fixing S.W. gully trap with C.I. grating brick masonry chamber and watertight precast R.C.C. coverwith frame of 300 mm. x 300 mm. size (Inside) with standard weight: (A) square mouth trap 100 mm. x 100 mm. size P trap.

1.0 Material : (1) Water shall conform to M-1. (2) Cement mortar of proportion 1:5 shall conform to M-11. (3) Burnt brick shall conform to M-15. (4) The S.W. Gulley trap of 100 mm. x 100 mm. size shall conform toM-47.

2.1 Workmanship
2.2 Excavation for gully trap shall be done true to dimensions and levels as indicated on plans or as directed. The excavation work shall generally be done as per relevant specification of item 1[4.0.0(A)]. of earth work.

2.3 Fixing:
2.2.1.1 The gully trap shall be fixed over cement concrete 1:5:10 (1 cement: 5 sand : 10 graded brick bats aggregate, 40 mm. nominal size) foundation, 650 mm. square and 100 mm. thick. The depth of top of concrete below the ground level shall be as per site requirement. The joining of gully outlet to the branch drain shall be done similar to jointing of S.W. pipe as described in item No.1[24.1 (A)].

2.4 Brick masonry chamber:
After fixing and testing gully branch drain, a brick masonry 300 x 300 mm. inside with bricks in C.M. 1:5 (1 cement :5 sand) shall be built with a 100 mm. brick work round the gully trap from the top of bed concrete upto ground level. The space between the chamber walls and the trap shall be filled with cement concrete 1:5:10. The upper portion of the chamber i.e. above the top level of the trap shall be plastered inside with cement mortar 1:3 (1 cement : 3 sand) finished with floating coat of neat cement. The corners and bottom of the chamber shall be rounded of so as to slope towards the grating.
Precast concrete cover with frame 300 x 300 mm size shall then be fixed on the top of the brick masonry cover shall be made in C.C. 1:2:4 (1 cement : 2 coarse sand : 4 graded aggregate 20mm. nominal size) having 40 mm thick and rendered smooth. The finished top of the cover shall be flushed with adjoining floor level.

3.1 Mode of measurements & payment
3.2 The rate includes cost of all labour, materials, tools and plant etc., required for satisfactory completion of this item as described above.
3.3 The rate shall be for a unit of one number basis.

6[24.4] Providing and laying (to level or slopes) and jointing reinforced concrete light duty non-pressure pipes 1.5. class N.P. 2 ofthe following internal diameters with collars and butt ends prepared for collar joints including testing of joints etc. complete (B) 150 mm. (C) 250 mm. (D) 300 mm. (E) 450 mm. (F) 500 mm. (G) 600 mm. (H) 900 mm. (K) 1000 mm. (M) 1200mm.

Materials:
The reinforced concrete light duty non-pressure pipes of specified diameter shall conform to I.S. 458-2021 or its relevant and latest edition.

The pipes shall be with or without reinforcement as required and shall be of class not lesser than NP2. These shall conform to IS 458 and shall be capable of withstanding a test pressure of 0.07 MPa (7 m head). The reinforced cement concrete pipes shall be manufactured by centrifugal (or spun) process while un -reinforced cement concrete pipes by spun or pressure process. All pipes shall be true to shape, straight, perfectly sound and free from cracks and flaws. The external and internal surface of the pipes shall be smooth and hard. The pipes shall be free from defects resulting from imperfect grading of the aggregate mixing or moulding.

Concrete used for the manufacture of un-reinforced and reinforced concrete pipes and collarsshall not be leaner than 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate). The maximum size of aggregate should not exceed one third of the thickness of the pipe or 20 mm whichever is smaller for pipes above 250 mm internal diameter. But for pipes of internal diameter 80 to 250 mm, the maximum size of aggregate should be 1Omm. The reinforcement in the reinforced concrete pipesshall extend throughout the length of the pipe. The circumferential and longitudinal reinforcements shall be adequate to withstand the specified hydrostatic pressure and further bending stresses due to the weight of water when running full across a span equal to the length of pipe plus three times its own weight.

The dimensional requirements of concrete pipes are given in Appendix I.

APPENDIX- 'I'

A: DIMENSIONAL REQUIREMENT OF CLASS NP2-REINFORCED CONCRETE LIGHT DUTY, NON PRESSURE PIPES & COLLAR

(Clause 19.2.2)

Nominal Internal Diameter of Pipe	Barrel Wall Thickness of pipe	Collar Dimensions			Reinforcements in Collar		
		Minimum Caulking Space	Minimum Thickness	Minimum Length	Longitudinal, Mild steel or Hard Drawn Steel		Spiral Hard Drawn Steel
					Minimum Number	Weight Kg/Collar	Kg/Collar
mm	mm	mm	mm	mm			
(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
80	25	13	25	150	6	0.08	0.07
100	25	13	25	150	6	0.08	0.08
150	25	13	25	150	6	0.08	0.10
200	25	13	25	150	6	0.08	0.12
225	25	13	25	150	6	0.08	0.14
250	25	13	25	150	6	0.08	0.16
300	30	16	30	150	8	0.11	0.22
350	32	16	32	150	8	0.11	0.25
400	32	16	32	150	8	0.11	0.27
450	35	19	35	200	8	0.15	0.40
500	35	19	35	200	8	0.15	0.60
600	45	19	40	200	8	0.15	0.70
700	50	19	40	200	8	0.23	1.05
800	50	19	45	200	8	0.23	1.85
900	55	19	50	200	8	0.23	2.05
1000	60	19	55	200	8	0.33	2.25
1100	65	19	60	200	8	0.33	3.09
1200	70	19	65	200	8	0.33	4.11
1400	75	19	75	200	12	0.50	5.08
1600	80	19	80	200	12 or 8+8	0.67	6.55
1800	90	19	90	200	12 or 8+8	0.67	9.00
2000	100	19	100	200	12+12	1.00	12.15
2200	110	19	110	200	12+12	1.00	13.30

Note:

1. If the mild steel is used for spiral reinforcement, the weight specified under col. 7 shall be increased by a factor 140/25.
2. Soft grade mild steel wire may be used as reinforcement for collars of pipes of nominal internal diameter up to 250 mm only, by increasing the weight by a factor 140/84. Where only soft grade mild steel wire is used for making collar cages, the weight of reinforcement shall be total weight or col. 6 and 7 multiplied by 140/84. This is allowed as a process requirement.
3. Internal diameter of collar to suit the actual diameter of pipes with minimum caulking space as given in col. 2

The minimum clear cover for reinforcement in pipes and collars shall be as given in Table 19.3.

TABLE 19.3

Sf. No.	*Precast concrete pipe/collar*	*Minimum clear cover, mm*
(i)	Barrel wall thickness	
(a)	Upto and including 75 mm	8
(b)	Over75 mm	15
(ii)	At spigot steps	5
(iii)	At end of longitudinal	5

Note : An effective means shall be provided for maintaining the reinforcement in position and for ensuring correct cover during manufacture of the unit. Spacers for this purpose shall be of rust proof material or of steel protected against corrosion.

Laying

The pipes shall be lowered into the trenches carefully. Mechanical applications may be used. Where necessary pipe shall be laid in straight lines or with easy curves and true to line and gradient as specified. The laying of pipe shall proceed upgrade of a slope. In the pipe spigot and socket joints ; the socket ends shall face upstream. In case of pipes with joints to be made with loose collars, the collars shall be slipped on before the next pipe is laid.

In case where the foundation conditions are unusual such as the proximity of trees or holes, under existing or proposed around in 150 mm. thick cement concrete 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40 mm. nominal size) or compacted sand or gravel shall be laid.

In case where the natural foundation is inadequate the pipes shall be laid either in concrete cradle, supported on proper foundations or on any other suitably designed structure. If concrete bedding is used, the depth of concrete below bottom of the pipe shall be at least 1/4th of the internal diameter of the pipe subject to a minimum of 100 mm and a maximum 300 mm. The concrete shall be extended up the sides of the pipe at least to a distance of 1/4th of the outside diameter for pipes 300 mm and over in diameter.

The pipes shall be laid in the concrete bedding before the concrete has set. Pipes laid in trenches in earth shall be bedded evenly and firmly and as far as up to the haunches of the pipe as to safely transit the load expected from the back fill through the pipe to the bed. This shall be done either by excavating the bottom of the trenches to fit the curve of the pipe or by compacting the earth under a round curve of the pipe to form an even bed. Necessary provision shall be made for joints wherever required.

Jointing

The joints shall be done by slipping the collar over the joint, coviering equialy both the pipe. The annual space shall be filled with steap mixture of cement mortar 1: 1% (1 cement : 1% fine sand) which shall be rammed with caulking tool. After a days work any extraneous material shall be remove from the inside of the pipe and the newly made joint shall be cured. Care shall be taken that the underside of the joints is properly filled with mortar.

Testing: For pressure pipes

The completed pipeline shall be tested for pressure (Known as site test pressure) which shall not be less than the maximum pipeline operating pressure plus the calculated surge pressure, but in no case shall it exceed the hydrostatic test pressure. For non-pressure pipes the joints shall be tested as per procedure laid down item no.24.1 (A).

Curing

Every joint shall be kept wet for about 10 days for maturing. The section of the pipe line laid and jointed shall be covered immediately to protect from weather effects.

The joints shall be left exposed for observation.

Mode of measurements & payment

The relevant specifications of item 24.1 (A) shall be followed except that the rate includes for laying to Qevel or slope in trenches etc. measured separately), making the joints as indicated and testing to stand the water test.

The measurements shall be net, without any allowance for cutting and waste. The length of bends, junctions and other connections (measured along the centre line) shall be included in the total length of the Pipes.

The size of bends, junctions, etc. shall suit the size of pipe. The bore (internal diameter of pipe) shall be the criterion for payment.

Nothing extra shall be paid separately for the use of mechanical appliances, where necessary, as described above.

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

7[24.5] Constructing Manhole with R.C.C. top slab in 1:2:4 mix (1 cement : 2coarse sand : 4 graded stone aggregate 20 mm. nominal size) foundation concrete 1:3:6 (1 cement : 3 coarse sand : 6 brick bats 40 to 50 mm. size) plastering 15 mm. thick with C.M. 1:3 (1 cement :3 coarse sand) finished with floating coat of neat cement and making channels in CC 1:2:4 mix (1 cement : 2 coarse sand : 4 stone aggregate 20 mm. nominal size) finishedsmooth complete including curing and testing (I) Inside size 900 mm. x 1200 mm. and 1.5 Mt. deep, Including precast cover and frame shall be heavy duty circular (HD-20) (Clear opening in frame 600mm) (A) with 230 mm. thick walls of conventional brick masonry using bricks having crushing strength of not less than 35 Kg. / cm2 in C.M. 1:5 (1 cement : 5 coarse sand)

I.	A type depth	0.90 meter for	150 mm or any dia.	sewer
II.	B type "	1.50"	150 or any dia	
III.	C type "	2.25"	150 or any dia	
IV.	D type "	3.15"	150 or any dia	

1.0 Materials :Water shall conform to M-1. Cement shall conform to M-3. Burnt bricks shall conform to M-15. Brick bats of 40 to 50 mm. size shall conform to M-14. Stone coarse aggregate of 20 mm. nominal size shall conform to M-12. Grit shall conform to M-8. Cement mortar of specified proportion shall conform to M-11.

2.0 Workmanship

The manholes of different type and sizes as specified shall be constructed in sewer line at such places and to such levels and dimension as shown in drawings or as directed.

2.2 Bed Concrete :

The manhole shall be built on a bed of cement concrete 1:3:6 (1 cement: 3 coarse sand: 6 brick bats)(40 to 50 mm, nominal size) to the thickness of the bed concrete shall be 15 em. For manhole up to 1m depths and 20 em. for manholes over meter and up to 2 metre, depth and 30 em. for manholes of greater depth. Projection of bed concrete beyond the masonry well shall be 15 em.

2.3 Walls:

2.3.1 The walls of manhole shall be carried out with burnt bricks using bricks, having crushing strength not less than 35 Kg/cm^2 in C.M. 1:5 (1 cement: 5 coarse sand). The thickness of brick masonry wall shall be 230 mm. The jointing face of such brick shall be well buttered with cement mortar before laying so as to ensure a full joints.

2.4 Plaster :

2.4.1 The outer faces of the wall shall be plastered from top of manhole to 300mm deep from existing/finished Ground Level with 15 mm. thick in C.M. 1:3 (1 cement: 3 coarse sand) and the inside wall shall be plastered 15mm thick in C.M. 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement. All angles shall be rounded to 7.50 em radius and all rendered internal surfaces shall have hard impervious finish obtained by using a steel trowel. The external joints of masonry shall be finished smooth.

2.5 Channels & Benching :

2.5.1 Channels shall be semicircular in the bottom half and of diameter equal to the sewer. Above the horizontal diameter, the sides shall be extended vertically to the same level as the crown of the outgoing pipe and the top edge shall be suitable rounded off. The branch channels shall also be similarly constructed with respect to the benching but at their junction with the main channel an appropriate fall suitably rounded off in the direction of flow in the main channel shall be given.

2.5.2 The channel and benching shall be done in C.C. 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) rising at a slope in line from edges of channel. The channels of the bottom of the chamber shall be plastered with C.M. 1:2 (1 cement: 2 coarse sand) and steel trowelled smooth.

Slab:

The cover slab of R.C.C. 1:2:4 (1 cement: 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) 15 em thick reinforced with 10 mm bars at 15 em C/C both ways, surface and edges finished fair, full bearing equal to the width of wall shall be given to the slab on all slides. The frame of manhole cover shall be embedded firmly in R.C.C. slab so that the top of the frame remains flush with the top of R.C.C.

Pre-Cast Concrete Manhole Covers & Frames:

Pre-cast reinforced cement concrete manhole covers intended for use in sewerage and waterworks shall generally conform to IS 12592-2002 (Reaffirmed 2018).

Concrete: The mix proportions of concrete shall be determined by the manufacturer and shall be such as will produce a dense concrete without voids, honey combing etc. The minimum cement content in the concrete shall be 410 kg/m^3 with a maximum water cement ratio of 0.45. Concrete weaker than grade M-30 (design mix) shall not be used. Compaction of concrete shall be done by machine vibration.

Reinforcement

(a) The reinforcement steel shall conform to IS 1786-2008 (Reaffirmed 2018). Reinforcement shall be clean and free from loose mill scale, loose rust, and mud, oil, grease or any other coating which may reduce or destroy the bond between the concrete and steel. A light film of rust may not be regarded as harmful but steelshall not be visibly pitted by rust.

(b) Fibers Steel: The diameter/equivalent diameter of steel fibers where used, shall not be greater than 0.75 mm. The aspect ratio shall be in the range of 50 to 80. The minimum volume of fibers shall be 0.5 percent of the volume of concrete.

The reinforced concrete manhole cover and frame shall be designed in accordance with the provisions of IS 456-2000 (Reaffirmed 2021). Clear cover to reinforcement shall not be less than 15 mm.

Shapes and Dimensions: Clear opening in frame 600mmm, cover shall be heavy duty circular (HD-20) has mention in Table 1, of IS 12592-2002 (Reaffirmed 2018). Outside dimension of cover at top shall match with corresponding frame so that the maximum clearance at top between the frame and the cover all round the periphery is not more than 5 mm and the top surface of the frame and covers, is in level within a tolerance of .:t_Smm.

For facility of removing the cover from the frame, suitable taper matching with taper given for the frame shall be provided to the periphery of the cover.

Lifting Device: The minimum diameter of mild steel rod used as lifting device shall be 12 mm forlight and medium duty covers and 16 mm for heavy and extra heavy duty covers. The lifting device shall beprotected from corrosion by hot galvanizing or epoxy coating or any other suitable treatment.

3.0 Mode of measurements & payment

3.1 The rate includes cost of all labour, materials, tools and plant etc., required for satisfactory completion of this item as described above.

3.2 The rate shall be for a unit of one number basis.

8[24.6(A)] Extra rate for constructing B.B. masonry for every additional depth of 0.1 m. and part thereof over item 24.5(1) for depth from 0.90 m. to 1.50 m.

1.0 Materials and Workmanship

The relevant specifications of item No. 24.5(1) shall be followed for excavation same, except that the depth of manhole shall be done 0.1 m. or part thereof more than 0.90 meter up to 1.5 m. The extra payment shall be made for additional depth of 0.1 m or part thereof manhole done over and above the depth 0.90 metre.

2.1 Mode of measurement and payment

2.2 The relevant specifications of item No. 24.5(1) shall be followed, except that the extra rate shall be paid for every additional depth of 0.1 m. or part thereof shall be paid over and above the rate of item No.24.5(1).

2.3 The rate shall be for a unit of one number.

9[24.6(8)] Extra rate for constructing B.B. masonry for every additional depth of 0.1 m. and part thereof over item 24.5(11) for depth from 1.50 m. to 2.25 m.

1.0 Materials and Workmanship

The relevant specifications of item No. 24.5(1) shall be followed, exceptthat the depth of manhole shall be done 0.1 m. or part thereof more than 1.50 meter and up to 2.25 m. The extra payment shall be made for additional depth of 0.1 m or part thereof manhole done over and above the depth 1.50 m. and up to 2.25 m.

2.1 Mode of measurement and payment

2.2 The relevant specifications of item No. 24.5(1) shall be followed, except that the extra rate shall be paid for 0.1 m. or part there of additional depth of manhole provided over and above item No. 24.5(11).

2.2 The rate shall be for a unit of one number.

10[24.6(C)] Extra rate for constructing B.B. masonry for every additional depth of 0.1 m. and part thereof over item 24.5(111) for depth from 2.25 m. to 3.15 m.

1.0 Materials and Workmanship
The relevant specifications of item No. 24.5(1) shall be followed , except that the depth of manhole shall be done 0.1 m. or part thereof more than 2.25 meter up to 3.15 m. The extra payment shall be made for additional depth of 0.1 m or part thereof manhole done over and above depth 2.25 m. and up to 3.15 m.

2.1 Mode of measurement and payment
2.2 The relevant specifications of items No. 24.5(1) shall be followed, except that the extra rate shall be paid for every addition 0.1 m. or part thereof depth provided over and above item No.24.5(111).
2.3 2 The rate shall be for a unit of one number.

11[24.6(0)] Extra rate for constructing B.B. masonry for every additional depth of 0.1 m. and part thereof over item 24.5(1V) for depth above 3.15 m.

1.1 Materials and Workmanship
1.2 The relevant specifications of items No. 24.5(1) shall be followed, except that the depth of manhole shall be done 0.1 m. or part thereof more than 3.15 m. above.
1.3 The extra payment shall be made for additional depth of0.1 m or part thereof manhole done over and above 3.15 m. and above depth.

2.1 Mode of measurement and payment
2.2 The relevant specifications of items No. 24.5(1) shall be followed, except that the extra rate shall be paid for every additional 0.1 m. or part thereof depth provided for and above item No.24.5(1V).
2.3 The rate shall be for a unit of one number.

12[24.7] Providing and fixing C.I. steps of size 500 x 150 mm. x 22.5 mm. and painting with two coats of anti-corrosive paint etc. complete.

1.0 Materials : The C.I. steps of size 500 x 150 x 22.5 mm. size shall conform I.S. 5455-1969 (Reaffirmed 2017) or its relevant and latest edition. Paint shallconform to M-30.

2.1 Workmanship
2.2 The C.I. steps of size 500 x 150 x 22.5 mm. size shall be fixed in manhole as and where directed. The stepsshall be staggered in vertical runs 380 mm. apart horizontally. The top step shall be 450 mm. below the manhole cover and lowest not more than 300 mm. above the benching. The steps shall be embedded in wall of man hole with C.C. 1:3:6 up to 200 mm. depth and the surface finished with cement plaster 15 mm. thick in C.M. 1:5. The steps shall be painted with two coats of anti-corrosive paint.

3.1 Mode of measurements & payment
3.2 The rate includes all labour materials tools and plants etc. required for satisfactory completion of this item.
3.2 The rate shall be for a unit of one number.

13[24.8] Supplying and fixing C.I. cover 300 x 300 mm. without frame for gully trap (Standard pattern). The weight of cover to be not less than 4.53 kg.

1.0 Materials:The C.I. cover300 x 300 mm. size shall be of standard pattern and approved make by GSPHCL. The weight of C.I. cover shall not be less than 4.53 kg. Without frame.

2.0 Workmanship
The C.I. cover 300 x 300 mm. size without frame shall be fixed on top of the brick masonry with cement concrete 1:2:4 (1 cement: 2 sand: 4 graded stone aggregate 20 mm. nominal size) 40 mm. thick and rendered smooth. The finished top of the cover shall be left about 40 mm. above the adjoining ground level so as to exclude the surface water from entering the gully trap.

3.1 Mode of measurements and payment
3.2 1 The relevant specifications of item 24.3 shall be followed.
3.3 2 The rate shall be for a unit of one number.

14[24.9] Constructing brick masonry road gully chamber500 mm. x 450 mm. x 600 mm. including 500 mm. x 450 mm. C.I. horizontal gratings with frame complete.

1.0 Materials :

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Brick shall conform to M-15. C.I. Grating of 500 x 450 mm. size of standard make shall be of approved quality by GSPHCL. Stone aggregate 40 mm. nominal size shall conform to M-12.

2.1 Workmanship

2.2 The chamber shall be of size 500 mm. x 450 mm. internal clear dimensions between the masonry wall faces. The height of600 mm. shall be measured from the top of the bed concrete to the top of the C.I. frame. The size of grating indicate the clear internal dimensions of the C.I. frame of the grating.

2.3 The excavation shall be done to true dimensions and levels.

2.4 The foundation concrete shall consist of650 mm x 600 mm x 15 mm thick C.C. 1:5:10 (1 cement: 5 sand : 1Ograded stone aggregate 40 mm. nominal size) & 40mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 coarse aggregate, 20mm nominal size).

2.5 The wall of the chamber shall be constructed in brick work with C.M. 1:5 and 23 em. thick as per relevant specifications of item [6.14(B)]. Outside of the chamber shall be finished with 15mm thick cement plaster in C.M. 1: 3 with floating coat of neat cement slurry. Outside plaster is carried out from top of chamber to 300mm deep from existing/finished ground level.

2.6 The walls and the bed concrete of chamber shall be plastered inside with 12 mm. thick cement plaster 1:3 (1 cement : 3 coarse sand) finished smooth floating with a neat coat of cement slurry.

2.7 The gully grating cover shall be hinged to frame to facilitate its opening for cleaning and repairs. The frames of the gully grating shall be fixed on the top of masonry walls of the chamber in 15 em. thick C.C. 1:2:4 (1 cement: 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) laid over the full thickness of walls.

2.8 The chamber shall have connection pipe, the length of which in metre between the road gully chamber and the manhole of the drain shall not be less than 1/40 times the nominal diameter of the pipe in mm. i.e. for 150 mm. connection pipe, the length shall not be less than 3.75 metre. The invert of the pipe at the junction with the wall shall be flush with the top of the cement plaster on the bed concrete.

2.9 Painting : After the completion of the work ofthe exposed surface of the grating of the frame shall be painted with a thick coat of coal tar.

3.1 Mode of measurements and payment

3.2 1 The cost of connection pipes is not included in the item and shall be paid separately. However, fixing the connection pipes in the walls of gully chamber is included in the rate for gully chambers and nothing extra shall be paid for this separately.

3.3 2 The rate includes all labours and materials required for satisfactory completion of this item as described above.

3.4 3 The rate shall be for a unit of one number.

15[24.1O(A)] Constructing brick masonry chamberfor underground inspection chamber and bends with brick having crushing strength not less than 35 Kg/Cm^2 in C.M.1:5 455 x 610 mm. internal dimensions, Including precast cover and frame shall be medium duty rectangular (MD-10) (Clear opening in frame 450x600mm) R.C.C. top slab C.C. 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. size) foundationconcrete 1:5:10, inside plaster 15 mm. thick with C.M. 1:3 finished smooth with a finishingcoat of neat cement on walls and bed concrete etc. complete : Inside dimensions 455 mm. x 610 mm. and 450 mm. deep for single or multi inlet pipe-line.

1.0 Materials :

Water shall conform to M-1. Cement shall conform to M-3. Coarse sand shall conform to M-6.Brick shall conform to M-15. Stone aggregate shall conform to M-12. M.S.bar shall conform to M-18.

2.0 Workmanship

The size of inspection chamber shall be of 455 mm. x 61Omm internal clear dimensions between the masonry wall faces. The height of 450 mm. shall be measured from the top of the bed concrete to the bottom of the precast cover.

The excavation shall be done to true dimensions and levels.

2.9 The foundation concrete shall consist of605 mm x 750 mm x 15 mm thick C.C. 1:5:10 (1 cement: 5 sand : 10 graded stone aggregate 40 mm. nominal size) & 40mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 coarse aggregate, 20mm nominal size).

2.10 The wall of the chamber shall be constructed in brick work with C.M. 1:5 and 23 em. thick as per relevant specifications of item [6.14(B)]. Outside of the chamber shall be finished with 15mm thick cement plaster in C.M. 1: 3 with floating coat of neat cement slurry. Outside plaster is carried out from top of chamber to 300mm deep from existing/finished ground level.

2.11 The walls and the bed concrete of chamber shall be plastered inside with 12 mm. thick cement plaster 1:3 (1 cement: 3 coarse sand) finished smooth floating with a neat coat of cement slurry.

2.12 At every change of alignment, gradient or diameter of drain, their shall be a inspection chamber. Bends

and junctions in the drain shall be group together in inspection chamber as far as possible. The maximum distance between chambers shall be 30m.

2.13 Where the diameter of the drain is increased, the crown of the pipe shall be fixed at the same level and necessary slope given in the invert of the inspection chamber.

2.14 Drainage of unequal sectional area shall not be joined at the same invert in a inspection chamber. The invert of the smaller drainage at its junction with main shall be at least 2/3 the diameter of the main above the invert of the main.

Precast cover & frame

The relevant specifications of item 24.5 shall be followed except cover shall be medium duty rectangular (MD-10) having clear opening in frame 450x600mm.

3.0 Mode of measurements and payment

The rate includes cost of all labour, materials, tools and plant etc., required for satisfactory completion of this item as described above. The rate also inclusive of excavation, filling etc.

The rate shall be for a unit of one number basis. (Precast cover and frame paid separately).

16[24.10(8)] Constructing brick masonry chamber for underground inspection chamber and bends with brick having crushing strength not less than 35 Kg/Cm^2 in C.M.1:5 500x700mm. internal dimensions, Including precast cover and frame shall be medium duty rectangular (MD-10) (Clear opening in frame 450x600mm) R.C.C. top slab C.C. 1:2:4 mix (1 cement : 2 coarse sand : 4 graded aggregate 20 mm. size) foundation concrete 1:5:10, inside plaster 15 mm. thick with C.M. 1:3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete : Inside dimensions 500 mm. x 700 mm. and 450 mm. deep for single pipe-line with single or multi inlets.

1.0 Materials and Workmanship:

The relevant specifications of item 24.1O(A) shall be followed except that the inside dimension of brick masonry chamber shall be 500 mm. x 700 mm. and 450 mm. deep for pipe linewith single or multi inlets.

2.1 Mode of measurements & payment

2.2 The relevant specifications of item 24.1O(A) shall be followed

2.3 The rate shall be for a unit of one number.

17[24.1O(C)] Constructing brick masonry chamber for underground . inspection chamber and bends with brick having crushing strength not less than 35 Kg/Cm^2 in C.M.1:5 600x850mm. internal dimensions, Including precast cover and frame shall be medium duty rectangular (MD-10) (Clear opening in frame 450x600mm) R.C.C. top slab C.C. 1:2:4 mix (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm. size) foundation concrete 1:5:10, inside plaster 15 mm. thick with C.M. 1:3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete : Inside dimensions 600 mm. x 850 mm. and 450 mm. deep for pipes line with three or more inlets.

1.0 Materials and Workmanship:

The relevant specifications of item 24.1O(A) shall be followed except that the inside dimension of brick masonry chamber shall be 600 mm. x 850 mm. and depth 450 mm. for pipe lines with three or more inlets.

2.1 Mode of measurements & payment

2.2 The relevant specifications of item 24.1O(A) shall be followed

2.3 The rate shall be for a unit of one number.

18[24.11] Extra over item 24.44 for every additional depth of 1.0 m. or part thereof beyond 450 mm. depth for brick masonry chamber. (I) For 455 mm. x 610 mm. size. (II) For 500 mm. x 700 mm. size. (III) For 600 mm. x 850 mm. size.

1.0 Materials & Workmanship:

The relevant specifications of item 24.1O(A), 24.10(8), 24.1O(C) shall be followed same except that extra depth of 0.1 m. or part thereof shall be constructed over and above the depth of respective items.

2.1 Mode of measurements & payment :

2.2 The relevant specifications of item 24.1O(A) shall be followed except that extra shall be paid for providing additional depth of 0.1 m. or part thereof over and above the item no. 24.1O(A), 24.10(8), 24.1O(C) as the case may be.

2.3 The rate shall be for a unit of one number.

19[24.12] Providing soak pit of 2 cu.m. volume including excavating and filling brick bats with dry masonry work at top for 450 em. height including covering, the top with stone including providing Vatas in C.M. 1:3 with finishing curing etc. complete as directed.

1.0 Materials :
Water shall conform to M-1. Cement mortar shall conform M-11. Burnt Bricks shall conform toM-15. Rough kotah stone slab 40 to 50 mm thick shall conform to M-33. Brick bat shall conform to M-14.

2.1 Workmanship
2.2 The excavation for soak pit shall be carried out as per relevant specifications of item 4.00(A) except that the size of soak pit such that the clear volume shall remain 2 cu.m. The diameter and depth shall be as directed.
2.3 The periphery of the soak pit shall be provided with dry masonry wall with burnt bricks in 23 em. thick. The masonry wall shall be done with best workman like manner in true line and plumb.
2.4 The soak pit shall be filled in with brick bats of burnt brick 40 mm. nominal size in 45 em. height. The work of filling brick-bats shall be done in such a way that no dry masonry shall be damaged during filling of brick bats.
2.5 The top of the soak pit shall be covered with rough stone slab 40 to 50 mm. thickness. The length of the stone shall be in single piece in length.
2.6 The cement mortar 1:3 shall be used to fill up the joints and preparing vata as directed.
2.7 The cement work shall be cured for 4 days.

3.1 Mode of measurements and payment
3.2 The rate includes costs of all labour and materials required for satisfactory completion this item as described above.
3.3 The rate shall be for a unit of one number.

20[24.13] Providing soak-pit of 5 cu.m. volume inc. excavating and filling brick bats with dry masonry work at top for 45 em. height including covering the top with stone including providing vatas in C.M. 1:3 with finishing curing etc. complete as directed.

1.0 Materials and Workmanship:
The relevant specifications of item 24.12 shall be followed except that the volume of soak pit shall be 5 cu.m. clear.

2.1 Mode of measurements and payment
2.2 The relevant specifications of item 24.12 shall be followed.
2.3 The rate shall be for a unit of one number.

21[24.14] Providing, supplying and Fixing Corrugated DWC HOPE Pipes of Class SN8 Structured Wall polyethylene Piping systems (Pipe with online/offline coupler and elastomeric sealing ring) with non-smooth External Annular Corrugated and Smooth Internal Surfaces (Double Wall) for non-pressure underground Sewerage & Drainage application as per EN:13476-3 including all local and central taxes, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to the departmental stores etc. complete. Including Lowering, laying and jointing of class SN 8 structured wall (External Annular Corrugated & Smooth Internal surface) Polyethylene Piping and fittings with the help of coupler (on line / off line) attached with one end of pipes, sliding over the elastomeric sealing rubber ring placed on the specified valley of the corrugation at the spigot end, lowering the same into the trench, laying on the lower bedding (constructed at bottom of trenches) at prescribed gradient, depth & alignment ,testing the water tightness of the joints, ensuring the continuity tests of specified pipe segments etc. complete as per drawing, specifications & detailed engineering, including carriage of pipes & fittings from site stacks to the place of laying etc. as per direction of Engineer-in-charge. The brand of the DWC pipe shall be as per the approved make list of GSPHCL. For diameter of pipe from 75mm to 1OOOmm.

Scope
This specification covers the requirements for manufacturing, supplying, transportation, handling, stacking, installation, jointing, and testing of Class SN 8 Structured Double Wall (Non-Smooth External Annular Corrugated wall & Smooth Internal wall) Polyethylene/Polypropylene Piping System for non-pressure underground Sewerage & Drainage Applications herein after called the DWC PE Piping System.

Applicable Codes

The manufacturing, testing at factory, supplying, transportation, handling, stacking, installation, jointing, and testing at sites shall comply with all currently applicable National statutes, standards & codes. If requirements of these specifications are at variance with any other standards, this particular document shall supersede.

IS 16098(Part-2): 2013 (Reaffirmed 2018)	Structured Wall Plastics piping Systems for non-pressure drainage and sewerage- Specification Part 2: Pipes and fittings with non-smooth external surface, Type B
ISO 9001: 2008	Quality Management Systems

Other Indian standards which are integral part of above standard as normative references form a significant portion of this specification document.

Manufacturing

TheDWC Piping System of stiffness class designation SN 8 shall confirm to the Indian standards as mentioned above and shall be configured as per the indicative Cross-sectional & Profile Drawings (Annexure A&B) annexed herewith. Each pipe shall be Socket (On-line or Off-line Coupler) and spigot type along with elastomeric rubber sealing ring (as designated under Clause 8.3 of above specifications).

Transportation

The arrangement of loading the pipes in a telescopic manner is advised, i.e. smaller diameters inserted into the next higher sizes of pipes. While loading the pipes onto the truck, care should be taken that the coupler- end should be arranged alternatively in the corresponding layers so as to avoid the damage to the coupler/ socket ends.

Handling

Following Recommendations shall be followed while handling the pipes:

- Adherence to National Safety requirements
- Pipes to be smoothly lowered to the ground
- Pipes should not be dragged against the ground to avoid the damages to the Coupler/pipes.
- 800mm and larger diameter pipes are carried with Slings at two points spaced approximately at 3 Meters apart
- For smaller diameters (400mm- 800mm) one lift point shall be sufficient & can be handled either manually or mechanically
- Do not use a loading Boom or Fork Lift directly on or inside pipe.

Pipe Storage at Site

- Stockpiling shall be done temporarily on a Flat Clear Area as per Fig. 1 & 2.
- For avoiding collapse of Stacks, use Wooden Posts or Blocks
- Stacking shall not be higher than 2.5 Meters
- While stacking, alternate the sockeVcoupler ends at each row of stacked pipes as shown inFig. 2.

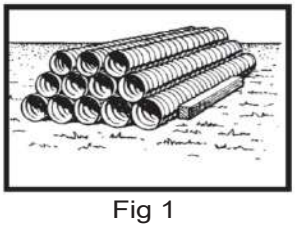


Fig 1

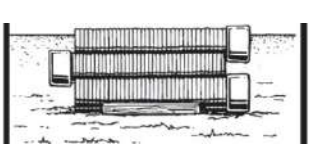


Fig 2

Lowering, Laying & jointing of Pipes

The width of a Sewer Trench depends on the soil condition, type of side protection needed and the working space required at the bottom of Trench for smooth installations. Increase in width over required minimum would unduly increase the load on pipe and cost of road restoration.

Considering all above factors, the Minimum Trench Width is specified as per Table below:-

Indicative Trench Widths	
Pipe Diameter (mm)	Trench Width (M)
75-200	0.6
250	0.7
300	0.8
400	0.9
600	1.2
800	1.3
1000	1.8

-In actual pract1ce the trench w1dth shall be kept as narrow as poss1ble but shall be adequate to allow the workmen to execute the Lowering, Laying & Jointing job satisfactorily.
The pipe segment between two manholes shall be laid approximately in straight line without any vertical undulations (at prescribed Gradient). However, on the strength of its flexibility, the DWC PE Piping system can be aligned and laid in smooth curve if found necessary. The piping system shall rest on the carefully prepared bedding portion of the Backfill Envelope (ref. Annexure A) and at appropriate jointing locations the trenches shall be excavated deeper to accommodate the bulges of coupler-spigot joints. However, special care shall be ensured as mentioned below:-

- Excavation of trenches shall be carried out in accordance with the drawing & specifications and as directed by the field engineer as well.
- The piping system shall be laid and jointed in true to gradient with the help of sight rails and boning rods as detailed in CPHEEO, MoUD, Gol Manual on Sewerage and sewerage treatment. The levels need be checked with calibrated modern Levelling Instrument. Specific care shall be taken to prevent entry of sand / mud /slush/ any other foreign material etc into the system during the installation operation.

The structural property of the system suggests that a minimum cover of 500 mm is adequate even for maximum quantum of superimposed (live) load.
In case of wider trenches than required (above table), the permission of the competent authority shall be necessary.
The bedding area (ref. Annexure A) is an essential portion of Back fill Envelope and shall be constructed with proper bedding material as computed in accordance with appropriate national code of practice for structural bedding design mentioned in the list of normative references under IS 16098-2.The bedding shall be laid to specified thickness and gradient with proper manual compaction of the aggregate. Indicative installation details with suggestive 'Backfill Envelop' have been shown in Annexure A.

The moulded on-line coupler (or separate coupler integrated to the pipe in case of lower sizes) will have a suitable internal surface to push-fit the said end over the spigot end of the next pipe. On first valley of the corrugation of said spigot end (destined to receive the pushed coupler), the sealing rubber ring of standard quality (as specified in Cl 8.3 of the mentioned IS Code) shall be placed so that the coupler end of the pipe smoothly but tightly slides over the sealing ring for making an absolute watertight joint. Similar system is also used for fabricated accessories or moulded fittings required such as Tee, Bends, Elbows, Reducer end caps for the purpose of installation of the system related to drainage/sewerage.
For quality connections following steps are to be ensured, failing which the performance aspects are to be severely compromised:-

- The non-coupler (socket) end needs to be thoroughly cleared and shall be free from any foreign material
- Clean and lubricate the coupler end of the pipe, if required.
- Lubricate the exposed Gasket in the same manner, if required.
- Keep the non-coupler end free from dirt, backfill material, and foreign matter so that the joint integrity is not compromised.
- Push the coupler onto the non-coupler end and align properly. Always push coupler end onto non-coupler end.

For smaller diameter pipes simple manual insertion shall be sufficient. It should be ensured that the coupler end is adequately 'homed' on non-coupler end to ensure installation and tight joining seal. Therefore prior to insertion always place a 'Homing Mark' on appropriate corrugation of the 'Non-Coupler End'.

Construction of backfill envelope and final backfilling of the trenches

DWC Piping System with well compacted Backfill Envelope along with the bottom and sides of trench (native soil) work together to support soil overburden and superimposed (traffic) loads. The carefully constructed Backfill Envelop has three distinct but non-isolated stages (ref. Annexure A).The construction need to be done stage by stage as per the sequence stated below:

- Bedding portion
- Up to Haunch level
- Remaining portion

The material for backfill envelop shall be in accordance with the structural design of flexible buried conduit as per relevant National code in meticulous consultation with ISO 21138-1 &3 :2007 and all other referred International Codes such as BS EN 1295-1 that forms an integral part of the said ISO Specifications . It can be the same material that were removed in the course of excavation or it can be fine sand/course sand/gravel/ moram /other form of course / fine aggregates depending on the effected Design Load [Overburden+ Superimposed (Live) load]. However, in no circumstances, the flexible pipe should not be embedded in cement concrete (un- reinforced or reinforced) which invariably induces undesired rigidity in the system .The Manufacturer may also be consulted to provide for the necessary module for the Structural Design of the 'Backfill Envelope'.

- The remaining portion of backfilling which do not contribute to the structural integrity of the system may be the materials that were removed in the course of excavation or any other foreign material as may be required to suit the particular site condition. These materials shall consist of at least clean earth and shall be free from large clod or stone above 75 mm, ashes, refuse and other injurious materials.
- After completion of bedding portion of the Backfill envelop and subsequent lying of pipes, etc, first the haunch portion & then upper portion of Backfill Envelope shall be constructed as per design around the pipe. Voids must be eliminated by knifing under and around pipe or by some other indigenous tools.
- The compaction, by hand rammers or compactors with necessary watering to a possible maximum level of proctor density shall be ensured.
- Remaining portion of the Construction of 'Backfill Envelope' (above the Bedding Portion) & subsequent final Backfilling of the Trenchshall start only after ensuring the water tightness test of joints for the concerned sewer segments . However, partial filling may be done keeping the joints open .
- Precautions shall be taken against floatation (if at all necessary) as per the specified methodology and the minimum required cover. For indicative Drawing See Annexure C.

Continuity Test /Hydraulic Testing
Continuity of the pipe segments in between two manholes is required to be ensured in the same modality as practiced for non-pressure RCC pipeline. Hydraulic testing of pipes shall be done , by the contractor, if specifically asked for by the client for any specific stretch. The procedure for hydraulic testing shall be similar to that for non-pressure RCC pipes.

Mode of Measurement &Payment:-
The rate shall be for a unit of one Rmt. Including all material , labour and all necessary fittings required etc. complete .
The excavation & refilling shall be paid separately .

22[24.15] P & F U.P.V.C./SWR soil waste pipe with "0" ring as per 1.5. 13592-2013 (Reaffirmed 2018) or its relevant & latest edition. [a] 75 mm dia. [b] 90mm dia. [c] 110 mm dia.

1.0 Material :

The SWR soil and waste water pipe of specified diameter shall confirm to I.S. 13592-2013 (Reaffirmed 2018) or its relevant & latest edition. The specials and fittings required shall confirm to I.S. 13592-2013 (Reaffirmed 2018) or its relevant & latest edition.

2.0 Workmanship :

The SWR pipe of specified diameter shall be fixed as directed. SWR pipe shall be supported at 1.50 m interval by using G.I. Z&U clamp:; as per details and direction for vertical line and horizontal line. The pipe must be 75mm away from the wall. The guide line indicated by the manufacture regarding handling, transportation, storing, laying and jointing of pipes shall followed during execution. All the specials and fittings like single or double 'Y' with door, coupler, reducer, single 'T' with door bend with shall be fixed as per instruction of Engineer in charge . All necessary fixtures & fittings shall be used with "0" ring and joints shall be sealed with pipe sealant. The holes for outlets of pipe in brick/concrete wall must be made with electric core cut machine. The hole shall be finished in C.M. 1:1 with waterproofing compound . A pipe bend shall be provided near the end ofthe pipe.
The wall/ concrete slots should allow for a stress free installation, pipes and fittings to be inserted into the slots without a cement base have to apply first within coat of PVC pipe sealant followed by

sprinkling of dry sand. Allow it to dry. This process gives a sound base for cement fixation.

Fittings

Fittings used shall be of the same make as that of the pipes Injeciton moulded or fabricated by ther and shall have a minimum wall thickness of 3.2 mm. The fittings shall be supplied with grooved socketted ends with square grooves and provided with Rubber Gasket conforming to IS 5382-2018. The plain ends of the fittings should be chamfered. The fittings shall be joined with the help of Rubber lubricant. The details offittings refer IS 13592-2013 (Reaffirmed 2018).

Testing of pipes :

Seal all opening below the top of the section to be tested . The water level shall then be raised to a height to not less than three meter above the highest point of the section tested or as the Engineer in charge direct every joint shall be carefully examined for leakage. The connection between main pipe and branch pipe shall be made by using branches and bend with access door for cleaning.

The rates includes ISI pipe together with all fitting such as bends, single or double 'Y', Single 'T,' reducer, coupler, short pieces, W.C. and N.T. connector pipe, pipe clips fixed on G.I. Z & U clamps etc. The rate also includes cutting through walls & floors (core cut) etc. and their making good the same. The rate shall for a unit of one running meter.

23[24.16] Providing and fixing in position U.P.V.C. cowel vents to 75mm /110mm dia. pipe.

1.0 General:

The work shall be carried out in general as per the relevant specification as per the relevant I.S. unless otherwise specified with the following additions:

2.1 Materials:

2.2 The U.P.V.C. 75 mm /110mm dia. cowel shall be approved make as per GSPHCL make list. It shall be got approved before fixing in position. Cowel vent shall be used of same manufacture as the manufacture of pipe & fittings.

3.1 Mode of work:

3.2 The U.P.V.C. cowel shall be fixed as per the instructions of the Engineer-in-charge and the joints shall be filled with relevant solution.

4.1 Mode of measurements and payment

4.2 1 The rate is inclusive of all cost of materials labourers for fixing etc. complete.
The rate shall be paid on 1 no. basis.

24[24.17] Providing and fixing in position U.P.V.C. cowel vent to 100 mm dia. pipes.

1.1 General :

1.2 The work shall be carried out in general as per the relevant specification of P.W.D. Hand Book Volume I and II, 1949 Edition as per the relevant I.S. unless otherwise specified with the following additions.

2.0 Materials

The U.P.V.C. 100 mm dia. cowel shall be approved make as per GSPHCL make list. It shall be got approved before fixing in position. Cowel vent shall be used of same manufacture as the manufacture of pipe & fittings.

3.0 Mode of work:

3.1 The U.P.V.C. cowel shall be fixed as per the instructions of the Engineer-in-charge and the joints shall be filled with relevant solution.

4.1 Mode of measurements and payment

4.2 1 The rate is inclusive of all cost of materials, labours for fixing etc. complete.

4.3 2 The rate shall be paid on 1 No. basis.

25[24.18] Providing & fixing to wall, ceiling and floor PVC pipe 63mm to 110mm dia. having 4kg/Sq.cm. / 6kg/Sq.cm. /1Okg/Sq.cm. working pressure. Pipe shall be as per the approved make list of GSPHCL.

Materials:

The PVC pipe of specified diameter 4kg/Sq.cm. /6kg/Sq .cm. /1Okg/Sq.cm. working pressure shall be confirmed to I.S. 4985-2021. The specials and fitting shall conform to I.S. 13492-1992 (Reaffirmed 2019). Pipe shall be as per the approved make list of GSPHCL.

Cutting, Laying & Jointing:
The relevant specification shall confirm to 23.2 except G.I. pipe, PVC pipe is to be used.

Workmanship :

The PVC pipe of specified diameter & working pressure shall be fixed as specified in tender item or as directed. Due to thermal expansion of rigid PVC pipes, Due allowance shall be made particularly in over ground pipe lines for any change in length of pipe line which may occur during installation or when pipe line is in service.

Above ground installation of rigid P.V.C. pipe should be under taken after preparations are observed for their protection against direct sun rays and mechanical damage.

The rigid PVC pipe lines should not be kept exposed above ground when passes through public places, railway line, road side and foot paths. PVC pipe shall be supported at 1.5mt intervals.

The guide lines indicated by the manufacturers regarding handling, transportation, staking, laying and jointing and supporting of PVC pipe shall be kept in view during execution.

PVC pipe shall be fixed on wall with G.I. Z & U clamp and G.I. Z & U clamp shall be fixed at the regular intervals of 1.5m. The projection of PVC pipe shall be minimum SOmm from the wall.

The pipe and sockets shall be accurately cut. The ends or joints of the pipes and fitting should be absolutely free from dirt and dust. The outside surface of the pipe and inside of the fittings shall then be roughened with emery paper and then pipe sealant. Since pipe sealant is aggressive to PVC, care must be taken to avoid applying excessive pipe sealant to the inside of pipe sockets as any surplus pipe sealant cannot be wiped off afterjointing. Empty solvent cement tins, brushes rags, or paper impregnated with pipe sealant should not be buried in the trenches. They should be gathered, not left scattered about, as they can prove to be a hazard to animals, which may chew them.

If manufacture recommends its own methods of jointing, the same shall be adopted after necessary approval from the engineer-in-charge.

Mode of measurement & payment

The rate include cost of all labour, materials, all necessary fixtures & fittings, tools and plants required for satisfactory completion of this item.

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

26[24.19] Providing and fixing SWR Nahni trap of the following nominal dia. Self-cleaning design with top jali and stainer including cost of cutting and making good the walls and floors 1OOmm inlet and 50mm outlet. Including 150 mm x 150 mm stainless steel jali with grating.

1.0 Material :

1.1 SWR Nahni trap shall be of best quality and shall generally conformed to relevant Indian standards and approved by Engineer-in-charge. The surface shall be smooth and free from chips and other flaws or any other kind of defects which effect serviceability. The size of Nahni trap shall be as specified and shall be self-cleaning design. Nahni trap provided shall be with deep seal minimum 50 mm except at places where deep seal cannot be accommodated. The nahni trap must be covered with 150x150mm S.S. jali with grating. Nahni trap shall be free from porosity or other defects which effect service area.

2.0 Workmanship :

2.1 The nahni trap shall be fixed as per drawing or as directed. The nahni trap shall bejointed with SWR pipe of 75 mm dia. with pipe sealant joint hydraulic testing of joint shall be given.

3.0 Mode of measurement and payment :

3.1 The rate includes cost of all labours, materials, tools, and plants etc. required for satisfactory completion of this item.

3.2 The rate shall be for a unit of one number.

EQUIVALENT PLAIN AREAS OF UNEVEN SURFACES

(For items relating to : Painting & Polishing)

Sr. No.	Description of work	How measured	Multiplying Factor
1.	Panelled or framed and braced on ledged and battened or leddged and braced joinery.	Measured flat (not girthed) including chowkat or frame Edges; chocks cleats, etc. shall be deemed to be included in the item.	1.30 (For each side)
2.	Flush joinery	Measured flat (not girthed) including chowkat or frame Edges, chocks cleats, etc. shall be deemed to be included in the item.	1.20 (For each side)
3.	Fully glazed or guazed joinery	Measured flat (not girthed) including chowkat or frame Edges, chocks cleats, etc. shall be deemed to be included in the item.	0.80 (For each side)
4.	Partly panelled and partly glazed or guazed joinery	Measured flat (not girthed) including chokat or frame Edges; chocks cleats, etc. shall be deemed to be included in the item.	1.00 (For each side)
5.	Fully venetioned or jouvered joinery.	Measured flat (not girthed) including chowkat or frame Edges; chocks cleats, etc. shall be deemed to be included in the item.	1.80 (For each side)
6.	Weather boarding	Measured flat (not girthed), supporting frame work shall not be measured separately.	1.20 (For each side)
7.	Wood single roofing	Measured flat (not girthed)	1.10 (For each side)
8.	Boarding with cover fillets at match boarding	Measured flat (not girthed)	1.05 (For painting)
9.	Tile and Slate battening	Measured flat, overall, no deduction shall be made for open space over.	0.80 (For each side)
10.	Trellies (or Jafri) work one way or two way	Measured flat, over all, no deduction shall be made for the open spaces, supporting members shall not be measured separately.	1.00 (For painting all over)
11.	Guard bars, baulstrades, gates, grarings, grills, expanded metal and railings.	Measured flat, over all, no deduction shall be made for the open spaces over supporting members shall not be measured separately.	1.00 (For painting all over)

12.	Gates and open palisade fencing including standards	Measured flat, over all, no deduction shall be made for the open spaces, supporting members shall not be measured separately (See not).	1.00 (For painting all over)

13.	Curved or enriched work	Measured flat	2.0 (For each side)
14.	Steel roller shutter	Measured flat (size of opening) over all jamb, guides bottom rails and locking arrangement etc., shall be included in the item (top cover shall be measured separately).	1.10 (For each side)
15.	Plain sheet door and windows	Measured flat (not girthed) including frame.	1.10 (For each side)
16.	Full glazed of guage steel door and windows	Measured flat (not girthed) including frame edges etc.	0.50 (For each side)
17.	Partly panelled and partly glazed or guazed steel doors	Measured flat (not girthed) including frame edges etc.	0.50 (For each side)
18.	Collapsible gate	Measured flat (size of opening) no separate measurements shall be taken for the top and bottom guide rails, rollers, fittings etc.	1.50 (For painting all over)

Note: The height shall be taken from the bottom of the lowest rail if the palisades do not go below it (or from the lower end of palisades, if they protect below the lowest rail) up to the top of palisades, but not upto the top of standards if they are higher than the palisades.

SECTION-13
WINDOWS, VENTILATORS / DOORS

1.0 Providing and fitting steel windows, ventilators, with fully glazed steel shutters, butt type hinges including iron fixtures and fastening with 12 mm. square M.S. safety bars@ 10 em. c/c. **distance with one coat of re-lead paints and two coats of oil painting etc. complete inclusive of plain or bajari glass all necessary putty pins.**

The structure steel conform to M-20(A), Oil paint shall conform to M-30, Glass shall conform to M-27.
The frame shutters of fully glazed windows shall be prepared from best rolled standard steel section (Z, F, and T) in accordance with at least I.S. specifications. Section for frame shutters are of FB7 and vertical member are 48. Section and horizontal tees are 19X19X8mm.
The size of steel section of window frame and shutter shall be as per detail drawing or as directed by Engineer-in-charge.
Vertical and horizontal member for window frame and shutter shall be cut to required length and shall be welded by Arc welding or as approved by Engineer-in-charge forming the shape and size of window as per drawing or as directed and welding shall be made smooth by filling as directed.
Steel frame shall be provided with welding 12 em. square M.S. bars at 10 em. Center to center horizontally. The bars shall be welded-properly and finished smooth.
Windows shall be provide with Three box type hinges, handles, hold-fast peg-stag and such other fixtures shall be of iron oxides conforming to relevant Indian standard specifications and shall be fixed with the frame and shutter by way of welding or bolting as directed.
The windows shall have openable shutter or fixed or combination of both as by Engineer-in charge as per drawing.
The steel shutter of window shall have panel of glass. The glass panes shall be of BAJRI- 4 mm thick pannels as/drawing unless specified other wise as per drawing. 1.5 mm. tolerances all the sides of the panel shall be allowed. Glass panel shall be fixed to the shutter with glazing clips and cement putty. The glass shall be thoroughly cleaned.
The iron work and putty work shall be painted with one coat of red-lead primer and two coat of oil paint of approved quality and shade.

Mode of Measurement and Payment

Rates includes all materials and labour including providing and fixing fully glazed steel window including fixing of fixtures and fastening including one coat of primer and two coats of oil painting.
The measurement shall be taken for the finished product.
The rate shall be paid per Sq. Mt. of steel window provided and erected as above.

2.0 Providing and fixing standard Angle section 40 mm. X 40 mm. X 5 mm. thick steel door frame and 32 mm. thick door shutter from well seasoned chemically treated, non teak frame (Ralls and styles) with panels 19 mm. thick partial boards. Rates inclusive of providing and fixing black anodized fixtures and fastenings including one coat of primer and two coats of oil paint etc. complete as per drawing and specification.

Material: (Fully Paneled Doors)
Frame: The steel of Angle section steel frame shall be conform to M-20A, Primer and Paint shall conform to M-30 and Non teakwood shall confirm to M-23.

Non Teak Wood

The non teak wood shall be chemically treated and well-seasoned as per I.S. specifications and of good quality. For this purpose non teak wood or any other wood confirm to I.S. 1003 (Part-1)-2003 (Reaffirmed 2013) as approved by GSPHCL shall be used. The non teak wood shall be free from large, loose, dead knots, flaws, warps, bends or any other defects. If 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 affect the strength, durability or its usefulness for the purpose for which it is required. The colour of wood shall be uniform as far as possible. The planks etc. shall be sawn in straight lines and planes in the direction of grain and shall be of uniform thickness. The agency shall produce certificate from forest Department in the event of dispute and the decision of the Corporation shall be final and binding. The tolerance in the dimension shall be allowed to 1.5 mm. per face to be planed.

Code of practice for seasoning shall be as per IS 1141-1993 (Reaffirmed 2020). Wood preservation for chemical treatment should be as per Is-401-2001 (Reaffirmed 2016).

Permissible moisture should be maintained as recommended in IS 287-1993 (Reaffirmed 2017). The shutter should satisfy I.S. 1003 (Part-1)-2003 (Reaffirmed 2013).

Particle Board: The particle board used for panels shall be of best quality and free from any detects. The particle boards shall be made with phenomaldelyede adhesive. The particle board shall conform to I.S. 3087-2005 (Reaffirmed 2020). "Specification for wood practice board for general purpose". The size and thickness shall be as per drawing. The brand of particle board should be got approved by GSPHCL before using the same.

Teak wood beading patti:

The teak wood shall confirm to M-22 and well-seasoned as per I.S. specifications & ofgood quality as shown in drawings.

Workmanship:

The rails and styles for shutter shall be made from chemically treated well seasoned non-teak wood. The thickness and width of styles shall be as per drawing. The width of top rail shall be 100 mm. and that of lock and bottom rail shall be 150 mm.

The panel shall be of particle board and the thickness of panel shall be as per drawing. Teak wood beading of 20 mm. X24 mm. size shall be provide as per detailed drawing. The panel shall be made of single piece and fixed with style and rail with tongue and groove joint and adhesive as per detailed drawing. The work shall be done as per drawing and in best workman like manner.

The shutter be painted with one coat of approved quality primer after preparing the surface clean with sand paper. Hair lines, shabbiness and patches etc. shall not appear on finished surface. Before applying primer coat of paints concerned Executive Engineer of GSPHCL should be informed in writing for inspection of manufactured shutter at manufacturers premises and should be got cleared for painting.

Fixing

Fixing or steel frame and shutter shall be done in the most workman like manner. It shall be in proper line level and plumb. It shall be fixed to true position with all necessary concrete etc. making required chases. Doing and redoing of surfaces, making good to surfaces etc. all complete as directed by Engineer-in-Charge.

Mode of Measurement and Payment

The size of frame and shutter shall be as per drawing or as per actual site condition.

Rate shall be inclusive of all labour, material, taxes, octroi, local taxes, freight, carting, loading, unloading, and fixing of position.

The rate shall be paid for unit of one square meter in which width shall be measured out to out of the frameand height is measured from top of the frame to finish top of the flooring.

10% of the billed amount for the tendered item shall be withheld till one year from the date of completion of the work. All the details noticed shall be rectified by the agency at his cost before release of deposited amount.

3.0 Providing and fixing standard Angle section 40 mm X 40 mm X 5 mm. thick steel door frame and 28 mm. thick door shutter from well seasoned. Chemically treated non-teak frame (rails and styles) with panels 19 mm thick partical board with 4 mm thick plain glass panes. Rates inclusive providing and fixing black anodized fixtures and fastenings, primer coat of approved quality and two coats of oil painting etc. complete as per drawing and specification. (Partly paneled partly glazed).

Materials

Frame

The steel angle section frame shall conform to M-20A, Primer & Paint shall conform to M-30 and Non teakwood shall confirm to M-23.

Non Teak Wood

The non teak wood shall be chemically treated and well seasoned as per I.S. specifications and of good quality. For this purpose non teak wood confirming to as per I.S. 1003 (Part-1)-2003 (Reaffirmed 2013). as approved by GSPHC shall be used. The non teak wood shall be free from large, loose, dead knots, flaws, 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 affect the strength, durability or its usefulness for the purpose for which it is required. The colour of wood shall be uniform as far as possible. The planks etc. shall be sawn in straight lines and planes in the direction of grain and shall be uniform thickness. The agency shall produce certificate from Forest Department in the event of dispute and decision ofthe Corporation shall be final and binding. The tolerance in the dimension shall be allowed to 1.5 mm. per face to be planed.

Code of practice for seasoning shall be as per IS 1141-1993 (Reaffirmed 2020). Wood preservation for chemical treatment should be as per Is-401-2001 (Reaffirmed 2016).

Permissible moisture should be maintained as recommended in IS 287-1993 (Reaffirmed 2017). The shutter

should satisfy I.S. 1003 (Part-1)-2003 (Reaffirmed 2013).

Particle Board

The particle board used for panels shall be of best quality and free from any defects. The particle board shall be made with phenolmaldeyede adhesive. The particle boards shall conform to I.S. 3087-2005 (Reaffirmed 2020). "Specification for wood particle board for general purpose". The size and thickness shall be as per drawing. The brand of particle board should be got approved by GSPHCL before using the same.

Teak wood beading patti

The teak wood shall confirm to M-22 and well-seasoned as per I.S. specifications & ofgood quality as shown in drawings.

Glass panel shall be of 4 mm thick plain glass.

Workmanship

The rail and styles for shutter shall be made from chemically treated well seasoned non teak wood. The thickness and width of styles shall be as per drawing. The width of top rail & bottom rail for glass panel shall be 100 mm. and that of lock and bottom rail shall be 150 mm. The panel shall be of particle board and the thickness of panel shall be as per drawing. Teak wood beading of 20 mm X 24 mm size shall be provided as per detailed drawing. The panel shall be made of single piece and fixed with style and rail with tongue and groove joint and adhesive as per detailed drawing. The shutter shall be painted with one coat of approved quality primer after preparing the surface clean with sand paper. Hair lines. Shabbiness and patches etc. shall not be appear on finished surface. Before applying primer coat of paints concerned Executive Engineer of GSPHC should be informed in writing for inspection of manufactured shutter at manufacturer premises and should got cleared for painting.

Fixing

Fixing of steel frame and shutter shall be done in most workman like manner. It shall be in proper line, level and plumb. It shall be fixed to true position with all necessary concrete etc. making required chases doing and redoing of surfaces, making good to the surface etc. all complete as directed by the Engineer-in-charge.

Mode of Measurement and Payment

The size of frame and shutter shall be as per drawing or as per actual site condition.
The rate shall be inclusive of all labour material, taxes, octroi, local taxes, freight, carting, unloading, and fixing in position.
The rate shall be paid for unit of one square meter in which width shall be measured out to out the frame and height from top of the frame to finish top of the flooring.
10% of the billed amount for the tendered item shall be with held till one year from the date of completion of the work. All the details noticed shall be rectified by the agency at his cost before release of deposited amount.

SECTION-14
MISCELLANEOUS ITEMS

1[22.20] Providing and fixing 1.20 meter high fencing with 2 meter long M.S. angle posts 40 mm. X 40 mm. X 6 mm. and oil painting 3 coats[1 coat of zinc primer & 2 coats of oil paint] fixed at 2.5 M C/C with five horizontal lines, and two diagonals of galvanized steel barbed wire weighing 9.38 Kg. per 100 meter. (Min.).Strained and fixed to posts with G.I. staples including fixing the posts in ground with 0.5M X 0.5 M block in C.C 1:5:10 (1cement : 5 sand : 10 graded brick aggregate 40 mm. nominal size) etc. complete.

1.0 Materials

(1) Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Brick bats aggregate shall conform to M-14. Oil paint shall conform to M-30. Barbed wire shall conform toM-54.

2.1 Workmanship

2.2 The pits of the size 0.5 m X 0.5 m X 0.5 m. shall first be excavated, true to line and level to receive the post at 2.5 m C/C. The relevant specifications of item 4.00.(A) shall be followed for excavation work.

2.3 The pits shall be filled with a layer of 0.15 m. thick with lean concrete 1:5:10 (1 cement: 5 sand: 10 graded brick bat aggregates 40 mm. nominal size). The M.S angles 40 mm X 40 mm X 6 mm. shall be filled in with leanconcrete 1:5:10 and rammed properly so as to form total 0.5 m X 0.5 m X 0.5 m concrete block. The concreteshall be cured for 7 days to allow it to set.

2.4 The barbed wire shall be stretched and fixed in 5 horizontal rows and two diagonals. The bottom row shall be 140 mm. above ground and the rest at 125 mm centre to centre. The diagonal shall be stretched between adjacent post from top wire of one post to the bottom wire of 2nd post. The wires sha ll be fixed to posts by means of staples. The M.S. Angle posts shall be painted with 3 coats[1 coat of zinc primer & 2 coats of oil paint] of approved make by GSPHCL .

3.1 Mode of measurements and payment

3.2 The work shall be measured for the finished work from centre to centre of the posts.

3.3e rate shall include the cost of all labour and materials involved inthe operations described above.

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

2[22.21] Providing and fixing Rajula stone 75 mm / 60 mm. thick 60 em X 45 ems. size including fixing in cement mortar as directed.

1.0 Materials

Water shall conform to M-1. Cement mortar shall conform to M-11. Rajula stone of specified size shall be of best quality and free from any defects. The stone shall not be less than in thickness as specified in tender item.

2.1 Workmanship

2.2 Size of the stone shall be as described in tender item shall be fixed as and where directed in cement mortar in 1:3. All the edges of the stone shall be fixed with cement mortar in C.M. 1:3 and sloped at 45° and finished smooth. The work shall be cured for 7 days after fixing.

3.1 Mode of measurement and payment

3.2 The work shall be measured for finished work.

3.3 The rate includes cost of all labour and materials required for satisfactory completion of this item.

3.3 The rate shall be for a unit of one Sq.m.

3[22.22] Treating the bottom and sides (up to height of 300 mm.) of the excavations made for themasonry foundations and basement with chemical emulsion at the rate of 5 litres per Sq. metre of the surface area.

Materials:

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

	Chemicals	Concentration
1.	IMIDA	30.50% (by weight)
2.	BIFLEX	2.50% (by weight)
3.	FIPRONIL	2.50% (by weight)

2.1 Workmanship

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

2.3 The bottom and the sides of foundations up to a height of 30 ems. for the bottom of excavation made for basement column pits shall be treated with the chemical emulsion at the rate 5 litres/sq. metre of the surfacearea.

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

2.5 Once formed, treated soil berries shall be not disturbed. If by chance, treated soil barriers are disturbed, immediate steps shall be taken to restore the continuing and compactness of the barrier system.

2.6 The treatment against termite infection shall remain fully effective for a period not less than 10 years from date of issue of the final certificate of completion of work. If at any time during this period, any defects in treatment are revealed or any evidence of infection in any part of the building or structure is noticed, the contractor shall berectify the concerned defects within 14 days on receipt of notice from Engineer-in-Charge on contractor's failure, to do so the Engineer in charge may get the same rectified through any other agency at contractor's risk andcost, and decision of Engineer-in-Charge as to the cost payable by the contractor for the same shall be final and binding to the contractor.

2.7 A guarantee bond on appropriately stamped paper shall be give by the contractor to the department in the manner and form prescribed below:

FORM OF GUARANTEE BOND (Note : For any sort of Pest control work executed)

"1/We ..... (contractor) hereby guarantee that work will remain unaffected and will
not be in any way damaged by termite or any other germs of similar types, for a period of 10 years after completion of the work of anti-termite as per the terms and conditions of the contract and contractor hereby indemnifies and agrees to save harmless and GSPHCL from any loss and or damage that might be caused on account of termite and or other similar type of germs and hereby guarantees to make good any loss or damages suffered by the GSPHCL and further guarantee to re-do the effective work without claiming any extra cost."

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

2.9 The Contracting agency shall be required to submit alongwith final bill towards security, total 50% of the cost of this itme in the form of FOR / Bank Guarantee of the approved bank mentioned in the tender document for the period of 10 years from the date of final bill.

3.1 Mode of measurements & payment

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

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

4[22.23] Treating the backfill immediately in contact with foundation structure with chemical emulsion at the rate 7.5 litres per sq. Mt. of vertical surface of the sub structure for eachside (in case of R.C.C. columns, beams and R.C.C. basement walls, treating the sides of50 em. from ground level with chemical emulsion at the rate of 7.5 liters/sq.Mt.)

1.0 Materials

The specification of the item 22.22 shall be followed.

2.1 Workmanship

2.2 After masonry foundations and retaining walls of basement come up, the backfill immediate in contact with foundation shall be treated with the chemical emulsion at the rate of 0.751itres per sq. m. of the vertical surface of the sub structure for each side. The filling of earth is usually carried out in layers and the treatment shall be directed towards the concrete or masonry surfaces of the columns and walls so that the earth in contact with these surfaces is well treated with chemical.

2.3 In case of R.C.C. framed structure with columns and plinth beams, and R.C.C. basements the treatment shall start at the depth of 50 em. below ground level from this depth backfill around the columns,

beams and
R.C.C. basement walls shall be treated at 7.5 lit/sq.m. of vertical surface. The relevant specifications shall be followed same as item 22.22.

3.0 Mode of measurements and payment

3.1 1 The area of substructure in contact with backfill to be measured. The length and breadth shall be measured correct to a em. as per dimension of sanctioned plans for the surfaces in contact with backfill.

3.2 2 No deduction shall be made nor extra paid for any opening for pipes, etc. up to 0.1 sq. m.

3.3 3 The rate includes cost of all labour, materials required for satisfactory completion of this item.

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

5[22.24] Applying general insecticide pest control treatment at the top surface of the plinth filling with chemical emulsion at rate of 5 litres sq.meter before the sand bed or sub grade is laid.

1.0 Materials:
The relevant specifications of item 22.22 shall be followed.

2.0 Workmanship
2.1 The relevant specifications of item 22.22 shall be followed except that the top surface of the consolidated earth within the walls shall be treated with the chemical emulsion at the rate of 5 litres/sq. meter of the surface before the sand bed or sub-grade is laid. If the filled earth has been well rammed and the surface does not allow the emulsion to seep through, holes up to 50 to 75 mm. deep at 150 mm. centers both ways may be made with 12 mm. dia M.S. rod on the surface to facilitate absorption of the emulsion.

3.0 Mode of measurements and payment
3.1 1 The length and breadth shall be measured clearforthe area actually treated
.
3.2 No deduction shall be made nor extra paid for any opening for pipes, etc. up to 0.1 sq. m.
3.3 The rate shall be for a unit of one sq. meter.

6[22.25] Treating the junction of walls and floor area with chemical emulsion at the rate of 7.5 litre/sq. Mt. by making holes at junction of walls, and columns with the floor before laying sub grade to a depth of 15 em. **making holes.**

1.0 Materials: The relevant specifications of item 22.22 shall be followed.

2.0 Workmanship
2.1 The relevant specifications of item 22.22 shall be followed except that the junction of walls columns with the floor shall be treated with the chemical emulsion at the rate 7.5 litres/sq. meter. Special care shall be taken to establish continuity of the vertical chemical barrier on inner wall surfaces from the ground level up to the level of filled earth surface. To achieve this, a small channel 3X3 em. shall be made at the junctions of the wall and columns with floor (before laying the sub grade) and rod holes made in the channels up to the ground level 15cm apart and the rod moved backward and forward to break-up the earth and chemical emulsion poured along the channel at the rate of 7.5 litres per sq. m. of the vertical walls or column surfaces of sub structures so as to soak the soil right to the bottom. The soil should be tamped back in to place after this operation.

3.0 Mode of measurements and payment
3.1 The relevant specifications of the item no. 22.22 shall be followed.
3.2 The vertical area of sub-structure in contact with filled up earth above ground level to top of filled up earth shall be measured for payment.
3.3 3 The rate shall be for a unit of one sq. meter.

7[22.26] Treating the earth along the external perimeter of the building by making holes 15 cm.apart up to a depth of 30 em. with chemical emulsion at the rate of 7.5 litres per sq. meter along the wall.

1.0 Materials: The relevant specification of item 22.22 shall be followed.

2.0 Workmanship
2.1 The relevant specifications of the item 22.22 shall be followed except that the external perimeter of the

building shall be treated with chemical emulsions. After building is complete the earth along the external perimeter of the building should be rodded at intervals of 15 em. and to a depth of 30 em. The rods shall be moved backward and forward parallel to the wall to break up the earth and chemical emulsion poured along the wall at the rate of
7.5 litres per sq. meter of vertical surfaces. After the treatment the earth shall be tamped back in to place theearth out side of the building should be graded on compaction of building, this treatment shall be carried out on the completion of such grading. In event of filling being more that 30 em. the external perimeter and treatment shall be extended to the full depth of filling up to ground level so as to ensure continuity of the chemical barrier.

3.0 Mode of measurements and payment
3.1 The relevant specifications of item No. 22.22 shall be followed.
3.2 The vertical surface area of sub-structure 30 em. in depth from finished ground level in external periphery only shall be measured and paid under this item. The depth of wall treated under back filled shall not be included in this item.
3.3 The rate shall be for a unit of one sq. meter.

8[22.27] Providing treatment along outside of foundation using chemical emulsion at 7.5 litresper sq. m. of vertical surface (for each side) of sub-structure.

1.1 Materials: The chemical used for the soil treatment shall be any one of the following with concentration shown against each in aqueous emulsion:

	Chemicals	Concentration
1.	IMIDA	30.50% (by weight)
2.	BIFLEX	2.50% (by weight)
3.	FIPRONIL	2.50% (by weight)

2.0 Workmanship
2.1 The surface of consolidated earth around the existing building shall be treated with chemical emulsion at the rate 7.5 litres/sq.m. of vertical surface of sub-structure. The minimum height to sub-structure shall be considered 60 ems. for treatment. If the earth along the perimeter does not allow emulsion to seep through holes up to 300 mm. deep at 150 mm. centres both ways be made by 25 mm dia GI Pipe on the surface to facilitate saturation of the soil with chemical emulsion.
2.2 The chemical barrier shall be complete and continuous under whole on the structure to be protected.
2.3 The chemical treatment shall be carried out when the surface is quite dry. Chemical treatment shall not be carried out when it is raining or when the soil is wet with rain or sub soil water.

3.0 Mode of measurements and payment
3.1 The length shall be measured along the periphery of the sub-structure. The depth shall be taken 0.60 m.
3.2 No deduction shall be made nor extra paid for any opening for pipes etc. up to 0.1 sq. m.
3.3 The rate includes cost of all labour and material required for the operations involved for satisfactory completion ofthis item.

9[22.28] Providing treatment along external wall perimeter below concrete or masonry apron using chemical at 5 lit. per linear including drilling and plugging etc.

1.0 Materials: The relevant specification of item no.22.27 shall be followed.

2.0 Workmanship: The relevant specification of item no.22.27 shall be followed except that the treatment shall be carried out along external wall perimeter below concrete or masonry apron, using chemical at rate of 5 lit/running meter.

3.0 Mode of measurements and payment
3.1 The relevant specification of item no.22.27 shall be followed
3.2 The rate includes drilling and plugging holes in apron etc. complete.
3.3 The rate shall be for a unit of one running meter.

10[22.29] Treatment of soil below existing floor using chemical at litre per hole at 300 mm. including drilling plugging holes etc.

2.0 Materials: The relevant specification of item no.22.27 shall be followed.

2.1 Workmanship:
2.2 The relevant specification of item no.22.27 shall be followed except that the termite control treatment shall be carried out in soil below existing floors.
2.3 The holes of 12 mm. dia. Rod shall be drilled in floor up to 150 mm. depth at 300m. apart both ways. The chemical shall be then injected with pressure at the rate of 1 litres/hole of the surface area.

3.1 Mode of measurements and payment
3.2 The relevant specification of item no.22.24 shall be followed.
3.3 The rate shall include cost of drilling hole and plugging.
3.4 The rate shall be for a unit of one sq. metre.

11[22.30] Treatment of voids in masonry using chemical at 1 lit/hole at 300 mm. apart includingdrilling holes and plugging.

1.0 Materials:
The relevant specifications of item no.22.27 shall be followed.
2.1 Workmanship
2.2 The walls affected by termite shall be cleaned off all live forms binding inside and the holes or voids in masonry wall surface shall be treated by chemical emulsion at rate 1 lit. Hole. The holes in cracks in surface of wall shall be drilled at 300 mm. apart.

3.1 Mode of measurements and payment
3.2 The rate shall be for a unit of one number of voids treated.

12[22.31] Treatment to wood work by chemical emulsion in oil or kerosene based including 6 mm. dia. downward slanted holes 150 mm. C/C and plugging the same with cement mortar.

1.0 Materials: The relevant specifications of item no 22.22 shall be followed.

2.1 Workmanship
2.2 The wood work affected by Ants shall be cleaned of all lives form hiding inside. The whole wood surface shall be then treated with oil or kerosene based chemical emulsion. The holes of 6 mm dia. shall be drilled slanteddownwards at 150 mm centre to centre and chemical emulsion shall be poured into holes by means of funnels specifically prepared for the same and allowed to seep. After funnels become empty another dose of chemicalshall be poured in them. This process shall be done repeatedly till the whole wood work is fully saturated with chemical.
2.3 The holes drilled in wood work shall be filled in with putty and other similar materials as directed and the whole wooden surface shall be made good as before.

3.1 Mode of measurements and payment
3.2 The work shall be measured for the finished work in sq. metre including frame.
3.3 The out to out of frame shall be measured as width and from top of flooring to top of frame shall be as height. This area includes for treating frame and shutters both.
3.4 The rate includes cost of all labours and materials, required for satisfactory completion of this item.
3.5 The rate includes drilling holes plugging the same after treatment completed and making good as before.
3.6 The rate shall be for a unit one sq. mere.

13[22.32] Providing and fixing 5.5. peg nails (5 Nos of pegs on 2.00mm thick on 5.5. Patti).

1.0 General :The work shall be carried out as per approved make list of GSPHCL or as directed by Engineer-in- Charge.

2.0 Materials

Wall Pegs : The pressed S.S. wall pegs & Patti shall be of SS 304 Grade of approved quality as per GSPHCL.

3.0 Mode of Works: The stainless steel Patti of minimum size 25.0cm length, 4.0cm width and 2.0mm thick with 5 nos. of S.S. pegs shall be fixed on S.S. Patti. The peg nails shall be fixed with S.S.Screws.

4.0 Mode of measurements and payment:
The rate includes of all cost of materials like S.S. Patti 5 nos. of wall pegs with screws etc. complete.
The rate shall be paid per 1 No. of set (S.S. Patti with 5 nos. of pegs consider as 1 set).

14[22.33] Providing & Filling Cinder including watering, consolidation etc. complete.

Materials
The cinder shall be of best quality and as per the sample approved by the Engineer-in-charge. Cinder shall not be dust type and shall be proper grading. The cinder shall be stocked on site of work only after approval ofthe Engineer-in-charge.

Mode of work :
It shall be filled in 20 ems. layer and well rammed and finished to the desired level. The required quality of sand shall be added in the cinder in proportion as directed by the Engineer-in-charge of the work. The work shall be carried out to the entire satisfaction of Engineer-in-charge.

Mode of measurements and payment :
The item is payable in cubic meter basis for consolidated quantity only, which includes laying watering, ramming etc. as required.
The rate shall be paid per one cu. m of work done

15[22.34] Providing & Filling Broken AAC Blocks including watering, consolidation etc. complete.

1.0 Materials
The broken AAC Block shall confirm to M-55. The broken AAC block Shall be of nominal 40mm size. The AAC blocks shall be of best quality and as per the sample approved by the Engineer-in-charge. The AAC Block shall be free from dust, harmful matters harming to concrete or any other deleterious materials. The AAC blocks shall be stocked on site of work only after approval of the same.

2.0 Mode of work :
It shall be filled in 20 ems. layer and well rammed and finished to the desired level. The required quality of sand shall be added in the AAC block in proportion as directed by the Engineer-in-charge of the work. The work shall be carried out to the entire satisfaction of Engineer-in-charge.

1.0 Mode of measurements and payment :
The item is payable in cubic meter basis for consolidated quantity only, which includes laying watering, ramming etc. as required.
The rate shall be paid per one cu. m of work done

16[22.35] Providing and supplying welding and fixing in position M.S. pipe railing of 40 mm dia includingtwo coat of oil painting with primer coat of approved quality.

1.0 The stell shall conform to M-20 of General specification red lead paint primer shall conform to latest IS.oil paint shall conform to M-30 of General specification
2.0 The M.S. tube shall be welded with M.S. flat of 15 em length at the ends (on each side) and embedded in masonry work R.C.C. work, as instructed by Engineer-in-charge.
3.0 The M.S. tube shall be painted with one coat of red primer and two coats of synthetic enamel paint ofspecified shade and approved quality as per M-30 of general specifications.
4.0 The surface shall be well cleaned and rubbed with sand paper. One coat of primer at 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 to dry and the two coats of synthetic enamel paint of approved quality and typeshall be applied Each coat of paint shall be allowed to dry before laying of next coat.
5.0 The rates shall be paid per R.M. of completed visible work.

17[22.36] Providing and fixing stainless steel (304 Grade) 1mm thick Matt / Satin Finish Kitchen sink of over all Minimum size 533mm X 457mm X 203mm deep having bowl Minimum size 470mm x 395mm x 203mm with cement mortar 1:3 etc. complete. Rate including of 32mm dia. C.P.brass waste coupling and 32mm dia. rigid PVC waste pipe upto N.T. S. S. Kitchen Sink Shall be of approved make by GSPHCL.

Stainless steel (304 grade) fixing shall be as per I.S. code 13983-1994 (Reaffirmed 2019) or its relevant & latest editions.

2 Sink shall be made of one piece and joints less and of matt finish.

3 The size of sink shall be 533mm X 457mm X 203mm with clear top opening of 470mm x 395mm.

4 Stainless steel coupling of standard make and design shall be fixed to sink. The minimum internal dimension when measured on the bowl centre lines across the top of the bowl.

5 Steel sink shall be fixed as per instruction in C.M. 1 :3

6 The rate shall be for a unit of one number of completed item, which includes cost of labour, materialstools and plant and other equipment required for satisfactory completion of item. The rates are also inclusive of P&F 32mm dia. C. P. brass waste coupling and 32mm dia. rigid PVC waste pipe up to N.T.

7 It shall be maintained free of any spots/scratches when completely handed over to the beneficiaries –if need be they shall be replaced at no extra cost if directed for.

8 The rate shall be of unit of one number basis.

18[22.37] Providing, Fabricating and fixing M.S. GRILUGATE of approved pattern fabricated from M.S. flat,square bars, round bars,c-channel, box pipe as per detail Drawings. Rate is inclusive of welding with grinding smooth surface, two coats of Oil paint and one coat of yellow Zinc primer coat of approved brand only. Oil paint shall be Luxol Enamel paint of Berger Paint india limited. or asian paint apcolite premium gloss Enamel of asian paint or Dulux premium gloss enamel of dulux paint only.

Materials:

The structure steel shall conform to M-20A, Oil paint shall confirm to M-30.

Workmanship :

Fabrication

The steel sections as specified shall be straightened and cut square to correct lengths and measured with a steel tape. The cut ends exposed to view shall be finished smooth. No two pieces shall be welded or otherwise jointed to make up the required length of member.

All straightening and shaping to form, shall be done by pressure. Bending or cutting shall be carried out in such a manner as not to impair the strength of the metal.

Great accuracy shall be observed in the fabrication of various members, so that these can be assembed without being unduly packed, strained or forced into position and when built up, shall be true and free from twist, kinks, buckles or open joints.

The steel section shall be straight or to be straightened or flattened by pressure unless required to be of curvilinear form and shall free from twists. These shall be cut square either by shearing or sawing to correct length and measured by steel tape. No two pieces shall be welded or joined to make up for the required length of member.

Erection

Steel work shall be hoisted and placed in position carefully without any damage to itself and other building work and injury to workmen. Where necessary mechanical appliances such as lifting tackle winch etc. shall be used. The suitability and capacity of all plant and equipment used for erection shall be upto the satisfaction of the Engineer-in-charge.

Welding:

Welding shall generally be done by electric arc process as per IS 816-1969 (Reaffirmed 2019) and IS 823.The electric arc method is usually adopted and is economical. Where electricity for public is not available generators shall be arranged by the contractor at his own cost unless otherwise specified. Gas welding shall only by resorted to using oxyacetylene flame with specific approval of the Engineer-in- charge. Gas welding shall not be permitted for structural steel work Gas welding required heating of the members to be welded along with the welding rod and is likely to create temperature stresses in the welded members. Precautions shall therefore be taken to avoid distortion of the members due to these temperature stresses.

The work shall be done as per drawings which should clearly indicate various detailsof the joint to be welded, type of welds, shop and site welds as well as the types of electrodes to be used. Symbol for welding on plans and shops drawings shall be according to IS 813(Part-1)-2018.

As far as possible every efforts shall be made to limit the welding that must be done after the structure is erected so as to avoid the improper welding that is likely to be done due to heights and difficult positions on scaffolding etc. apart from the aspect of economy. The maximum dia of electrodesfor welding work shall be as per IS 814-2004 (Reaffirmed 2021). Joint surfaces which are to be welded together shall be free from loose mill scale, rust, paint, grease or other foreign matter, which adversely affect the quality of weld and workmanship.

Painting

All surfaces of painted priming coat of approved steel primer such as a Zinc Chromate primer conforming to IS 2074(Part-1)-2015 (Reaffirmed 2020) shall be applied before any member of steel structure are placed in position or taken out of workshop. All the member shall be dry and thoroughly cleaned to remove all loose scale and rust. After erection, two coats of oil paint of approved make of GSPHCL shall be applied to the structure. For application of the oil paint relevant specification of 19.7 shall be followed.

Mode of measurement and payments :

The work as fixed in place shall be measured in running metres correct to a millimetre and weights calculated on the basis of standard tables correct to the nearest kilogram. The standard weight of steel sections shall conform to IS 808-2021 with tolerance in sizes as per IS 1852-1985 (Reaffirmed 2017). Steel sections shall be acceptable within tolerance limits. Payment for steel sections shall be made asper actual weight within tolerances. Sections having weight on higher side than permissible tolerance, maybe acceptable but payment shall be made on the basis of standard weight only. Steel sections havingweight variations lower side than permissible variation shall not be acceptable.

The weight of steel sheets, plates and strips shall be taken from relevant Indian standards based on 7850Kg/Cum. for every millimeter sheet thickness. For rolled sections, steel rods and steel strips, weight given in relevant Indian Standards shall be used. No payment shall be made for weight of screws, bolts, nuts etc. only weight of steel structure shall be paid.
Rate inclusive of applying one coat of yellow zinc primer and two coats of oil paint of approved brand by GSPHCL.
The rate shall be for a unit of the one kg. actually measured (weighted) at site.

19[22.38] Providing a ISI mark 7 levers keys brass pad lock of Navtal Godrej make 65 mm dia.

1.0 Materials :

Agency should provide I.S.I. mark 7 lever three keys brass pad locks of Navtal (Godrej) make65mm dia.

2.0 Workmanship :

On completion of the project agency has to lock the each units and require to paint mark on block
/ unit number on lock and key.
2.2 Agency has to makes bunch of keys per unit properly tied with chain.

3.1 Mode of measurement and payment :

3.2 The rate shall be for one number of completed item.

20[22.39] Providing and fixing Flat Back Urinal as per approved make & model by GSPHCL. Urinal size specified in tender item. Including With trap, integral longitudinal flush pipe etc. Complete with all Necessary Fittings.

1.0 Materials :

The squatting plate pattern, white glazed earthenware urinal shall confirm to I.S. 771(Part-1)-1979 (Reaffirmed 2017) or its relevant & latest edition. It shall be of best Indian Make. The urinal must be of first quality, free from any defects, cracks etc.

Urinal basins shall be of flat back or corner wall type lipped in front. These shall be of whitevitreous china conforming to IS 2556(Part-6)-1995 (Reaffirmed 2018). The urinals shall of one piece construction. Each urinal shall be provided with not less than two fixing holes of minimum dia. 6.5 mm on each side. Each urinal shall have an integral flushing rim of suitable type and inlet or supply horn for connecting the flush pipe. The flushing rim and inlet shall be of the self-draining type. It shall have a weep hole at the flushing inlet of the urinals.

2.1 Workmanship :

2.2 The squatting plate urinal shall be fixed as directed.

2.3 The top edge of the squatting plate shall be fixed by using S.S. screw. It shall be at a height of 65cm from the standing level to the top of the leaf of the urinal unless otherwise directed by engineer in charge. Each urinal shall be connected to 32mm dia. waste pipe which shall discharge into the channel or a floor trap. The connection between the urinal and flush or waste pipe shall be made by means of putty or white lead mixed with chopped hemp. The C.P. brass trap and union shall be connected to 32mm dia. solid UPVC waste pipe which shall be suitably laid towards the wall and which shall discharge into concerned NT as shown in drawings or as directed by GSPHCL.

3.0 Mode of measurements and payment :

The rate shall include cost of all labours, materials, tools and plants etc. required for satisfactory completion of this item.
The rate also includes waste pipe upto NT, 32mm dia. brass coupling & connection pipe etc.
The rate shall be for a unit of one number.

21[22.40] P & F chicken wire mesh jali.

Material:

Chicken wire mesh jail shall be confirm to IS 3150-1982 (Reaffirmed 2018). Diameter of the wire shall be 0.90mm(20 gauge).
The galvanized coating of the steel wire shall conform to IS 4826-1979 (Reaffirmed 2021).
Wire netting woven has to be produce hexagonal openings of uniform size.
The wire used in the manufacture of netting shall be annealed mild steel wire conforming to IS 280-2006 (Reaffirmed 2015). The wire shall be galvanized before weaving.
The finished surface of the netting shall be even, without any distortions. The netting shall not have any in between break in the wires in either direction.

Workmanship :

To prevent surface cracks appearing between junctions of column/beam and walls, 180 mm wide chicken wire mesh should be fixed with U nails 150 mm centre to centre and cement mortar 1:1 before plastering the junction. The plastering of walls and beam/column in one vertical plane should be carried out in one go.

Mode of measurement and payment:

The rate shall include cost of all labours, materials, tools and plants etc. required for satisfactory completion of this item.
The rate shall be of Sq.m. basic.

22[22.41] Providing, supplying and laying WATER BOUND MACADAM WITH STONE AGGREGATE (WBM)

Water Bound Macadam with Stone Aggregate

Coarse aggregate shall consist of clean, crushed or broken stone. Coarse aggregate shall confirm to one of the grading in table below. Grading 1 shall be used only for sub base course, with a compacted layer thickness of 1OOmm. Stone aggregate of specified size is used. This is a standard sub base/base and is used where stone aggregate is available at reasonable rates. This consists of clean crushed coarse aggregate mechanicallyinterlocked by rolling and voids thereoffilled with screening and binding material with the assistance ofwater, laid on a prepared sub grade, sub-base, base or existing pavement as the case may be. Water bound macadam may be used as a sub base, base course or surfacing course.

Table
Size and Grading Requirement of Coarse Aggregate for WBM

Grading No.	Size Range and compacted thickness for layer	Sieve Designation (IS 460)	Percent by Weight passing the sieve
1	90mm to 45mm (1OOmm)	125 mm 90 mm 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 53 mm 45 mm 22.4 mm 11.2 mm	100 90-100 65-90 0-10 0-5

Approximate Quantities of Materials

Quantities of coarse aggregate, screening and binding material required to be stacked for 100 mm approximate compacted thickness ofW.B.M. for 10 sq.m. shall be as per Table-1 for stone aggregate of the size 90 mm to 45 mm. For stone aggregate of other size, 63 mm to 45 mm and 53 mm to 22.4 mm quantity of coarse aggregate and stone screening for 75 mm approximate compacted thickness ofWBM base for 10 sqm. shall be as per Table-2.

TABLE-1

Coarse Aggregate			*Stone Screenings*		*Binding Material*
Classification	Size Range	Loose Quantities	Grading/classification and size	Loose Quantity	Quantity
Grading 1	90 mm to 45mm	1.21 cum to 1.28 cum	Type A 13.2 mm	0.27 cum to 0.30 cum	0.08 cum to 0.10 cum

Note : Net quantity= Loose quantity measured in stacks minus 7.5%.

TABLE-2

Coarse Aggregate				Stone Screenings		
Classification	Size Range	Compacted Thickness	Loose Quantity	Grading Classification & Size	ForWBM Sub-base/Base Course (Loose Quantity)	For WBM surface course (Loose Quantity)
Grading 2	63-45 mm	75mm	0.91 to 0.96 m3	Type A 13.2 mm	0.12 cum to 0.15 cum	0.10cumto 0.12 cum
-Do-	-do-	-do-	-do-	TypeS 11.2 mm	0.20 cum to 0.22 cum	0.16cumto 0.18 cum
Grading 3	53-22.4 mm	75mm	-do-	TypeS 11.2 mm	0.18 cum to 0.21 cum	0.14cumto 0.17 cum

*Note:
1. The quantity of metal measured in stacks and reduced by 7.5% to calculate net quantity.
2. The above mentioned quantities should be taken as a guide only for estimation of quantitiesfor construction etc.

The quantity of binding material required for 75 mm (approximate) compacted thickness will be 0.09 cum/10 sq.m. in the case of W.B.M. base course and 0.13 cum/10 sq.m. when the W.B.M. is to function as a surface course.

Binding Material

Binding material to be used for WBM has filler shall consist of a fine grained material passing 100 percent through 425 micron sieve and possessing PI value of 4-8 when the WBM is used as a surfacing course, and less than 6 when the WBM is adopted as a sub-base/base course with bituminous surfacing.

Preparation of Foundation

In the case of an existing unsurfaced road, where new materials is to be laid, the surface shall be scarified and reshaped to the required grade, camber and shape as necessary. Weak places shall be strengthened, corrugations removed and depressions and pot holes made good with suitable materials, before spreading the aggregate forW.B.M.

Where the existing surface over which the sub base of W.B.M. is to be laid is black topped, to ensure effective internal drainage, furrows 50 mm x 50 mm (depth offurrows increased to reach bottom of bituminous layer where necessary) at one metre intervals shall be cut in the existing bituminous surface at 45 degree C to the central line of the carriageway before the W.B.M. is laid.

Provision of Lateral Confinement of Aggregates

Before starting with W.B.M. construction, necessary arrangements shall be made for lateral confinement of aggregates. One method is to construct side shoulders in advance to a compacted layer of the W.B.M.

coarse. Inside edges may be trimmed vertical and the included area cleaned off all spilled materialsthereby setting the stage for spreading the coarse aggregate.

The practice of laying W.B.M. after excavating a trench section in the finished formation must be completely avoided.

Spreading Aggregate

The coarse aggregate shall be spread uniformly and evenly upon the prepared base in required quantities with a twisting motion to avoid segregation. In no case shall these be dumped in heaps directly on the area where these are to be laid nor shall their hauling over a partly completed base be permitted. The aggregates shall be spread uniformly to proper profile by using templates placed across the road six metres apart. Where specified, approved mechanical devices may be used to spread the aggregates uniformly. The levels along the longitudinal direction up to which the metal shall be laid, shall be first obtained at site to the satisfaction of Engineer-in-Charge, and these shall be adhered to.

The surface of the aggregate spread shall be carefully trued up and all high or low spots remedied by removing or adding aggregate as may be required.

The W.B.M. sub-base shall be normally constructed in layer of 100 mm compacted thickness and W.B.M. base shall be normally constructed in layers of 75 mm compacted thickness. No segregation of large or fine particles shall be allowed and the coarse aggregate as spread shall be of uniform gradation with no pockets offine material.

The coarse aggregate shall normally not be spread in lengths exceeding three days average work ahead ofthe rolling and blending of the proceeding section.

Rolling

Immediately following at spreading of the coarse aggregate, it shall be compacted to the full width by rolling with either the three- wheel- power -roller of 8 to 10 tones capacity or an equivalent vibratory roller. Initially, light rolling is to be done, which shall be discontinued when the aggregate is partially compacted with sufficient void space in them to permit application of screenings.

The rolling shall begin from the edges with the roller running forward and backward and adding the screenings simultaneously until the edges have been firmly compacted. The roller shall then progress gradually from the edges to the centre, parallel to the centre line of the road and overlapping uniformly each preceding rear wheel track by one half width and shall continue until the entire area of the course has been rolled by the rear wheel. Rolling shall continue until the road metal is thoroughly keyed with no creeping of metal ahead of the roller. Only slight sprinkling of water may be done during rolling, if required. On super elevated curves, the rolling shall proceed from the lower edge and progress gradually continuing towards the upper edge of the pavement.

Rolling of sub base shall not be done when the sub-grade is soft or yielding or when the rolling causes a wave like motion in the sub-base or sub-grade. When rolling develops irregularities that exceed 12 mm when tested with a three metre straight edge, the irregular surface shall be loosened and then aggregate added to or removed from it as required and the area rolled until it gives a uniform surface conforming to the desired cross-section and grade. The surface shall also be checked transversely by template for camber and any irregularities corrected in the manner described above. In no case shall the use of screenings to make up depressions be permitted.

Application of Screenings

After the coarse aggregate has been lightly rolled to the required true surface, screenings shall be applied gradually over the surface to completely fill the interstices. Dry rolling shall be continued while the screenings are being spread so that the jarring effect of the roller causes them to settle into the voids of the coarse aggregates. The screenings shall not be dumped in piles on the coarse aggregate but shall be spread uniformly in successive thin layers either by the spreading motion of the hand, shovels or a mechanical spreader.

The screenings shall be applied at a slow rate (in three or more applications) so as to ensure filling of all voids. Rolling and brooming shall continue with the spreading ofthe screenings. Either mechanical brooms or hand brooms or both may be used. In no case shall the screenings be applied, so fast and thick as to form cakes, ridges on the surface making the filling of voids difficult, or to prevent the direct bearing of the roller on the coarse aggregates. The spreading, rolling and brooming of screenings shall be performed on sections which can be completed within one day's operation and shall continue until no more screenings can be forced

into the voids ofthe coarse aggregate. Damp and wet screenings shall not be used under any circumstances.

Sprinkling and Grouting

After spreading the screening and rolling the surface shall be copiously sprinkled with water, swept and rolled. Hand brooms shall be used to sweep the wet screening into the voids and to distribute them evenly. The sprinkling, sweeping and rolling operations shall be continued and additional screenings applied where necessary until the coarse aggregates are well bonded and firmly set for the entire depth and until a grout has been formed of screenings and water that will fill all voids and form a wave of grout ahead of the wheels of the roller. The quantity of water to be used during the construction shall not be excessive so as to cause damage to the sub-base or sub-grade.

Application of Binding Material

Afterthe application of screenings and rolling, a suitable binding material shall be applied at a uniform and slow rate in two or more successive thin layers. After each application of binding material, the surface shall be copiously sprinkled with water and the resulting slurry swept in with hand brooms or mechanical brooms or both so as to fill the voids properly. The surface shall then be rolled by a 8-10 tonne roller, water being applied to the wheels in order to wash down the binding material that may get stuck to the wheels. The spreading of binding material, sprinkling of water, sweeping with brooms and rolling shall continue until the slurry that is formed will, after filling the voids form a wave ahead of wheels of the moving roller.

Setting and Drying

After final compaction ofthe course, the road shall be allowed to cure overnight. Next morning defective spots shall be filled with screenings or binding material, lightly sprinkled with water, if necessary and rolled. No traffic shall be allowed till the macadam sets.

Surface Evenness

The surface evenness of completed W.B.M. sub -base in the longitudinal and transverse directions shall be as specified in Table-3 for sub base with stone aggregate of size 90-45 mm and above.

TABLE-3

Size of Coarse aggregates	Longitudinal profile measured with a 3 metre straight edge			Cross profile
	Maximum permissible undulation	Max. No. of Undulations permitted in any 300m length exceeding		Max. permissible undulation when measured with a camber template
		15 mm	10 mm	
90-45 mm & above	15 mm	-	30	12 mm

The longitudinal profile shall be checked using a 3 meter long straight edge and graduated wedge at the middle of each traffic lane along a line parallel to the Centre line of the road. The transverse profile shall be checked with adjustable template at intervals of 10 meters. For base with stone aggregate of size 63 to 45 mm and 53 to 22.4 mm surface evenness to be as per Table-4.

TABLE-4

Size of Coarse aggregates	Longitudinal profile measured with a 3 metre straight edge			Cross profile
	Maximum permissible undulation	Max. No. of Undulations permitted in any 300m length exceeding		Max. permissible undulation when measured with a camber template
		15 mm	10 mm	
63-45 mm and 53-22.4 mm	12 mm	-	30	8mm

The longitudinal profile shall be checked with a three metre long straight edge and graduated wedge at the middle of each traffic lane along a line parallel to the centre line of the road. The transverse profile shall be checked with adjustable templates at intervals of 10 metres.

Rectification of Defective Construction

Where the surface irregularity of the W.B.M. sub-base course exceeds the tolerances specified in Table-3 or where the course is otherwise defective due to sub grade soil mixing with the aggregates, the layer to its full thickness shall be scarified over the affected area, reshaped with added material or removal and replaced with fresh materials as applicable, and recompacted. The area treated in the aforesaid manner shall not be less than 10 sq.m. In no case shall depressions be filled up with screenings and binding materials.

Meaurements

The length and breadth shall be measured to the nearest centimetre. The depth of consolidated layer shall be computed to nearest half centimetre by taking average of depths at the centre and at 30 em from the left and right edges at a cross section taken at 100 metre interval or less as decided by the Engineer-in-Charge by making small pits. The consolidated cubical contents shall be calculated in cubic metres correct to two places of decimal. The cubical contents shall be compared with net quantity of stone aggregates paid (that is stacked quantity- 7.5%). If the cubical contents are within (±) 5% of the paid net stacked quantity of stone aggregates, the work shall be treated as acceptable .If the cubical contents is short of net stacked quantity by more than 5% then the payment shall be restricted to the quantities derived from cubical content.

Rate

The rate shall include the cost of all labour and materials involved in all the operations described above, including cost of stone aggregate, kankarlmoorum, screenings and spreading , rolling, watering , etc . completed . The rate shall be for a unit of One Cu .m. for consolidated item .

23[22.42] Surface dressing of ground including disposal of rubbish, cleaning of ground lift.

Workmanship:

Surface dressing shall include cutting and filling upto a depth of 15 em and clearing of shrubs , rank vegetation, grass, brushwood, trees and saplings of girth upto 30 em measured at a height of one metre above the ground level and removal of rubbish and other excavated material upto a distance of50 metres outside the periphery of the area under surface dressing. High portions of the ground shallbe cut down and hollows depression filled upto the required level with the excavated earth so as to give an even , neat and tidy look.

Mode of measurement and payment:

The rates shall be for a unit of one sq .m.

24[22.43] Disposing of all unserviceable material and excavated surplus earth up to any lead & lift including spreading to level as directed by engineer in charge.

Disposing of excavated materials.

All unserviceable material, which in the opinion of Engineer-in-Charge cannot be used or auctioned shall be removed from the area and disposed off as per the directions of the Engineer-in-Charge . Careshall be taken to see that unsuitable waste materials are disposed off in such a manner that there is nolikelihood of these getting mixed up with the materials meant for construction .

Mode of measurement and payment:

The rate shall be for a unit of one cu . Meter and shall be as per joint measurement as per levels .

25[22.44] Providing and fixing precast R.C.C. cover 0.60m x 0.45 m x 0.075 m size along with 40x40x5mm M.S. angle frame to I.C. chamber / manhole etc. including finishing complete with necessary steel reinforcement etc. complete with steel handles.

Materials:

Water shall confirm to M-1 cement shall confirm to M-3 , sand shall confirm to M-6, cement mortar shall confirmto M-11 , mild steel shall confirm to M-18, paint shall confirm to M-30, Aggregate shall conform to M-12, and structural steel shall conform to M-20A.

Workmanship :

I.C . / Manhole frame should be made of ISA 40 x 40 x 5 mm section which is fixed to manholeslab as directed by site in charge.

2.1 2.2 Precast R.C .C. Cover casting in C.C . (1 :1.5:3)with using 8 mm steel reinforcements both ways 15cm *C/c* distance

2.2 2.3 R.C .C. cover shall be well finished in C .M.1:3 on all side of cover and frame painted with

one coat of primer and two coats of oil paint. Each coat of paint shall be allowed to dry before laying of next coat.

Mode of measurement & payment :
The rate shall be paid per number basis. This includes providing and fixing steel frame and a precast cover.

26[22.45] Filling brick bats of 40 mm nominal size at required depth as per drawing and specification and direction of engineer in charge.

Material:
Brick bat aggregate shall confirm to M-14.
Brick bat aggregate shall be broken from well burnt or slightly over burnt and dense bricks. It shall be homogenous in texture, roughly cubical in shape clean and free from dirt or any other foreign material. The brick bats shall be of 40 mm to 50 mm size unless otherwise specified in the item. The under burntor over burnt brick bats shall not be allowed.
The brick bats shall be measured by suitable boxes as directed.

Workmanship :
The brickbats shall be filled up to depth as specified in the drawing and as per the instruction of engineer in charge.

Mode of measurement and payment :
The rate shall be for a unit of one cubic meter.

27[22.46] Providing and fixing mosquito proof wire mesh jali shutter having non-teak wood frame of 8 em x 2.5 emin size.

1.0 Material :
1.1 The non-teak wooden frame for mosquito proof jali shall be well seasoned & chemically treated shall confirm to M-23.
1.2 The mosquito proof jali shall be confirm to IS 1568-1970 (Reaffirmed 2018).
1.3 The mosquito proof jali shall be stainless steel having nominal dia. of wire shall be 0.50mm and average width of aperture shall be 1.00mm.

2.1 Workmanship :
2.2 The size of wooden frame shall be 8 em x 2.5 em. The mosquito proof jali shall be properly fixed with teakwood bidden patti as per required on the wooden frame such that no mosquito should pass through it. It shall be fixed in proper groove of the wooden frame. If the span of jali is more than 1.0 m, extra wooden support shall be fixed.

3.1 Mode of measurement and payment :
3.2 The payment shall be made on a units of sq.m. basis including of all materials and labours.

28[22.47] Providing and fixing corrugated asbestos cement sheets roofing fixed with G.I. plain and bitumen washers complete cost of purlins, rafters and trusses 7mm thick corrugated Asbestos Sheet (ISI) including making good to the base frame structure as and when necessary.

1.1 Materials :
1.2 Asbestos cement sheet shall conform to M-24.

2.1 Workmanship :
2.2 The maximum spacing of purlins shall be 1.6 meters in case of 7mm thick A.C. sheet and 1.4meterfor6mm thick A.C. sheet.

2.3 Laying and fixing of sheets : The sheet shall be laid on the purlins and other roof members as per code of practice. Top bearing surface of all purlins and other roof members shall be checked and made in one plane so that the sheets when being fixed shall not be required to be forced to rest on the purlins. The finished roof shall present uniform slope and the line of corrugation shall be straight and true. The sheets shall be laid with smooth side upwards. Corrugated sheet shall be laid starting at the caves either form left to right or right or right

to left depending up on the direction of wind before actual laying of the sheet is started. The purlins spacing and the size of sheets shall be checked to ensure that the arrangements shall be provided the laps requiredand the specified over hang at the caves. In the sheet are laid form right to left, the first sheet shall be laid uncut but the remaining sheet in the bottom row shall have the top left hand corners cut or mitred. The sheets in the second and other immediate rows shall have bottom right hand corner of the first sheet cut. All other except the last sheets shall have both bottom right hand corners and top left hand corner cut with exception of the last sheet, which shall be left uncut. If the sheets are laid to right, the first sheet shall be laid and cut the remaining procedure shall be reversed.

2.4 The free overhanging of the sheet at the eaves shall not exceed 400mm in case of 7mm thicksheets and 300 mm in case of 6mm thick sheet.

2.5 The mitre described above is necessary to provide sung fit. Where 4 sheets meet at a lap the length of mitre shall be 150 mm and width of mitre shall be equal the width of the side lap. Thecaving may be done with ordinary wood saw at site.

2.6 Laps: The sheet shall be laid with an end lap of 150mm minimum. In case of roof with a pitchflatter than 1 vertical to 2.5 horizontal (Approx.22') or in the case of very exposed situations approximate larger laps may be provided. The sheet shall be laid with side lap of half a corrugation.

2.7 Fixing Accessories : The sheets shall be secured to the purlins and other roof members by means of 8 mm dia galvanized iron bolts ('J') type hook bolts in case of angle iron purlins and 'L' type bolts in case of R.S. joints, precast concrete or timber purlins and nuts bearing on galvanized iron washers and bitumen washers. The grip of 'J' or **'L'** bolts on the side , of purlins shall not be less than 25mm. Each galvanized iron 'J' or 'L' hook bolts shall have a bitumen washer and galvanized washers placed. Over the sheet before the nuts is screwed down from above. On each purlin there shall one hook of bolt on the crown adjacent to the side lap on either side. Bitumen washer shall be approved quality. The G.I. flat washer shall be 25mm in diameter and 1.6mm thick and bitumen washer shall be 35mm in dia and 1.5mm thick with hole to suit therequired size of fixing accessory . Each nut shall be screwed lightly at first. After a dozen or more sheets are laid, the nuts shall be tightened to ensure a leak-proof joint and also nut tightened only to extent so as to prevent damage damage to the sheets. The length of the 'J'bolts or crank bolts shall be 75mm more than the depth of purlins for single sheets fixing ad 90 mm more where two sheets overlap or where ridges or other accessories are to be fixed. The minimum length of coach screw for timber purlins shall be 110 mm.

2.8 Holes : The hole for fixing the sheet shall be drilled in the center of end lap of sheet to suit the purlins i.e. on the center line of the purlins, if there are of timber and square head coach screwsare used, or as close as possible to the back of purlins if 'j' or 'I' bolts are used as with steel angles or precast concrete or timber purlins. Holes for hook bolts etc. shall be 2mm more than
the diameter of the fixing bolts. No holes shall be nearer than 40mm to any edge of sheet oraccessory.

3.0 Mode of measurement and payments:

3.1 The cover lap of the corrugate sheet over valley gutter, roof lights, caves, filers pieces and underlay of the corrugated sheet below ridges, hips north light caves , flashing pieces, roof light sheet and barge board shall be included in the measurement. No deduction shall be made of forhole cut for extractor or cowl type ventilators. Deduction shall be made for roof light sheets.

3.2 The rate shall be for a unit of one square meter. Open visible flat measurement where in laps asnomated above shall not be considered separately- measurements include forth em.

29[22.48] Major repairs of doors, windows, shutters (Fully paneled or partly paneled and partly glazed doors)and frames including partly replacing panels styles, rails hinges, anodized aluminium fittings and fixtures re-fixing aligning resizing including painting.

In case of major repairs of doors and windows following items shall be considered for repairs, prior approval of Engineer in charge.

Replacement of broken frames with new frames.
Replacement of broken shutters with new shutters.
Replacement of broken fittings and fixtures will new one.
Replacement of broken glass and with new glasses and putty.

All the parts of doors and windows shall be checked thoroughly. The doors and windows, which are to berepaired, shall be removed from the opening. Due care shall be taken not to disturb adjoining masonry). Frames and shutters shall be changed, if required and as directed by engineer in charge. All damaged fittings and fixtures shall be replaced with the new fittings and fixtures as approved by engineer in charge.

Specified timber shall be used for repair work. Sawing shall be truly straight and square and in the direction of grains. The scanllings shall be accurately planed smooth to the full dimensions and rebates roundingsand mouldings shown in the drawings. Palching or pluggig of any kind shall not be permitted.

Broken glasses shall be removed and old putty shall be rocked out with hack knito. The glass panes shall confirm the relevant IS. The pieces of glass panes as found useful shall be handed over to the engineer in charge of the work. All other work shall be carried out as, directed by engineer in charge.
Joints:
Joints shall be simple, neat and strong. All joints shall fit in fully and accurately without wedging or fittings. The joints shall be as per detail drawings or as directed by the Engineer in charge. Before the frames are fixed in position these shall be inspected and passed by the Engineer in charge.
Fixing:
After repair all doors and windows shall be fixed to the positions. The sides of frames of doors and windows to be embedded in masonry shall be painted with two coats of cool tar before being placed in position. The frames then shall be inserted in position with their holdfasts bolted tight. The frames shall then be adjusted to proper line and plumb and secured in position by temporary branchings, which shall not be disturbed or removed until the holdfasts are embedded in the masonry and the latter shall have set. The concrete to be used for embedding holdfasts shall be 1:3:6 mix (1 cement: 3 course sand : 6 graded stone aggregates 20 mm nominal size).
After surface surrounding the holdfasts has sufficiently died it shall be cleaned of dust etc. and welled, it shall then be plastered with cement mortar 1:4 (1 cement : 4 fine sand) flush with the surrounding plasterwork. Any other portion of the wall opening, if damaged, shall be repaired in similar way.
After the cement plaster patched have been thoroughly cured and have dried, they shall either be white washed or colour washed as required unless otherwise specified. All malba and debris obtained from cutting etc. shall be disposal of to the painting coat.
The oil paint of two coats shall be don over the painting

coat.Mode of measurement and payment:

The payment shall be made on the number basis.
The payment shall be inclusive of two coats of oil paints.

30[22.49] Minor repairs of doors, windows, shutters and frames including refixing, aligning, shutters. Providing, replacing and fixing black anodized fittings and fixtures etc. complete excluding the paitning as per specification.

All the parts of doors and windows shall be checked thoroughly. The doors and windows, which are to berepaired, shall be removed from the opening. Due care shall be taken not to disturb adjoining masonry). Frames and shutters shall be changed, if required and as directed by engineer in charge. All damaged fittings and fixtures shall be replaced with the new fittings and fixtures as approved by engineer in charge.

Specified timber shall be used for repair work. Sawing shall be truly straight and square and in the direction of grains. The scanllings shall be accurately planed smooth to the full dimensions and rebates roundingsand mouldings shown in the drawings. Palching or pluggig of any kind shall not be permitted.

Broken glasses shall be removed and old putty shall be rocked out with hack knito. The glass panes shall confirm the relevant IS. The pieces of glass panes as found useful shall be handed over to the engineer in charge of the work. All other work shall be carried out as, directed by engineer in charge.

Joints :
Joints shall be simple, neat and strong. All joints shall fit in fully and accurately without wedging or fittings. The joints shall be as per detail drawings or as directed by the Engineer in charge. Before the frames are fixed in position these shall be inspected and passed by the Engineer in charge.

Fixing:
After repair all doors and windows shall be fixed to the positions. The sides of frames of doors and windows to be embedded in masonry shall be painted with two coats of cool tar before being placed in position. The frames then shall be inserted in position with their holdfasts bolted tight. The frames shall then be adjusted to proper line and plumb and secured in position by temporary branchings, which shall not be disturbed or removed until the holdfasts are embedded in the masonry and the latter shall have set. The concrete to be used for embedding holdfasts shall be 1:3:6 mix (1 cement : 3 course sand : 6 graded stone aggregates 20 mm nominal size).

After surface surrounding the holdfasts has sufficiently died it shall be cleaned of dust etc. and welled, it shall then be plastered with cement mortar 1:4 (1 cement : 4 fine sand) flush with the surrounding plasterwork. Any other portion of the wall opening, if damaged, shall be repaired in similar way.

After the cement plaster patched have been thoroughly cured and have dried, they shall either be white washed or colour washed as required unless otherwise specified. All malba and debris obtained from cutting etc. shall be disposal of to the painting coat.

The oil paint of two coats shall be don over the painting

coat.Mode of measurement and payment:
The payment shall be made on the number basis.
The payment shall be inclusive of two coats of oil paints.

31 [22.50] Providing and fixing 4mm thick bajari glass bended in putty / wooden bedding patti with scrapping of existing putty and glass in existing windows as directed by Engineer in charge.

Material :
1.1 The glass shall conform to M-27. Non-teakwood beading patti shall confirm to M-23, Putty shall conform to IS 419-1967 (Reaffirmed 2019) or its relevant & latest edition.

Workmanship:
The glass shall be sheet glass of selected quality for 4 mm thick.

The size of glass for glazing shall allow a clearance of2.5 mm between the edges of glass and the wood or metal surrounds. The clearance may be increased as case maybe, provided the depth of the rebate of groove is sufficient to provide not less than 1.5 mm cover to the glass. The detailed process of glazing shall be as specified in IS 3548-1988 (Reaffirmed 2019) or its relevant & latest edition. The glass shall be fixed in putty / wooden beading as specified in item.
All stains from the surface of glass shall be removed and cleaned with thinner or spirit without any extra payment.

Beading :
The size of wood beads for glass panes shall be 1.5 ems x 3 ems unless otherwise specified. Beads shall be secured to wooden frames with either panels pains or screws and to metal framesin the way provided for in the frame.
Sufficient putty compound shall be applied to the rebate so that when the glass has been pressed into the rebate, a bed or compound not less than 1.5mm thick will remain between the glass and the rebate. There should also be surplus of compound squeezed out above the rebate which should be stripped at an angle not under cut to prevent water accumulating. Beads should be bedded with compound against the glass. Care should be taken to see that no voids are left between the glass and the bend.

Mode of measurement and payment :
All measurement of cutting shall unless otherwise stated, be held to include the consequent waste.
Each pane of glass shall be measured to the nearest 0.5 ems both in width and height / length.
Irregular shaped or circular panes shall be measured as the smallest rectangular area from which the irregular or circular pane can be cut.
The rate includes cost of materials, labour, required for complete of the item including hoisting, carriage, temporary erections like scaffolding etc.
The rate also includes (i) the wastage and breakage involved in the process. (ii) Straight cutting on glass and glazing putty, teak wood beading, glass, pin, putty etc. complete.
The rate shall be for a unit of sq. meter.

32[22.51] Cleaning of chocked waste sewerage pipes including of removing rubbish, ash, loose soil, stone pieces etc. as directed by Engineer in charge.

Materials:
The chocked / blocked sewer line shall be cleaned in following steps:

1. The manhole covers shall be kept open for same time before the cleaning of sewer line so as to escape the foul gases.
2. Sucking the chocked malba material by diesel running, vehicle mounting hydraulic operated suction/jetting cleaning machine with appropriate capacity as per requirement.
3. Disposal of the accumulated malba, rubbish to the approved dumping ground with the help of trolley/wheel barrows properly lined with PVC sheet to avoid splashes of the sewage/ rubbish on the ground.

All above mentioned 2 operations shall be done in presence of supervisor and by making all adequate safety arrangement to the labour including providing them medical aid, rubber gloves, helmets, masks, oxygen cylinder etc.

Mode of measurement and payment :
Payment shall be made on running meter basis. Inclusive of all labour, material, required equipment and disposal of the sludge etc. completed.

33[22.52] Cleaning of inspection chamber, gully traps and man hole including of removing rubbish, ash, loose soil, stone pieces etc. as directed by Engineer in charge.

Materials:
The gully trap/chamber shall be cleaned and de-silted in following manner:
Removal of rubbish mixed with earth by deployment of sufficient manual labour.
Disposal of the accumulated malba, rubbish to the approved dumping ground with the help of trolley/wheel barrows properly lined with PVC sheet to avoid splashes of the sewage/rubbish on the ground.
All above mentioned 2 operations shall be done by making all adequate safety arrangement to the labour including providing them medical aid, rubber gloves, helmets, masks, oxygen cylinder etc. and make the site neat and clean after completion of work.
The payment to be making is inclusive of all operation like labour, material and T&P whichever is required.

Mode of measurement and payment :
Payment shall be made on number basis. Inclusive of all labour, material, required tools & plants and disposal of the sludge etc. completed.

34[22.53] Filling the joints of existing white glazed tiles / kota stone floors and dado with white cement / ordinary cement as directed by engineer in charge.

Materials:
Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform M-6.

Workmanship :
First clear the existing joints of white glazed / kota stone flooring & dado and properly with the help of water and other suitable material / equipment as directed by engineer in charge. Then scrapped off the weak joints of the existing floors/ dedo.

Joints shall be filled by using either ordinary Portland cement for kota stone flooring and white cement for glazed tiles flooring & dado as specified in tender item.

The joints shall be cured for at least 7 days. All the work shall be carried out as per instruction of engineer in charge strictly.

Mode of measurement and payment :
The rate shall be for a unit of one square meter area under taken.

35[22.54] Providing and fixing tiles roofing with manglore tiles including non teak reapers of size 50mm x 25mm including 1.25mm thick valleys.

Material:
Manglore pattern roof tiles shall conform to I.S.-654-1992 (Reaffirmed 2016) or its relevant& latest edition, Non teak wood batten shall conform to M-23.

Workmanship :
The maximum distance between center to center of rafters shall be not more than 600mm. Non teak wood reapers 50 mm x 25 mm shall be nailed to each rafter at centre distances to size of the tiles by means of nails 50mm long. The reapers shall be well seasoned non teak wood and shall be straight places of uniform size and colour and not shorter than the necessary to cover at least four rafter. The under face and sides of the reapers shall be before fitting up. Joints shall come over the rafters. The joints of two adjacent rows shall not corner over the same rafter. At the eaves, there shall be two reapers of such and shape that the uniformity of the top of slope of the roof shall be preserved.

Work of valleys shall be executed as under :
Iron sheet 1200 mm wide and 1.25mm thick shall be used for valleys. The sheet shall by about 450mm under tiles on either side in depth of 100 mm at center. The sheet carried 75 mm into the wall and set with cement mortar unless flashing is specified. The any, on the slope shall be 300 mm. The sheet be laid over the reapers and nailed. Reapers 50 mm x 25 mm each shall be fixed over the galvanized iron sheet 150 mm away centre line of the valley on either side to keep the tiles and mortar from failing into of the valley.
The tiles shall be laid from the eaves towards the ridges after fitting of the reapers, the tiles resting full against the reapers. The joints of the hips and ridges tiles and also between them and the plain tiles shall be set in and well grouted with cement mortar and, mortar surface painted and finished off with a mixture of red paint with cement pigment colour. The finished slope of roof shall be uniform ridges to eaves. The eaves line shall bestraight, horizontal and parallel to each other. The over gables shall be protected borders and neatly finished. Side of valleys and for 230 mm on either side of the roof at valleys, thick cement plastering in C.M. 1:3 shall be done to prevent the rain water from the gutter leaking by the side of eaves, wind tile shall be placed over the ends of the last tiles and secured by means of iron washers and screws in the ridges and not in the gutter of the tiles, where full not necessary, half tiles manufactured for the purpose shall be used.

Mode of measurement & payment:
The measurements of the roof shall be taken for finished work for superficial area flat in the plane of the roof and not girthed. Laps shall not be measured.
No deduction in measurements of roof shall be made for openings at area upto 0.40 sq.mt. nor shall any extra be paid for labour and wastage in forming such openings.
The rate includes the cost of all materials and labour including ridges hips, eaves and battens. The rate shall be for a unit of one sq. meter.

36[22.55] Providing and replacing chemically treated and well-seasoned non teak wood purlins or rafters or any part of purlins or rafters any size as per site requirement. Rate inclusive of cost of repairing of old broken purlins or rafters and refixing the same or replacing & providing, fixing new purlins, rafters by using nails etc. in wall with cement concrete 1:2:4. Rate inclusive of all labour and materials and cost of repairing of purlins or rafters for all floor.

Material:
Non teakwood shall conform to M-23.
Non teak wood shall be chemically treated and well-seasoned. The face of the purlin / rafter in contract with the wallshall be painted with coat-tar.
Rate inclusive of all cost of labour for removing the old reapers / purlins or any part of and replacing the new

reapers / purlins.
Reapers / purlins shall be fixed on wall in C.C. 1:2:4.
Rate also inclusive of all cost of labour and material required for providing, repairing and replacing of the reapers/ purlins in well finished condition etc. completed. Rate shall be per cum. of wood actually used.

37[22.56] Providing ridges or hips 600 mm overall in plain G.I. sheets fixed with G.I. "J" or "L" hooks bolts and nuts 8 mm dia. G.I. limpet and bitumen washer etc. complete 0.80 mm thick sheet.

1.1 Materials :
1.2 The G.I. gutters and ridges shall be confirm to M-23A.

2.1 Workmanship :
2.2 The relevant specification of item no. shall be followed except that the work shall be carried out for ridges or hips. The overlaps for laps for ridges and hipes on either side over the C.G.I. sheet and legs shall be minimum 225 mm width of the ridges and hips shall be described in the item.
2.3 Ridges shall be fixed to the purlins with same 8 mm dia. G.I. hook bolts and nuts and bitumen and
G.I. limpet washers, which fix the sheet for the purlins. Hips shall be fixed to the roof members with the same 8 mm dia. G.I. hook bolts and nuts and bitumen and G.I. limpet washers which fixed thesheet. At least one of the fixing bolts shall pass through the end laps of the ridges and hips on other sides. If this is not possible, extra hook bolt shall be provided. End laps of ridges and hips shall be jointed together by galvanized iron seam bolts and G.I. washers. There shall be at least two suchbolts in each end lap.

3.1 Mode of measurement and payment:
3.2 The measurements of ridges or hips shall be taken for finished work in length along their center lines.
3.3 No laps shall be measured.

38[22.57] cutting cut minor cracks of wall in V section making rectangular slots to insert key stone/brick at every 60 em interval and grout it with cement and sand slurry in em 1:2 mixed with non-shrinking binding agent and agent and plastering surface using chicken mesh of 18 em wide strip.

Material:
Waters hall confirm to M-1. The cement plaster of proportion of 1:2 shall confirm to M-11. Non-shrinking binding agent shall be fabricated from FBR, flow grout- 40 or equivalent.

Workmanship:
The existing plaster along the cracks shall be scrapped off. After the cleaning the surface with the effected portion shall be sealed with using C.M. 1:2 with non-shrinking primer adhesive and using chicken mesh as directed by engineer in charge.

Make sure that surface shall be properly repaired with nearby using plaster in space & then after a cutting compound on it and leave the surface for 48 hours to check whether fresh cracks are developed or not.

Mode of measurement and payment:
The rate shall be for a unit of one running meter length of finished cracks.

39[22.58] Providing and fixing non teak wood new door/window shutter or styles and rails or panels as directed by Engineer in charge.

1.1 Materials
Non teak wood shall confirm to M-23.

1.2 Method
The non teak wood shall be chemically treated and well seasoned as per I.S Specification and of good quality. For this purpose non teakwood or any other wood conforming to class 'C'oftable 1 page 6 as per I.S 1003(part1) 2003 (Reaffirmed 2013) or its relevant & latest edition as approved by GSPHCL shall be used. The non teak wood shall be free from large, loose, dead knots, flaws, warps, bends or any other defects. It shall be uniform in substances 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. The planks etc. shall be sawn in straight lines and planes in the direction of grain and shall be uniform thickness. The agency shall produce certificate from forest Department in the event of dispute and the decision of the corporation shall be final and binding. The tolerance in the dimension shall be allowed to 1.5 mm per face to be planed.

Code of practice for seasoning shall be as per IS 1141-1993 (Reaffirmed 2020) or its relevant & latest edition. Wood preservation for chemical treatment should be as per IS 401-2001 (Reaffirmed 2016) or its relevant & latest edition.

Workmanship :
Frame shall be removed for damaged portion.
New frame made from above method shall be fixed in place of damaged portion with necessary bolts, screws,
jali.
Frame shall be replaced fully / partly as per situation and as per direction of Engineer in charge. Joints of old frame and new frame shall be in uniform manner.

Mode of measurement and payment :
The rate shall include all the material and labour.
The rate shall be for a unit of sq. m.

40[22.59] Repairing of windows, door or cupboard shutters including removing old hinges and refixing of shutter with new hinges.

1. Defective shutter due to expansion and contraction effect style panels and frame and rails to be opened and re-fixed in proper manner as per instruction of engineer in charge.
2. Any un-serviceable fixtures and fastenings in the shutter should be replaced properly by contractor. Wrth all required procedure.
3. Adhesive materials, nails and screws etc. are used if required for repairing of shutters and cupboard shutters.
4. Completed item is measured on number basis.

41[22.60] Dewatering and cleaning of existing ST / soak well by machine and/or manual including disposing the sludge up to any lead and lifts and making septic tank/soak well clear as per instruction of Engineer in charge. Soak well/septic tank loaded with excessive sludge and other deposits or any other foreign matter shall be cleaned of all solid and liquid / semi liquid matter complete of all the sludge as described below.

Cleaning of such sludge /foreign matter should be carried out in proper manner and sludge /foreign matter is disposed of immediately, so that no health nuisance is created within the premise. Sludge/Foreign matter shall be dispose off upto any leads and lifts as directed by Engineer in charge.
Disposal of such sludge / foreign matter should be carried out in such a manner that it should not affected the existing structure and should not damage septic tank / soak well or drainage lines etc.

Mode of measurement and payment :
Payment shall be made on number basis i.e. job work.

42[22.61] Providing & fixing 5.5. 304 grade jali on nahni trap.

S.S. 304 grade jali shall be of best quality. Size of jali is 15 em x 15 em. The S.S. jali shall be fixed over Nahni trap. Joint between s.s. jali and flooring is filled with white cement with required shade of pigment as per instruction of Engineer in Charge.

The rates includes cost of all labours, materials, tools and plants etc. required for satisfactory completion of this item.
The rate shall be for a unit of one number.

43[22.62] Removing and refixing grill from site including cutting, welding etc. complete.

1.0 All materials and equipment needed for refixing of defective grill. Grill is fixed in a proper manner so it

function in well.
2.0 Any unserviceable fixtures like chaplas shall be replaced properly by contractor with all required procedure.
3.0 Nails, screws and other minor welding works should be of such a way that it can be work like originally fixed and as per direction by Engineer in charge.
4.0 Rates are also inclusive of removing and refixing in properly positioned with all necessary repairs works.
5.0 No payment shall be made for weight of chaplas, screws, bolts, nuts etc. of minor necessary materials.
6.0 Rates inclusive of applying one coat of zinc primer and two coats of oil paint on a repair part.
7.1 The rate shall be for a unit of Job work.

44[22.63] Repairing the damaged or spalled concrete for all R.C.C. members.

Repairing the damaged or spalled concrete by opening concrete up to reinforcement, applying rust, removing treatment providing anti corrosive treatment to reinforcement, applying acrylic polymer based binding chemical for bound between old and new concrete with not shrink cementation grout, additional mixture with polypropylene fibre, curing with curing compound etc. complete.

The item involves repair work of cracked or deteriorated concrete of slab, lintel etc. R.C.C. members inthe specified manner.

Step-1 Remove all loose concrete and expose reinforcing steel in the deteriorated region. Clean all dust, loose particles etc. with wire brush.

Step-2 Wherever reinforcing steel found rusted, rust removing chemical of approved make shall be applied in the manner prescribed by the manufacturer and rust removed.

Step-3 Anti corrosive chemical of approved make shall be applied and let it set for the time prescribed by themanufacturer.

Step-4 Acrylic polymer based binding chemical of approved make shall be applied in the manner prescribed by the manufacturer.

Step-S Concrete shall be applied within half hour of application of binding chemical. If thethickness or finishing required is more than 25 mm, first a coat of concrete of 1 grit, %sand and 1 cement shall be applied up to 15mm deeper than finishing level and roughened with wire marks than after next day second coat of the necessary thickness shall be applied to finish the surface.

Step-6 Finishing shall be done with cement mortar 1:2 along with non-shrink grout admixture (fair add or equivalent) and polypropylene fibre at the rate of half kilogram shall be added in cement mortar. Finishing of the plaster shall be done by a skilled mason with great care so that the joint with old finishing is not easily visible. If necessary, the joint shall be rubbed smooth with emery stone. Curing shall be done by applying chemical curing compound after initial setting of the plaster. If curingcompound is not applied at the same day the new plaster shall be soaked in water and then curingcompound shall be applied when it is wet.

The item includes all the operations, labour, materials, chemicals, scaffolding etc. requiring for satisfactory completion of the item and shall be paid on sq.mt. Basis of work done.

45[22.64] Repairing the cracks in walls

The item involves repairing of cracks in plaster or maonary of joints of plaster and masonary. It shall be carried out in the following manner.

Step-1 Surface crack should be opened in 'V' groove with to width of about 25mm to 35 mm.
Step-2 If the crack is visible in brick masonry or brick joints, the same shall be first filled by non shrink cementetious grout.
Step-3 If the crack is through the wall masonry and visible on the other side, crack shall be open in "V" groove, necessary length of the nipple to be provided in the crack at about 30cm intervals on both side of the wall than after all the cracks shall be filled by non shrink cementatious grout. Next day non shrink

cementatious grout shall be carried out by using pressure grouting pump from one side. Grouting shall be carried out till the cementing material flow out from the nipple from other side. Than nipple on both surface shall be cut and fill with necessary cementing material.
Step-S Curing compound shall be applied after initial setting (between one and two hours). If curing compound applied much later, the repaired cracks shall be fully soaked and compound applied when wet. If necessary curing compound may have to be applied again approximate two to three days. If the joint is not finished properly, it may require rubbing by emery stone and finishing.

The item including all the above operations, labour, materials scaffolding curing etc. complete and shall be paid on running meter basis of work done. Where the crack is repaired on both two sides of wall, single side measurements shall be given.

46[22.65] Providing & applying injection grouting of concrete.

MATERIAl:

The materials for injection grouting shall be approved by the Engineer-in- charge.

Surface preparation

The final chipped off concrete surface and exposed reinforcement, if any, ofthe affected structural member should be cleaned off all loose and foreign materials by free air blast and then with water and allow it to dry. For the honey combed portion of the concrete or cracked concrete, drill holes at least 18 mm in diameter and depth up to 50 mm or half the member thickness whichever is less, at the required spacing, as directed by the Engineer-in-Charge. For cracked surface, open up cracks by making V notch or groove of size 12 mm X 12 mm as directed by the Engineer-in-Charge. Remove coarse debris and dust in opened up cracks and drilled holes by blowing air with hand operated blow out pump. Concrete surface required to be grouted shall be free from all loose and unsound material. The prepared surface should be clear of dust which could obstruct free flow of grout material and also impede its bonding with concrete surface. Saturate the concrete in vicinity of crack / honey combed concrete surface with water (but without excess water) only if the cement / polymer admixed grout is to be injected.

Application:

The emulsified acrylic polymeriSBR polymer shall be as specified and shall conform to Manufacturer's specification. The physical and mechanical properties of polymers shall conform to manufacturer's specification. One test shall be carried out mandatory for every lot of acrylic polymeriSBR polymer supplied at site, before use in the work. The grouting equipment shall be capable of supplying mixing, stirring and pumping grout to the satisfaction of Engineer-in-charge. It shall have capacity to inject grout at a pressure up to 7 kg / sq. em measured at grout connections. It shall be capable of mixing and pumping the cement sand grout 1:2(1 cement: 2 sand) with water cement ratio ranging from 0.5 to 1.0. Wherever epoxy is to be used, the surface of the concrete shall be dried with air blast, before grouting or applying epoxy. The cement grout in proportion as directed by the Engineer-in-Charge shall be prepared. It should be lump free of creamy consistency, thoroughly blended and shall be continuously stirred to keep the cement particles in suspension to retain uniform consistency till grout is injected. In case of vertical cracksthe injection shall be started at the lowest nipple and continued until the injected grout begins toflow out at the next higher nipple. The first nipple shall then be closed and injection continued from second until grout flows out at the third and so on. The process shall be repeated until the whole surface is treated. As soon as the system is cured, the nipples shall be suitably cut. In case of honey combed concrete, each grout hole shall be grouted individually. The sequence of injection shall be as per the directions of the Engineer-in-Charge.

Mode of Measurement :

The measurement of grout material shall be on the basis of actual weight of approved grout injected. Premeasurements of the quantities of such grouting materials brought at site and balance quantities remaining at the end of grouting application shall be recordedseparately, which will determine the quantity of grout material actually injected. Adequate care is to be taken by the contractor as not to waste the grout. The quantity which can be consumed immediately within the prescribed time only shall be prepared in batches. The quantity of grout material

wasted, discarded, hardened shall not qualify for payment and shall be recorded for deduction at the end of each operation.

The rate shall include all the operation, labour, materials described above except injection nipple which will be paid in the relevant item.

The rate shall be for a unit of Kg. of actual grout material used.

47[22.66] Providing and fixing PVC Plain colour FALSE CEILING with grid type with aluminum frame consisting of 600mm x 600mm.3mm thick plain PVC sheet used as panel insert in a frame work made using anodizedaluminum "T" section of size 1"x 1"(25mm x 25mm 19 gauge or of 1 mm thick) in square pattern of grid sizes of 2" X 2" (600 X 600mm). The aluminum frame work is supported from the ceiling with the help of G.I. hook G.I. wire / 6mm M.S. rods of required sizes to maintain proper level etc. The allunimium frame work is supported on side wall with the used of alluminium "L" section of size 1" X 1" (25mm X 25mm) anglesetc. complete as per direction of Engineer in charge manufactiure's specification & drawings.

Materials :-

PVC Plain colour sheet

Workmanship:-

Fixing false ceiling PVC plain colour false ceiling with grid type with aluminum frame consisting of 600mm X 600mm with 3mm thick PVC sheet insert in anodized aluminum frame work with the help of

G.I. hook and G.I. wire /6mm M.S rods by using following sections to supported on side wall.

Section "T" 1" X 1" (25 X 25mm 19 gauge or 1mm thick)

Section "L" 1" X 1" (25 X 25mm)

The rate quoted shall include the making necessary opening / outlets with required frame work in theceiling to fixing sheet. No separate payment shall be made to projections. Change in level up to 4.00mtrheight as per direction of engineer in charge. Manufacture's specification & drawings.

Made of measurement:-

The ceiling shall be measured in square meter in plan no extra payment shall be made for curved wallsor wastage due to partially used board. No deduction shall be made for cut outs.

48[22.67] Box cutting the road surface to proper slope and camber for making a base for road work including removing the excavated stuff and disposing on the road side slope as directed up to 50 Mt. lead.

1) The land width required for the road way, gutters, side slopes and catch water gutters shall be cleared of all trees, having a girth of 30 ems. And less, loose stones, vegetation, bushes, stumps and all other objectionable materials. The roots of trees and slumps shall be removed to depth of 30 ems. Below the grade formation and slopes and excavation filled up to with excavated materials and compacted. All thematerials cleaned with the property of Government. Useful materials shall be arranged in convenientstacks along the road boundary or as directed places within 50 mts. lead and handed over to the department in convenient sections. Unsuitable materials shall be burnt or otherwise disposed off by the contractor at his own cost without causing any nuisance inconvenience or damaged to the work properly or people in the neighborhood.

   Ifthe materials disposed off outside the road land, necessary permission from the private landowners shall be taken by the contractor and royalty etc. if any paid by him without claiming compensation. In all the road land, necessary permission from the private land owners shall be taken by the contractor and royalty etc. if any paid by them without claiming compensation. In all the materials shall be disposed off in a neat manner.

2) After clearing the site, the alignment of the road shall be properly set out true to lines, curves

slopes,grades and sections as shown on the plans or directed by the Engineer in charge. The contractor shall provided all labour and materials such as lime, strings, pegs, nails, bamboos stones mortar, concrete etc. required for setting out, establishing bench marks and giving profiles. The contractor shall be responsible for maintaining the benchmarks profiles alignments and other stacks and marks, as long as they are required for the work in the opinion of the Engineer.

If the contractor defaults in this respect even after the reaction of the Engineer within the specified time the Engineer in charge at the cost of contractor may restore them. Levels and sections of the ground shall be taken and recorded in the presence of the contractor or his authorized representative before the excavation is started so as to serve at the basis of measurement. The contractor or his representatives shall sign the book in token of his acceptance of the levels etc.

If there is any disagreement the contractor of the levels etc. If there is any disagreement the contractor shall inform of it in writing to the officer concerned with the specific reference to the Sectionsbefore starting further work. Once the work is started no cognizance of any complaint shall be taken merely not signing of the book shall not be deemed as disagreement.

3) Profiles of the section including the road side gutters to be excavated shall be laid at suitable intervals of 10 m. to 50 m. or other intervals as directed by the Engineer in charge to conform to the curved orstraight alignment, sections, grades and side slopes. The line outs shall be clearly marked and profiles of embankment where excavated materials are to be used shall be set up with the line marked on each side.

4) The roadway sections shall first be excavated with vertical side for each lift and the sides' slopes when the excavation reaches the road formation. The contractor shall on no account excavate beyond the slopes or below the specified grade unless or as directed by the Engineer in writing. If excavation is done below the specified level or outside the section, it shall not be paid for the contractor shall be required to fill up at his own such extra excavation in the road portion, with approved materials of the embankment grade in layers watered and fully compacted to all in maximum density laid down for the embankment in its relevant them. The Engineer may require measurement ridges and dead men to be left at specified intervals or placed and kept in tact till ordered to removed for the purpose of check. The excavation shall be finished neatly, smoothly and evenly to the correct lines, curves graded sections and side slopes as shown on the plans or directed by the Engineer.

The sub grades if loose, shall be scarified, watered and compacted to the same density as the embankment. The section side slopes and catch water gutter shall be maintained by the contractor at his own cost in such a way that the formation and gutters will be well drained by providing necessarydiversions etc. and not damaged due to obstructions of any drainage. Necessary passages shall be provided for leading away seepage, springs, and surfaces flow or rainwater safety without damaging the work. If any damage occur due to default of the contractor in this respect the same shall make good thedamage at his own cost, it is in necessary in the execution of the work to interrupt existing surface drainage, irrigation channels, sewers of under drainage, temporary arrangements shall be provided till such time as necessary.

The contractor at his own cost shall make good the interrupt drainage and sewer etc. unless separately provided in the tender. Any damage to the existing works or work in hand caused as a result of his operations or negligence shall be made good by the contractor at his own cost. Roadside guttersshall be excavated to the specified sections and shall be measured along with the main cutting in cubic meters.

5) If sides occur in the cutting they shall be removed as ordered by the Engineer. If finished slopes slide into the road way before the fine acceptance of the work such slides shall be removed by the contractorand shall be paid for at the contract rate for the loss of excavation involved provided the slides are not due to negligence of the contractor. The classification of the materials in slides shall conform to its condition at the time of removal and payment made accordingly regardless of its prior

condition. Care shall be taken to see that excavation is arranged in a safe way so that there will be risk to the work orworkmanby slides falling materials, boulders and collapsing sides etc.

6) If there is traffic nearby or if there are town and villages in the neighborhood, barricades and or traffic signals shall be provided day and night for the duration of the work in such way as to prevent accidents. Warning signals shall be displaced at 7.0 Mt. from the danger point on both sides giving sufficient warning. If necessary, signalers shall be stationed at each end to regulate traffic where it is heavy. Measures shall be taken to see that the execution does not affect or damage adjoining structures or property. If there is damage to property, injury to workers, the members of the public animals etc., dueto the negligence of the contractor, he will be responsible and liable to all the consequences including compensation.

7) All the excavated materials shall be property of Government. When the useful excavated materials is to be used in embankment within a lead of 200 meters and all lift it shall be directly deposited at the required location in specified layers. No handling or conveyance charges shall be paid if the material is temporarily deposited elsewhere and subsequently conveyed to site of deposition. The sequence of operations should be arranged properly. Materials required for items otherthan bank shall be arranged in near stacks at convenient places without inter-furring with the drainage in any way.

If no Government lands is available but the excavated useful stuff is to be stacked temporarily before use under the same arrangement the contractor shall make his own arrangement for the stacking of this material temporarily on private land by paying rents etc. without claiming any compensation. Surplus material not required for use on embankment or unsuitable materials may be used of his own to uniformly widen embankment to flatten slopes and to fill low places in the road land if so permitted by the Engineer. Materials not required for use whatsoever may be disposed off by the contractor at his own cost in a manner approved by the Engineer. The excavated materials shall not be deposited within 8Mt. from top edge of slope or toe of the bank. The lead shall be measured from the junction point of cutting and embankment up to 200 Mt. on either side.

8) If the contractor does not wish to utilize the quantity of cutting within the specified lead for any reason then he may do the embankment work with the earth from other sources (except borrow pits) in lengthof the road where cutting stuff is to be utilized but in that case the full or part quantity of acceptable stuff for which payment is made or to be made will be deducted from the net quantity of earth work in the embankment arrived at within the chain age measured as above.

9) The contract rate shall be for a unit of one cubic meter for the strata mentioned in the working of the main of excavation acceptably complete, limited to the dimensions shown on the plans or as directed by the Engineer.

Excavation shall be measured in its original position by taking cross sections before the work starts and after it is entirely completed. The quantity shall be worked out by the average end area method. Where the classification of the strata changes, the contractor shall bring this to the notice ofthe Engineer, who will then verify any if necessary take levels for the changed strata for purpose of measurement.

Embankment for Road.

The earth to be used for embankment for the road shall be free from salt organic or other foreign matter. 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.
All clods ofthe earth shall be broken.
Contractor shall make is 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.

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

Earth shall be spread in a layer not existing 20 em. Then water shall be sprinkle on each layer and each layer shall then be compacted by rolling with 8 to 10 tonnes power road roller and a sheep foot roller if required. The required amount of water shall be added during consolidation to keep the moisture content of the soil at the optimum as per test. The density to be achieved for each layer of the material shall not be less than 95% of the density obtained in the laboratory (Proctor Method).

In the case of earth work consolidated under optimum moisture conditions each layer of earth shall be carefully moistened to give field moisture content of about +1% to -2% of the optimum moisture content (OMC).

Each compacted layer shall be tested in the field for density and accepted before the operations for next layer are begun.

Control on compaction in the field shall be exercised through frequent moisture content and density determinations. A systematic record of these shall be maintained. At all times during construction the top of the embankment shall be maintained at such cross fall as will shed water and prevent ponding.

Mode of measurement and payment

The rate shall include all the operation, labour, materials and tools & plants etc. as described above.

The rate shall be for a unit of One Cu.m.

49[22.68] Providing and fixing solid PVC Flush Door shutter 24mm thick. made from Co-extruded three layer rigid PVC foam sheet(single Extruded) with density not less than 600kg/cbm outer layer (0.8-1mm)thick should be rigid PVC with density of not less than 1400kg/cbm. Door should be water proof, Termite proof, fire retardant & having good screw holding capacity(200 kgf). Providing and fixing 100% Solid Wood Plastic composite (WPC) Door Frame 90mmx45mm made from wood plastic composite(single Extruded Process)material with density 780kg/cbm. As per drawing as directed by the engineer in charge.

2 A1 Material:

1OO%solid PVC Flush Door shutter 24mm thick. made from Co-extruded three layer rigid PVC foam sheet(single Extruded) with density not less than 600kg/cbm outer layer (0.8-1mm)thick should be rigid PVC with density of not less than 1400kg/cbm.

100% Solid Wood Plastic composite 0fVPC) Door Frame 90mmx45mm made from wood plastic composite (single Extruded Process) material with density 780kg/cbm.

2 A2 Workmanship:

Ontractor to check & verify all dimension before execution of the work.

Iron mongrey shall be alluminium anodised except but hinges, which shall be cold rolled M.S.

PVC sheet to be sealed on flush door with rubber based adhesive.

For fixing hinges on the stile pre drilled a hole of half the size of shaft, fitted screw then drive the screw. Do not hammer the screw.

PVC door frame shall be fixed to wall using 8/1OOmm long M.S. screw through the frame for using PVC fastners.

Colour of the PVC sheet to be finalized by Engineer in Charge.

Accessory required for door

1.Aidrop 300mm
2.Butt hinges 1OOmm long fixed with 30x6csk screw
3.Tower bolt 10th.100mm long fixed with 19x6 csk screw.
4.Handle 150mm long "D" type Fixed with 19x6 csk screw
5."L" shape bracket 150mm long(15x15 sc tube og 19guage)
6. Door frame fixing in wall with 100x8mmlong anchore fastners screw.

2 A3 Mode of measurement of payment

The rate includes cost of all materials, tools and labour involved in satisfactory completion of work.

The rate shall be for unit of one Sq.mt.

Measurement shall be in Sq.mt.

50[22.69] Trimix RCC Road of Controlled C.C. M-300 using MS Channel of CC thickness on both side includingapplying screed Vibrator machine, dewatering system device and finished with float machine etc. complete.

Materials:

Water confirm to M-1, Cement shall confirm to M-3, Sand shall confirm to M-6, Grit shall confirm to M-8 and stone aggregate shall confirm to M-12, Steel shall confirm to M-19.

Steel Dowel Bars and Tie Bars

These shall confirm to the requirements of IS 432-1982(Reaffirmed 2020) and IS 1786-2008(Reaffirmed 2018) as relevant. The dowel bars shall confirm to IS 432-1982(Reaffirmed 2020) of Grade I. Tie bars shall be Thermo- Mechanically Treated (TMT) bars confirming to IS 1786-2008(Reaffirmed 2018) and grade of Fe 500. If steel mesh is used, it shall confirm to IS 1566-1982 (Reaffirmed 2020). The steel shall be coated with appropriate anti-corrosive coating as per IS 13620-1993(Reaffirmed 2020).

Temperature Reinforcement

Whenever the steel bars are used as temperature, reinforcement bars, those shall be deformed TMT (Thermo Mechanically Treated) bars as per IS 1786-2008(Reaffirmed 2018) can be tied with binding wire to formthe mesh. The size and spacing of bars depends on the design considerations, material properties and climatic condition of the region, but in any case the weight of the mesh shall not be less than 3.14 kg/m^2. The steel mesh may be placed in the upper half of the slab between say 50-75 mm below the top surface and to be sufficiently above the dowel bars such as not to cause any interference to their movement.

Materials for Joint Sealing

Joint Sealing

The joint sealing compound shall be of hot poured, elastomeric type or cold polysulphide/ polyurethane/silicon type having flexibility, durability and resistance to age hardening. Manufacturer's certificate shall be produced by the contractor for establishing that the sealant is not more than six months old and stating that the sealant complies with the relevant standard mentioned below.

The material for cold poured joint sealant shall conform to any one of the following:

Polysulphide	IS:11433(Part I)-1985(Reaffirmed 2020), BS:5212 (Part II)
Polyurethene	BS:5212
Silicon	ASTM 05893-04

Ifthe sealant is of hot poured type, it shall conform to IS 1834-1984(Reaffirmed 2020) or ASTM: D 3406, as applicable.Hot poured joint sealing compound should not be heated above 180°C and also over long duration; both are not permitted as it will lose its properties due to overheating. Material once heated cannot be reheated again for use. Hence, the quantity of material to be heated should be such that it is used fully. The overheated or reheated material will be rejected. Therefore,quantity of sealing compound required for one operation of joint sealing work shall only be heated.

Steel Forms

All side forms shall be of mild steel. The steel forms shall be of M.S. Channel sections and their depth shall be equal to the thickness of the pavement.

The side forms shall have a length of at least 3.0 metres except on curves of less than 4.5 metres radius where shorter lengths may be used. When set to grade and stacked in place the maximum deviation of the top surface of any section from a straight line shall not exceed 3 mm. The method of connection between sections shall be such that the joint formed shall be free from play or movement in any direction. The use of bent, twisted or worn out forms shall not be permitted. At least three stake pockets for bracing pins or stakes shall be provided for each 3.0 M length of forms. Bracing and supports must be ample to prevent the springing of forms under pressure of concrete or weight or thrust of the machinery (like screed vibrator) operating on the forms. Support to the forms shall be sufficiently rigid to hold them in position during the entire operation of laying and compacting and finishing and that they shall not at any time deviate more than 3 mm from straight edge 3 metres in length. Forms which show a variation from the required rigidity of the alignment and levels shown on the plans shall be reset or removed as directed. The length and number or pins or stakes shall be such as to maintain the forms at the correct line and grade.

The supply of forms shall be sufficient to permit their remaining in place for at least 12 hrs. after the concrete has been placed or longer, if in the opinion of the Engineer-in-Charge, it is necessary.

The top line of the forms is not to vary from the correct level or alignment and the levels and alignment of the forms are to be checked and corrected as necessary immediately prior to the placing of concrete. The top edges and faces of the forms are to be carefully cleaned and maintained in clean condition.

While removing the steel forms, care shall be taken to withdraw them gradually, any damageto the bull nosed edges shall be made good while the concrete is still green.

Workmanship:

Setting of Forms

(a) Setting of forms shall be according to the slab plan subject to the approval of Engineer-in-Charge and concreting shall not commence until the setting of forms is approved.

(b) Forms shall be set for at least 50 metres in advance of the point where the concrete is being laid and shall not be removed until at least 12 hrs. of placing of the concrete or longer if in the opinion of Engineer-in-Charge is necessary.

(c) After setting, the working faces shall be thoroughly oiled by using approved oil before concrete is placed against them.

(d) The pavement joints of overlay layer would overlap with the joints of underlay cement concrete.

JOINTS

The location and type of joints shall be as shown in the drawings. Where semi-mechanized method of construction is used, the concrete along the face of all joints and around all tie bars and dowels shall be compacted with an internal vibrator inserted in the concrete and worked along the joint and around all tie bars and dowels to ensure a concrete free from honeycombing. It shall be ensured that vibrator should not contact the dowel bar, and the vibration operation does not misalign the dowels. In case of mechanized construction, working and their vibration/RPM of all the fixed vibrators shall be checked. There shall be two additional needle vibrators to compact the concrete near bulk head. Wherever, tie bars or dowel bars are inserted in the PQC/Trimix, proper marking on the projecting surface of DLC/PCC will help to cut the joint at proper location.

Initial cut or a slot of 2.5 to 5 mm wide and having a depth equal to one-third to one-fourth the depth of the PQC/Trimix slab at transverse and longitudinal joint is made as soon as the concrete sets. Normally, in summer when ambient temperature is more than 30°C initial cutting may be carried after 4-8 hours of laying and in winter when ambient temperature is less than 30°C, initial cut may be done at 8-12 hours of laying. In any case initial cut of all the transverse and longitudinal joints shall be completed within 24 hours to avoid the random cracking. Subsequent widening of joint groove will be done after 14-16 days of casting concrete pavements. No sealing of joints shall be undertaken before 21 days of construction. All joints shall be sealed using sealants and joints shall be sealed when grooves are dry and clean and free from foreign object or loose material. Alternatively, compression seals or solid seals can also be used to seal the joints after initial cut without widening with the permission of Engineer.

Joint cutting equipment which can be used to cut joint at the early age of concrete is called as early-entry saw. This is light weight equipment and has a plate on both sides of saw to keep concrete pressed at the location of saw cutting to basically control raveling. With use of early-entry joint cutting equipment, joints can be cut even earlier than that mentioned above using early-entry saw with the permission of the Engineer. Early-entry saw cutting are dry- cuts so their blades are designed for use without water for cooling. The depth of cut shall be minimum 10 per cent subject to 30 mm minimum.

Types of Joints

There are four types of joints (IRC:57). These are:

(i) **Expansion joint:** Expansion joint provides the space into which pavement can expand thus relieving compressive stresses due to expansion and inhibiting any tendency towards buckling of concrete slabs.

(ii) **Contraction joint:** Contraction joint relieves tensile stresses in the concrete and prevents formation of irregular cracks due to restraint in free contraction of concrete. Contraction joints also relieve stresses due to warping.

(iii) **Longitudinal joint:** Longitudinal joint relieves stresses due to warping. These are commonly used for dividing the pavement into lanes when width of the slab becomes more than 4.5 m.

(iv) **Construction Joint:** Construction joints are provided whenever day's construction operations start and stops/ends. These are full depth joints Construction should be so planned that days construction activity may end at the location of regular contraction joint. It may also be provided where paving stops for more than half an hour due to stoppage of work.

Figs.2 to 5 show the location of contraction and longitudinal joints .All joints shall be carefully installed in accordance with the location and details given in the plans. The details of different types of joints, sealing groove, their plan, cross section etc., are shown in Figs. 6 to 10. For details IRC:57 may be referred.

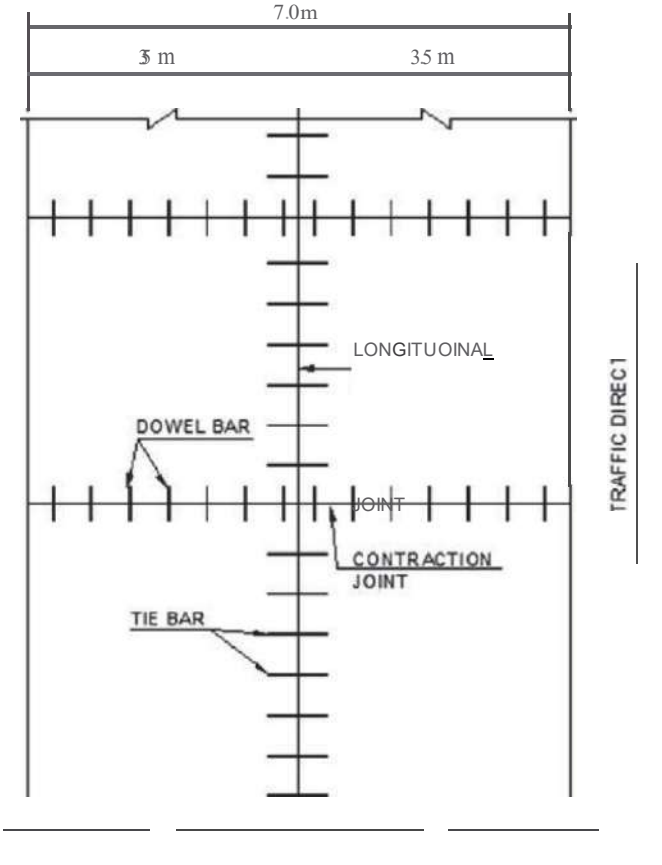


Fig. 2: Joints Configuration of Two Lane Road without Tied Shoulder

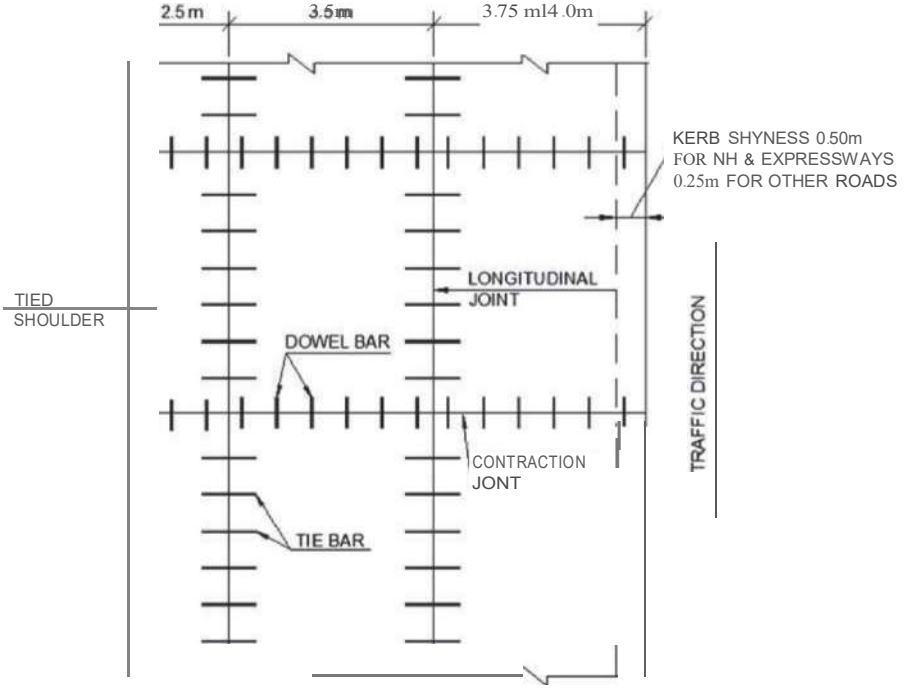


Fig. 3 Joints Configuration for each Carriageway of Four Lane Divided Road with Tied Shoulder (Half Cross-Section)

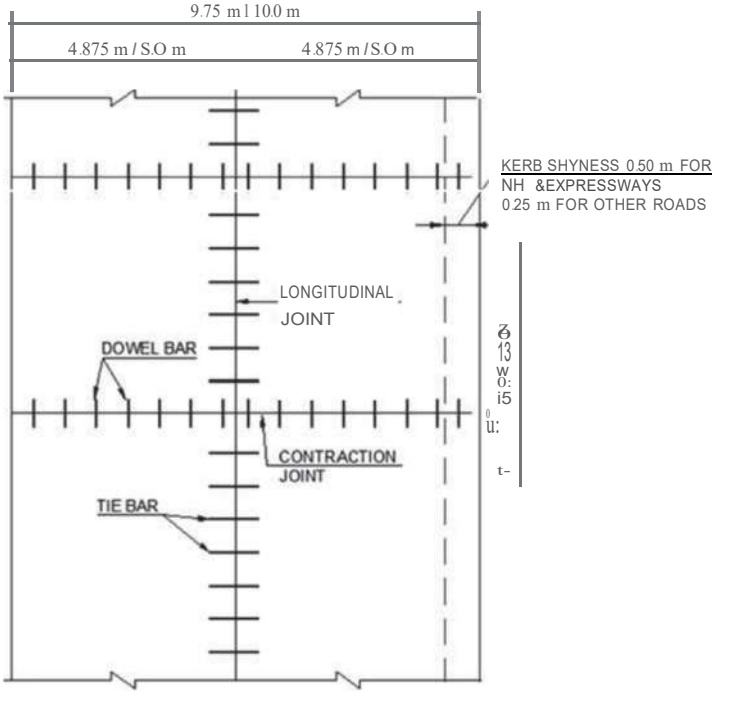


Fig. 4 Alternate Joints Configuration for each Carriageway of Four Lane Divided Road
(Half Cross-Section)

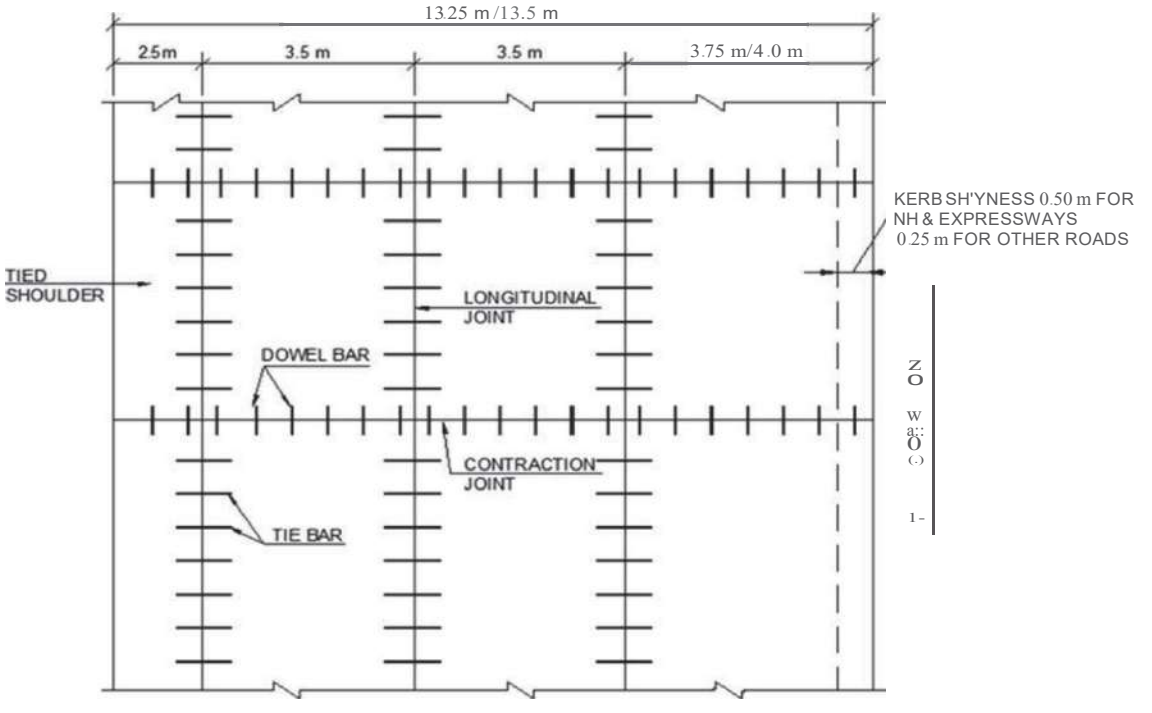


Fig. 5 Joints Configuration for each Carriageway of Six Lane Divided Road With Tied Shoulder (Half Cross-Section)

Contraction Joints

These shall be placed as shown on the drawing and shall be of the weakened plane of "dummy" groove type. The groove is formed preferably by a joint cutting saw. This groove is subsequently widened and sealed with sealant as shown in Figs. 6 to 10. Alternatively, in case of semi-mechanised construction and minor works, the slot may be formed in a manner approved by the Engineer-in-Charge, such as, by pushing into the concrete a flat bar or plastic strip or the web of a "T" bar using a suitable vibratory device, removing the bar subsequently, and keeping the slot open. It shall be ensured that no spalling of concrete occurs while removing the bar. Such manually formed grooves are found to affect the riding quality of the pavement.

Construction Joints

These shall be formed whenever placing of concrete is suspended for more than 30 minutes. Excepting in the case of emergency, construction shall always be suspended at the regular site of expansion or contraction joint. If the construction joint is located at the site of an expansion joint, regular expansion joint shall be provided; if at the site of a contraction joint or otherwise, the construction joint shall be of butt type with dowels. In case of emergency the joints should be placed only in the middle third of the specified contraction joint interval or slab length.

At all construction joints, bulkhead shall be used to retain the concrete and care shall be taken in striking off and finishing the concrete surface to the top face of the bulkhead. When work is resumed, the surface of concrete laid subsequently, shall conform to the grade and cross-section of previously laid pavement, and a straight edge 3 m in length shall be used parallel to the centre line of pavement, to check any deviation in the surface of the two sections. Any deviation from the general surface in excess of 3 mm shall be corrected.

General Requirements of Transverse Joints

Dowel Bars

Dowel bars shall be in accordance with details/dimensions as indicated in the drawing and free from

oil, dirt, loose rust or scale. These shall be coated with appropriate anti-corrosive coating as per IS 13620-1993(Reaffirmed 2020). Coated bars should be protected from scratching during handling, and should be manually recoated by epoxy or anti-corrosive paint wherever scratches are observed. For uniformity in thickness of coating, the coating done in factory environment is preferable. Coating shall be done within 4 hours of cleaning of bars from all rust. Cleaning is done by sand/shot blasting. They shall be straight, free of irregularities and burring restricting free movement in the concrete. The sliding ends shall be sawn or cropped cleanly with no protrusions outside the normal diameter of the bar. The dowel bar shall be supported on cradles/dowel chairs in pre-fabricated joint assemblies positioned prior to the construction of the slabs or mechanically inserted by a Dowel Bar Inserter (OBI) with vibration into the plastic concrete by a method which ensures correct placement of the bars besides full re- compaction of the concrete around the dowel bars.

Design of dowel bars has been given in IRC:58. The minimum length of dowel bar shall be 500 mm keeping in view the requirement of load transfer and placement errors. The diameter and spacing of dowels shall be designed as per IRC:58. The dowel bars shall be aligned parallel to the finished surface of the slab and to the centre line of the carriageway and to each other within tolerances as given hereunder:

(a) Horizontal or vertical rotational alignment:::;; 10 mm

(b) Longitudinal shift:::;; 50 mm

(c) Depth of dowel bar: mid-depth± 25 mm.

Dowel bars shall be covered by a thin plastic sheath for at least 60 per cent of the length from one end for dowel bars in contraction joints or half the length plus 50 mm for expansion joints. The sheath shall be tough, durable, smooth, slide fit, and of an average thickness not greater than 0.5 mm and shall have closed end. The sheathed bar shall comply with the following pull out test.

Four bars shall be taken at random from stock or without any special preparation shall be covered by sheaths as required. The ends of the dowel bars which have been sheathed shall be cast centrally into concrete specimens 150 x 150 x 600 mm, made of the same mix proportions to be used in the pavement, but with a maximum nominal aggregate size of 31.5 mm and cured in accordance with IS 516-1959 (Reaffirmed 2018). At 7 days a tensile load shall be applied to achieve a movement of the bar of at least 0.25 mm. The average bond stress to achieve this movement shall not be greater than 0.14MPa .

For expansion joints, a closely fitting cap 100 mm long with closed end consisting of G1 pipe or stiff plastic of 2 mm thickness shall be placed over the sheathed end of each dowel bar. An expansion space at least equal in length to the thickness of the joint filler board shall be formed between the end of the cap and the end of the dowel bar by using compressible sponge. To block the entry of cement slurry between dowel and cap it may be taped all round.

Table

Recommended Dimensions of Dowel Bars (As per IRC 58-2015)

Slab Thickness	Dowel Bar Details		
mm	Diameter, mm	Length, mm	Spacing, mm
200	25	360	300
230	30	400	300
250	32	450	300
280	36	450	300
300	38	500	300
350	38	500	300

Longitudinal Joints

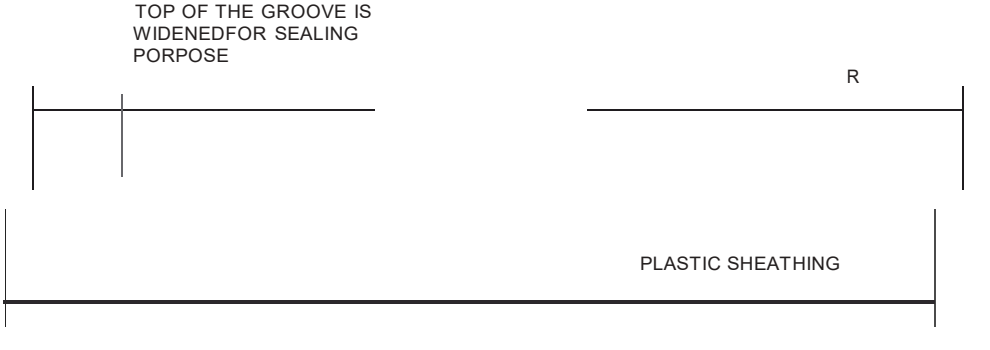
These joints are known as warping joints and can be formed by two different methods: (i) These can be of construction butt type formed by placing the concrete against the face of the slab cast earlier. The face of the slab cast earlier, shall be painted with bitumen before placing of fresh concrete. (ii) When a pavement of width of more than one lane is laid, the longitudinal joint may be cut by a joint cutting machine. In case of four lane divided road, when a two-lane carriageway (7.25/7.5 m wide) with tied shoulder (2.5 m wide) is laid using full width paver, then, two longitudinal saw cut joints shall

be provided- one between the inner and outer lane and the other between outer lane and tied concrete shoulder (Fig. 3). In place of two longitudinal joints, one longitudinal joint may also be provided in the centre of carriageway dividing the carriageway into two equal parts of 4.875/5.0 m width as per the design recommended by the designer (Fig. 4).

Table

Details of Tie Bars for Longitudinal Joint

Slab Thickness mm	Tie Bar Details				
	Diameter (d) mm	Max. Spacing, mm		Minimum length, mm	
		Plain	Deformed	Plain	Deformed
150	8	330	530	440	480
	10	520	830	510	560
200	10	390	620	510	560
	12	560	900	580	640
250	12	450	720	580	640
300	12	370	600	580	640
	16	660	1060	720	800
350	12	320	510	580	640
	16	570	910	720	800



CONTRACTION JOINT WITH DOWEL BAR

(a)

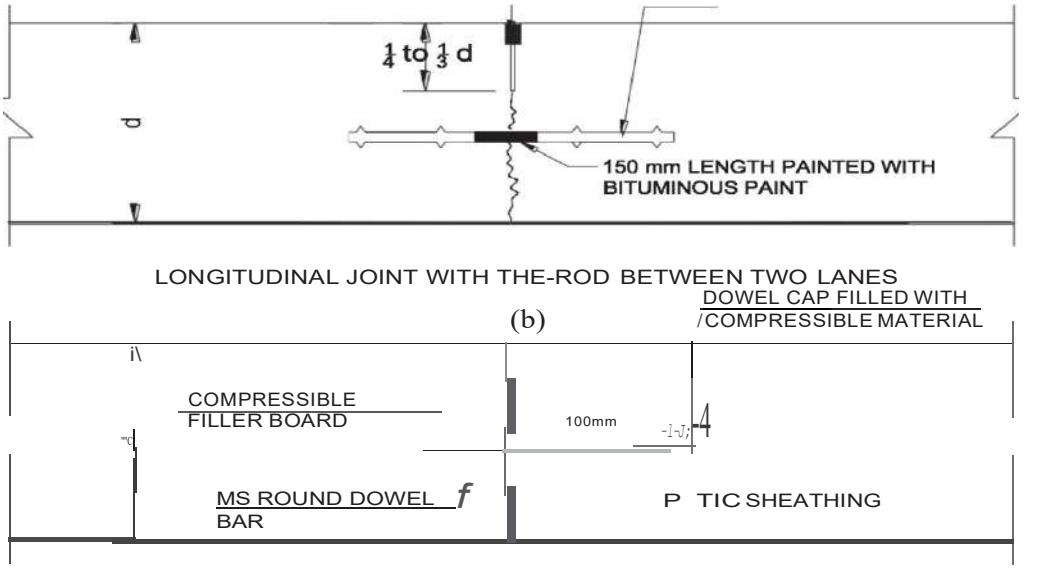


Fig. 7: Typical Cross- Section of Joints

Note: Construction joint shall be same as contraction joint at (a) above with a butt type.

Tie bars

The bars shall be free from oil, dirt, loose rust and scale.

Tie bars are used across the longitudinal joints of concrete pavements to ensure firm contact between slab faces or to prevent abutting slabs from separating. Tie bars are not required for structural reasons, but their only function is to prevent separation of the slabs, especially at fills or curves. Tie bars are not designed to act as load transfer devices. Tie bars are designed to with stand tensile stresses only and provided at mid-depth.

Tie bars projecting across the longitudinal joint shall be protected from corrosion for 75 mm on each side of the joint by a protective coating of bituminous paint. The coating shall be dry when the tie bars are used.

Tie bars shall be laid automatically in a fully mechanized construction using slip form paver. For semi mechanized construction tie bars shall be made up into rigid assemblies with adequate supports and fixings to remain firmly in position during the construction of the slab. Alternatively, tie bars at longitudinal joints may be mechanically or manually inserted into the plastic concrete from top by vibration using tie bar inserter. This method ensures correct placement of the bars and re-compaction of the concrete around the tie bars. When the pavement is constructed in single lane width, tie rods are also inserted mechanically or manually from sides. During side insertion in fixed form paving these may be bent so that half-length remains along the form. After removal of forms, bars shall be straightened using hollow GI pipe so that they extend into the concrete placed on the other half of the concrete slab.

Tie bars shall be positioned to remain within the middle third of the slab depth but well below the proposed sawing depth as indicated in the Fig.7(b), normally parallel to the surface and perpendicular to the line of the joint, with the centre of each bar on the intended line of the joints within a tolerance of 50 mm, and with a minimum cover of 30 mm below the joint groove.

Preparation of Joint Grooves for Sealing

All grooves shall be cleaned of any dirt or loose material by air blowing with filtered, oil-free compressed air. If need arises, cleaning by pressurized water jets may be done depending upon the requirement of the sealant, the sides of the grooves may have to be sand blasted to increase the

bondage between sealant and concrete.

The groove shall be cleaned and dried at the time of priming and sealing.

Sealing with sealants

When sealants are applied an appropriate primer shall also be used in accordance with the recommendation of the manufacturer. The sealant shall be applied within the minimum and maximum drying times of the primer. Priming and sealing with applied sealants shall not be carried out when the temperature of the pavement is below rc.

Placing of Concrete

The Specification is followed as per IT. 19[5.8.2] Section 2 of General Specification booklet. Read controlled CC M-300 instead of M-200 and rate is including the cost of formwork.

Where semi-mechanized construction technique is adopted, concrete shall be deposited between the forms directly from head loads or wheel barrows. Where a certain amount of redistribution is necessary, it shall be done with shovels and not with rakes. The concrete shall be compacted with needle vibrators and vibrating screeds in semi-mechanized construction where a paver finisher is not available . Use of vibrator near side forms is essential to eliminate honey combing. To effect adequate compaction , the concrete shall be placed with appropriate surcharge over the final slab thickness. The amount of surcharge will depend on the mode of placement of concrete and shall be determined by trial. In general, the required surcharge is about 20 per cent of the required slab thickness. Any portion of the batch of concrete that becomes segregated while depositing it on sub-base shall be thoroughly mixed with the main body of the batch during the process of spreading. In case of unavoidable interruption, a full depth transverse joint shall be made at the point of stoppage of work provided the section on which the work has been suspended is about 2 to 3 m long.

Compaction

Where semi-mechanized technique is adopted, compaction of the pavement shall be accomplished by a vibrating screed supplemented by plate/internal vibrators. For slabs of thickness more than 125 mm, vibrating screeds may be supplemented by needle vibrators. The vibrating screed shall rest on side forms. It shall be lowered vertically on to the concrete surface, evenly spread to the appropriate level above the base to provide the required surcharge for compaction; allowed to remain in position for a few seconds until compaction is complete, then lifted vertically and lowered to the adjacent strip of un-compacted concrete. The amplitude of vibration of the screed shall not be less than 1.5 mm and the speed of travel not more than 0.6 m per minute. The screed shall again be taken slowly over the surface, sliding with its axis slightly tilted away from the direction of sliding and the operation repeated until the required dense and closed surface is obtained. Compaction of concrete slabs up to 125 mm thickness may be done by means of vibrating screed alone. Even in the case of slabs of lower thickness, internal vibrators may be used with advantage of compacting the slab corners and edges. The working of the vibrators shall be regularly checked and stand by shall always be maintained for emergency use. Segregated particles of coarse aggregate which collect in front of the screed shall be discarded. Under no circumstances shall such segregated particles be carried forward and pushed on to the base in front of the mass. Compaction by screeding shall be carried on till the mortar in the mix just works up to the surface. Care shall be exercised and the operation of tamping so controlled as to prevent an excess of mortar and water from being worked on the top. Repeated operation other than to secure the necessary compaction and to eliminate voids shall be avoided. Immediately after the screening has been completed and before the concrete has hardened, i.e. while the concrete is still in the plastic stage, the surface shall be inspected for irregularities with a profile checking template and any needed correction made by adding or removing concrete followed by further compaction and finishing.

Floating

As soon as practicable after the concrete has been compacted, its surface shall be smoothened by means of a longitudinal/skim float, operated from a foot-bridge. The longitudinal/skim float shall be worked with a sawing motion, while held in a floating position parallel to the carriageway centre line and passed gradually from one side of the pavement to the other. Movements ahead along the centre line of the carriageway shall be in successive advances of not more than one half the length of the float. This process may also be carried out in slip form or fixed form paving method.

Forms shall not be removed from freshly placed concrete until it has set, or at least 12 hours, whichever is later. They shall be carefully removed in such a manner that no damage is done to the edges of the pavement. After the forms have been removed, the slab edges shall be cleaned and any limited honey-combed areas pointed up with 1:4 cement and sand mortar, after which the sides of the slab shall be covered with wet hessian for curing. Slabs with excessive honey-combing as a result of inadequate compaction shall be removed up to the nearest transverse joints.

Brooming

After belting and as soon as the surplus water, if any, has risen to the surface, the pavement shall be given a broom finish with an approved steel or fiber broom not less than 45 em wide. The broom shall be pulled gently over the surface of the pavement from edge to edge. Adjacent strokes shall be slightly overlapped. Brooming shall be perpendicular to the centre line of the pavement and so executed that the corrugations formed shall be uniform in character and width and not more than 1.5 mm deep.

Brooming shall be completed before the concrete reaches such a stage that the surface is likely to be torn or unduly roughened by the operation. The broomed surface shall be free from porous or rough spots, irregularities, depressions, and small pockets such as may be caused by accidental disturbing of particles of coarse aggregates embodied near the surface. The brooming shall be of uniform pattern all through.

Honey Combing

The side forms shall not be removed until 12 hours or such longer period as the Engineer- in-Charge may decide after the laying of concrete.

As soon as the side forms are removed, any minor honey combed area shall be filled with mortar composed of one part of cement and two parts of fine aggregate. Major honey combing areasor segregated concrete or other defective work or areas damaged by removal of the forms or concrete damaged by rain or due to any other reason whatsoever shall be considered as defective work and shall be removed and replaced by the contractor at his own expense. The total area of honey combed surface shall not exceed 4 per cent of the area of the slab side. However, no individual honeycomb patch shall exceed 0.1 sqm. Engineer-in-Charge's decision as to whether the concrete is defective or not shall be final and binding.

Surface Accuracy

After the concrete has sufficiently hardened after about 12 hours and not later than 24 hours, the surface shall be tested again for high spots. All high spots shall be marked and those exceeding 3 mm shall be ground down immediately. Care shall be taken to see that the grinding does not in any way damage the concrete surface.

The final surface finish is to be such that when tested with a profilograh/roughness indicator/or a 3 metre long straight edge or an equivalent mechanical unevenness indicator placed anywhere within the same or adjoining slab in any direction on the surface, there shall be no variation greater than 3 mm.

If the surface irregularity exceeding 3 mm still remains despite grinding.

The concrete shall be removed to its full depth. The area of concrete to be removed shall be complete slab between the nearest joints, where the defective slab is less than 4.5 metres from the expansion joint, the whole area upto the expansion joint shall be removed to the full depth. The concrete so removed shall not be reused in the work. Fresh concrete shall be laid in the manner already de-scribed in above paras and shall again be subject to test for surface accuracy and other quality control measures. Nothing extra shall be paid on this account.

Every slab shall bear an impression not exceeding 3 mm in depth comprising the numberallotted to the slab and the date on which it is laid. This impression shall be formed by the contractor when the concrete is green so as to leave permanent mark on setting.

Initial Curing

Immediately after completion of the finishing operations, the surface of the pavement shall be entirely covered with wetted burlap, cotton or jute mats. The mats used shall be of such length (or width) that as laid they shall extend at least 45 em beyond the edges of the slab. The mats shall be placed so that the entire surface and both edges of the slab are completely covered. This covering shall be placed as soon as, in the judgment of the Engineer- in-Charge the concrete has set sufficiently to prevent damage to the surface prior to being placed, the mats shall be thoroughly saturated with water and shall be placed with the wettest side down. The mats shall be so placed and weighed down as to

cause them to remain in intimate contact with the surface covered, and the covering shall be maintained full wetted and in position for 24 hours after the concrete has been placed or until the concrete is sufficiently hard to be walked on without suffering damage. Water shall be gently sprayed so as to avoid damage to the fresh concrete. If it becomes necessary to remove a mat for any reason, the concrete slab shall not be exposed for a period of more than half an hour.
Worn burlap or burlap with holes shall not be permitted. Burlap reclaimed from previous use other than curing concrete shall be thoroughly washed prior to use for curing purposes. If burlap is obtained in strips, shall be laid to overlap by at least 150 mm.
Burlap shall be placed from suitable bridges. Walking on freshly laid concrete to facilitate placing burlap shall not be permitted.

Final Curing

Upon the removal of the burlaps, the slab shall be thoroughly wetted and then cured as follows:-
AII joints shall be filled with filler in order to prevent the edges of joints from getting damaged and entry of clay materials into the joints during final curing. Exposed edges of the slab shall be banked with a substantial berm of earth. Upon the slab shall then be laid a system of transverse and longitudinal dykes of clay about 50 mm high immediately covered with a blanket of sandy soil free from stones to prevent the drying up and cracking of clay. The rest of slab shall then be covered with sufficient sandy soil so as to produce a blanket of earth not less than 40 mm deep after wetting. The earth covering shall be thoroughly wetted while it is being placed on the surface and against the sides of the slab and kept thoroughly saturated with water for 21 days and thoroughly wetted down during the morning of the 22nd day and shall thereafter remain in place until the concrete has attained the required strength and permission is given by the Engineer-in-Charge. Thereafter the covering shall be removed and the pavement cleaned and swept. If the earth covering becomes displaced during the curing period, it shall be replaced to the original depth and resaturated.

Protection of Concrete

Suitable barricades and sign boards shall be erected and maintained and watchmen employed to exclude traffic from the newly constructed pavement for the period wherein prescribed, and these barriers shall be so arranged as not in any way to interfere with or impede traffic on any lane intended to be kept open and necessary signs and lights shall be maintained clearly indicating any lanes open to the traffic. Where, as shown on the plans or indicated in the special provision, it is necessary to provide for traffic across the pavement suitable and substantial crossings to bridge over the concrete shall have to be provided. Such crossings, as constructed, shall be adequate for the traffic and approved by the Engineer.
Any part of the pavement damaged by traffic or other causes occurring prior to its final acceptance shall be repaired or replaced by contractor with his own expense in a manner satisfactory to the Engineer. The pavement shall be protected against all traffic usage including that of construction vehicles. Construction traffic may be allowed after 21 days of paving with written permission of the Engineer. However, it is preferable to open after 28 days of curing.

Tools & Equipment's :-

A. **SURFACEVIBRATOR**

Beam Lengths (meters)	4.2 meters
Weights (Kgs)	41 Kgs.
Beam Spacing (mm)	300
Beam Height (mm)	100
Vibrator Unit	Electrically operated on 3 phase V,
415V,50 Hz.A.C. Supply	
Power input (Walls)'	450
Vibrator (Vib/min)	2860
Rated current (Amp.)	1.5
Centrifugal Force (N)	1350-4600
Weight (Kg)	19

B. **VACUUM PUMP**

Drive	Electrically operated on 3
Phase V,415V,50Hz.	A.C. Supply
Power (Kw)	4
Current (Amp)	7.5

Pump Capacity (Lit/Min)		1850
Max. Vacuum(mm Hg)		680(90%)
Overall Length (mm)		1300
Overall Width (With empty Tank):	125	

C. SUCTION MAT TOP COVER

Length (Mt.)	6
Width (Mt.)	4
Weight (Kg)	31

D. FILTERPAD

Length / Pieces (Mt.)	3.8
Width (Mt.)	1.2
Weight (Kg)	4

E. SKIM FLOATER

Supply	3 Phase V, 415V ,50 Hz.A .C.Supply
Power (Kw)	2.1/1.8
Current (Amp.)	6/4
Motor Speed (rpm)	3000/1500
Final Speed (rpm)	115/57
Working Diameter (mm)	1000
Max. Reach (Meter)	3
Diameter of Floating Disc(mm)	985
Weight of Floating Disc(Kg)	16

MODE OF MEASUREMENT:
Above operation the rate shall be including all materials , formworks, machinery and labour charges etc. except dowel bars, making of joints filling with sealant.
The rate shall be for a unit of one cum.

51[22.70] Providing and Applying water proofing layer of acrylic modified cementation composite coating systemin two coats. 1st coat shall be acrylic polymer and cement and second coat shall be of acrylic polymer, cement and silica sand. The application of both the coats shall be as per manufacture's manual at any floor level including terrace.

1.0 Materials :
Acrylic polymer liquid to produce (PMCC) polymer modified cementitious composite for waterproof coating. Cement shall conform to M.3 Water proofing material shall be used of CICO, Fairmate, Perma, Sika, Pidilite (Dr.fixit) as per manufacturer's specifications .

2.1 Workmanship :
2.2 Workmanship shall be as per manufacturer's specifications and recommendations. However, following steps shall be followed for workmanship .
2.3 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 prior to application of 1st coat.
2.4 Application of 1st coat of acrylic polymer modified cementitious slurry with cement. The recommended ratio is 100 parts of OPC 50 parts of acrylic polymer liquid or it is as recommended by manufacture placed on the surface to be treated after wetting the surface to saturation but without any free water. 2nd coat of acrylic polymer modified cementitious slurry with cement and silica sand, brush topping over 1st coat. Curing is required for minimum 4 days. Curing shall be start next day after application of 2nd coat.

3.1 Mode of measurement and payment.
3.2 The rate shall include the cost of materials and labours involved in the operations.
3.3 Rate shall be inclusive of all T & P, scaffolding as required to workman like manner.
3.4 Rate shall be for all floor and at any height.
3.5 The rate shall be for a unit of one sq. m.

52[22.71] Providing, supplying & mixing plasticizers in all concrete items.

1.0 Materials :

These are used as water-reducing agents, so that for a given workability, the water-cement ratio can be reduced to achieve a higher strength as compared to mix without the additive. The components of water-reducing admixtures are surface-active agents, which alter the physico-chemical forces at the interface between two phases. The agents are adsorbed on the surface of the cement particles, which gives them a negative charge, which cause mutual repulsion, leading to their dispersal. Even air bubbles are repelled and cannot attach themselves to the cement particles. The negative charge causes a sheath of oriented water molecules around each particle which separates them. The water, free from the flocculated system, is thus available to lubricate the mix, thereby increasing its workability. The decrease in mixing water varies between 20 and 25 per cent in case of superlicizers and up to 40 per cent in case of PCE based HRWRA, and depends on the cement content, aggregate type, presence of pozzolana or admixture etc. Trial mixes should be made to ensure desired workability at paving site. The water/cement ratio shall however, not be less than 0.25. The Admixture used shall conform to below Table.

Table
Uniformity Tests and Requirement

S. No.	Property	As per IS 9103-1999 (Reaffirmed 2018)
1	Chloride ion content (% by mass as Cl)	Within 10% of the value or within 0.2% whichever is greater as stated by the manufacturer and determined as per IS:6925
2	Relative Density	Within± 0.02 of the value stated by the manufacturer
3	pH value	7-8
4	Dry Material Content (DMC) (% by mass) at 105+/- 2oC)	0.97T<DMC<1 .03T **T**- manufacturer's stated value, DMC test Result
5	Ash Content (AC) (%by mass at 600+/- 1OoC)	0.99T<AC<1.01T **T**- manufacturer's stated value, AC test Result

Plasticizer/ water reducing agent shall be as per approved make list of GSPHCL.

2.0 Workmanship :

2.1 Workmanship shall be as per manufacturer's specifications and recommendations.

2.2 Quantity of plasticizer shall be use in concerned grade of concrete as mention in mix design for concerned grade of concrete.

3.0 Mode of measurement & payments :

3.1 The rate shall include the cost of material and labour involved in the operations described under workmanship.

3.2 The payment shall be for a unit of Liter basis.

53[22.72] Providing Supplying and fixing alluminium section for Door, Windows and ventilator .

Material :-

Aluminium Sections

Aluminium sections used for fixed/openable windows, ventilators, partitions, frame work & doors etc. shall be suitable for use to meet architectural designs to relevant works and shall be subject to approval of the Engineer-in- Charge for technical, structural, functional and visual considerations. The aluminium extruded sections shall conform to IS 733-1983 (Reaffirmed 2017) and IS 1285-2002 (Reaffirmed 2017) for chemical composition and mechanical properties. The stainless steel screws shall be of grade AISI 304.

The permissible dimensional tolerances of the extruded sections shall be as per IS 6477-1983 (Reaffirmed 2021) and shall be such as not to impair the proper and smooth functioning/operation and appearance of door and windows.

Aluminium glazed doors, windows etc. shall be of sizes, sections and details as shown in the drawings. The details shown in the drawings may be varied slightly to suit the standards adopted by the manufacturers of the aluminium work, with the approval of Engineer-in-Charge. Before proceeding with any fabrication work, the contractor shall prepare and submit, complete fabrication and installation drawings for each type of glazing doors, windows, ventilators and partition etc. for the approval of the Engineer-in- Charge. If the sections are varied, the contractor shall obtain prior approval of Engineer-in-Charge and nothing extra shall be paid on this account.

Anodising
Standard aluminium extrusion sections are manufactured in various sizes and shapes in wide range of solid and hollow profiles with different functional shapes for architectural, structural glazing, curtain walls, doors, window & ventilators and various other purposes. The anodizing of these productsis required to be done before the fabrication work by anodizing/electro coating plants which ensures uniform coating in uniform colour and shades. The extrusions are anodized up to 30 micron in different colours. The anodized extrusions are tested regularly under strict quality control adhering to Indian Standard.

Tinted Float Glass
The glass shall be clear tinted float glass and should be approved by the Engineer in Charge. It shall be clear, float transparent and free from cracks subject to allowable defects. The Tinted float glass shall conform to the IS 14900-2018.

Thickness:
The thickness of float glass shall depend on the size of panel. The tolerance in thicknessshall be as under:

TABLE

Nominal Thickness (in mm)	Tolerance (in mm)
4.0	± 0.3
5.0	± 0.3
6.0	± 0.3
8.0	± 0.6

Thickness:
The thickness of float glass shall be measured with micrometers or a caliper which is graduated to 0.01 mm or with a measuring instrument having an equivalent capacity.

EPDM- GASKETS
The EPDM Gaskets shall be of size and profile as shown in drawings and as called for, to render the glazing, doors, windows, ventilators etc. air and water tight. Samples of gaskets shall be submitted for approval and the EPDM gasket approved by Engineer- in- Charge shall only be used. The contractor shall submit documentary proof of using the above material in the work to the entire satisfaction of Engineer-in-Charge.

The EPDM gasket shall meet the requirements as given in Table below:

TABLE

Sl. No.	Description	Standard Follow	Specification
1	Tensile strength Kg.f/cm^2	ASTM-D 412	70 Min.
2	Elongation at break %	ASTM-D 412	250 Min.
3	Modulus 100% Kgf/cm^2	ASTM-D 412	22 Min.
4	Compression set % at oa CC 22 Hrs.	ASTM-D 395	50 Max.
5	Ozone resistance	ASTM-D 1149	No visible cracks

SEALANT
The sealants of approved grade and colour shall only be used. The silicone for perimeter joints (between Aluminium section and RCC/Stone masonry) shall be of make approved by the Engineerin Charge.

Workmanship
Frame Work
First of all the shop drawings for each type of doors/windows/ventilators etc. shall be prepared by using suitable sections based on architectural drawings, adequate to meet the requirement/ specifications and by taking into consideration varying profiles of aluminium sections being extruded by approved manufacturers. The shop drawings shall show full size sections of glazed doors, windows, ventilators

etc. The shop drawings shall also show the details of fittings and joints. Before start of the work, all the shop drawings shall be got approved from the Engineer-in-Charge.

Actual measurement of openings left at site for different type of door/window etc. shall be taken. The fabrication of the individual door/windows/ventilators etc. shall be done as per the actual sizes ofthe opening left at site. The frames shall be truly rectangular and flat with regular shape corners fabricated to true right angles. The frames shall be fabricated out of section which have been cut to length, mitered and jointed mechanically using appropriate machines. Mitered joints shall be corner crimped or fixed with self-tapping stainless steel screws using extruded aluminium cleats of required length and profile. All aluminium work shall provide for replacing damaged/broken glass panes without having to remove or damage any member of exterior finishing material.

Fixing of Frames

The holes in concrete/masonry/wood/any other members for fixing anchor bolts/fasteners/screws shall be drilled with an appropriate electric drill. Windows/doors/ventilators etc. shall be placed in correct final position in the opening and fixed to Sal wood backing using stainless steel screws of star headed, counter sunk and matching size groove. of required size at spacing not more than 250 mm c/c or dash fastener. All joints shall be sealed with approved silicone sealants.

In the case of composite windows and doors, the different units are to be assembled first. The assembled composite units shall be checked for line, level and plumb before final fixing is done. Engineer -in-Charge in his sole discretion may allow the units to be assembled in their final location if the situation so warrants. Snap beadings and EPDM gasket shall be fixed as per the detail shown in the shop drawings.

Where aluminium comes into contact with stone masonry, brick work, concrete, plaster or dissimilar metal, it shall be coated with an approved insulation lacquer, paint or plastic tape to ensure that electrochemical corrosion is avoided. Insulation material shall be trimmed off to a clean flush line on completion.

The contractor shall be responsible for the doors, windows etc. being set straight, plumb, level and for their satisfactory operation after fixing is complete.

Method of Application

Surface Preparation : Clean all joints and glazing pockets by removing all foreign matter and contaminants such as grease, oil, dust, water, frost, surface dirt, old sealants or glazing compounds and protective coatings.

Masking

Areas adjacent to joints shall be masked to ensure neat sealant lines. Masking tape shall not be allowed to touch clean surfaces to which the silicone sealant is to adhere. Tooling shall be completed in one continuous stroke immediately after sealant application and before a skin forms and masking shall be removed immediately after tooling.

Application

Install backer rod of appropriate size and apply silicone sealant in a continuous operation using a positive pressure adequate to properly fill and seal the joint. The silicone sealant shall be tooled with light pressure to spread the sealant against backing material and the joint surfaces before a skin forms. A tool with convex profile shall be used to keep the sealant within the joint. Soap or watershall not be used as a tooling aid. Remove masking tape as soon as silicone joint is tooled.

Tolerance: A tolerance of+ 3 mm shall be allowed in the width of silicone joints. The depth of the joints at throat shall not be less than 6 mm.

All members shall be accurately machined and fitted to form hairlines jointed prior to assembly.

The PVC wrapping protecting the anodized finish shall be retained and all work connection with installation of doors/ windows is complete.

All aluminum work shall be washed clean with a suitable thinner and left in a finished condition in approved uniform appearance and free from all marks and blemished. The contractor shall executed the work careful to ensure that the finished on external walls are not damaged in the event the said finished are damaged they

shall be good by the contractor at his cost.
The materials for alluminium window / ventilator louvers shall be of extruded alluminium section of size as specified with 15 microns anodized coating 4 mm thick Tinted float glass special gakets EPDM quality for weather tightening with silicon sealant compound.

[A]	Two track Bottom Section	20830
[8]	Two track top and side section	20829
[C]	Handle section	20738
[D]	Interlock	20737
[E]	Shutter top bottom section	20736

With all necessary fixtures and

fasteners, Workman ship:
Alluminium alloy and finished certificates,
Contractor shall have to provide certificates from the extruded regarding alloy and certificate of the anodized finishing indicating micron thickness from the anodized. Contractor shall submit shop drawing (showing a fabricating derails) to the client/ Architect for the approval in advance of commencement of work for which decision of Superintending Engineer shall be final.

The weight of section given in the tender is minimum required weight and if the agency offers alternate section which have higher weight then used for such excess weight of section ,nothing extra shall be paid.

Mode of Measurement and payment: -
The rate shall include all cost of material and labour involved in the operations described in the item.
The payment shall for a unit of one Square meter.

54[22.73] Supplying and filling rubbles including hand packing for dry stone pitching 15 em. thick including preparing the surface etc. complete.

Material
1.0 Rubble stone shall confirm to M-16, Sand shall confirm to M-6.

2.0Workmanship
The relevant specification item no.4.12 oftenderspecification shall be followed exceptthe Rubble stone shall be filled in foundation or plinth 15 ems. Layers including filling voids with rubble chips and sand including watering, ramming, consolidation etc., complete.

3.0 Mode of Measurement and Payment
The relevant specification of item no. 4.12 of tender specification shall be followed.
The rates includes all cost of material, labour and tools & plants required for filling in trenches and plinths etc. complete. The thickness shall be measured of compacted layer.
The rates shall be for a unit of one cubic meter.

55[22.74] Labour charges for fixing 40mm thick fully panelled double shutter provoted hinges doors, includingIndian teak wood frame of size 15cm x 10cm or any other size supplied by the corporation stylies and top rails 15cm wide bottom rail 20cm wide, middle rail shall be 25cm wide intermediate rails and indian teak wooden panel shall be as per drawing supplied by the Engineer - in Charge. Rates also inclusive of providing and fixing 4 Nos. of brass pivoted hinges as per detail drawings supplied by Engineer in charge. Rates are also inclusive of following fixture and fastening (1) 4 Nos. of brass hinges pivoted type size as per detail drawings (2) 2 Nos. of brass aldrop of size 300mm x 18mm of decorative type (3) 4 Nos. brass handle of size 20cm long decorative type. (4) 2 Nos. of brass door holder of 7.5cm long (5) 2 Nos. brass tower bolt of size 200mm long. Rate are also inclusive of primer coat and lapi coat to get smoothness and line level upto satisfaction of Engineer in charge. Rates are also inclusive of two coat of oil paint or polishing with french polish to give even shade including cleaning the surface of all dirt & dust and sand papers smooth & including a coat of wooden filler all the work done as per drawing and upto the satisfaction Engineer in charge. Rates are also inclusive of providing and fixing 6 Nos. of M.S. flat hold fast of size 15cm long 25mm wide and 6mm thick as per drawing supplied by Engineer in charge. (For MAIN ENTRANCE DOOR)

MATERIAL:

Iron hold fast confirm to M-29, all brass fittings shall be approved by Engineer in charge. Paints confirm to M-30. French polish of required tint and shade shall be prepared with denatured spirit of approved quality, chandres, shellac and pigment. The French polish confirm to I.S. 348-1968 (Reaffirmed 2019).

FRENCH SPIRIT POLISHING

Pure shellac conforming to IS 16 varying from pale orange to lemon yellow colour, free from resin or dirt shall be dissolved in methylated spirit at the rate of 140 gm of shellac to 1 litre of spirit. Suitable pigment shall be added to get the required shade. Ready made polish conforming to IS 348 can also be used.

Polishing New Surface

Preparation of Surface :

The surface shall be cleaned. All unevenness shall be rubbed down smooth with sand paper and well dusted. Knots if visible shall be covered with a preparation ofred lead and glue size laid on while hot. Holes and indentations on the surface shall be stopped with glazier's putty. The surface shall then be given a coat of wood filler made by mixing whiting (ground chalk) in methylated spirit at the rate of 1.5 Kg of whiting per litre of spirit. The surface shall again be rubbed down perfectly smooth with glass paper and wiped clean.

Application :

The number of coats of polish to be applied shall be as described in the item.

A pad ofwoolen cloth covered by a fine cloth shall be used to apply the polish. The pad shall be moistened with the polish and rubbed hard on the wood, in a series of overlapping circles applying the mixture sparingly but uniformly over the entire area to give an even level surface. A trace of linseed oil on the face of the padfacilitates this operation. The surface shall be allowed to dry and the remaining coats applied in the same way.To finish off, the pad shall be covered with a fresh piece of clean fine cotton cloth slightly damped with methylated spirit and rubbed lightly and quickly with circular motions. The finished surface shall have a uniform texture and high gloss.

WORKMANSHIP:

Teak wood frame and shutter shall be supplied by the Corporation. Minimum 3 Nos. of hold fast shall be fixed on each side of door frame. Size of hold fast shall be 15 em long 25 em wide and 6 mm thickmade from M.S. plate with split end. The hold fast shall be fixed with screw to frames M.S. hold fast shall be protected with coating of paint. The surface of frame abuting the masonry or concreteface shall be properly treated by applying a coat of coal tar approved coating.

Doors and frames shall be stacked in proper manner as directed by Engineer in charge. Fixing of door frame and shutter shall be done in proper position on line level as per instruction given by Engineer in charge. Shutter shall be fixed by using pivoted hinges as per detailed working drawing supplied by Engineer in charge.

Preparation of Surface for polishing:

The surface shall be cleaned. All unevenness shall be rubbed down smooth with sand paper and well dusted. Knots if visible shall be covered with a preparation ofred lead and glue size laid on while hot. Holes and indentations on the surface shall be stopped with glazier's putty. The surface shall then be given a coat of wood filler made by mixing whiting (ground chalk) in methylated spirit at the rate of 1.5 Kg of whiting per litre of spirit. The surface shall again be rubbed down perfectly smooth with glass paper and wiped clean.

Application for polishing:

The number of coats of polish to be applied shall be as described in the item.

A pad of woolen cloth covered by a fine cloth shall be used to apply the polish. The pad shall be moistened with the polish and rubbed hard on the wood, in a series of overlapping circles applying the mixture sparingly but uniformly over the entire area to give an even level surface. A trace of linseed oil on the face of the padfacilitates this operation. The surface shall be allowed to dry and the remaining coats applied in the same way.To finish off, the pad shall be covered with a fresh piece of clean fine cotton cloth slightly damped with methylated spirit and rubbed lightly and quickly with circular motions. The finished surface shall have a uniform texture and high gloss.

FIXTURES AND FASTENING:

Following fixtures and fastening shall be provided and fixing.

Hold fast:

6 Nos. of size 150 mm x 25 mm x 6 mm thick made from M.S. plate with split end.

Hinges: (brass) pivoted type

4 Nos. of 1OOmm x 75mm x 3mm thick size as per details drawings.

Aldrop: (brass)

2 Nos. of size 300 mm long and 16 mm dia.

Handle: (brass)

2 Nos. per shutter of size 20 em long.

Tower bolt: brass

2 Nos. of size 20 em long and 10 mm dia.

Door holder brass

Nos. of size 7.5 em long

MODEOFMEASUREMNTANDPAYMENT:

The rates include labour charges for fixing doors with frame. Cost of providing and fixing brass fixtures and fastening, iron hold fast, oil painting or french polishing. The measurement shall be taken out to out of frame in width and top of frame to floor finish in height.

The rate shall be paid per One Sq.mt. for the work done.

56[22.75] LABOUR CHARGES FOR NON TEAK WOOD 10 x 7 CM size door frame including fixing 32mmwooden shutter to frame using butt hinges and screws including providing and fixing stainlesssteel fixture and fastening quality and providing primer coat of approved brand and two coats of oil paint over one coat of primer painting etc. complete as per drawing and specification (Fully paneled doors)

MATERIAL:
Iron hold fast confirm to M-29, all stainless steel fittings shall be approved by Engineer in charge. Paints confirm to M-30.

WORKMANSHIP :

Teak wood frame and shutter shall be supplied by the Corporation. Minimim 3 Nos. of hold fast shall be fixed on each side of door frame. Size of hold fast shall be 15 em long 25 mm wide and 6 mm thick made from M.S. plate with split end. The hold fast shall be fixed with screw to frames M.S. hold fast shall be protected with coating of oil paint. The surface offrame abuting the masonary or concreate face shall be properly treated by applying a coat of coal tar.

Doors and frames shall be stacked in proper manner as directed by Engineer in charge. Fixing of doorframe and shutter shall be done in proper position on line level as per instruction given by Engineer in charge. Shutter shall be fixed by using pivoted hinges as per detailed working drawing supplied by Engineer in charge.

FIXTURES AND FASTENING:

Following fixtures and fastending shall be provided and fixing.

Hold fast:

Nos. of size 150 mm x 25 mm x 6 mm thick made from M.S. plate with split end.

Hinges: (55)

3 Nos. of size 1OOmm x 75mm x 3mm thick.

Aldrop: (55 for door)

1 Nos. of size 250 mm long and 16 mm dia.

Handle: (55 for door)

2 Nos. per shutter of size 15 em long.

Tower bolt: (55 for door)

1 Nos. of size 20 em long and 10 mm dia.

Tadi: (55 for door)

1 Nos. of size 200 mm long and 12 mm thick.

Painting:

The wood work in contact with masonry shall be painted with two coats of coal tar and one coat ofprimer and two coat 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 similarother defects in wood work shall be made good by filling them with appropriate putty one coat of primer as approved by 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 type 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 Engineer in charge.

MODEOFMEASUREMENTANDPAYMENT:

The rates include labour charges for fixing doors with frame. Cost of providing and fixing Stainless Steel fixtures and fastening, iron hold fast, oil painting. The measurement shall be taken out to out of frame in width and top of frame to floor finish in height.

The rate shall be paid per One Sq.mt. for the work done.

57[22.76] Providing and laying plantation including providing and fixing tree guard. Rates are also inclusive of maintaining the tree plant in live condition at the time of completion of work and handing over of tree plants. Tree to be planted well in time say at the time of excavation of the building i.e. initial starting time the tree shall be planted. Minimum height of Tree plant shall be 1.50 mt.

Materials: -
Tree and pattern of tree- guard shall be as per direction of Engineer-In- Charge. Tree plant shall be minimum height of 1.5 mt. and of good quality. Quality & Selection of plants shall be as decided by Engineer- In-Charge. Plants shall be selected suiting to the local region.

Mode of work: (Workmanship)
A fresh tree with roots are planted at the time of excavation of main civil work (i.e. at the start of the project work) at those places which are given in Layout /Architect drawing as per direction of Engineer-In- Charge. The tree plants shall be covered by the appropriate tree guards in such a manner to project the same tree plant against animals. Supply & spreading of sufficient water and all other necessary materials like fertilizer, pesticides etc. which are required to growth the tree plants by the contractor without any extra cost.
The design and pattern of tree guard shall be as per drawing or as directed by Engineer-In- Charge. The trees shall be maintained in a manner that the same trees remains in a live condition till the end of the project handed over to the beneficiary. No payment shall be given to the contractor for those tree guards which are not maintain proper and trees are not in the live condition till the original works handed over to the concern police department.

Mode of Measurement: -
The rate includes the cost of trees, tree gaurds, fertilizers, pesticides, labour, materials, painting of trees guards etc. complete.
The rate shall be for a unit of one no. basis.

58[22.77] Providing and Fixing Sluice valve class Itested to 20kg/cm2 for body and 10 kg/cm2 for seat of ISI mark. Diameter & class of the sluice valve shall be as described in tender item.

Materials:
Sluice valve of I.S.I make the dia. as specified in tender item. Sluice valve body shall be grew cost iron. It shall be without any short of wasp, knot and short of Sluice valve shall be painted with bitumen base paint. Sluice valve shall be of class- I type of 20kg/cm2.
The sluice valves are used in a pipe line for controlling or stopping flow of water. These shall be of specified size and class and shall be of inside non-raising screw type up to 300 mm size and raising or non-raising screw type above 300 mm with either double flange or double socket ends and cap or hand

wheel. These shall in all respects comply with the Indian Standard Specification IS 14846-2000(Reaffirmed 2020). Class I sluice valves are used for maximum working pressure of 10 Kg/sq.cm (100 metre head) and class II sluice valve for 15 Kg/sq.cm (150 metre head).
The body, domes covers, wedge gate and stuffing box shall be of good quality cast iron, the spindle of bronze, and the nut and valve seats of leaded tin bronze. The bodies, spindles and other parts shall be truly machined with surface smoothly finished. The area of the water way of the fittingsshall be not less than the area equal to the nominal bore of the pipe.
The valve shall be marked with an arrow to show the direction of turn for closing of the valve.

Workmanship:
The valve shall be fully examined and cleared of all foreign matter before being fixed. The fixing of the valve shall be done by means of bolts, nuts and 3 mm rubber insertions or chemically treated compressed fiber board 1.5 mm minimum thickness and of weight not less than 0.183 gm./ sq.cm. with the flanges of spigot and the socketed tail pieces drilled to the same specification in caseof S&S pipes and with flanges in case of flanged pipes. The tail pieces shall conform to IS 1938. These shall be jointed to the pipe line by means of lead caulked joints.
Necessary fitting materials such as nuts, bolts, flanges, rubber packing etc. shall be supplied by the contractor at his own cost.
On completion of jointing in pipe line alignment contractor shall have to give the testing of joints.

Mode of Measurement and payment:
All rates are inclusive of all material, labour and tools & plants etc. charges.
The rates shall be unit of a number basis.

59[22.78] Gypsum Ceiling Providing and fixing gypsum board ceiling as per manufactures' specifications incl. acrylic paint. Fixing of suspended gypsum plain false ceiling by using standard company section (GYPSTEEL ULTRA), which includes providing and fixing G.I. parameter channels of size 20 X 28 X 30 X 0.55 mm thick having one flange of 20 mm and another flange of nylon sleeves and screws at 610 mm center. Then suspending G.I intermediate channels of size 15 X 45 X 15mm, 0.9 mm thick fixed with two flanges of 15 mm each from the soffit at 1220 mm center with ceiling angle of width 25 mm x 10 mm x 0.55 mm thick fixed to soffit with G.I. cleat and steel expansion fasteners. Ceiling section of 0.55 mm. thickness having knurled web of 51 mm. and two flanges of 26 mm each with lips of 10.5 mm. area then fixed to the intermediate channel with the help of connecting clips and in direction perpendicular to the intermediated channel at 457 mm. center 12.5 mm tapered edge gypsum board (conforming to is 2095-1982) is then screw fixed to ceiling section with 25 mm drywall screws at 230 mm center. Screws fixing is done mechanically either with screwdriver or drilling machine with suitable attachment. Standard company manufactured section (GYPSTEEL ULTRA) should be used for the entire framework. Finally the board are to be jointed and finished, so as to have a flush look which includes filling and finishing the tapered and square edges of the boards with jointing compound, paper tape and two coats of primer suitable for Gyp-board (as per recommended practices of India Gyproc -Saint Gobain make). (also including application of primer and preparing surface even & smooth by rubbing the sand paper, two coats of lapi...) Including two coats of plastic emulsion paint. Lapi, Primer and Plastic emulsion paint shall be as per approved make list of GSPHCL. Including all materials and labour etc. complete as per detail drawing and instruction of engineer-in charge.

Materials:
Gypsum plaster board shall be confirm to IS 2095(Part-1)-2011 (Reaffirmed 2021), Thickness of the gypsum plaster board shall be as specified in tender item.
Make of Suspended G.I. section shall be as specified in tender item.
Plastic emulsion paint shall confirm to M-30.

Workmanship:
Suspended ceiling which include G.I. periphery channels of size 0.55 mm thick heaving one flange of 20mm and other flange of 30mm and a web of 28mm along with perimeter of ceiling screw fixed to the wall/ partition with help of nylon sleeves and screw at 610mm Centre, then suspending G.I. intermediate channels to size 45mm x 0.9mm thick with two flange of 15mm each from the slab at 1.220 center to soffits with G.I. cleat and steel expansion fasteners ceiling section of 0.55 mm thickness having knurled web of 40mm and two flanges of 35mm each with lips of 10.5 mm are then fixed to the intermediate channel at 457mm centers.
12mm thick gypsum calcium silicate tapered edge board is than screw fixing is done mechanically either with screw driver of drilling machine with suitable attachment. The boarding is to be done keeping a gap/groove of 2mm to 3mm shall be maintain from all sides of the boards and making a 3mm tapered edge on the two

sides of the boards.
Jointing and finishing method : finally the boards are to be jointed and finished so as to have a flush which includes filling and finishing the square edges of the boards with lime and PVA based materials with fiber tape.
Necessary gape for light diffuser fans and cut out shall have to be made.
Two coats of lapi, One coat of primer and two coats of plastic emulsion paint shall be apply to Gyp-board.
Application of Lapi, primer and plastic emulsion paint shall be followed as per 18.21 of Section-8.

Mode of Measurements and Payment
The rate includes the cost of materials, labour and tools & plants etc. complete
Measurement shall be taken for finished visible work.
Rate shall be for a unit of one Sq. m.

60[22.79] Providing and fixing Door closer pneumatic Hydraulic of ISI mark with heavy duty as per specification.

Materials:
These shall be made of cast iron/aluminium alloy/zinc alloy and of shape and pattern as approved by Engineer-in-Charge. Make shall be as specified in tender item or as directed.
These shall generally conform to IS Specifications for door closers (Hydraulically regulated) IS 3564-1995 (Reaffirmed 2018).

The door closers may be polished or painted and finished with lacquer to desired colour. Aluminium alloy door closer shall be anodized and the anodic coating shall not be less than grade AC15 of IS 1868-1996 (Reaffirmed 2021). All dents, burrs and sharp edges shall be removed from various components and theyshall be pickled, scrubbed and rinsed to remove grease, rust, scale or any other foreign elements. Afterpickling, all the M.S. parts shall be given phosphating treatment in accordance with IS 3618-1966 (Reaffirmed 2021).

The nominal size of door closers in relation to the weight and the width of the door size to which it is intended to be fitted shall be given in Table.

TABLE

Type and Designation of Door Closers

Designation of closers	Mass *of the door (kg)*	*Width of the door (mm)*	*Remarks*
1.	upto 35	upto 700	For light doors such as double leaved and toilet doors.
2.	36 to 60	701 to 850	Interior doors, such as of bed rooms, kitchen and store
3.	61 to 80	851 to 1000	Main doors in a building, such as entrance doors

Workmanship:
After being fitted in its position when the door is opened through 90°, the same should swing back to angle of 20° ± 5° with nominal speed but thereafter, thespeed should get automatically retarded and in case of doors with latches, it should be so regulated that in its final position the door smoothly negotiates with the latch.

Mode of measurement and payment:
Rate are inclusive of all material and labour etc.
The rate shall be for a unit of Number basis.

61[22.80] Providing and Laying integrated cement based proprietary water proofing treatment of required thick- ness over the roof including Providing and Applying water proofing layer of acrylic modified cementation composite coating system in two coats. 1st coat shall be acrylic polymer and cement and secondcoat shall be of acrylic polymer, cement and silica sand. The application of both the coats shall be as per manufacture's manual at terrace. and 10 mm thick water proofing cement plaster in C.M. 1:3 and china mosaic fitting and finally finishing the surface with white cement slurry including treating the vertical surface of the parapet wall up to 20cms height above finished level of terracing including finishing the top with joint less water proofing plaster, curing, testing etc. complete. Rate including ten years performance

of guarantee bond to be given on Rs.50/- stamp paper. (No extra shall be paid for variation in thickness.)

MATERIALS:
Sand M-6, Cement M-3, White Cement M-4, China Mosaic quality and uniform in colour. Acrylic polymer liquid to produce (PMCC) polymer modified cementitious composite for waterproof coating. Cement shall conform to M.3 Water proofing material shall be used of CICO, Fairmate, Perma, Sika, Pidilite (Dr.fixit) as per manufacturer's specifications.

WORKMANSHIP:
Workmanship shall be as per manufacturer's specifications and recommendations. How ever, following steps shall be followed forworkmanship.
Cleaning the roof surface by means of wire brush to make the roof surface free from all loose particles,dust etc prior to application of 1st coat.
Application of 1st coat of acrylic polymer modified cementitious slurry with cement. The recommended ratio is 100 parts of OPC 50 parts of acrylic polymer liquid or it is as recommended by manufacture placed on the surface to be treated after wetting the surface to saturation but without any free water. 2nd coat of acrylic polymer modified cementitious slurry with cement and silica sand, brush topping over 1st coat. Curing is required for maximum 4 days starting one day after application.
Finishing the surface with 1Omm thick water proofing cement plaster in cement mortar 1:3 than applying glazed tiles pieces over cement mortar with required slope as directed by Engineer-In -Charge towards rain water pipe and finally finishing the surface with towel with white cement slurry.
The whole terrace so finishing shall be flooded with water for a minimum period of two weeks of curing and for final test. All above operations to be done in order and as directed and specified by the Engineer -In- Charge.

MODEOFMEASUREMENTANDPAYMENT:
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 the operation described above, hire charges of all machinery, scaffolding, curing for complete above items.
The rate shall be for a Unit of One Sq.mt.

62[22.81] Constructing a counter basin platform (Sandwich type) 80cm high resting on sandwich polished granite slab in C.M. 1:3 with providing and fixing 25mm thick single side polish kotah stone at bottom and 18 to 20mm thick polished granite stone (Single piece, telephonic black or colour as directed) on top. Vertical polished granite stone (single piece) shall be fixed at the end of the counter as per detail drawing or as directed. Half rounded facia shall be fixed on the exposed face of counter as per detail drawing or as directed. With making of necessary holes in stone/counter for fixing of basin. Width of the counter shall be as specified in drawing or as directed.

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 counter basin 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.
Width of the granite facia shall be as specified in detail drawing or as directed and fixed with adhesive material. Facia shall be fixed on exposed surface of the counter as specified in detail drawing or as directed.
The facia shall be chamfered / half chamfered / half rounded as specified in detail drawing or as directed.
At the end of counter, a vertical round moulded granite shall be fixed as specified in detail drawing or as directed. The exposed surface of vertical granite shall be double polished.

Mode of measurements and payment
The rate includes cost of all material & labour required for satisfactory completion of this item. The rate for basin shall be paid separately.
The rate also inclusive of making necessary holes in stone/counter.
The rate shall be for a unit Sq. m. for visible length & width of counter.

63[22.82] S.S. Sinage Board (Name Plate)(18"x4.5")
Providing and fixing S.S. signage board made from 2 mm thick Stainless steel sheet

fixed on 12mm thick pre-laminated plywood on wall with s.s. screw with cap as per detail drawing or as directed by Engineer-In-Charge.

Material:
S.S. sheet shall confirm to IS 5522-2014 (Reaffirmed 2019) & S.S. sheet shall be 304 grade.
Plywood shall confirm to M-26.
Laminate shall confirm to IS 2046-1995 (Reaffirmed 2020) and thickness shall be 1.0mm.

Workmanship
S.S. signage board shall be made from Stainless steel sheet 304 grade in required size and fixed on 12mm thick laminated plywood finished. S.S. signage board shall be fixed on wall with s.s. screw with cap as per detail drawing or as directed by Engineer-In-Charge.

Mode of Measurements and Payment Measurement:
The rate includes the cost of materials and labour etc. complete.
The rate shall be for a unit of Number Basis.

64[22.83] Applying two coats of water proofing chemical (Zycosil) in proportional1:10 (one part of zycosil + 10 part of water) on the water proofing plaster including preparing the surface and ponding test etc. complete as directed by Engineer-In-charge.

Material:
ZYCOSIL: Use Zydex Industries made ZYCOSIL water proofing material
Water: Water confirm to M-1.

Application:
Clean the surface thoroughly. Remove dirt, dust, efflorescence, mold, salt, grease, oil, asphalt, curing compound, paint, coating and other foreign material.
Repair and cure visible cracks having more than 0.5 mm width by using epoxy based crack filler. Then apply two coat of Zycosil which shall be dilute Zycosil with water in proportion 1 : 10 (1 part of Zycosil and 10 part of Water) .(Do not store diluted Zycosil)
All toping/finishing must be completed and allowed to be cured.
In case of rains, allow the structure to dry for at least for 24 hours prior to apply the Zycosil coat.
Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards which together shall constitute one coat.
Apply first coat of the solution with help of painting brush.
Allow the surface to dry completely and then apply second coat of solution after 24 hours.
After 24 hours of second coat, fill the surface with water for 24 hours and check the dampness, if any.

Mode of measurements & payment
(a) All the work shall be measured to the nearest 0.01 M.
(b) Deductions for openings exceeding 0.5 sq. mt. but not exceeding 3 sq.mt. each shall be made.
(c) No deductions shall be made for attachment such as casing, conducts, pipe and the like.
(d) The rate shall include the cost of all materials, labour, scaffolding, protective measures etc. Involved in all the operations described above.
(e) The rate shall be for a unit of one sq. meter.

65[22.84] Rebaring work including drilling hole of required size & depth & grouting of required dia. T.M.T. bars of approved brand fixed by Epoxy based chemical of fairmate or its equivalent 1.5.1. mark.

For introducing additional reinforcement bars for new structural connections or supplementing additional steel area to the existing RCC member, the cross sectional area (diameter and no. of bars) and length required shall be approved by the Engineer-in-Charge. Also the depth of embedment of reinforcement bar shall be approved by the Engineer-in-Charge. The holes have to be power drilled in RCC. The drilled hole in dry state has to be cleaned with round brush and by blowing air through a tube inserted in the hole and connected to hand operated blower.

Then epoxy is to be injected from foil pack with help of epoxy dispenser and epoxy cartridge holder and disposable PVC mixing nozzle inserted inside the drilled hole to fill it from bottom of hole and upwards. Then the reinforcement bar is to be inserted and allowed to remain undisturbed for minimum 24 hours and allow epoxy adhesive to be air cured. Epoxy resin anchor grout shall be approved by the Engineer-in Charge.

Mode of Measurement and payment :
Rate shall include cost of all inputs of material, labour etc. involved in all the operations except the cost of reinforcement.
Rate shall be paid in units of Number basis of each dia. of bars.

66[22.85] Full Glass Door on Patch Fitting

Providing and fixing glass door with patch fitting door as shown in dwg. Door shall consist of make 12mm thk. Toughened clear float glass. Rate shall include necessary designer film, approved locking systems, S.S. handle pair, floor spring (heavy duty or equivalent) gasket & miscellaneous hardware items. Including all material and labour etc. Complete as per detail drawing and instruction of engineer in charge and consultant.

Materials:

12mm toughen glass

This is a clear 12mm toughened safety glass frameless shutter having a consulate top and bottom self-doser mechanism with a pivot connecting to a discrete metal patch fitting at the top and bottom corners to the door.

Hydraulic Floor Spring

The hydraulic floor spring shall be heavy duty double action floor spring of make approved by the Engineer -in-Charge suitable for door leaf of weight minimum 100 kg. The top cover plate shall be of stainless steel, flushing with floor finish level. The contractor shall cut the floor properly with stone cutting machine to exact size & shape. The spindle of suitable length to accommodate the floor finishshall be used. The contractor shall give the guarantee duly supported by the company for proper functioning of floor spring at least for 10 years.

Tubular Handle

The tubular handle bar shall be S.S. 304 grade. Outer dia. of tube shall be 32 mm, tube thickness 3.0 mm and centre to centre length as specified in detail drawing or as directed by engineer in charge.

Lock (Floor mounted & wall mounted)

S.S. 304 grade

Patch

Size and shape of the patch shall be as specified in detail drawing or as directed by engineer in charge.

Workmanship

Application

The 12mm thick clear toughened safety glass frameless shutter is fixed with the help of corner patch fittings. The corner patch fittings are simply a bolt through glass metal fitting requiring a corner cut out andhole inthe glass. These discrete corner patch fittings provide a sleek and clean frameless look. The lock bodypatch fitting can also be installed where there is a necessity to provide locking arrangements for framelessshutter. The maximum size of frameless doors shutters using corner patch fittings should not exceed from1OOOmm X 2400mm. bigger size doors should not be fixed with these fittings. The figure shows thefixing of frameless door shutters with top and bottom corner patch fittings.

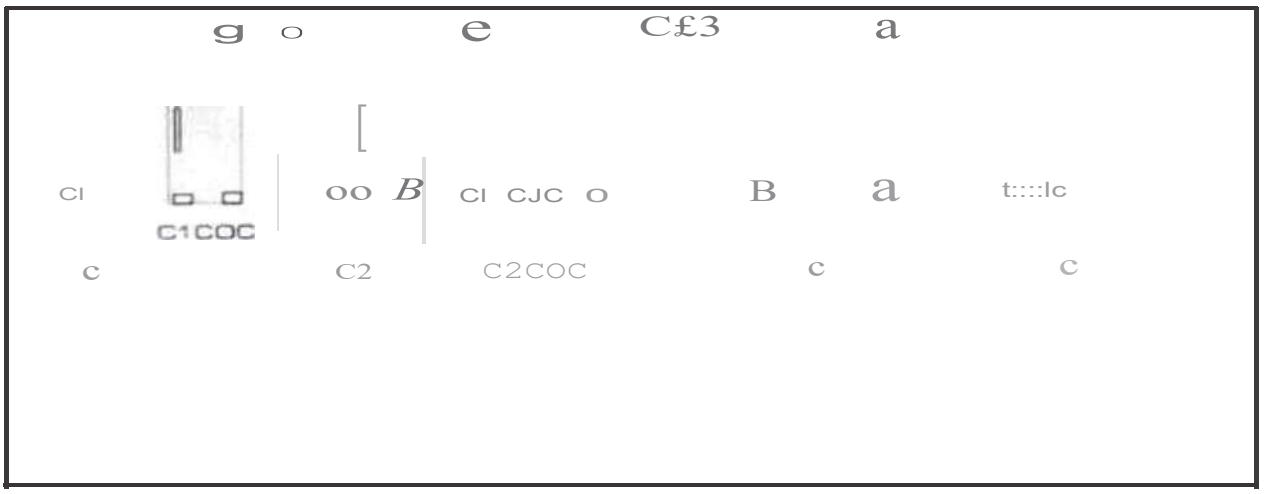


Fig.

Installation

The frameless toughened glass door shutters of required thickness as specified in the item should be installed with the help of 304 grade stainless steel patch fittings of approved brand and manufacturer. These fittings should be complete in all respect with top and bottom pivots and doubleaction hydraulic floor spring types fixing arrangement. These fittings should be based on a modular system, consisting of a base unit, functional inserts, and clip-on covers in a wide range of finishes. The fittings should be suitable to support the weight of the complete glass door in such a way that the movement of the door is smooth and free. The fittings should be got approved from the engineer-in- charge and all the fixings etc. shall be done as per manufacturer specification and corresponding codes described in the description of the fitting.

Mode of Measurements and Payment:

The finished final length/ height and width of the glass door should be measured correct to two places of decimal and overall area in sq.m. correct to two places of decimal should be calculated for payment.

The rate shall include the cost of all the materials, labours involved in all the operations above and as described in the nomenclature of item and particular specification.

The rate shall be for a unit of Sq.m.

67[22.86] Two way Bib Cock

Providing, supplying and fixing C.P. brass Two way Bibcock of approved quality (a) lSmm nominal bore make & model shall be as per approved make list of GSPHCL.

Materials:

The minimum wall thickness of the body not less than 3mm at any section. The operating knob and the fitting should be made of brass. The seat bore inlet and outlet bore of the body and the internal water passage of the body throughout the whole length should be minimum 12.7mm. The valve and spindle used in the cartridge should be made of extrude brass rods and should bear. Rubber seat washer should be of 0.19mm with thickness 4.5mm further the hardness and tensile strength of the materials used should conform as per the material norms. Rubber 'o' ring of size 12.5 x 2.5mm should be provided on the valve used in internal cartridge and 0-ring 0.6 x 2.25 on the spindle. The minimum plating thickness at all points of the plated body section and knob should conform as per specification of manufacturer's product manual. The component should be able to withstand a pressure of 20kg/Sq.cm. for a minimum period of 5 minutes, during this period it should not be sweating or leakaging. Two way bibcock shall be legibly marked with the manufacturers name and trade mark.

Workmanship :

Teflon tape should be used on thread, the end shall be screwed in the socket/tee etc. with pipe wrench. Care shall be taken that two way bibcock is properly jointed so as to make the joint completely water tight. The fitting shall be inspected under working condition or pressure flow. If any joints found in leakaging conditions shall be redone. All leakage shall be removed and replaced without any extra cost. Fitting should

be carried out as per manufacturer's product manual and as directed by engineer in-charge.

Mode of Measurement and Payment :
The rate shall include the cost of all the materials, labours involved in all the operations above and as described in the nomenclature of item and particular specification.
The rate shall be for a unit of Number basis.

68[22.87] Hand Health Faucet Spray
Providing and fixing 15mm dia. chromium plated brass hand health Faucet Spray with tube and hook including fixing in pipe line etc. complete. Make & model shall be as per approved make list of GSPHCL.

Materials:
Hand health faucet spray of 15mm dia. of ABS body.

Workmanship :
Teflon tape should be used on thread, the end shall be screwed in the socket/tee etc. with pipe wrench. Care shall be taken that hand health faucet is properly jointed so as to make the joint completely water tight. The fitting shall be inspected under working condition or pressure flow. If any joints found in leakaging conditions shall be redone. All leakage shall be removed and replaced without any extra cost. Fitting should be carried out as per manufacturer's product manual and as directed by engineer in-charge.

Mode of Measurement &Payment :
The rate shall include the cost of all the materials, labours involved in all the operations above and as described in the nomenclature of item and particular specification.
The rate shall be for a unit of Number basis.

69[22.88] S.S. Railing
Providing and fixing of stainless steel 304 grade pipe railing 1.05 mt. height or as specified in detail drawing or as directed. Top round pipe (Baluster) shall be of 2" dia. Vertical balustar 1.5" x 1.5" at every maximum 0.90m c/c or as specified in detail drawing or as directed and intermediate 3 nos. runners pipe mid rail of 1" dia. and S.S. katori shall be minimum 50mm x 50mm. All S. S. Pipe and S. S. katori must be 16 gauge. The railing system shall be floor mounted with anchor fastener completed as per detailed drawing & as directed by engineer in charge. Rate are inclusive of all material, labour, taxes & polishing.

Materials:
The stainless steel of 304 grade of as per IS 6911- 2017 shall be used for further fabrication of railing as per Architectural Design.

Stainless steel of 304 grade is most common in 300 series of Austenitic stainless steel.
It is still sometimes referred to by its old name 18/8 which is derived from the nominal composition of type 304 being 18% chromium and 8% nickel.
Fabrication of all stainless steel sections should be done only with tools dedicated to stainless steel materials. Tooling and work surfaces must be thoroughly cleaned before use. These precautions are necessary to avoid cross contamination of stainless steel by easily corroded metals that may discolour the surface of the fabricated product. Some specific hints are as under:
Remove all moisture by blowing with dry air or heating with a torch.
Eliminate organic contaminates like oil, paints, anti-spatter compounds, grease, pencil marks, cutting compounds, adhesive from protective paper, soap used for leak testing etc.
Stainless steels cannot be flame cut with a torch. Acceptable results are achieved with an arch plasma cutter.
Be particularly careful to avoid zinc contamination. Do not use brushes or tools previously used on galvanized steel.
Use only stainless steel wire brushes and use these brushes only on stainless steel.

Fixing
Fixing with railing with necessary accessories & stainless steel dash fasteners, stainless steel bolts etc. of required size, on the top of the floor / tread or the side of waist slab with suitable arrangement as per approval of Engineer-in-charge.

Mode of measurement and payment:
The rate shall include the cost of materials and labour involved in all the operations described above. Nothing extra shall be paid for fixing arrangements i.e. drilling, nut & bolts etc.

Measurement shall be in running meter of the top handrail
Rate shall be for a unit of One running meter.

70[22.89] Long body bib cock
Providing, supplying and fixing C.P. brass Long body Bibcock of approved quality (a) 15mm nominal bore make & model shall be as per approved make list of GSPHCL.

Materials:
The CP brass long body bib cock shall be conforming to IS standards. The body shall be of chromium plated copper alloy and external and internal surfaces shall be clean, smooth and free from sand. The 15mm nominal bore shall be designated by the nominal bore of the pipe outlet to which the long body bib cocks are normally fitted.
The weight of long body Bib Cock shall be less than 690 grams. Each bib cock shall be legibly marked with the Manufacture's name and trade mark.

Workmanship :
Teflon tape should be used on thread, the end shall be screwed in the sockeUtee etc. with pipe wrench. Care shall be taken that two way bibcock is properly jointed so as to make the joint completely water tight. The fitting shall be inspected under working condition or pressure flow. If any joints found in leakaging conditions shall be redone. All leakage shall be removed and replaced without any extra cost. Fitting should be carried out as per manufacturer's product manual and as directed by engineer in-charge.

Mode of Measurement and Payment :
The rate shall include the cost of all the materials, labours involved in all the operations above and as described in the nomenclature of item and particular specification.
The rate shall be for a unit of Number basis.

71[22.90] Applying all weather proof synthetic fibre groove finish (scratch type) texture paint of make & manufacturer of approved by GSPHCL.

Material:
Synthetic fibre texture paint (Asian, Burger or ISI mark of equivalent mark)

Workmanship:
Synthetic fibre groove paint should be applied on absolutely dry surface. Care should be taken on ensure that no water or moisture finds its way behind the texture paint coating. On newly plastered surface it can applied direct without any dilution by steel/plastic trowel in desired texture finish. Unlike other similar factory made coatings, texture paint provides enough flexibility to the uses as its colors and designs of the panels area specially made for each site. A single coat in 1.2 to 2.0 mm thickness is recommended on smooth surface and multiple coats of up to 3mm thickness if the surface is rough and uneven, with sand or other particles sticking out. Old flaky/chalky surfaces should be so scraped to remove all the old plaster and a sealing primer applied before texture paint application, it has to be finished with 2 top coats of desired shades.
Synthetic fibre groove paint dries completely after 24 hours in normal climatic conditions.

Mode of Measurement and payment:
The rate for marble texture paint shall include the cost of materials, surface preparation, labour, tools, plants, lead lift and transportation etc. required to finish the work. The unit rate for the item shall be for a unit Smt.

72[22.91] ACP PANELLING

Providing and Fixing 4mm thick external grade alluminium composite panel over plaster with alluminium frames as directed by Engineer- in -charge properly screwed over plaster. ACP should be properly fixed and screwed with the frame and all joints to be filled and finished with silicone sealant. Colour and pattern of ACP shall be as specified in detail drawing or as directed by the architect.

MATERIAL:

4mm thick PVDF coated aluminum foil composite section in three layers top layer of the PVDF coated metallic coloured aluminum foils shall not less than 0.30mm thick and bottom layer of the aluminum foils shall not less than 0.30mm thick and middle layer of polyethylene. SOmm x 25mm aluminum box pipe with 20mm x 20mm. Aluminum clamping G.E. (Winsil- 20) weather silicone sealant.

1.0 WORKMANSHIP:

1.1 Finishing the surface by aluminum section cladding.
The aluminum box pipe of SOmm x 25mm size shall be fix on existing wall at all required distance with screwing to correct length as per drawings and design. In case of different shapes other than structural parts, aluminium framing to be done as per drawing and instructions of consultants as a base for gi framing.
The cut and exposed to view shall be finished smooth. Two pieces shall not be allowed or otherwise jointed to make up the required length of member. Powdered coated M.S. clamp shall be used in R.C.C. work where ever necessary. Roll plugs shall be used while drilling in wall for screwing.
The aluminum PVDF coated foil composite section of selected and approved metallic colour finishing and of leading company having 4mm thick. PVDF coated aluminum foil composite section in three layers, top layer of the PVDF coated metallic coloured aluminum foils shall not less than 0.30mm thick and bottom layer of the aluminum foils shall not less than 0.30mm thick and middle layer of polyethylene. It shall be fold from surrounding edge to fix with 20 x 20mm aluminum angle screwing using tray system and panels sites as per detailed design supplied by Architect or Engineer in charge.
Tray shall be formed of aluminum PVDF coated foil in required size as per design and suggested by Engineer in charge.
The aluminum PVDF coated tray shall be fixed to the SOmm x 25mm box pipe on exterior face of building wall with the help of screw. Roll plugs to correct line length and width.
The Horizontal and vertical joints between tray shall be sealing with structural sealant GE (Winsil - 20) weather silicon sealant to cover the expose surface with matching colour.
The detail design for the entire framing work shall be made by the contractor at his own cost and get approved from Engineer in charge before executing the work. The aluminum PVDF coated composite section, tray size shall be as approved by Engineer in charge.

2.0 MODE OF MEASUREMENT AND PAYMENT:
The rate shall be included the cost of all materials, all labour and scaffolding etc. involve to complete and finished the said items.
All the finished visible surface of aluminum cladding shall be measured in Square meter correct to a two decimal.
The rate shall be for a unit of One square meter.

73[22.92] S. S. Letters
Providing, supplying & fixing Stainless steel letters 304 grade with spraying colour on surface etc. complete as directed. Size of the S.S. letters shall be as described in tender item. Coating of the S.S. letters shall be as directed by engineer in charge. Letter shall be fixed at any height as directed by engineer in charge.

Materials:
The stainless steel letter shall be confirm to IS 6911- 2017 and shall be of 304 grade.

Workmanship :
The letter shall be fixed in true line and level and at any height as per the drawing or as directed by engineer in charge. Work shall be carried out with all the required tools, plants, materials, labour and chemicals required for fixing of letter.

Mode of measurement and payments
Rates are inclusive of all labour, materials, tools, plants, scaffolding etc. to complete the work.
The rate shall be paid per unit of No.

74[22.93] Supplying and fixing glass brick of size 190mm x 190mm x 80mm with white cement and wooden patti as per design given by architect.

Materials :-
Glass brick (190 x 190 x 80mm)
Wooden patti shall confirm to M-22
White cement shall confirm to M-4
French polish confirm to I.S. 348-1968 (Reaffirmed 2019).

Workmanship :-
Teakwood patti shall be fixed inside the frame on which glass brick shall be fixed. Size of the teakwood patti shall be same size of the frame and thickness of the teakwood patti shall be as per site requirement. After fixing the wooden patti on frame fixed the glass bricks on that patti in proper line & level and finished with white cement for bonding the glass brick with each other. Glass brick shall be installed as per

manufacturer guide line. Glass brick shall not be cut. Glass brick wall are self-supported but should not be used as a free standing wall. Wooden patti & frame shall be finished with French polish or as directed by engineer in charge or architect.

Mode of measurement & payment :-
The rate for the glass brick shall include the cost of material and labour involved to finish the work.
The payment shall be made for above item on Sq.m. basis of work completed as above.

75[22.94] Providing and fixing ANODIZED ALLUMINIUM GLAZING (Jindal/banco make) having top/sides section- 22735 (64.0 x 58.0 x 1.70 mm wt. 0.831 kg/mt.) with 8mm thick reflection toughened glass (Saint Globin / Ashahi-AIS) fixing with pressure patti, screws and cleats as per architectural detailed drawings and specifications and as directed by Engineer in Charge.

Materials
Materials shall be of approved quality and shall be generally confirmed to the latest IS specifications and size of the 3 sections are as specified in the item description. The contractor shall order all the materials required for the execution of work as early as necessary and ensure that such materials are on site well ahead of requirement for use in the work. The work involved calls for high standard or workmanship combined with speed and to the entire satisfaction of the Consultant.

Glass in doors, windows, glazing and ventilators shall be 8mm thick toughen glass, clearer tinted, reflective as mentioned in the tender item, and shall be approved quality free from stains, scratches, bubbles and flaws of any kind and shall be properly cut to fit frames and mullions. All windows and ventilators shall be glazed from outside with snap fit anodized aluminum beading and EPDM / gasket lining complete. The buildings shall be snap fit and shall be fitted without use of screws. No screws other than those on some of the hardware shall be visible.

EPDM gaskets of approved size and profile shall be provided and installed at all locations as shown and as called for to render the doors, windows, etc. absolutely air tight and weather tight. Openable shutters shall have single row continuous EPDM weather strip. Weather strips shall not be interrupted by any fittings.

The specifications, drawings, and schedule of quantities cover the major requirement only. Supply and fixing of additional fastenings, fixtures and other items of work not mentioned specifically but which are necessary for satisfactory completion of the work are deemed to be included in the rates quoted by the contractor. Nothing extra shall be paid on this account.

Weather strips, gaskets and sealant shall be of high quality material capable of resisting local environment exposure and performance requirements. Interior primary seal shall be of compression type weather seal. The contractor shall make his own arrangement for necessary scaffolding/staging, cradle etc., for erection of the aluminium doors, windows, ventilators etc.

Workmanship
Specification for sliding and fixed (composite) window:
The windows shall be made out of extruded aluminum sections.
Each shutter shall be provided with two ball bearing rollers, 2 anti-rattling piece guides one each at top and bottom PVC weather strip all around.
All joints shall be mechanical.
8.1mm thick toughen glass shall be fixed in the shutters by means of rubber gasket.
The contractor shall submit for approval to the Consultants shop drawings of each type of door, windows, glazing ventilator etc. The shop drawings should show full size section of doors, windows etc. thickness of metal, details of construction, anchoring details, hardware and connection of the framework hardware such as hinges, handles, floor springs, sample of joints of fastenings and joining etc. along with the shop drawings.

Covering channels:
The members shall be covered by suitable anodized, aluminum channels so that no screens etc. are visible and the quoted rate shall allow for the same.

Drainage:
The system offered by the contractor shall have a burn in provision for drainage of water.

Replacement and cleaning of glass:
The system offered by the contractor shall allow for ease of cleaning and easy replacement of glass panels.

Technical Considerations:

1. The aluminum sections shall be extruded from aluminum alloy HE 9 WP & HV 9 WP as per IS 733-1983 (Reaffirmed 2017) and IS 1285-2002 (Reaffirmed 2017) respectively and free from all defects impairing appearance strength and durability. The permissible dimensional tolerance of the extruded sections shall be such as not to impair the proper and smooth function/operation appearance of doors and windows.
2. The aluminum sections shall be confirmed to the following parameters also
    a) The minimum tensile strength shall be 19kgf/m
    b) The maximum allowable deviation in length from a straight line shall be 0.5 mm/mtr.
    c) The maximum allowable deviation from a straight line shall be 1 degree.
    d) The maximum permissible twist shall be 0.5 mm/mtr.
3. All aluminum section shall be anodized t matt finish colour & shade anodizing shall be 6 microns thick prior to anodizing to all aluminum members shall be rendered uniform in appearance free from scratches, stains or other blemishes.
4. All aluminum members shall be wrapped with self-adhesive non staining PVC tapes.
5. All members shall be accurately machined and lifted to form hairline joints. Prior to assembly, the design of the joint and accessories shall be such that the accessories are fully concealed. The fabrication of doors, windows etc. shall be done in suitable sections to facilitate easy transportation, handling and installation. Adequate provision shall be made in the members for anchoring to supports and fixing of hardware and other fixtures and approved by the Consultants.
6. Fabricated materials shall be erected in an approved manner to protect the material against any damage during transportation. The loading & unloading shall be carried out with utmost care.
7. Prior to installation, the doors, windows etc. shall be stacked on edge on level bearers and supported evenly. The assembled doors/windows etc. shall be placed in correct final position in the opening and fixed to wall as per detail and rawel cadmium plated machine screws, plugs, fasteners etc. of required size and spacing. All the joints with approved silicon sealants
8. In case of composite windows and doors, the different units are to be assembled first. The assembled composite units should be checked for line, level and plumb before final location if the situations so warrants.
9. Where aluminum member comes into contact with masonry brick work, concrete, plaster or dissimilar metal, it shall be coated with an approved insulation lacquer paint or plastic tape to ensure that their elector chemical corrosion is avoided. Insulation material shall be trimmed off to a clean flush line on completion .
10. The contractor shall be responsible for assembling composite units, bedding and pointing with mastic inside and outside, at the transoms and mullions and placing the doors, windows etc. in their respective openings, after the doors, windows etc. have been fixed in their correct assigned position the open hollow sections abutting masonry/concrete shall be filled with cement grout (1 cement : 3 coarse sand) densely packed and finished neat backing (grout shall be of the expanding type made by approved additive). The contractor shall be responsible for the doors, windows etc. being set straight, plumb, level and for their satisfactory operation after fixing is complete.
11. The gap between frames & supports & also gaps in the door & window section shall be filled with approved silicon sealant of approved colour and make to ensure the complete water tightness and the silicon sealant shall be of such colour and composition that it would not stain the masonry/concrete work. The masonry/concrete work should receive paint without bleeding. Silicon sealant should set or dry out under any condition of weather; silicon sealant shall be applied with special guns as per manufacturer's recommendations.
12. The PVC wrapping protecting the anodized finish shall be retained till the glazing work is commenced and all work connected with installation of doors/windows is complete. All aluminum work shall be washed clean with a suitable thinner and left in a finished condition in approved uniform appearance and free from all marks and blemishes.

Mode of measurement and payment:

The clear opening in close position shall be considered for measuring the area of windows. Measurement shall be taken in length and width of completed dimension.

The rate includes for execution of whole item and shall be paid for a unit of one sq. meter as per actual work done.

76[22.95] Providing and fixing weep holes.

Adequate number of weep holes not existing one meter spacing in both direction should be provided to prevent any accumulation of water and building up of hydrostatic pressure behind the wall. The weep holes should be provided above the low water level.

The size/diameter of the weep hole shall be as mentioned in detailed drawing or as directed.

PVC pipe of necessary dia. (As mentioned in detail drawing or as directed) shall be used for weep hole.

Length of the PVC pipe shall be as per the wall thickness of the member plus 5mm projected from the outer face of the wall.
The rate shall be include labour and material etc. completed.
The rate shall be for a unit of One running meter.

77[22.96] Providing and laying gravel base filter media as specified in detail drawing.

Material:
Gravel shall be confirm to IS 4097-2019.

Workmanship:
The gravel selected for packing of filter media shall consist of hard quartz (about 96 percent Si02) or other suitable material, with an average specific gravity of not less than 2.5. Not more than 10 percent by weight of the material shall have a specific gravity of less than 2.25. The gravel shall contain no more than two percent by weight of thin flat or elongated pieces. In the case of such pieces, the larger dimensions shall not be more than 3 times the smallest dimensions. The quartz shall be of sub-rounded to rounded grains with minimum angular features.
The gravel for use as pack shall be free from impurities, such as shale, mica, feldspar, clay, sand, dirt, loam, and hematite and organic materials.
The porosity of the gravel when laid as a pack shall not be less than 25 percent.

Gravel Sizes:
The gravel conforming to this standard as per IS 4097-2019 shall be of the following grades:

51. No.	Grade	Pack	Particle Size Range Mm	IS Sieves (see 15:460-1962*)
1	A	Fine Gravel	Over 2.0 to 3.35	2.0 , 3.35
2	B	Fine Gravel	Over 3.35 to 4.75	3.35 , 4.75
3	C	Medium Gravel	Over 4.75 to 6.3	4.75, 6.3
4	O	Medium Gravel	Over 6.3 to 8.0	6.3 , 8.0
5	E	Coarse Gravel	Over 8.0 to 12.5	8.0 , 12.5

Note:- The particle size distribution of gravel shall be determined by screening through standard sieves in accordance with IS: 460-1985. The percentage distribution of the sizes shall be determined from a graph in which the percentage of material passing through each sieve is plotted against the standard aperture of that sieve. Any size, say 020, will thus indicate that the cumulative weight of all the grains smaller than this size is 20 percent of the total weight of the test sample. The uniformity coefficient of the gravel, that is, the ratio of its 020to 01Osizes shall not exceed 2. A material with uniformity coefficient less than 2 shall be classified as uniform and if greater than 2 it shall be taken as non-uniform. The limiting sizes given in above table are the minima and maxima, and the stacks containing smaller or bigger sizes as shown by sieve analysis shall be rejected.

The gravel shall have a hardness of not less than 5 in Moh's scale.

The pack aquifer ratio (PIA ratio) is defined as the ratio of 50 percent size (030) of the gravel pack to the 50 percent size of the aquifer. The size of gravel when used as pack in tubewells shall be decided in accordance with the size of the aquifer material proposed to be tapped. The gravel size shall be limited as below:
Uniform aquifer with uniform gravel pack.
Pack aquifer ratio — 9to 12.5
Non-uniform aquifer with uniform gravel pack. Pack aquifer ratio- 11 to 15.5 Note:-

The thickness of gravel pack shall be limited to 13 to 18 em.

The filter material shall be well packed to a thickness of not less than as specified in detail drawing or as directed. With smaller size towards the soil and bigger size towards the wall and provide over the entire surface behind wall/ abutment, wings or return walls to the full height.

Mode of measurement and payment:
The rate shall be include labour, material, compaction, consolidation etc. completed.
The rate shall be for a unit of One Cu.m.

78[22.97] Non-Woven Geotextile: Supplying and laying of polypropylene needle punched non woven geotextile as filter media behind Terramesh facia units, as per MoRTH 700 Type-1 geotextile. The width of geotextile roll shall not be less than 4.5 m, at easily accessible location including top and bottom, with all leads and lifts, manpower and machinery, materials, labour etc. complete and as directed by Engineer- In-Charge.

General:
All works shall be done strictly according to section 702.1 specifications of MORTH & designed using IRC SP 116-2018.. In the event of any discrepancy of above, the decision of Engineer-in-charge shall be final and binding on the contractor. Good workmanship and neat appearance is the prerequisite for all sections of work. The total planning and sequence of different activities must be got approved by the Engineer- in- charge.

Testing and Acceptance criteria:
The material should get approval from the client before the actual supply start. Contractor within 30 days of issue of work order shall intimate Engineer in charge about the brand of material he intend to procure along with technical literature, past experience and other details about the manufacturer / supplier.
Testing shall be done on material as per codes specified in Table 1 at every 40,000 sqm. The manufacturer / supplier of geogrid shall provide Certificate of Conformity for the material with every lot/shipment. The Manufacturers Certificate of Conformity for geotextile shall be provided for certifying that material conforms to all the technical and special requirements. The material shall be tested Laboratory BTRA or TRI or BTTG or TBU-Germany. Cost of material testing shall be borne by contractor.

Specification of Geotextile:
The product should have 'CE' certification and the manufacturer should be ISO certified. The non woven PP geotextile should be thermally bonded and should be manufactured using continuous polypropylene filaments coated with polypropylene without using any glues or chemical binders. The product should not contain any color or dyes so as to prevent any possible ground / ground water contamination.
The geotextile to be used for the work should be a Non-woven continuous filament thermally bonded geotextile, in white colour and having a minimum roll width of 4.5 m without joints – meeting the following specifications:-

Table 1 Properties of thermally bonded nonwoven geotextile

PROPERTIES:	Value	Tolerance	Test Method
Mechanical Properties:			
Mean Peak Strength	8.0 kNim	-2 kNim	EN ISO 10319
ElonQation	24%	±15%	EN ISO 10319
Mass Per Unit Area	120 gsm		
Tensile StrenQth @ 5% ElonQation	3.4 kNim	NA	EN ISO 10319
CBR Puncture Resistance	1500 N	-270 N	EN ISO 12236
Dynamic Cone Puncture	38mm	NA	EN ISO 13433
Opening Size 090	150 IJ.m	1101-J.m	EN ISO 12956
Permeability (H50)	100 llm2.s	-10%	EN ISO 11058
Minimum Roll width	4.5 m		
Minimum Roll Length	100m		

Note: Values indicated in above table are typical.

Testing and acceptance criteria
The material should get approval from the client before the actual supply start. Contractor within 30 days of issue of work order shall intimate Engineer in charge about the brand of material he intend to procure along with technical literature, past experience and other details about the manufacturer and if client intended for testing of supplied material, contractor shall arrange a visit of client to factory for inspection and testing of the material. The visit expenses (traveling, lodging and boarding) and testing expenses will be borne by the Contractor.

The manufacturer shall have ISO or CE Certification for manufacturing process and quality control.

The manufacturer shall provide 'Manufacturer's Test Certificate' for every lot supplied from the factory.

The supplier shall provide third party test reports from an independent laboratory with valid accreditation for all the test values in 'Manufacturer's Test Certificate'.

The materials shall be Tested in accordance with tests prescribed by BIS. In absence of IS codes, tests

prescribed by either ASTM, EN, BS of ISO shall be conducted.

The material shall meet the requirements as specified in the contract.
The material/packing shall be marked with the following information:-

(a) Manufacturer's name
(b) Roll number
(c) Grade
(d) Size/length
(e) Date of manufacture
(f) Product identification details.

Eligibility Criteria

Manufacturer / Supplier should have production facility ISO 9001:2008 Quality Management System certified. Manufacturer/ Supplier shall have in-house technical support facilities to provide site specific design and required technical assistance at site.
Manufacturer should undertake for site supervision during the execution of Reinforced Soil wall work.
The Manufacturer / Supplier should not have a history of poor performance such as abandoning the works, financial failures, blacklisting. If it is observed, Manufacturer / Supplier will be automatically disqualified.
The Manufacturer / Supplier shall be manufacturing / supplying the system in India for more than 10 years from the date of this tender notice. Manufacturer must produce performance certificate for a minimum of 10 year old waterfront structure made of gabion fascia with integrated tail soil reinforcement, from the central or state government authority..

Construction Requirements

A. Geotextile packaging and storing – Geotextile materials should not be left directly exposed to sunlight for a period longer than the period recommended by the manufacturer. If stored outdoors, they shall be elevated and protected with a waterproof cover. Prevent excessive mud, wet concrete, epoxy, or other deleterious materials from coming in contact with and affixing to the geogrid materials.

B. Site preparation- The subgrade or natural ground shall be prepared as indicated on the construction drawings or as directed by the Engineer.

C. C. Installation -The geotextile shall be laid at the proper elevation and alignment as shown on the construction drawings. The geotextile shall be installed in accordance with the installation guidelines provided by the manufacturer or as directed by the Engineer. The geotextile may be temporarily secured in place with sand bags or backfill as required by fill properties, fill placement procedures or weather conditions or as directed by the Engineer.

D. D. Overlap – An overlap of 300 mm or as indicated by Engineer shall be provided between the adjacent rolls..

Mode of measurement and payment for Geotextile

Accepted geotextile shall be paid at the unit price (per square metre Plan area) for each pay item included in the contract. Wastage due to overlap will not be paid extra.

79[22.98] Providing and Fixing of Mineral Fiber Ceiling at any height, Tiles size of 595mmx 595mm x 16mm {20mm) beveled angular edge. Make & model shall be as per specified in tender or as directed by Engineer in charge.

Materials

Tiles

Mineral Fiber Ceiling Tiles shall be made of granulated high-density Mineral Wool as the main material and top production technique which gives it superior features of fire-proofing, sound absorption, heat insulation & sag resistance. They are cost effective and are mainly used for acoustics and decoration.
Tiles shall be appropriate class and of finished thickness as specified in the description of the item. Only selected tiles of uniform width shall be used. Unless otherwise specified in the description of the item or shown in the drawings, the width of tiles selected for use shall not be less than 595 x 595mm in size and of approved texture, design and patterns and patterns and shall be of 16mm/20mm thick Beveled Tegular

edge type.
Where width of room/ corridor is in multiple of standard width of tiles, same pattern shall be maintained throughout the length. Where the width of rooms/ corridor is not in multiple of standard width of tiles, borders with appropriate width and material of boards shall be provided in design approved by the Engineer-in-charge and maintained uniformly throughout of the length/ width of room/ corridor.

Mineral Fibre tiles shall have the following properties:

Surface: Shall be of approved texture, design and pattern.
Dimensions: 595mm x 595mm x 16mm (20mm) thick Beveled Tegular edge type. Size referred to are always module sizes. The nominal panel size may differ depending on the suspension system used.
Relative humidity: 99% RH resistant.
Fire resistance: Fire performance as per BS:476 (Part-6 & 7)
Thermal conductivity: 0.052 W/m-K- 0.057 W/m-K
Acoustic control: Noise reduction coefficient (NRC)= 0.50 to 0.60
Light reflectance: >85%.
Weight: 3.10 Kg/m2 (for 16mm thick) & 5.29 Kg/m2 (for 20mm thick)

Suspension system:
Suspension system shall be made of interlocking metal T-grids of hot-dipped all round galvanized steel.

Frame
Frame is made up of interlocking metal **T**-grids of hot dipped all round galvanized steel sections of 0.33mm thick (Galvanized @ 120 grams per sq.m. including both sides) comprising of main T runners of size 15 x 32mm of length 3000mm, cross **T** of size 15 x 32mm of length 1200mm and secondary intermediate cross T of size 15 x 32mm of length 600mm to form grid modules of size 600 x 600mm. This grid shall be suspended from ceiling using galvanized mild steel members (Galvanized@ 80 gms/m2 including all sides) i.e. 50mm long, 8mm outer diameter M-6 dash fasteners, 6mmdia fully threaded hanger rod up to 1000 mm length and L-shaped level adjuster of size 85 x 25 x 2mm. Frame also consist of galvanized iron perimeter wall angle of size 24 x 24 x 0.40mm of length 3000mm to be fixed on periphery wall/ partition with the help of plastic rawl plugs at 450mm centre to centre and 40mm long dry wall SS screws.
The bottom surface of the frame shall be checked and corrected to true plans and slopes.

Fixing
Outer wall angle shall be fixed accurately and truly at required height and level, parallel and close to the wall. Thereafter all the **T** members shall be placed and fixed carefully to form the grid. The grid comprises of main T-runners at 1200mm centres securely fixed to the structural soffit by approved and adjustable hanger rods at 1200mm maximum centres and not more than 150mm from spliced joints of main **T**-runners. The last hanger at the end of each runner should not be greater than 600mm from the adjacent wall. Similarly, cross T-runners of 1200mm length shall be placed at 600mm centre to centre. 600x600mm modules to be formed by fitting 600mm long flush fitting cross Tees (secondary cross **T)** centrally between 1200mm cross T-runners. The tiles shall then be placed properly in the grids as per required pattern, texture and design/ drawing and as per directions of the Engineer-in-Charge. If required, level of the false ceiling grid shall be checked after placing of calcium silicate tiles and necessary adjustment shall be made wherever required through level adjuster.

Finishing
Care should be taken while placing calcium silicate tiles into the grid so that there will be no displacement to grid and stains/ dirty marks put by the workers.

Measurements
Length and breadth shall be measured correct to a em.
Areas shall be worked out to nearest 0.01sqm.
The superficial area of the finished work ceiling shall be measured in square metres.
No deduction in measurements shall be made for openings of areas upto0.36 Sq.m.
Nothing extra shall be payable either for any extra material or labour involved in forming such openings.
For openings exceeding 0.36 sq.m. in area, deductions in measurements for the full opening in multiple of area of each tile (0.36 Sq.m.) will be made.

Mode of measurement and payment
Rates are inclusive of all labour, materials, tools, plants, scaffolding etc. to complete the work.
The rate shall be a unit of one Sq.m.

80[22.99] Calcium Silicate False Ceiling
Providing and Fixing Eco-friendly light weight calcium silicate false ceiling at any height,

Tiles size of 595mmx 595mm x lSmm tagular edge. Make & model shall be as per specified in tender or as directed by Engineer in charge.

Materials

Tiles

Eco friendly light weight calcium silicate tiles shall be made from Non-cementitious hydrated wet moulded calcium silicate slurry/mixture, reinforced with fibers and natural fillers. Free from formaldehyde and other harmful materials. Does not contain any toxic ingredients. Shall have appropriate recycled material contents. The Ceiling Tiles shall be of appropriate class and of finished thickness as specified in the description of the item .Only selected tiles of uniform width shall be used. Unless otherwise specified in the description of the item or shown in the drawings, the width of tiles selected for use shall not be less than 595 x 595 mm in size and shall be 15 mm thick integral densified tegular edged type, light weight wet moulded calcium silicate. Where width of room/ corridor is in multiple of standard width of tiles, same pattern shall be maintained throughout the length. Where the width of rooms/ corridor is not in multiple of standard width of tiles, borders with appropriate width and material of boards shall be provided in design approved by the Engineer-in-charge and maintained uniformly throughout of the length/ width of room/ corridor. Calcium silicate tiles shall have the following properties:

(a) Surface: All tiles are prime coated on both sides. Standard finish in two coats white dispersion type, solvent free paint.

(b) Dimensions:
595mmx595mmx15mm thick tegular edged. Size referred to are always module sizes. The nominal panel size may differ depending on the suspension system used.

(c) Thickness: 10 mm thick in the center and 15mm thick all around on edge resting portion with integral densified edge.

(d) Density of material: 350 kg per cum in the central 10 mm thick portion and 450 kg cum on the edges, (Average 370 kg per cum as per EC8C Code 2007).

(e) Relative humidity: 100% RH resistant.

(f) Fire resistance: Non-combustible as per 8S:476 Part-4. Fire performance: as per 8S:476 (Part-6) for fire propagation and 8S 476 (Part 7) for Surface spread of flame.

(g) Thermal conductivity: 0.048 W/m- K- 0.052 W/m- K as per EC8C Code 2007 and ASTM 518-1991.

(h) Recycled Content: Shall have 46-50% recycled content out of which 18-20% should be FLYASH.

(i) Acoustic control: Sound Attenuation 30-

32d8 Noise reduction coefficient (NRC)

Plain & Designer tile: 0.10-0.15.

For Pin Hole/Texture pattern tiles: 0.20-0.30.

Pin hole/Texture fully perforated tile: 0.30-

0.40. For 5mm fully perforated 0.40-0.50.

For 5mm fully perforated with 50mm/48gsm glass wool 0.65-0.85.

(j) Light reflectance: >85%.

(k) Weight: 5 - 5.5Kg/m2.

Frame

Frame is made up of interlocking metal T-grid of hot dipped galvanized steel sections of 0.33mm thick (Galvanized @ 120 gms/m2 including all sides) comprising of main T runners of size 24 x 38mm of length 3000mm, cross T of size 24 x 32 mm of length 1200mm and secondary intermediate cross T of size 24 x 32mm of length 600mm to form grid modules of size 600 x 600mm. This grid shall be suspended from ceiling using galvanized mild steel members (Galvanized@ 80 gms/m2 including all sides) i.e. 12x50mm long dash fasteners, 6mm dia fully threaded hanger rod upto 1000 mm length and L-shaped level adjuster of size 76 x 25 x 25x 1.6mm fixed with grid and Z cleat of size 25x37x25x1 .6mm thick with precut hole on

both 25mm flange to pierce into 12x50mm or even bigger dash fastener if require. Frame also consist of galvanized iron perimeter wall angle of size 24 x 24 x 0.40mm of length 3000mm to be fixed on periphery wall/ partition with the help of plastic rawl plugs at 450mm centre to centre and 40mm long dry wall SS screws .
The bottom surface of the frame shall be checked and corrected to true plans and slopes.

Fixing
Outer wall angle shall be fixed accurately and truly at required height and level, parallel and close to the wall. Thereafter all the T members shall be placed and fixed carefully to form the grid. The grid comprises of main T-runners at 1200mm centres securely fixed to the structural soffit by approved and adjustable hanger rods at 1200mm maximum centres and not more than 150mm from spliced joints of main T-runners. The last hanger at the end of each runner should not be greater than 600mm from the adjacent wall. Similarly, cross T-runners of 1200mm length shall be placed at 600mm centre to centre. 600x600mm modules to be formed by fitting 600mm long flush fitting cross Tees (secondary cross T) centrally between 1200mm cross T-runners. The tiles shall then be placed properly in the grids as per required pattern, texture and design/ drawing and as per directions of the Engineer-in-Charge. If required, level of the false ceiling grid shall be checked after placing of calcium silicate tiles and necessary adjustment shall be made wherever required through level adjuster.

Finishing
Care should be taken while placing Light Weight calcium silicate tiles into the grid so that there will be no displacement to grid and stains/ dirty marks put by the workers. (worker should preferably wear clean soft cotton gloves while placing tile).

Measurements
Length and breadth shall be measured correct to a em.
Areas shall be worked out to nearest 0.01sqm.
No deduction in measurements shall be made for openings of areas upto 0.36 Sq.m.
Nothing extra shall be payable either for any extra material or labour involved in forming such openings.
For openings exceeding 0.36 sq.m. in area, deductions in measurements for the full opening in multiple of area of each tile (0.36 Sq.m.) will be made.

Mode of measurement and payment
Rates are inclusive of all labour, materials, tools, plants, scaffolding etc. to complete the work.
The rate shall be a unit of one Sq.m.

81[22.100] Providing, supplying and fixing M.S. rolling shutter including one coat of zinc chromate primer and two coats of oil paint. Width & height of the rolling shutter shall be as detail drawing.

ROLLING SHUTTERS
Rolling shutters shall conform to IS 6248-1979 (Reaffirmed 2017). These shall include necessary locking arrangement and handles etc. These shall be suitable for fixing in the position as specified i.e. outside or inside on or below lintel or between jambs of the opening. The door shall be either push and pull type or operated with mechanical device supplied by the firm. Shutters up to 10 sq. metre shall be of push and pull type and shutters with an area of over 10 sq. metre shall generally be provided with reduction gear operated by mechanical device with chain or handle, if bearings are specified for each of operation, these shall be paid for separately.

Shutter: The shutter be built up of inter locking lath section formed from cold rolled steel strips. The thickness of the sheets from which the lath sections have been rolled shall be not less than 0.90mm for the shutters upto 3.5 m width. Shutters above 9 metres width should be divided in 2 parts with provision of one middle fixed or movable guide channel or supported from the back side to resist wind pressure. The lath section shall be rolled so as to have interlocking curls at both edges and a deep corrugation at the centre with a bridge depth of not less than 12 mm to provide sufficient curtain of stiffness for resisting manual pressures and normal wind pressure. Each lath section shall be continuous single piece without any welded joint. When interlocked, the lath sections shall have a distance of 75 mm rolling centers. Each alternate lath section shall be fitted with malleable cast iron or mild steel clips securely riveted at either ends, thus locking in the lath section at both ends preventing lateral movement of the individual lath sections. The clips shall be so designed as to fit the contour of the lath sections.

Spring : The spring shall be of coiled type. The spring shall be manufactured from high tensile spring steel wire or strips of adequate strength conforming to IS 4454 (Part-1)-2001 (Reaffirmed 2015).

Roller and Brackets : The suspension shaft of the roller shall be made of steel pipe conforming To heavy duty as per IS 1161. For shutter upto 6 metre width and height not exceeding 5 metre, Steel pipes of 50 mm nominal bore shall be used. The shaft shall be supported on mild steel brackets of size 375 x 375 x 3.15 mm for shutters upto a clear height of 3.5 metre. The size of mild steel brackets shall be 500 x 500 x 10 mm for shutters of clear height above 3.5 m and upto 6.5 m. The suspension shaft clamped to the brackets shall be fitted with rotatable cast iron pulleys to which the shutter is attached. The pulleys and pipe shaft shall connected by means of pretension helical springs to counter balance the weight of the shutter and to keep the shutter in equilibrium in any partly open position.
When the width of the opening is greater than 3.5 mtr. The cast iron pulleys shall be interconnected with a cage formed out of mild steel flats of at least 32 x 6 mm and mild steel dummy rings made of similar flats to distribute the torque uniformly. Self-aligning two row ball Bearing with special cast iron casings shall be provided at the extreme pulley and caging rings shall have a minimum spacing of 15mm and at least 4 number flats running throughout length of roller shall be provided.
In case of shutters of large opening with mechanical device for opening the shutter the roller shall be fitted with a purion wheel at one end which in contact with a worm fitted to the bracket plate, caging and pulley with two ball bearing shall be provided.

Guide Channel : The width of guide channel shall be 25 mm the minimum depth of guide channels shall be as follows:

Clear width of shutters	Depth of guide channel
Up to 3.5 m	65mm
3.5 m up to 8 m	75mm
8 m and above	100 mm

The gap between the two legs of the guide channels shall be sufficient to allow the free movement of the shutter and at the same time close enough to prevent rattling of the shutter due to wind.
Each guide channel shall be provided with a minimum of three fixing cleats or supports for attachment to the wall or column by means of bolts or screws. The spacing of cleats shall not exceed 0.75 m. alternatively, the guide channels may also be provided with suitable dowels, hooks or pins for embedding in the walls.
The guide channels shall be attached to the jambs, plumb and true either in the overlapping fashion or embedded in grooves, depending on the method of fixing.

Cover: Top cover shall be of mild steel sheets not less than 0.90 mm thick and stiffened with angle or flat stiffeners at top and bottom edges to retain shape.
Lock plates with sliding bolts, handles and anchoring rods shall be as per IS 6248-1979 (Reaffirmed 2017).

Fixing: The arrangement for fixing in different situations in the opening shall be as per IS 6248-1979 (Reaffirmed 2017).
Brackets shall be fixed on the lintel or under the lintel as specified with rawl. Plugs and screws bolts etc. The shaft along with the spring shall then be fixed on the brackets.
The lath portion (shutter) shall be laid on ground and the side guide channels shall be bound with ropes etc. The shutter shall then be placed in position and top fixed with pipe shaft with bolts and nuts. The side guide channels and cover frames shall then be fixed to the walls through the plate welded to the guides. These plates and bracket shall be fixed by means of steel screws bolts, and rawl plugs concealed in plaster to make their location invisible. Fixing shall be done accurately in a workmen like manner that the operation of the shutter is easy and smooth.

Painting

All the members of the collapsible gate including T-iron shall be thoroughly cleaned off rust, scales, dust etc. and given a priming coat of approved steel primer conforming to IS 2074 (Part-1)-2015 (Reaffirmed 2020) before fixing them in position. Then after installation of collapsible gate painting two coats of oil paint shall be as per item 19.7.

Mode of Measurements and payment:

Clear width and clear height of the opening for rolling shutter shall be measured correct to a mm. The clear distance between the two jambs of the opening shall be clear width and the clear distance between the sill

and the soffit (bottom of lintel) of the opening shall be the clear height.

The rate shall include the cost of materials and labour involved in all the operations described above including cost of top cover and spring except ball bearing and mechanical device of chain and crank operation, which shall be paid for separately.

The area shall be calculated in square metres correct to two places of decimal.

The rate shall be unit of One Sq. m.

82[22.101] Providing, supplying and fixing M.S. Collapsible gate including one coat of zinc chromate primer and two coats of oil paint. Width & height of the rolling shutter shall be as detail drawing.

These shall be of approved manufacture and shall be fabricated from the mild steel sections.
The gates shall consist of double or single collapsible gate depending on the size of the opening. These shall consist of vertical double channels each 20 x 10 x 2 mm. at 10 em. centre to centre braced with flat iron diagonals 20 x 5 mm and top and bottom rails ofT- iron 40 x 40 x 6 mm @ 3.5 kg/m with 40mm dia. ball bearings in every fourth double channel, unless otherwise specified. Wherever collapsible gate is not provided within the opening and fixed along the outer wall surface, T- iron at the top may be replaced by flat iron 40 x 10 mm.
The collapsible gate shall be provided with necessary bolts and nuts, locking arrangement, stoppers and handles. Any special fittings like spring, catches and locks, shall be so specified in the description of item where so required. The gate shall open and close smoothly and easily.

Fixing
T-iron rails shall be fixed to the floor and to the Lintel at top by means of anchor bolts embedded in cement concrete of floor and lintel. The anchor bolts shall be placed approximately at 45 em centres alternatively in the two flanges of the T- iron. The bottom runner (T- iron) shall be embedded in the floor and proper groove shall be formed along the runner for the purpose. The collapsible shutter shall be fixed at sides by fixing the end double channel with T -iron rails and also by hold- fasts bolted to the end double channel and fixed in masonry of the side walls on the other side. In case the collapsible shutter is not required to reach the lintel, beam or slab level, a Tee -section suitably designed may be fixed at the top, embedded in masonry and provided with necessary clamps and roller arrangement at the top. All the adjoining work damaged in fixing of gate shall be made good to match the existing work, without any extra cost.

Painting
All the members of the collapsible gate including T-iron shall be thoroughly cleaned off rust, scales, dust etc. and given a priming coat of approved steel primer conforming to IS 2074 (Part-1)-2015 (Reaffirmed 2020) before fixing them in position. Then after installation of collapsible gate painting two coats of oil paint shall be as per item 19.7.

Mode of Measurements and payment:
The height and breadth shall be measured correct to a em.
The height of the gate shall be measured as the length of the double channels and breadth from outside to outside of the end fixed double channels in open position, of the gate.
The area shall be calculated in square metres, correct to two places of decimal.
The rate shall include the cost of materials and labour involved in all the operations described above.
The rate shall be unit of One Sq. m.

83[22.102] Providing, making and filling the polysulphide / polyurethane / silicon joint.

The relavent specification shall be followed as per item no. 50[22.69].

The joint shall be finished smooth after filling the filler materials.

The mode of measurement and payment shall be made on Rmt. basis of work done incl. labours & materials .

84[22.103] Providing, supplying and grouting epoxy base grouting for tiles.

Material:
Epoxy Grout
Grout is the material that is used to fill the space between adjacent tiles and support the joints.

The Epoxy grout consists of mix of 0.70 kg of organic coated filler of desired shade and mixing of 0.10 kg of hardener and 0.20 kg of resin per kg.. They have very low water absorption, higher compressive strength and are resistant to staining and easy to maintain. Epoxy grout is a waterless mix formed by mixing a base

material (part A) and a hardener (part B). These components are mixed at site just prior to grouting.

Generally, epoxy grouts require no additional sealer to protect the surface.

Application process

Surface preparation

It shall be ensured that tiles are firmly set and adhesive or mortar is completely dry for 24 hours. All spacers, pegs, ropes and string shall be removed and joints be cleaned by removing free loose dirt particles.

Preparing mix and application

The complete unit Part A (Base) and Part B (Hardener) shall be properly mixed in given ratio. The desired colour of grout shall be obtained by mixing required quantity of colour with base to ensure homogeneity.

The grout shall be pressed firmly by using a hard rubber squeeze into joints ensuring that joints are completely filled. Excess grout material shall be removed from joints and surface by moving squeeze on grout line after 22 to 25 minutes. The damp sponge shall be used in circular motion on tile surface to achieve the flush joint. After completion of work the grout haze shall be cleaned with clean water or soap solution. The suitable rubber gloves shall be used to avoid skin contact during application.

Mode of Measurement and payment:

Length and breadth of grouted tile area shall be measured correct to a em and the area shall be calculated in sq.m. correct to two places of decimal.

The rate shall include the cost of all materials and labour involved in all operations described above.

Nothing extra shall be paid.

The rate shall be unit of One sq. m.

85[22.104] Providing, supplying and laying Precast kerb stone.

Laying

Trenches shall first be made along the edge of the wearing course of the road to receive the kerb stones of cement concrete of specified grade. The bed of the trenches shall be compacted manually with steel rammers to a firm and even surface and then the stones shall be set in cement mortar of specified proportion.

The kerb stones with top 15 em. wide shall be laid with their length running parallel to the road edge, true in line and gradient at a distance of 30 em. from the road edge to allow for the channel and shall project as shown in detail drawing or as directed. The joints of kerb shall not be more than 10 mm. wherever specified all joints shall be filled with mortar 1:3 (1 cement: 3 coarse sand) and pointed with mortar 1:2 (1 cement: 2 fine sand) which shall be cured for 7 days.

The necessary drainage openings of specified sizes shall be made through the kerb as per drawings or as directed by the Engineer-in-Charge for connecting to storm water drains.

Finishing

Berms and road edges shall be restored and all surplus earth including rubbish etc. disposed off as directed by the Engineer-in-charge. Nothing extra shall be paid for this.

Mode of Measurement and payment:

It shall be measured in running meter of the finished work (for specified width and height of stone) along the edge of the road correct to a em.

The rate shall include the cost of all the materials and labour involved in all the operations described above.

The rate shall be unit of One running meter.

86[22.105] Providing, supplying and laying of Granular sub base course.

This work shall consist of laying and compacting well-graded material on prepared subgrade in accordance with the requirements of these Specifications. The material shall be laid in one or more layers as sub-base or lower sub-base and upper sub-base (termed as sub-base hereinafter) as necessary according to lines, grades and cross-sections shown on the drawings or as directed by the Engineer-in-charge.

Materials

The material to be used for the work shall be natural sand, crushed gravel, crushed stone, crushed slag or combination thereof depending upon the grading required. Use of materials like Kankar and crushed

concrete shall be permitted in the lower sub-base. The material shall be free from organic or other deleterious constituents and shall conform to the grading given in Table-1 and physical requirement given in Table-2 Gradings III and IV shall preferably be used in lower sub-base. Grading V and VI shall be used as a sub-base-cum-drainage layer. The grading to be adopted for a project shall be as specified in the Contract. Where the sub-base is laid in two layers as upper sub-base and lower sub-base, the thickness of each layer shall not be less than 150 mm.

If the water absorption of the aggregate determined as per IS 2386(Part-3)-1963 (Reaffirmed 2021); if thisvalue is greater than 2 per cent, the aggregate shall be tested for Wet Aggregate Impact Value (AIV) (IS 5640-1970 (Reaffirmed 2017)). Soft aggregates like Kankar, Brick ballast and laterite shall also be tested forWet AIV (IS 5640-1970 (Reaffirmed 2017)).

TABLE No.1
GRADING FOR GRANULAR SUB-BASE MATERIALS

IS Sieve Designation	Percent by Weight Passing the IS Sieve					
	Grading I	Grading II	Grading III	Grading IV	Grading V	Grading VI
75.0 mm	100	--	--	--	100	--
53.0 mm	80-100	100	100	100	80-100	100
26.5 mm	55-90	70-100	55-75	50-80	55-90	75-100
9.50 mm	35-65	50-80	--	--	35-65	55-75
4.75 mm	25-55	40-65	10-30	15-35	25-50	30-55
2.36 mm	20-40	30-50	--	--	10-20	10-25
0.85 mm	--	--	--	--	2-10	--
0.425 mm	10-15	10-15	--	--	0-5	0-8
0.075 mm	<5	<5	<5	<5	--	0-3

TABLE No.2
PHYSICAL REQUIREMENTS FOR MATERIALS FOR GRANULAR SUB-BASE

Aggregate Impact Value (AIV)	IS 2386(Part-4)-1963 (Reaffirmed 2021) or IS 5640-1970 (Reaffirmed 2017)	40 Maximum
Liquid Limit	IS 2720(Part-5)-1985 (Reaffirmed 2020)	Maximum 25
Plasticity Index	IS 2720(Part-5)-1985 (Reaffirmed 2020)	Maximum 6
CBR at 98% dry density (at IS:2720-Part 8)	IS 2720(Part-5)-1985 (Reaffirmed 2020)	Minimum 30 unless otherwise specified in the Contract

Construction Operations

Preparation of Sub-Grade:

The surface of the sub grade to receive the Granular Sub-base shall be prepared to the specified lines and crossfall (Camber) as necessary and made free of dust and other extraneous materials. Any ruts or soft yielding places shall be corrected in an approved manner and rolled with 80- 100 kN smooth wheeled roller until firm surface is obtained if necessary by sprinkling water. Weak places shall be strengthened, corrugations removed and depressions and pot holes made good with suitable materials, before spreading the aggregate for GSB.

Where the existing surface over which the sub base of GSB is to be laid is black topped, to ensure effective internal drainage, furrows 50 mm x 50 mm (depth of furrows increased to reach bottom of bituminous layer where necessary) at one metre intervals shall be cut in the existing bituminous surface at 45 degrees to the central line of the carriageway at one metre intervals in the existing road before the GSB is laid.

Spreading and compacting:

The sub-base material of grading specified in the Contract and water shall be mixed mechanically by a suitable mixer equipped with provision for controlled addition of water and mechanical mixing. So as to ensure homogenous and uniform mix. The required water content shall be determined in accordance with IS 2720(Part-8)-1983 (Reaffirmed 2020). The mix shall be spread on the prepared sub-grade with the help of a motor grader of adequate capacity, its blade having hydraulic controls suitable for initial adjustmentand for maintaining the required slope and grade during the operation, or other means as approved by the Engineer-in-charge.

Moisture content of the mix shall be checked in accordance with IS 2720(Part-2)-1973 (Reaffirmed 2020) and suitably adjusted so that, at the time of compaction, it is from 1 to 2 per cent below the optimum moisture content (OMC).

Immediately after spreading the mix, rolling shall be done by an approved roller. If the thickness of the compacted layer does not exceed 100 mm, a smooth wheeled roller of 80 to 100 kN weight may be used. For a compacted single layer upto 200 mm the compaction shall be done with the help of a vibratory roller of minimum 80 to 100 kN static weight capable of achieving the required compaction . Rolling shall commence at the lower edge and proceed towards the upper edge longitudinally for portions having unidirectional crossfall or on super elevation. For carriageway having crossfall on both sides, rolling shall commence at the edges and progress towards the crown.

Each pass of the roller shall uniformly overlap not less than one third of the track made in the preceding pass. During rolling, the grade and crossfall (camber) shall be checked and any high spots or depressions,which become apparent, corrected by removing or adding fresh material. The speed of the roller shall not exceed 5 km per hour.

Rolling shall be continued till the density achieved is at least 98 percent of the maximum dry density for the material determined as per IS 2720(Part-8)-1983 (Reaffirmed 2020). The surface of any layer of material on completion of compaction shall be well closed, free from movement under compaction equipment and from compaction planes, ridges, cracks or loose material. All loose, segregated or otherwise defective areas shall be made good to the full thickness of layer andre-compacted .

Mode of Measurements and payment:
Granular sub-base shall be measured as finished work in position in cubic metres.
The Contract unit rate for granular sub-base shall be payment in full for carrying out the required operations including all labour, tools, equipment, machinery and incidentals to complete the work to the specifications as described above.
The rate shall be unit of One Cu.m.

87[22.106] Providing and fixing Water tight constuction or expansion joints of 150 mm dia wide thin ribbed PVC.

Water stops

Material:

The material for the PVC waterstops shall be a plastic compound with the basic resin of polyvinyl chloride and additional resins, plasticizers, inhibitors, which satisfies the performance characteristics specified below as per IS 12200-2001 (Reaffirmed 2019).

Testing shall be in accordance with IS 8543(Part-1)-1978 (Reaffirmed 2020).

a)	Tensile strength Ultimate elongation	3.6 N/mm2 minimum 300% minimum
b)	Tear resistance	4.9 N/mm2 minimum
d)	Stiffness in flexure	2.46 N/mm2 minimum
c)	Accelerated extraction	
	i) Tensile strength	10.50 N/mm2 minimum
	ii) Ultimate elongation	250% minimum
(d)	Effect of Alkali	7 days
	i) Weight increase	0.10% maximum
	ii) Weight decrease	0.10% maximum
	iii) Hardness change	± 5 points

(e)	Effect of Alkali	28 days
	i) Weight increase	0.40% maximum
	ii) Weight decrease	0.30% maximum
	iii) Dimension change	±1%

PVC water stops shall be either of the bar type, serrated with centre bulb and end grips for use within the concrete elements or of the surface (kicker) type for external use. PVC water stops shall be of approved manufacture. Samples and the test certificate shall be got approved by the ENGINEER INCHARGE before procurement for incorporation in the works.

Workmanship

Water stops shall be cleaned before placing them in position. Oil or grease shall be removed thoroughly using water and suitable detergents.

Water stops shall be procured in long lengths as manufactured to avoid joints as far as possible. Standard L or T type of intersection pieces shall be procured for use depending on their requirement. Any non-standard junctions shall be made by cutting the pieces to profile for jointing. Lapping of water stops shall not be permitted.

Water stops shall be placed at the correct location/level and suitably supported at intervals with the reinforcement to ensure that it does not deviate from its intended position during concreting and vibrating. Care shall also be taken to ensure that no honey- combing occurs because of the serrations/end grips, by placing concrete with smaller size aggregates in this region. Projecting portions of the water stops embedded in concrete shall be thoroughly cleaned of all mortar/ concrete coating before resuming further concreting operations. The projecting water stop shall also be suitably supported at intervals with the reinforcement to maintain its intended position during concreting so as to ensure that it does not bend leading to formation of pockets. In addition, smaller size aggregates shall be used for concreting in this region also.

Mode of Measurements and payment:

The rate shall include the cost of all the materials and labour involved in all the operations described above.

The rate shall be unit of One running meter.

88[22.107] Proving corrugated G.I. sheets roofing fixed with galvanized iron 'J' or 'L' hook bolts, and nuts 8mm dia. with bitumen and G.I. limpet washers filled with white lead complete excluding the cost of purline, rafters and trusses. Thickness of the G.I. sheet as per specified in tender item.

These shall be of the thickness specified in the description of the item and shall conform to IS 277-2018. The sheets shall be of 275 grade of coating (See Appendix-A) unless otherwise specified in the description of item.

The sheets shall be free from cracks, split edges, twists, surface flaws etc. They shall be clean, bright and smooth. The galvanising shall be non-injured and in perfect condition. The sheets shall notshow signs of rust or white powdry deposits on the surface. The corrugations shall be uniform in depthand pitch and parallel with the side.

Purlins

Purlins of the specified material or M.S. rolled sections of requisite size shall be fixed over the principal rafters. These shall not be spaced at more than the following distances.

TABLE

Thickness ofC.G.S. sheet	*Maximum spacing of pur/ins*
1.00 mm	2.00 metre
0.80 mm	1.80 metre
0.63 mm	1.60 metre

The top surfaces of the purlins shall be uniform and plane. They shall be painted before fixing on top. Embedded portions of wooden purlins shall be coal tarred with two coats.

Slope

Roof shall not be pitched at a flatter slope than 1 vertical to 5 horizontal. The normal pitch adoptedshall usually be 1 vertical to 3 horizontal.

Laying and Fixing

The sheets shall be laid and fixed in the manner described below, unless otherwise shown inthe working drawings or directed by the Engineer-in-Charge.

The sheets shall be laid on the purlins to a true plane, with the lines of corrugations parallel or normal to the sides of the area to be covered unless otherwise required as in special shaped roofs.

The sheets shall be laid with a minimum lap of 15 em at the ends and 2 ridges of corrugationsat each side. The above minimum end lap of 15 em shall apply to slopes of 1 vertical to 2 horizontal and steeper slopes. For flatter slopes the minimum permissible end lap shall be 20 em. The minimumlap of sheets with ridge, hip and valley shall be 20 em measured at right angles to the line of the ridge,hip and valley respectively. These sheets shall be cut to suit the dimensions or shapes of the roof, either along their length or their width or in a slant across their lines of corrugations at hips and valleys. They shall be cut carefully with a straight edge chisel to give a smooth and straight finish.

Lapping in C.G.S. sheets shall be painted with a coat of approved steel primer and two coatsof painting with approved paint suitable for G.S. sheet, before the sheets are fixed in place.

Sheets shall not generally be fixed into gables and parapets. They shall be bent up along theirside edges close to the wall and the junction shall be protected by suitable flashing or by a projecting drip course, the later to cover the junction by at least 7.5 em.

The laying operation shall include all scaffolding work involved.

Sheets shall be fixed to the purlins or other roof members such as hip or valley rafters etc. with galvanized J or L hook bolts and nuts, 8 mm diameter, with bitumen and G.I. limpet washers or with a limpetwasher filled with white lead as directed by the Engineer-in-Charge. While J hooks are used for fixing sheets on angle iron purlins, and L hooks are used for fixing the sheet to R.S. joists, timber or precast concrete purlins. The length of the hook bolt shall be varied to suit the particular requirements.he bolts shall be sufficiently long so that after fixing they project above the top of the nuts by not less than1 0 mm. The grip of J or L hook bolt on the side of the purlin shall not be less than 25 mm. There shall be aminimum of three hook bolts placed at the ridges of corrugations in each sheet on every purlin and their spacing shall not exceed 30 em. Coach Screws shall not be used for fixing sheets to purlins.

The galvanized coating on J or L hooks, and bolts shall be continuous and free from defectssuch as blisters, flux stains, drops, excessive projections or other imperfections which would impair serviceability.

The galvanized coating should conform to IS 1367(Part-XIII) (Sec-1)-2018. The mass of coating per square meterof the surface shall be as under:

Mass and Equivalent Thickness of Coating

7Yllntt1:1Um IVJaSS (glm)	*Average Thickness (pm)*	*Jvummu"!:l 'ass (glm)*	*Individual Thickness (pm)*
375	54	300	43

Where slopes of roofs are less than 21.5 degrees (1 vertical to 2.5 horizontal) sheets shall bejoined together at the side laps by galvanized iron bolts and nuts 25 x 6 mm size, each bolt provided with a bitumen and a G.I. limpet washer or a G.I. limpet washer filled with white lead. As the overlap atthe sides extends to two corrugations, these bolts shall be placed zig-zag over the two overlapping corrugations, so that the ends of the overlapping sheets shall be drawn tightly to each other. The spacing of these seam bolts shall not exceed 60 em along each of the staggered rows. Holes for all bolts shall be drilled and not punched in the ridges of the corrugations from the underside, while the sheets are on the ground.

Wind Tie

Wind ties shall be of 40 x 6 mm flat iron section or of other size as specified. These shall be fixed atthe eaves of the sheets. The fixing shall be done with the same hook bolts which secure the sheets tothe

purlins. The ties shall be paid for separately unless described in the item of roofing.

Finish

The roof when completed shall be true to lines, and slopes and shall be leak proof.

Measurements

The measurements of G.I. sheet roof shall be taken for finished work insuperficial area in general plane (not girthed on the roor). The laps between the G.I. sheets both at their ends and along the side edges shall not be measured. The overlaps of G.I. sheets over the valley piece and their underlap under the ridge, hip and flashing piece shall be included in the measurements.

No deductions in measurements shall be made for openings for chimney stacks, sky light etc. of area upto 0.40 Sq.mt. nor extra be paid for extra labour in cutting and for wastage etc. in forming such openings.

The rate of roof shall include the cost of all materials and labour involved in all operations described above. The rate also includes the cost of provision, erection and removal of the scaffolding, bending, ladders, templates and tools required for the proper erection and completion of the work. The rate includes the cost of purlines, rafters and trusses.

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

89[22.108] Proving ridges or hips 600mm overall in plain G.I. sheets fixed with G.I. 'J' or 'L' hooks, bolts and nuts 8mm dia. G.I. limpet and bitumen washer etc. complete. Thickness of the G.I. sheet as per specified in tender item.

Ridges and hips of C.G.S. roof shall be covered with ridge and hip sections of plain G.S. sheet witha minimum lap of 20 em on either side over the C.G.S. sheets. The end laps of the ridges and hips and between ridges and hips shall also be not less than 20 em. The ridges and hips shall be of 60 em overall width plain G.S. sheet, 0.6 mm or 0.8 mm thick as given in the description of the item and shallbe properly bent in shape.

Fixing

Ridges shall be fixed to the purlins below with the same 8 mm dia. G.I. hook bolts and nuts and bitumen and G.I. limpet washers which fix the sheets to the purlins.

Similarly, hips shall be fixed to the roof members below such as purlins, hip and valley rafterswith the same 8 mm dia G.I. hook bolts and nuts and bitumen and G.I. limpet washers which fix the sheets to those roof members. At least one of the fixing bolts shall pass through the end laps of ridgesand hips, on either side. If this is not possible extra hook bolts shall be provided.

The end laps of ridges and hips shall be joined together with C.G.S sheet by galvanised ironseam bolts 25 x 6 mm size each with a bitumen and G.I. washer or white lead as directed by the Engineer-in-Charge. There shall be at least two such bolts in each end lap.

Surface of C.G.I. sheets of ridge and hip sections and the roofing sheets which overlap eachother shall be painted with a coat of approved primer and two coats of approved paint suitable for painting G.S. Sheets before they are fixed in place.

Finish

The edges of the ridges and hips shall be straight from end to end and their surfaces should be plane and parallel to the general plane of the roof. The ridges and hips shall fit in squarely on the sheets.

Measurement

The measurements shall be taken for the finished work in length along the centre line of ridge or hip, as the case may be, correct to a em. The laps in ridges and hips and between ridges and hips shall not be measured.

The rate shall include the cost of all labour and materials specified above, including painting, costof seam bolts and any extra G.I. hook bolts, nuts and washers, required.

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

SECTION-15
DEMOLITION & DISMANTLING

15.0 GENERAL

This chapter relates to buildings only.

Precautions

All materials obtained from dismantling or demolition shall be the property of the Government unless otherwise specified and shall be kept in safe custody until they are handed over to the Engineer-in-Charge/ authorized representative.

The demolition shall always be well planned before hand and shall generally be done in reverse order of the one in which the structure was constructed. The operations shall be got approved from the Engineer-in-Charge before starting the work.

Due care shall be taken to maintain the safety measures prescribed in IS 4130-1991 (Reaffirmed 2017) and construction and demolition waste management rules 2016 shall be followed.

Necessary propping, shoring and or under pinning shall be provided to ensure the safety of the adjoining work or property before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining work or property. Wherever specified, temporary enclosures or partitions and necessary scaffolding with suitable double scaffolding and proper cloth covering shall also be provided, as directed by the Engineer-in-Charge. It shall be ensured that no dust is generated while demolishing. Demolition Rules- 2016 shall be followed.

Necessary steps shall be taken to keep noise and dust nuisance to the minimum. All work needs to be done under the direction of Engineer-in-Charge. Helmets, goggle, safety belts etc., should be used whenever required and as directed by the Engineer-in-Charge. The demolition work shall be proceeded with in such a way that it causes the least damage and nuisance to the adjoining building and the public. Barricading shall be provided as per NGT guidelines.

Dismantling shall be done in a systematic manner. All materials which are likely to be damaged by dropping from a height or by demolishing roofs, masonry etc. shall be carefully removed first. Chisels and cutters may be used carefully as directed. The dismantled articles shall be removed manually or otherwise ,lowered to the ground (and not thrown) and then properly stacked as directed by the Engineer-in-Charge.

Where existing fixing is done by nails, screws, bolts, rivets, etc., dismantling shall be done by taking out the fixing with proper tools and not by tearing or ripping off.

Any serviceable material, obtained during dismantling or demolition, shall be separated out and stacked properly as directed by the Engineer-in-Charge within any lead. All unserviceable materials, rubbish etc. shall be disposed off at authorized locations by urban local bodies as directed by the Engineer-in-Charge.

The contractor shall maintain/disconnect existing services ,whether temporary or permanent, whereverrequired by the Engineer-in-Charge.

No demolition work should be carried out at night especially when the building or structure to be demolished is in an inhabited area.

Appropriate screens shall be placed where necessary to prevent injuries due to falling pieces.

Water spray shall be used to reduce dust while tearing down plaster from brick work.

Safety belts shall be used by laborers while working at higher level to prevent falling from the structure. Wherever, possible mechanized working platform shall be used.

First-aid equipment shall be made available at all demolition works of any magnitude.

1.0 Dismantling tiled or stone floors laid in mortar including stacking of serviceable materials and disposal ofunserviceable materials with all lead and lift.

Workmanship :
The relevant specifications as above mention shall be followed.

Mode of measurement and payment :
The rate shall be for a unit of one square meter.

2.0 Demolition of brick work / stone masonry including stacking of serviceable materials and disposal ofunserviceable materials with all lead and lift (II) in cement mortar.

Workmanship :
The relevant specifications as above mention shall be followed.

Mode of measurements and payments :
The wall and independent piers of columns of brick or stone masonry shall be measured incubic meters. All copings, corbel, cornices and other projections shall be included with the wallmeasurements.
In measuring thickness plastered walls, the thickness of plaster shall be included.
The rate shall be for a unit of one cubic meter.

3.0 Dismantling C.I. pipes, G.S.W. pipes and A.C. rain water pipes with fitting and clamps including stacking the materials with all lead and lift for any dia. of pipe.

Workmanship :
The relevant specifications as above mention shall be followed

Mode of measurement and payment :
The rate shall be for unit of one running meter.

4.0 Dismantling manglore or country tile roofing or A.C. Sheet roofing boarding etc. including stacking of serviceable materials and disposal of unserviceable materials with all lead and lifts.

Workmanship:
The relevant specifications as above mention shall be followed

Mode of measurement and payment :
The supporting members shall be measured under separate items.
The rate shall be for a unit of one square meter.

5.0 Dismantling of existing plaster to the inner / external surfaces and preparing surface for plastering as directed by Engineer in charge for all heights with all scaffolding tools and plants.

Workmanship:
The relevant specifications as above mention shall be followed

Mode of measurement and payment :
The rate shall be for a unit of one square meter.

6.0 Dismantling doors, windows, ventilators etc. not exceeding 3 sq.m. in area (wood or steel) shutters including chowkhats, architraves holdfasts and other attachment etc. complete and stacking them within all lead and lift.

Workmanship :
The relevant specifications as above mention shall be followed
Dismantling of doors, windows, clerestory windows, ventilators etc. (wood or metal) whether done separately or along with removal of wall by making recess in the wall shall be enumerated. Those exceeding 3 sqm each in area shall be measured separately. The item shall include removal of chowkhats architraves, holdfasts and other attachments.

If only shutters are to be taken out it shall be measured separately.

Mode of measurement and payment :
The rate shall be for a unit of one number.

7.0 Dismantling sanitary fittings like wash basin, W.C. pan, India, Orissa pan or European type flushing tank etc. including stacking the materials with all lead and lift.

Workmanship :
The relevant specifications as above mention shall be followed

Mode of measurement and payment :
The rate shall be for a unit of one number.

SECTION-16
REFERENCES

REFERENCE To VARious IS CooEs

1	Water : -Chemical analysis	456-2000(Reaffirmed 2020)
2	Cement:	
	- Specification ordinary portland cement	269-20 15(Reaffirmed 2020)
	-Sampling	3535-1986(Reaffirmed 2018)
	-Chemical analysis	4032-1985(Reaffirmed 2019)
		4031-1996(Reaffirmed 2021)
3	Bricks	
	- Specification	1077-1992(Reaffirmed 2020)
	- Compressive strength, water absorption, efflorescence	3495-2019 (Part I, II, III)
	Sampling	5454-1978 (Reaffirmed 2020)
4	Aggregates	
	-Specification's to coarse & Fine aggregates	383-2016 2386-1963(Reaffirmed 2021) 6759-1972(Reaffirmed 2019)
	- Specification to aggregates for WBM	2386-1963 (Part I to VIII) (Reaffirmed 2021)
5	Masonry Mortar	
	-Specification	2116-1980(Reaffirmed 2017)
6	Concrete	456-2000(Reaffirmed 2021)
7	Steel	
	Specification for mild steel and high yield deformed Bar	1786-2008(Reaffirmed 2018)
	Ternate tests	1608-2018
	Bend Tests	1599-2019
	Re bend tests	1786-2008(Reaffirmed 2018)
8	Tiles	
	Shape and dimension water absorption Abrasion tests and specification For cement concrete flooring tiles	1237-2012(Reaffirmed 2017)
9	Structural steel, plates, sections, flats	2261-1975(Reaffirmed 2015)
10	Sand for masonry	2116-1980(Reaffirmed 2017)
	Sand for Plaster	1542-1992(Reaffirmed 2019)
11	Asbestoes Cement	1592-2003(Reaffirmed 2018)
	Pressure Pipe	9627-1980(Reaffirmed 2020)
12	A.C. Sheets code of practice for laying	
	Part I Corrugated	3007-I-1999(Reaffirmed 2019)
	Part II Semi Corrugated	3007-II-1999(Reaffirmed 2019)
13	Anti termite measures in building	
	Part I. Constructional measures	6313(1)-1981 (Reaffirmed 2020)

	Part II Pre constructional Chemical Treatment measures	6313(11)-2013(Reaffirmed 2018)
	Treatment for existing building	6313(111)-2013(Reaffirmed 2018)
14	Hot rolled sections for doors/ windows/vents	7452-1990(Reaffirmed 2017)
	Steel door frames	4351-2003(Reaffirmed 2013)
	Steel doors, windows, frames	1038-1983(Reaffirmed 2017)
15	Laying *in situ* cement concrete flooring Code of practice	2571-1970(Reaffirmed 2017)
16	Laying and finishing of cement concrete flooring tiles code of practice	1443-2018
17	Measurement of building and civil engineering works methods of	
	Earthwork	1200-I-1992(Reaffirmed 2017)
	Cement concrete works	1200-II-1974(Reaffirmed 2017)
	Brick works	1200-III-1976(Reaffirmed 2017)
	Formwork	1200-V-20 13(Reaffirmed 2018)
	Steel work and iron work	1200-VIII-1993(Reaffirmed 2017)
	Paring, floor finishers -Dado and skirting	1200-XI-2013(Reaffirmed 2018)
	Plastering and Pointing	1200-XII-1976(Reaffirmed 2017)
	White washing, color washing, Distempering and other finishes	1200 -XIII -1994(Reaffirmed 2017)
	Glazing	1200-XIV-1984(Reaffirmed 2018)
	Laying of water and sewer lines	1200-XVI-1979(Reaffirmed 2017)
	Demolition and dismantling	1200-XVIII-1974(Reaffirmed 2017)
18	Measurement for plinth carpet and rentable area of building method of	3861-2002(Reaffirmed 2017)
19	A.C. Building Pipes and pipe fitting, gutter and gutter fittings	
	Pipe & pipe fitting	1626-I-1994(Reaffirmed 2020)
	Gutter and gutter fitting	1626-I-1994(Reaffirmed 2020)
	For sewerage and drainage	1908-2020
	Asbestoses pressure pipe	1592-2003(Reaffirmed 2018)
	Concrete pipe method of tests	3597-1998(Reaffirmed 2018)
20	Salt glazed stone ware pipes and fittings	651-2007(Reaffirmed 20 17)
	unplasticized PVC pipes for potable water supply	4985-2021
21	Stacking and storage of construction materials at site recommended	4082-1996(Reaffirmed 2018)
22	Painting concrete, plaster masonry shapes code of practice	
	Operations and workman ship	2395(1)-1994(Reaffirmed 2019)
	Schedules	2395(11)-1994(Reaffirmed

		2019)
23	Painting of feurous method in building for	
	Pretreatment	1477-1-1971(Reaffirmed 2020)
	Painting	1477-11-1971 (Reaffirmed 2020)
24	Bending and fixing of bars for concrete reinforcement	2502-1963(Reaffirmed 2018) 1786-2008(Reaffirmed 2018\
25	Burnt Clay flat terrace tiles I machine made	2690-I-1993(Reaffirmed 2016)
26	Ceramic unglazed vitreous acid resisting tiles	4457-2007(Reaffirmed 2017)
27	Flooring tiles cement concrete	1237-2012(Reaffirmed 2017)
28	Glazed earth ware tiles	15622-2017
29	Roofing slate tiles	6250-1981 (Reaffirmed 2017)
30	Preparation and use of masonry mortars code of practice for	2250-1981 (Reaffirmed 2020)
31	Water proofing of roofs with bitumen felts code of practice for	1346-1991(Reaffirmed 2020)
32	Building drainage code	1346-1991(Reaffirmed 2020)
33	Design and construction of septic tanks code of practice for	
	Small installations	2470-I-1985(Reaffirmed 2017)
	Large installations	2470-II-1985(Reaffirmed 2017)
34	Laying of AC pressure pipes	6530-1972(Reaffirmed 2017)
	Concrete pipes	783-1985(Reaffirmed 2017)
	Stone ware pipes	4127-1983(Reaffirmed 2017)
30	Water supply in building code of practice	2065-1983(Reaffirmed 2017)
31	Rotational molded polyethylene water storage tanks specification	12701-1996(Reaffirmed 2017)
32	Sheet glass	2835-1987(Reaffirmed 2018)
	enamel paints	2933-(I)-2013(Reaffirmed 2018)
	marble chips	2114-2018
	wash basins	2556-IV-2004(Reaffirmed 2019) 771-1979(Reaffirmed 2017)
	Bibcock	781-1984(Reaffirmed 2020)
	Wheel Valves	778-1984(Reaffirmed 2020)
	G.I. Mild steel tubes	1239-2004(Reaffirmed 2014)
	White glazed tiles	15622-2017
	Orissa type water closet	771-1979(Reaffirmed 2017)

	EuropeanWE	2556-III-2004(Reaffirmed 2019)
	Plastic seats	2548-1996(Reaffirmed 2017)
	gully trap	651-2007(Reaffirmed 2017)
33	White portland cement	8042-2015(Reaffirmed 2020)
34	Concrete pipes with or without Reinforcement	458-2021

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