

**Name of Project: Construction of New Building for General Nursing  
Hostel at General Hospital Santrampur Ta. Santrampur, Dist.  
Mahisagar**

**M-1 Water:**

- 1.2 Water shall not be salty or brackish and shall be clean, reasonably clear and free objectionable quantities of silt and traces of oil and injurious alkalis, salts, organic matter and other deleterious material which will either weaken the mortar or concrete or cause efflorescence or attack the steel in R.C.C Container for transport, storage and handling of water shall be clean. Water shall conform to the standards specified in I.S.456-1978.
- 1.3 If required by the Engineer-in-charge it shall be tested by comparison with distilled water. Comparison shall be made by means of standard cement tests for soundness, time of setting and mortar strength as specified in I.S.269-1976. Any indication of unsoundness, change in time of setting by 30 minutes or more or decrease of more than 10 per cent in strength of mortar prepared with water sample when compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.
- 1.4 Water for curing mortar, concrete or masonry should not be too acidic or too alkaline. It shall be free of elements which significantly affect the hydration reaction or otherwise interfere with the hardening of concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces.
- 1.5 Hard and bitter water shall not be used for curing.
- 1.6 Portable water will be generally found suitable for curing mortar or concrete.

**M-2. Lime:**

- 2.1. Lime shall be hydraulic lime as per I.S. 712-1973. Necessary test shall be carried out as per I.S. 6932 (Parts I to X), 1973.
- 2.2. The following field tests for limes are to be carried out:
  - (1) A very rough idea can be formed about the type of lime by its visual examination i.e. fat lime bears pure white colour, lime in form of porous lumps of dirty white colour indicates quick lime, and solid lumps are the unburnt lime stone.
  - (2) Acid tests for determining the carbonate content in lime, Excessive amount of impurities and rough determination of class of lime.
- 2.3. Storage shall comply with I.S. 712-1973. The slaked lime, if stored, shall be kept in a weather proof and damp-proof shed with impervious floor and sides to protect it against rain, moisture, weather and extraneous materials mixing with it. All lime that has been damaged in any way shall be rejected and all rejected materials shall be removed from site of work.
- 2.4. Field testing shall be done according to I.S. 1624-1974 to show the acceptability of materials.

**M-3. Cement:**

- 3.1 Cement shall be ordinary Portland slag cement as per I.S. 269-1976 or Portland slag cement as per I.S. 455-1976.

**M-4. White Cement:**

4.1 The white cement shall conform to I.S. 80412-E 1978.

**M-5. Coloured Cement:**

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

5.2 The pigments used for coloured cement shall be of approved quality and shall not exceed 10% of cement used in the Mix. The mixture of pigment shall be properly grounded to have a uniform colour and shade. The pigments shall have such properties to provide for durability under exposure to sunlight and weather.

5.3 The pigment shall have the property such that it is neither by the cement nor detrimental to it.

**M-6. Sand:**

6.1. Sand shall be natural sand, clean, well graded, hard strong durable and gritty particle free from injurious amounts of dust clay, kankar nodules, soft or flaky particles shale, alkali, salts organic matter, loam, mica or another deleterious substance and shall be got approved from the Engineer-in-charge. The sand shall not contain more than 8 percent of silt as determined by field test. If necessary the sand shall be washed to make it clean.

6.2. Coarse Sand: The fineness modulus of coarse sand shall not be less than 2.5 and shall not exceed 3.0.

The sieve analysis of coarse shall be as under:

I.S. Sieve	Percentage by weight	I.S. Sieve	Percentage by weight
Designation	Passing Sieve	Designation	Passing Sieve
4.75 mm.	100	600 Micron	30-100
2.36 mm.	90 to 100	300 Micron	5-70
1.18 mm.	70-100	150 Micron	0-50

6.3 **Fine Sand:** The fineness modulus shall not exceed 1.0. The sieve analysis of fine sand shall be as under:

I.S. Sieve	Percentage by weight	I.S. Sieve	Percentage by weight
Designation	Passing Sieve	Designation	Passing Sieve
4.75 mm.	100	600 Micron	40-85
2.36 mm.	100	300 Micron	5-50
1.18 mm.	70-100	150 Micron	0-10

**M-7. Stone Dust:**

7.1. This shall be obtained from crushing hard black trap or equivalent. It shall not contain more than 8% of silt as determined by field test with measuring cylinder. The method of determining silt contents by field test is given as under:

7.2. A sample of stone dust to be tested shall be placed without drying in 200 mm. measuring cylinder. The quantity of the sample shall be such that it fills the cylinder up

to 100 mm. mark. The clean water shall be added up to 150 mm. mark. The mixture shall be stiffed vigorously and the content allowed to settle for 3 hours.

- 7.3. The height of silt visible as settled layer above the stone dust shall be expressed as percentage of the height of the stone dust below. The stone dust containing more than 8% silt shall be washed so as lowering the silt content within the allowable limit.

- 7.4. The fineness modulus of stone dust shall not be less than 1.80.

**M-8. Stone Grit:**

- 8.1. Grit shall consist of crushed or broken stone and be hard strong, dense, durable, clean, of proper gradation and free from skin or coating likely to prevent 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 I.S. 383-1970. Unless special stone of particular quarries is mentioned, grit shall be obtained from the best black trap or equivalent hard stone as approved by the Engineer-in-charge. The grit shall have no deleterious reaction with cement.

- 8.2. **The grit shall conform to the following gradation as per sieve analysis:**

I.S. Sieve	Percentage by weight	I.S. Sieve	Percentage by weight
Designation	through Sieve	Designation	through Sieve
12.50 mm.	100%	4.75 mm.	0-20%
10.00 mm.	85-100%	2.36 mm.	0-25%

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

- 8.4. The necessary tests for grit shall be carried out as per the requirements of I.S. 2386 (Parts I to VII) 1963, as per instructions of the Engineer-in-charge. The necessity of test will be decided by the Engineer-in-charge. The necessity of test will be decided by the Engineer-in-charge.

**M-9. Cinder:**

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

- 9.2 Cinder aggregates shall be well burnt furnace residue obtained from furnace using coal fuel only. It shall be sound clean free from clay, dirt ash or other deleterious matter.

- 9.3 **The average grading for cinder aggregates shall be as mentioned below:**

9.4

I.S. Sieve Designation	Percentage passing	I.S. Sieve Designation	Percentage passing
20 mm.	100	4.75 mm.	70
10 mm.	86	2.36 mm.	52

**M-10. Lime Mortar:**

- 10.1. Lime shall conform to specification M-2 Water shall conform to specification M-1.

**Sand:** Sand shall conform to specification M-6.

- 10.2. **Proportion of Mix:** 10.2.1. Mortar shall consist of such proportions of slaked lime and sand as may be specified in the item. The slaked lime and sand be measured by volume.

- 10.3. **Preparation of Mortar:**

- 10.3.1.** Lime mortar shall be prepared by wet process as per I.S. 1625-1971. Power driven mill shall be used for preparation of lime mortar. The slaked lime shall be placed in the mill in an even layer and ground for the 180 revolutions with a sufficient water. Water shall be added as required during grinding (care being taken not to add more water) that will bring the mixed material to a consistency of stiff paste. Thoroughly wetted sand shall then be added evenly and the mixture ground for another 180 revolutions.
- 10.4.** Storage: 10.4.1 Mortar shall always be kept damp, protected from sun and rain till used up, covering it by tarpaulin or open sheds.
- 10.5.** Use: 10.5.1 All mortar shall be used as soon as possible after grinding it should be used on the day on which it is prepared. But in no case mortar made earlier than 36 hours shall be permitted for use.

**M-11. Cement Mortar:**

- 11.1** Water shall conform to specification M -1. Cement: Cement shall conform to specification M- 3.  
**Sand:** Sand shall conform to M-6
- 11.2** Preparation of Mix:11.2.1 Cement and shall be mixed to specified proportion, sand being measured by measuring boxes. The proportion of cement will be by volume on the basis of 50 kg / Bag of cement being equal to 0.0342 Cu.m. The mortar may be hand mixed or machine mixed as directed.
- 11.3** Preparation of mortar: 11.3.1 In hand mixed mortar cement and sand in the specified proportions shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3 times or more till a homogenous mixture of uniform colour is obtained., Mixing platform shall be so arranged that no deleterious extraneous material shall get mixed with mortar or mortar shall be gradually added and thoroughly mixed to form a stiff plastic mass of uniform colour so that each particle of sand shall be completely covered with a film of wet cement. The water cement ratio shall be adopted as directed.
- 11.3.1** The mortar so prepared shall be used within 30 minutes of adding water Only such quantity of mortar shall be prepared as can be used within 30 minutes.

**M-12 Stone Coarse Aggregate for nominal Mix Concrete:**

- 12.1** Coarse aggregate shall be machine crushed stone of black trap or equivalent and be hard, strong, dense, durable, clean and free from skin and coating likely to prevent proper adhesion for mortar.
- 12.2** The aggregate shall generally be cubical in shape. Unless special stones of particular quarries are mentioned aggregates shall be machine crushed from the best black trap or equivalent hard stone as approved. Aggregate shall have no deleterious reaction with cement. The size of the coarse aggregate for plain cement concrete and ordinary reinforced cement concrete shall generally be as per the table given below. However, in case of reinforced cement concrete the maximum limit may be restricted to 6 mm. less than the minimum lateral clear distance between bars or 6 mm. less than the cover, whichever is smaller.

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I.S. sieve	percentage passing for single sized aggregates of nominal size			I.S. Sieve Designation sized	Percentage passing for single aggregates of Nominal size		
80 mm.	--	--	--	12.5 mm.	--	--	--
63 mm.	100	--	--	10 mm.	0.5	0.02	0.30
40 mm.	85-100	100	--	4.75 mm	--	0.5	0.5
20 mm.	0-20	85-100	100 mm.	2.35	--	--	--
15 mm.	--	--	85-100				

**NOTE:** This percentage may be carried somewhat by Engineer-in-charge when considered necessary for obtaining better density and strength of concrete.

- 12.3.** The grading test shall be taken in the beginning and at the change of source of materials. The necessary test indicated in I.S. 383-1970 and I.S. 456-1978 shall have to be carried out to ensure the acceptability. The aggregates shall be stored separately and handled in such a manner as to prevent the intermixing of different aggregates. If the aggregates are covered with dust, they shall be washed with water to make them clean.

**M-13. Black Trap or Equivalent Hard Stone Coarse:**

- 13.1** Aggregate For Design Mix Concrete: Coarse aggregate shall be of machine crushed stone of black trap or equivalent hard stone and be hard strong dense, durable clean and free skin and coating likely to prevent proper adhesion of mortar.
- 13.2** The aggregates shall generally be cubical in shape. Unless special stones of particular quarries are mentioned, aggregates shall be machine crushed from the best, black trap or equivalent hard stones as approved. Aggregate shall have no deleterious reaction with cement.
- 13.3** The necessary tests indicated in I.S. 383-1970 and I.S. 456-1978 shall have to be carried out to ensure the acceptability of the material.
- 13.4** If aggregate is covered with dust, it shall be washed with water to make it clean.

**M-14. Brick Bats Aggregate:**

- 14.1** Brick bat aggregate shall be broken from well burnt or slightly over burnt and dies brick. It shall be homogeneous in texture roughly cubical shape, clean and free from dirt of any other foreign material. The brick bats shall be of 40 mm. to 50 mm. size unless otherwise specified in the item. The unburnt or over burnt brick bats shall not be allowed.
- 14.2** The brick bats shall be measured by volume by suitable boxes or as directed.

**M-15 Bricks:**

- 15.1** The bricks shall be hand or machine moulded and made from suitable soils and kiln-burnt. They shall be free from crack and nodules of free lime. They shall have smooth rectangular faces with sharp corners and shall be of uniform colour. The bricks shall be moulded with a frog of 100 mm. X 40 mm. and 10 mm. to 20 mm. deep on one of its flat sides. The bricks shall not break when thrown on the ground from a height of 600 mm.

- 15.2** The size of modular bricks shall be 190 mm. X 90 mm. X 90 mm.
- 15.3** The size of the conventional bricks shall be as under: ( $9 \times 4\frac{3}{8} \times 2\frac{3}{4}$ ) 225 x 110 x 75 mm.
- 15.4** Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the conventional size adopted in a particular work. Length: 1.8 (3.0 mm.) Width: 1/6" (1.51 mm.) Height: 1/6" 1.50 mm.)
- 15.5** The crushing strength of the bricks shall not be less than 35 Kg/Sq.Cm. The average water absorption shall not be more than 20 percent by weight. Necessary tests for crushing strength and water absorption etc. shall be carried out as per I.S. 3493 (Part-I to IV) 1976.

**M-16 Stone:**

- 16.1** The stone shall be of the specified variety such as Granite/Trap Stone. Quartzite or any other type of good hard stones. The stones shall be obtained only from the approved quarry and shall be hard, sound, durable and free from defects like cavities, cracks, sand holes, flaws, injurious veins, patches of loose or soft materials etc. and weathered portions and other structural defects or imperfections tending to affect their soundness and strength. The stone with round surface shall not be used. The percentage of water absorption shall not be more than 5% of dry weight, when tested in accordance with I.S. 1134-1974. The minimum crushing strength of the stone shall be 200 kg/Sq. Cm. unless otherwise specified.
- 16.2** The samples of the stone to be used shall be got approved before the work is started.
- 16.3** The Khanki facing stone shall be dressed by chisel as specified in the item for khanki facing in required shape and size. The face of stone shall be so dressed that the bushing on the exposed face shall not project by more than 40 mm. from the general wall surface and on face to be plastered it shall not project by more than 19 mm. nor shall it have depressions more than 10 mm. from the average wall surface.

**M-17. Laterite Stone:**

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

**M-18. Mild Steel Bars:**

- 18.1** Mild steel bars reinforcement for R.C.C work shall conform to I.S. 432(Part-II) 1966 and shall be tested quality. It shall also comply with relevant part of I.S. 456-1978.
- 18.2** All the reinforcement shall be clean and free from dirt, paint, grease, mill scale or loose or thick rust at the time of placing.

**18.3** For the purpose of payment, the bar shall be measured correct up to 100 mm. length and weight payable worked out at the rate specified below:

1. 6mm. x 0.22 Kg/Rmt	8. 20mm x 2.47 Kg/Rmt
2. 8mm. x 0.39 Kg/Rmt	9. 22mm x 2.98 Kg/Rmt
3. 10mm x 0.62 Kg/Rmt	10. 25mm x 3.85 Kg/Rmt
4. 12mm x 0.89 Kg/Rmt	11. 28mm x 4.83 Kg/Rmt
5. 14mm x 1.21 Kg/Rmt	12. 32mm x 6.31 Kg/Rmt
6. 16mm x 1.58 Kg/Rmt	13. 36mm x 7.99 Kg/Rmt
7. 18mm x 3.00 Kg/Rmt	14. 40mm x 9.86 Kg/Rmt

**M-19. High yield Strength Steel Deformed Bars:**

**19.1** High yield strength steel deformed bars are either cold twisted or hot rolled, shall conform to I.S. 1739-1966 and I.S.1139-1966 respectively.

**19.2** Other provision and requirements shall conform to specification NO. M-18 for Mild steel bars.

**M-20. High Tensile Steel Wire:**

**20.1** The high tensile wires for the use in prestressed concrete work shall conform to I.S. 2090-1962.

**20.2** The tensile strength of the high tensile steel bars shall be as specified in the item. In absence of the given strength, the minimum strength shall be taken as per para 6.1 of I.S. 1785-1962. Testing shall be done as per I.S. requirements.

**20.3** The high tensile steel shall be free from loose mill scale, rust oil, grease, or any other harmful matter, Cleaning of steel bars may be carried out by immersion in solvent solution, wire brushing or passing through a pressure box containing carborundum.

**20.4** The high tensile wire shall be obtained from manufactures in coil having diameter not less than 350 times the diameter of wire itself so that wire springs back straight back straight on being uncoiled.

**M-21. Mild Steel Binding Wire:**

**21.1.** The mild steel wire shall be of 1.63 mm or 1.22 mm. (16 or 18 gauge) diameter and shall conform to I.S. 280-197.

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

**M-22. Structural Steel:**

**22.1.** All structural steel shall conform to I.S. 226-1965. The steel shall be free from the defects mentioned in I.S. 226-1975 and shall have a smooth finish. The material shall have a smooth finish. The material shall be free from loose mill scale, rust pits or other defects affecting the strength and durability. Rivet bars shall conform to I.S. 1148-1973.

**22.2.** When the steel is supplied by the Contractor test certificates of the manufactures shall be obtained according to I.S. 226-1975 and other relevant Indian Standards.

**M-23. Galvanised Iron Sheets:**

**23.1** The galvanised iron sheets shall be plain or corrugated sheets of specified in item. The G.I. sheets shall conform to I.S. 217-1977. The sheets shall be undamaged in carriage

and handling either by rubbing off of zinc coating or otherwise they shall have clean and bright surface and shall be as directed as per site condition.

**23.2** The length and width of G.I. sheet shall be as directed as per site condition.

**M-23(A) G.I Valleys gutter ridges:**

**23.A.1.** The G.I. ridges and hips shall be of plain galvanised sheets class-3 of the thickness as specified in item. These shall be 600 mm. in width and properly bent up to shape without damage to the sheets in process of bending.

**23.A.2.** Valleys gutters and flashings shall also be galvanised sheet of thickness as specified in item. Valleys shall be 900 mm. Wide overall and flashing shall be 380 mm. wide overall. They shall be bent to the required shape without damage to the sheet in the process of bending.

**M-24. Asbestos Cement Sheets:**

**24.1.** Asbestos cement sheets plain, corrugated or semi corrugated shall conform to I.S. 459-1970.

**24.2. Ridges & Hips:**

**24.2.1** Ridges and hips shall be same thickness at that of A.C. sheets. The types of ridges suitable for the type of sheets and locations.

**24.2.2** Other accessories to be used in roof such as flashing pieces, caves filler pieces valley gutters, north light and ventilator curves, barge boards etc. shall be standard manufacture and shall be suitable for the type of sheets and location.

**M-25. Mangalore Pattern Roof Tiles:**

**1.1** The Mangalore pattern tiles shall conform to I.S. 654-1972 for Class AA or Class "A" type as specified in item. Samples of the tiles to be provided shall be got approved from the Engineer-in-charge. Necessary tests shall be carried out as directed.

**M-26. Shuttering:**

**26.1.** The shuttering shall be either of widen planking of 30 mm. minimum thickness with or without steel lining roof steel plates stiffened by steel angles. The shuttering shall be supported on battens and beams and props of vertical ballies properly cross braced together so as to make the centring rigid. In places of bully props, brick pillar of adequate section built in mud mortar may be used.

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

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

**26.4.** The props shall consist of bullies having 100 mm. minimum diameter measured at mix length and 80 mm, at thin end and shall be placed as per design requirement. These



shall rest squarely on wooden sole plates 40 mm. thick and minimum bearing area if 0-10 sq. m. laid on sufficiently hard base.

- 26.5. Double wedges shall further be provided between the sole plate and the wooden props so as to facilitate tightening and easing of shuttering without jerking the concrete.
- 26.6. The timber used in shuttering shall not be so dry as to absorb water from concrete and swell or bulge nor so green or wet as to shrink after erection. The timber shall be properly sawn and planed on the sides and surface coming in contact with concrete. Wooden formwork with metal sheet lining or steel plates stiffened by steel angles shall be permitted.
- 26.7. As far as practicable, clamps shall be used to hold the forms together and use of nails and spikes avoided.
- 26.8. The surface of timber shuttering that would come in contact with concrete shall be well wetted and coated with soap solutions before the concreting is done. Alternatively coat of raw linseed oil or oil of approved manufacturer may be applied in place of soap solution. In case of steel shuttering either soap solution or raw linseed oil shall be applied after thoroughly cleaning the surface. Under no circumstances black or burnt oil shall be permitted.
- 26.9. The shuttering for beams and slabs shall have camber of 4 mm. per meter (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 1/50 of the projected length or as directed by the Engineer-in-charge.

**M-27. Expansion joints-Premoulded filter:**

- 27.1 The item provides for expansion joints in R.C.C frame structures for internal joints, as well as exposed joints, with the use of premoulded bituminous joint filler.
- 27.2 Premoulded bituminous joint filler, i.e. performed strip of expansion joint filler shall not get deformed or broken by twisting, bending or other handling when exposed to atmospheric condition. Pieces of joint filler that has been damaged shall be rejected.
- 27.3 Thickness of the pre-moulded joint filler shall otherwise specified.
- 27.4 Premoulded bituminous joint filler shall conform to I.S. 1838-1961.

**M-28 Expansion joints-Copper strips & hold fasts:**

- 28.1 The item provided for expansion joints in R.C.C frame structure for internal joints as well as for exposed joints with the use of necessary copper strip and hold fasts.
- 28.2 Copper sheet shall be of 1.25 mm. thick and of 1.25 mm. width when the 'U' shape in middle. Copper strips shall have hold fast of 3 mm. diameter copper rod fixed to the plate soldered on strip at intervals of about 30 cm. or as shown in the drawing or as directed. The width of each flange (horizontal side) of the copper plate to be embedded in the concrete work shall be 25 mm. Depth of 'U' to be provide in the expansion joint, in the copper plate shall be of 25 mm.

**M-29. Teak wood:**

- 29.1 The teak wood shall be of good quality as required for the item to be executed. When the kind of wood is not specifically mentioned, good Indian teak wood as approved shall be used.
- 29.2 Teak wood shall generally be free from large, loose, dead or cluster knots, flaws, shakes, warps, twists bends or any other defects. It shall generally be uniform in substance and

of straight fibres 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 of its usefulness for the purpose for which it is required. The colour shall be uniform as far as possible. Any effort like painting, using any adhesive or resins materials made to hide the defects shall render the pieces liable to rejection by the Engineer-in-charge.

- 29.3** All scantlings, planks etc. shall be sawn in straight lines and planes in the direction of grains and of uniform thickness.
- 29.4** The tolerances in the dimensions shall be allowed at the rate of 1.5 mm per face to be planed.
- 29.5 First class teak wood: 29.5.1.** First class teak wood shall have no individual hard and sound knots, more than 6 sq. cm. size and the aggregate area of such knots shall not be more than 1% of area of piece. The timber shall be closed grained.
- 29.6 Second Class Teak Wood:29.6.1.** No individual hard and sound knots shall be more than 15 Sq. CM. in size and aggregate area of such knots shall not-exceed 2% of the area of piece.

**M-29. (A) Non-teak wood:**

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

For this purpose, wood of Bio, Kalali, Siras, Behda, Jamun, Sisoo will be used for door frames whereas only Kalali, Siras, Halda, Kalam etc. will be permitted for shutters after proper seasoning and chemical treatment.

The non-teak wood shall be free from large, loose, dead or cluster knots, flows, shakes warps bends or any other defect. It shall be uniform in substance and of straight fibre far as possible. It shall be free from rot, decay harmful fungi and other defects of nature which effect the strength, durability or its usefulness for the purpose for which it is required. The colour of wood shall be uniform as far as possible. The scantlings planks etc. shall be sawn in straight lines and planes in the direction of grain and uniform thickness.

The department will use the Agency to produce certificate from forest Department in event of Disputes and the decision of the Department shall be final and binding to the contractor.

The tolerance in the dimension shall be allowed as 1.5 mm. per face to be planed.

**M-30. Wooden flush door shutters (solid core):**

- 30.1** The solid core type flush door shutters shall be decorative or non-decorative type as specified in the drawing. The size and thickness of the shutter shall be as specified in drawings or as directed. The timber species for core shall be used as per I.S. 2202- (Part-I) 1980. The timber shall be free from decay and insect attack. Knots and knot holes less than half the width of cross-section of the members in which they occur may be permitted. Pitch pockets, Pitch streaks and harmless pin holes shall be permissible except in the exposed edges of the core members. The commercial plywood, cross-bands shall conform to I.S. 303-1275.
- 30.2** The face panel of the shutters shall be formed by gluing by the hot press process on both faces of the core with either plywood or cross-bands and face veneers. The

hopping rebating opening of glazing, Venetian etc. shall be provided if specified in the drawing.

**30.3** All edges of the door shutters shall be square. The shutters shall be free twist or warp in its plane. Both faces of the shutters shall be sand papered to smooth even texture.

**30.4** The shutters shall be tested for

**(1) End immersion test:** The test shall be carried out as per I.S. 2202 (part-I) 1980. There shall be no delamination at the end of the test.

**(2) Knife test:** The face panel when tested in accordance with I.S. 1659-1979 shall pass the test.

**(3) Glue adhesion Test:** The flush door shall be tested for glue adhesive test in accordance with I.S. 2202 (Part-I) 1980. The shutters shall be considered to have passed the test if no delamination occurs in the glue lines in the plywood and if no single delamination more than 80 mm. in length and more than 3 mm. in depth has occurred in the assembly glue lines between the plywood face and the style and rail. Delamination at the corner shall be measured continuously around the corner. Delamination at the knots, knots holes and other permissible wood defects shall not be considered in assessing the sample.

**30.5** The tolerance in size of solid core type flush door shall be as under:  
In Normal thickness + 1.2 mm. In Normal height + 3 mm.

**30.6** The thick of the shutters shall be uniform throughout with a permissible variation of not more than 0.8 mm. when measured at any two points.

**M-31. Aluminium doors, Windows, Ventilators.**

**31.1** Aluminium alloy used in the manufacture of extruded window sections shall conform to I.S. designation HEA-WP of I.S.:733-1975 and also to I.S. Designation WVG-WP of I.S. 1285-1975. The Section shall be as specified in the drawing and design. The fabrication shall be done as directed.

**31.2** The hinges shall be cast or extruded aluminium hinges of same type as in windows but of large size.

**31.3** The hinges shall normal be of 50 mm. projecting type. Non-projecting type of hinges may also be used if directed. The handles of door shall be of specified in the drawing and design. The fabrication shall be done as directed.

**M-32. Rolling Shutters:**

**32.1** The rolling shutter shall conform to I.S. 6248-1979. Rolling shutters shall be supplied of specified type with accessories. The size of the rolling shutters shall be specified in the drawings. The shutters shall be constructed with interlocking lath sections formed from cold rolled steel strips not less than 0.9 mm. thick and 80 mm. wide for shutters up to 3.5 mm., width not less than 1.25 mm. thick and 80 mm. wide for shutters 3.5 mm in width and above unless otherwise specified.

**32.2** Guide channels shall be of mild steel deep channel section and of rolled pressed or built up (fabricated) jointures construction. The thickness of sheet used shall not be less than 3.15 mm.

**32.3** Hood covers shall be made of M.S. Sheets not less than 0.92 mm. thickness for shutters having width 3.5 Meter and above the thickness of M.S. Sheet for the hood cover shall be not less than 1.25 mm.

- 32.4** The spring shall be of best quality and shall be manufactured from tested high tensile spring steel wire or strip of adequate strength to balance the shutters in all position. The spring pipe shaft etc. shall be supported on strong M.S. or malleable C.I. brackets. The brackets shall be fixed on or under the lintel as specified with raw plugs and screws bolts etc.
- 32.5** The rolling shutters shall be of self-rolling type up to 8 Sq.m. clear area without ball bearing and p to 12 Sq.m. clear area with ball bearing. If the rolling shutters are larger, then gear operated type shutters shall be used.
- 32.6** The locking arrangement shall be provided at the bottom of shutter at both ends. The shutters shall be opened from outside.
- 32.7** The shutters shall be completed with door suspension shafts, locking arrangements pulling hooks, handles and other accessories.

**M-33. Collapsible Steel Gate:**

- 33.1** The collapsible steel gate shall be in one or two leaves and size as per approved drawings or as specified. The gate, shall be fabricated from best- quality mild steel channels, flats etc. Either steel pulleys or ball bearing shall be provided in every double channel. Unless otherwise specified the particulars of collapsible gate shall be as under:
- (a) Pickets: These shall be of 20 mm. M.S., channels of heavy sections unless otherwise shown on drawings. The distance centre to centre of pickets shall be 12 CM. with an opening of 10 CM.
  - (b) Pivoted M.S. flats shall be 20 mm x 6 mm.
  - (c) Top and bottom guides shall be from tee or flat iron of approved size.
  - (d) The fittings like stoppers, fixing hold fasts, locking cleats, brass handles and cast-iron rollers shall be of approved design and size.

**M-34. Welded Steel Wire Fabric:**

- 34.1.** Welded steel wire fabric for general purpose shall be manufactures from cold drawn steel wire "as drawn" or galvanised steel conforming to I.S. 226-1975 with longitudinal and transverse wire securw4ely connected at every intersection by a process of electrical resistance welding and conforming to I.S. 4948-1974. It shall be fabricated and finished in workmanlike manner and shall be free from injurious defects and shall be rust proof. The type of mesh shall be oblong or square as directed. The mesh sizes and size of wire for square as well as oblong welded steel wire fabric shall be as directed. The steel wire fabric in panels shall be in one whole piece in each panel as far as stock size permit.

**M-35. Expanded Metal Sheets:**

- 35.1.** The expanded metal sheets shall be free from flaws, joints, broken strands, laminations and other harmful surface Expanded metal steel sheet shall conform to I.S. 412-1975, Except that blank sheets need not be with guaranteed mechanical properties. The size of the diamond mesh of expended metal and dimensions of strands (width and thickness) shall be as specified. The tolerance in nominal weight of expended metal sheets shall be of + 10 percent.
- 35.2.** Expanded metal in panels shall be in one whole piece panel each as far as stock size permit. The expanded metal sheets shall be coated with suitable protective coating to prevent corrosion.

**M-36. Mild Steel Wire (Wire):**

**36.1** Mild steel wire may be galvanised, as indicated All finished steel wire shall be well cleanly drawn to the dimensions and size of wire as specified in item. The wire shall be sound, free from splits, surface flaws, rough jagged and imperfect edges and other harmful surface defects and shall conform to I.S. 280-1978.

**M-37. Plywood:**

**37.1** The plywood for general purpose shall conform I.S. 303-1975. Plywood is made by cementing together thin boards or sheets of wood into panels. There are always an odd number of layers 3,5,7,9 ply etc. The plies are placed so that grain of each layer is right angle to the grain in the adjacent layer.

**37.2** The Chief advantages of plywood over a signal board of the same thickness are the more uniform strength of the plywood, along the length and width of the plywood and grater resistance to cracking and splitting with change in moisture content.

**37.3** Usually, synthetic resins are used for gluing, pherolic resins are usually cured in a hot press which compresses and simultaneously heats the plies between hot plates which maintain a temperature of 90 degrees C. to 140 degrees C. and a pressure of 11 to 14 kg/sq.cm. on the wood. The time of heating may be anything from 2 to 69 minutes depending upon thickness.

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

**37.5** According to I.S. 303-1975 the plywood for general purpose shall be of three grades **BWR**, **WWR** and **CWR**, depending upon the adhesives used for bonding and veneers, and it will be further classified into six types namely AA,AB,AC,BB,BC and CC based on the quality of the two faces, each face being of three kinds namely, A,B and C, After pressing, the finished plywood should be reconditioned to a moisture content not less than 8 percent and not more than 16 percent.

**37.6** Thickness of plywood Boards:

**TABLE**

Board	Thickness	Board	Thickness	Board	Thickness	Board	Thickness
3 ply	3 mm.	5 ply	5 mm.	7 ply.	9 mm.	9 ply.	16 mm.
	4 mm.		6 mm.		13 mm.		19 mm.
	5 mm.		8 mm.		16 mm.	11 ply.	19 mm.
	6 mm.		9 mm.	9 ply.	13 mm.		22 mm.
							25 mm.

**M-38. Glass:**

**38.1** All glass shall be of the best quality free from specks, bubbles, smokes, veins, air holes blisters and other defects. The king of glass to be used shall be mentioned in the item or specification or in the special provisions or as shown in detailed drawings. Thickness of glass panes shall be uniform. The specifications or different kinds of glass shall be as under.

**38.2 Sheet Glass:**

**38.2.1** In absence of any specified thickness or weight in the item or detailed specifications of the item of work, sheet glass shall be weighing 7.5 Kg/Sq.m. for panes up to 600 mm x 600 mm.

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

**38.2.3** Sheet glass shall be patent flattened glass of best quality and for glazing and framing purposes shall conform to I.S.: 1761-1960. Sheet glass of the specified colours shall be used, if so shown on detailed drawings or so specified. For important buildings and for panes with any dimension over 900 mm. plate glass of specified thickness shall be used.

**38.3. Plate Glass. 38.3.1.** When plate glass is specified, it shall be 'Polished patent plate glass' of best quality. It shall have both the surface ground flat and parallel and polished to obtain clear undisturbed vision and reflection. The plate glass shall be of the thickness mentioned in the item or as shown in the detailed drawing or as specified. In absence of any specified thickness and type of glass shall be as per details on drawings or as specified or as directed.

**38.4 Obscured Glass: 38.4.1.** This type of glass transmits light so that vision is Partially or almost completely obscured. Glass shall be plain rolled, figured, ribbed or fluted or frosted glass as may be specified as required. The thickness and type of glass shall be as per details on drawings or as specified or as directed.

**38.5. Wired Glass: 38.5.1** Glass shall be with wire netting embedded in a sheet of plate glass electrically welded 13 mm. Georgian square mesh may be used. Thickness of glass shall not be less than 6 mm. Wired glass shall be of type and thickness as specified.

**M-39. Acrylic Sheets:**

**39.1.** Acrylic sheet be of thickness as specified in the item and of a specified shape and size as the case may be. Panels may be flat or curved. It should be light in weight. It shall be colourless or coloured or opaque as specified in the item. Colourless sheet shall be as transparent as the finest optical glass. Its light transmission rate shall be about 95%. Transparency shall not be affected for the sheets of larger thickness. It shall be extremely resistant to sunlight, weather and low temperatures. It shall not show any significant yellowing or change in physical properties or loss of light transmission over a longer period of use. The sheet shall be impact resistant also. Sheets should be available in complete range of standard transparent, translucent and opaque colours. Sheets shall be of such quality that they can be cut bent and jointed as desired. Solution for the joints shall be used as per the requirement of manufacturer.

**M-40. Particle board:**

**40.1.** The particle boards used for face panels shall be of best quality free from any defects. The particle boards shall be made with phenolmaldehyde adhesive. The particle boards shall conform to I.S. 3087-1965. "Specification for wood particle board for general purpose". The size and the thickness shall be as indicated.

**M-41. Expanded polystyrene of framed stopper slabs:**

**41.1** The expanded polystyrene ceiling boards and tiles shall be approved make and shall be of size, thickness, finish and colour as indicated. It shall be of high density and suitable

for use as insulating material. The insulating material shall be like slab of Thermocol etc.

**M-42. Resin bonded fibre glass:**

- 42.1** The resin bonded fibre glass tiles, or rolls shall be of approved make and shall be of sizes, thickness and finish as indicated.
- 42.2.** For test of Minerrak wool thermal insulation Blanket I.S.: 3144?1965 shall be followed.
- 42.3.** Insulation wool blanket shall be with following coverings on one or both sides as indicated.
  - (1) Bituminous adhesion Kraft paper for keeping out dust.
  - (2) Hessian cloth or Kraft paper for keeping out dust.
  - (3) G.I. wire netting, suitable for surface to be plastered over.

**M-43. Fixtures and fastenings:**

**43.1. General**

- 43.1.1** The fixtures and fastenings, that is, butt, hinges, tee and strap hinges sliding door bolts, tower bolts, door latch, bath room latch, handles, door stoppers, casement window fasteners, casement stays and ventilators catch shall be made of the metal as specified in the item or its specifications.
- 43.1.2** They shall be of iron, bras, aluminium, chromium plated iron chromium plated brass, copper oxidised iron, copper oxidised brass or anodized aluminium as specified.
- 43.1.3** The fixtures shall be heavy, Medium or light type. The fixtures and fastenings shall be smooth finished and shall be such as will ensure ease of operation.
- 43.1.4** The samples of fixtures and fastenings shall be got approved as regards quality and shape before providing them in position.
- 43.1.5** Brass and anodised aluminium fixtures and fastenings shall be bright finished.

**43.2. Holdfasts:**

- 43.2.1.** Holdfasts shall be made from mild steel flat 30 cm. length and one of the holdfasts shall be bent at right angle and two nos. of 6 mm. diameter holes shall be made in it for fixing it to the frame with screws. At the other end. The holdfast shall be forked and bent at right angles in opposite directions.

**43.3. Butt hinges:**

- 43.3.1.** Railway standard heavy type butt hinges shall be used when so specified.
- 43.3.2.** The strap hinges shall be manufactured from M. S. Sheet.

- 43.4 Siding door bold (Aldrops):** 43 The Aldrops as specified in the item shall be used and shall be got be got approved.

- 43.5 Tower bolts (Barrel Type):**43.5.1: Tower bolts as specified in the item shall be used as shall be used and shall be got approved.

- 43.6 Door Latch:**43.7.1The size of door latch shall be taken as the length of latch.

- 43.7 Bathroom Latch:**43.5.1 Bathroom latch shall be similar to tower bolt.

- 43.8 Handle:** The size of the handles shall be determined by the inside grip length of the handles. Handles shall have a base plate of length 50 mm more than size of the handle.

- 43.9 Door Stopper:** 43.9.1 door stoppers shall be either floor door stopper type or door catch type floor stopper shall be of overall size as specified as shall have rubber cushion.

- 43.10 Door Catch:**43.10.1 Door catch shall be fixed as height of about 900 mm from the floor level so that one part of the catch is fitted on the inside of the shutter and the other part

is fixed in the wall with necessary wooden plug arrangements for appropriate fixate. The catch shall be fixed 20 mimesed the face of the door for easy operation of catch.

**43.11 Wooden Door stop with highs:**

wooden door stop of size 100mm X 60 mm X 40 mm shall be fixed on the door frame with a high of 75 mm size at high of 900 mm from the floor level the wooden door stop shall be provided with 3 coats of approve oil paint.

**43.12 Case meant window fastener:** Casement window fastener for single leaf window shutter shall be left or right handled as directed.

**43.13 Casement stays (straight peg stay):**

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

**43.14 Ventilator catch:**

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

**43.15 Pivot:**

The base and socket plate shall be made from minimum 3 mm thick plate and projected pivot shall not be less than 12 mm length and shall be firmly riveted to the base plate in case of brass pivot.

**M-44. Paints:**

**44.1 (A) Oil Paints:**

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

**44.1.2.** All the paints shall meet following general requirements:

- (i) Paint shall not show excessive setting in a freshly opened full can and shall easily be redispersed with a paddle to a smooth homogeneous state. The paint shall show no curing, livering, caking or colour separation and shall be free from lumps and skins.
- (ii) The paint as received shall brush easily, possess good levelling properties and show no running or sagging tendencies.
- (iii) The paint shall not skin within 48 hours in a three quarters filled closed container.
- (iv) The paint shall dry to a smooth uniform finish free from roughness, grit, unevenness and other imperfections.

**44.1.3.** Ready mixed paint shall be used exactly as received from the manufactures and generally according to their instructions and without any admixtures whatsoever.

**44.2. (B) Enamel Paints:**

The enamel paint shall satisfy in general requirements as mentioned in specification of oil paints. Enamel paint shall conform to I.S. 2933-1975.

**M-45 French polish:**

**45.1.** The french polish of requirement and shape shall be prepared with the below mentioned ingredients and other necessary materials:

(I) Denatured sprit of approved quality (ii) Chandras (iii) Shellac (iv) Pigment.

**45.2.** The French polish so prepared shall conform to I.S.: 348-1968.



**M-46 Marble chips for marble mosaic terrazzo:**

- 46.1.** The marble chips shall be of approved quality and shades. It shall be hard, sound, dense and homogenous in texture with crystalline and coarse grains. It shall be uniform in colour and free from stains, cracks decay and weathering.
- 46.2.** The size of various colours of marble chips of approved quality and colours only as per grading as decided by the Engineer-in-charge shall be used for marble mosaic tiles or works.
- 46.3.** The marble chips shall be machine crushed. They shall be free from foreign matter, dust etc. Except as above, the chips shall conform to I.S.: 2114-1962.

**M-47. Flooring Tiles:**

**47.1. (A) Plain Cement tiles:**

- 47.1.1.** The plain cement tiles shall be general purpose type. These are the tiles in the manufacturer of which no pigments are used Cement used in the manufacturer of tiles shall be as per Indian Standards.
- 47.1.2.** The tiles shall be manufactured from a mixture of cement and natural aggregates by pressure process. During manufacture, the tiles shall be subjected to a pressure of not less than 140 Kg/Sq. Cm. The proportion of cement to aggregate in the backing of the tiles shall be not less than 1:3 by weight. The wearing face through the tiles are of plain cement, shall be provided with stone chips of 1 to 2 mm. Size. The proportions of cement to the marble chips aggregate in the wearing layer of the tiles shall be three parts of cement to one part chips by weight. The minimum thickness of wearing layer shall be 3 mm. The colour and texture of wearing layer shall be uniform throughout its face and thickness. On removal from mould, the tiles shall be kept in moist conditions continuously at least for seven days and subsequently, if necessary, for such long period as would ensure their conformity to requirements of I.S.: 1237-1980 regarding strength resistance to wear and water absorption.
- 47.1.3.** The wearing face of the tiles shall be plain, free from projections, depressions and cracks and shall be reasonably parallel to the back face of the tile. All angles shall be right and all edges shall be sharp and true.
- 47.1.4.** The size of tiles shall generally be square shape 24.85 Cm. x 24.85 Cm. or 25 Cm. x 25 Cm. The thickness of tiles shall be 20 mm.
- 47.1.5.** Tolerance of length and breadth shall be plus or minus one millimetre, Tolerance or thickness shall be plus 5 mm.
- 47.1.6.** The tiles shall satisfy the tests as regards transverse strength, resistance to wear and water absorption as per I.S.:1237-1980.

**47.2. (B) Plain Coloured Tiles:**

- 47.2.1.** These tiles shall have the same specification as per plain cement tiles as per (A) above except that they shall have a plain wearing surface where in pigments are used. They shall conform to I.S. 1237-1980.
- 47.2.2.** The pigment used for colouring cement shall not exceed 10 percent by weight of cement used in the mix. The pigments, synthetic or otherwise, used for colouring tiles shall have permanent colour and shall not contain materials detrimental to concrete.
- 47.2.3.** The colour of the tiles shall be specified in the item or as directed.

**47.3. (C) Marble mosaic tiles:**

- 47.3.1.** These tiles have the same specifications as per plain cement tiles except the requirements as stated below:

**47.3.2.** The marble mosaic tiles shall conform to I.S. 1237-1980. The wearing face of the tiles shall be mechanical ground and filled. The wearing face of tiles shall be free from projections, depressions and cracks and shall be reasonably parallel to the back face of the tiles. All angles shall be right angles and all edges shall be sharp and true.

**47.3.3.** Chips used in the tiles be from smallest up to 20 mm. size. The minimum thickness of wearing layer of tiles shall of 6 mm. For pattern of chips to be used on the wearing face, a few samples with or without their full-size photographs as directed shall be presented to the Engineer-in-charge for approval.

**47.3.4.** Any particular samples, if found suitable shall be approved by the Engineer-in-charge, or he may ask for a few more samples to be prepared indicating roughly the particular sized chips to be more or less in the samples presented. The samples have to be made by the contractor till a suitable sample is finally approved for use in the work.

The Contractor shall ensure that the tiles supplied for the work shall be in conformity with the approved sample only, in terms of its dimensions, thickness of backing layer and wearing surface, materials, ingredients, colour shade, chips, distribution etc. required.

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

**47.4. (D) Chequered Tiles:**

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

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

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

**47.4.4.** Tiles shall conform to relevant I.S. 1237-1980.

**47.5 (E) Chequered Tiles for Stair cases:**

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

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

**M-48. Rough Kota Stone:**

**48.1.** The Kota stones shall be hard, even, sound, and regular in shape and generally be green. Brown colour stones shall not be allowed for use. They shall be without any soft veins, cracks or flaws.

- 48.2. The size of the stones to be used for flooring shall be of size 600 mm x 600 mm and/or size 600 mm x 450 mm, as directed. However smaller sizes will be allowed to be used to the extent of maintaining required pattern. Thickness shall be as specified.
- 48.3. Tolerance of minus 30 mm. on account of chisel dressing of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be + 3 mm.
- 48.4. The edges of stones shall be truly chiselled and table rubbed with coarse sand before paving. All angles and edges of the stone shall be true, Square and free from chipping and the surface shall be true and plain.
- 48.5. When machine cut edges are specified, the exposed edges and the edges at joints shall be machine cut. The thickness of the exposed machine cut edges shall be uniform.

**M-49. Polished Kota Stones**

- 49.1. Polished Kota stone shall have same specifications as per rough Kota stone except as mentioned below:
- 49.2. The stones shall have machine polished smooth surface. When brought on site, the stones shall be single polished or double polished depending upon its use. The stones for paving shall generally be single polished. The stones to be used for dado, skirting, platforms, sink, veneering, sills, steps, etc. Where machine polishing after the stones are fixed in situ is not possible, shall be double polished.

**M-50. Dholpur Stone Slab:**

- 50.1. Dholpur stone slab shall be of best quality as approved by the Engineer-in-charge. The stone slab shall be even, sound and durable, regular in shape and of uniform colour.
- 50.2. The size of the stone shall be specified in the item or detailed drawings or as approved by the Engineer-in-charge. The thickness of the stone shall be as specified in the item of work with the permissible tolerance of plus or minus 2 mm. The provisions in respect of polishing as for polished Kota stone shall apply to polished Dholpur stone also. All angles and edges of the face of the stone slab shall be fine chiselled or polished as specified in the item of work and all the four edges shall be machine cut. All angle and edges of the stone slab shall be true and plane.
- 50.3. The sample of stone shall be got approved from the Engineer-in-charge for shade and tint for a particular work. It shall be ensured that stones to be used in a particular work shall not differ much in shade or tint from the approved sample.

**M-51. Marble Slab:**

- 51.1. Marble slab shall be white or of other colour and of best quality as approved by the Engineer-in-charge
- 51.2. Slabs shall be hard, uniform and homogeneous in texture. They shall have even crystalline grain and free from defects and cracks. The surface shall be machine polished to an even and perfectly plane surface and edges machine cut true and square. The rear face shall be rough to provide key for the mortar.
- 51.3. Marble slabs with natural veins, if selected shall have to be laid as per the pattern given by the Engineer-in-charge. Size of the slab shall be minimum 450mm x 450mm. and preferable 300 mm x 600 mm. However, smaller sizes will be allowed to be used to the extent of maintaining required pattern.

**51.4.** The slab shall not be thinner than the specified thickness at its thinnest part. A few specimen of finished slab to be used shall be deposited by the Contractor in the office for reference.

**51.5.** Except as above, the marble slabs shall conform to I.S. 1130-1969.

**M-52 Granite Stone Slab:**

**52.1** Granite shall be of approved colour and quality. The stone shall be hard, even, sound regular in shape and generally uniform in colour. It shall be without any soft veins, cracks or flaws.

**52.2** The thickness of the stone shall be as specified in items.

**52.3** All exposed face shall be double polished to tender truly smooth and the even reflecting surface. The exposed edges and corners shall be rounded off as directed. The exposed edges shall be machine cut and shall have uniform thickness.

**M-53 P.V.C. Flooring:**

**53.1** P.V.C sheets for P.V.C. floor covering shall be homogenous flexible type, conforming to I.S. 3452-1966. The P.V.C covering shall neither develop any toxic effect while put to use nor shall give off any disagreeable odor.

**53.2** Thickness of flexible type covering tiles shall be as specified in the description of the item.

**53.3** The flexible type shall be backed with Hussein or other woven fabric. The following tolerances shall be applicable on the nominal dimension of the sheet rolls or tiles:

(a) Thickness + 0.15 mm

(b) Length or Width:

- |                         |            |                        |               |
|-------------------------|------------|------------------------|---------------|
| 1. 300 mm. square tiles | + 0.20 mm. | 39.00 mm. square tiles | +0.30 mm.     |
| 2. 600 mm. square tiles | + 0.40 mm. | 4 Sheets ad rolls      | +0.10 percent |

**53.4 Adhesive:**

**53.4.1** The adhesive for PVC flooring shall be of the type and make recommended by the manufactures of PVC sheets/tiles.

**M-54. Facing tiles:**

**54.1.** The facing tiles (burnt clay facing bricks) shall be free from cracks, flaws and nodules of free lime. They shall be thoroughly burnt and shall have plane rectangular faces with parallel sides and sharp straight right edged faces. The texture of the finished surface that will be exposed when in place, shall conform to an approved sample consisting not less than four stretcher bricks each representing the texture desired. The facing tiles shall have a pleasing appearance, sufficient resistance to penetration by rain and greater durability than common bricks. The tiles shall conform to I.S. 2691-1972.

**54.2.** The standard size of facing brick tiles shall be 19 x 9 x 4 CM. The facing brick tiles shall be provided with frog which shall conform to I.S. 1077-1976.

**54.3.** The permissible tolerance in dimensions specified above shall be as follows:

**Size Tolerance for**

	1 <sup>st</sup> class Brick	2 <sup>nd</sup> class Brick
19 cm.	+ 6 mm.	+ 10 mm.
9 cm.	+ 3 mm.	+ 7 mm.
4 cm.	+1.5 mm	+ 3 mm.

- 54.4** The tolerance for distortion or war page of face or edges of individual brick from a plane surface and from a straight line respectively shall be as follows:  
Facing dimensions Permissible tolerance  
Max. below 19 CM. Max. 2.5 mm.  
-do- above 19 cm. Max 3.0 mm.
- 54.5** The average compressive strength obtained as sample of five tiles when tested in accordance with the procedure laid as per I.S. 1077-1976 shall be not less than 175 Kg/Sq. Cm. The average compressive strength of any individual bricks shall be not less than 160 Kg/Sq.Cm.
- 54.6** The average water absorption for five bricks tiles shall not exceed 12 percent of average weight of brick before testing.  
The absorption for each individual bricks shall not exceed 25 percent.
- 54.7** The brick tiles when tested in accordance with I.S. 1077-1976, the rate of efflorescence shall not be more than 'Slightly effloresced'.

**M-55. White glazed tiles:**

- 55.1** The tiles shall be of best quality as approved by the Engineer-in-charge. They shall be flat and true to shape. They shall free from cracks, crazing, spots chipped edges and corners. The glazing shall be of uniform shade.
- 55.2** The tiles shall be nominal size of 150 mm x 150 mm. unless otherwise specified. The maximum variation from the stated sizes, other than the thickness of tile, shall be plus or minus 1.5 mm. The thickness of tile shall be 6 mm. Except as above the tiles shall conform to I.S. 777-1970.

**M-56. Galvanised iron pipes and fittings:** **56.1.** Galvanised iron pipe shall be of the medium type and of required diameter and shall comply with I.S. 1239-1979. The specified diameter of the pipes shall refer to the inside diameter of the bore, Clamps, screw and all galvanised iron fittings shall be of the standard 'R' or equivalent make.

**M-57. Bib cock and stop cock:**

- 57.1** A bib cock is a draw off tap with a horizontal inlet and free outlet. A stop cock is a valve with a suitable means of connection for insertion in a pipe line for controlling or stopping the flow.
- 57.2** They shall be of screw down type and of brass chromium plated and of diameter as specified in the description of the item. They shall conform to I.S. 781-1977 and they shall be of best Indian make. They shall be polished bright.
- 57.3** The minimum finished weight of bib cock and stop cock shall be as given below:
- | Diameter | Bib cock | Stop cock | Diameter | Bibcock  | Stop cock |
|----------|----------|-----------|----------|----------|-----------|
| 8 mm.    | 0.25 Kg. | 0.25 Kg.  | 15 mm.   | 0.40 Kg. | 0.40 Kg.  |
| 10 mm.   | 0.30 Kg. |           | 0.35 Kg. | 20 mm.   | 0.75 Kg.  |
| 0.75 Kg. |          |           |          |          |           |

**M-58. Gun metal wheel valve:**

- 58.1.** The gun metal wheel valve be of approved quality. These shall be gun metal fitted with wheel and shall be of gate valve opening full way and of the size as specified. These shall conform to I.S. 778-1971.

**M-59. White glazed porcelain wash basin:**

**59.1.** Wash basin shall be of white porcelain first quality best Indian make and it shall conform to I.S. 2556 (Part-IV) 1972 and I.S. 771-1979.

The size of the wash basin shall be as specified in the item, Wash basin shall be of one-piece construction with continued over-flow arrangements. All internal angles shall be designed so as to facilitate cleaning. Wash basin shall have single tap hole or two holes as specified. Each basin shall have a circular waste hole which is either rebated or bevelled 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 holder recess which shall fully drain into the bowl.

**59.2.** 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 basin rigidly and adequately and shall be so designed as to make the height from floor to top of basin 750mm. to 800 mm. as directed.

**M-60. European type water closet/with low level flushing:**

**60.1.** The European type water closet shall be white glazed porcelain first quality and shall be of wash down type conforming to I.S. 2556-1973 and I.S. 771-1979.

**60.2.** 'S' trap shall be provided as required with water seal not less than 50 mm. The solid plastic seat and cover shall be of the best Indian make conforming to I.S. 2548-1980. They shall be made of moulded syntactic materials which shall be tough and hard with high resistance to solvents and shall be free from blisters and other surface defects and shall have chromium plated brass hinges and rubber buffer of suitable size.

**M-61. Orissa type water closet:**

**61.1.** The specification of Orissa type white glazed water closet of first quality shall conform to I.S. 2556 (Part-III) 1981 and relevant specification of Indian type water closet except that pan will be with the integral squatting pan of size 580 mm x 440 mm. with raised footrest.

**M-62. Indian type water closet:**

**62.1.** The Indian type white glazed water closet of first quality shall be of size as specified in the item and conforming to I.S. 771-1979 and I.S. 2556 (Part-II) 1981. Each pan shall have integral flushing ring of suitable type with adequate number of holes around as directed to have satisfactory flushing. It shall also have inlet at back or front connecting flush pipe as directed. The inside of the bottom of the pan shall have sufficient slope from the front towards the outlet and surface shall be uniform and smooth.

Pan shall be provided with 100 mm. diameter 'P' or 'S' trap with approximately 50 mm. water seal and 50 mm. diameter vent horn.

**M-62. (A) Foot Rests:**

**62-A-1** A pair of white glazed earthen ware rectangular foot rests of minimum size 250 mm. x 130 mm x 20 mm. shall be provided with water closet.

**M-63. Glazed Earthen Ware Sink:**

- 63.1.** The glazed earthen-ware sink shall be specified size colour and quality. The sink shall conform to I.S. 771 Part-II-1979 waste coupling of standard pattern with brass chain and rubber plug shall be provided with sink.
- 63.2.** The pipes shall conform to I.S. 1239-Part-I 1973 and I.S. 404-1962 for steel and lead pipes respectively 32 mm. brass waste coupling of standard pattern with brass chain and rubber plug shall be provided with sink.

**M-64. Glazed earthen ware Lipped type flat back urinal/corner type urinal:**

- 64.1** The lipped type urinal shall be flat back or corner type as specified in the item and shall conform to I.S. 771-1979. It shall be of best Indian make and size as specified and approved by the Engineer-in-charge. The flat back or corner type urinal must be 1<sup>st</sup> quality free from any defects, cracks, etc.

**M-65. Low level enamel flushing tank:**

- 65.1.** The low-level flushing tank shall be of 15 litres capacity. It shall conform to I.S. 774-1971. The flushing vaster shall be of best quality and free from any defects. The flushing tank shall have outlet 32 mm. diameter The outlet shall be connected with W.C. Pan by lean pipe or P.V.C. pipe as specified. The flushing tank shall be provided with inlet and outlet for fixing G.I. inlet pipes and over-flow pipes. The flushing castern shall be provided with chromium plated handle for flushing. The flushing tank shall be provided with brackets of cast iron so that it can be fixed on wall at specified height. The brackets shall Conform to I.S. 775-1970.

**M-66. Cast iron flushing cistern:**

- 66.1.** The cast iron flushing cistern shall be of 15 litres capacity. It shall conform to I.S. 774-1971. The flushing cistern shall be of best quality free from any defects. The flushing cistern shall have outlet of 32 mm. diameter. The outlets shall be connected to lead pipe of 32 mm. diameter. The lead pipe shall conform to I.S. 404 (Part-I) 1962. For fixing G.I. inlet pipes and overflow pipe 20 mm. diameter. inlet and outlet shall be provided. The flushing cistern shall be provided with galvanised iron chain and pull of sufficient length and shall be got approved from the Engineer-in-charge. The cast iron flushing cistern shall be painted with one coat of anticorrosive paint and two coats of paints. The flushing cistern shall be fixed on two C.I. brackets. The C.I. brackets shall conform to I.S. 775-1970.

**M-67. Flush cock:**

- 67.1.** Half turn flash cock (Heavy Weight) shall be of gun metal chromium plated of diameter as specified in the description of the item. The flush cock shall conform to relevant Indian Standard.

**M-68. Cast iron pipes and fittings:**

- 68.1.** All soil waster, vent and anti-siphonage pipes and fittings shall conform to I.S. 1729-1964. The pipe shall have spigot and socket ends with head on spigot end. The pipes and fittings shall be true to shape, smooth, cylindrical, their inner and outlet surfaces being as nearly as practicable concentric. They shall be sound and nicely cast and shall

be free from cracks, laps, pinholes or other imperfection and shall be neatly dressed and carefully fettled.

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

**68.3.** The sand cast iron pipes shall be of the diameter as specified in the description and shall be in lengths of 1.5 M, 1.8 M. 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.

**68.4. Tolerances.**

**68.4.1.** The Standard weights and thickness of pipes shall be as shown in the following table: A tolerance up to minus 10 percent may however be against these standard weights.

Sr. no.	Nominal	Thickness	Overall, Weight of pipe excluding ears		
			1.5 m. long	1.8m. long	2.m. long
1.	75 mm.	50 mm.	12.83 Kg.	16.52 Kg.	18.37 Kg.
2.	100 mm.	5.0 mm.	18.14 Kg.	21.67 Kg.	24.15 Kg.

**68.4.2.** A tolerance up to minus 15 percent in thickness and 20 mm. in length will be allowed. For fittings tolerance in lengths shall be plus 15 mm. and minus 10 mm.

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

**M-69. Nahni Trap:**

**69.1.** Nahni trap shall be of cast iron and shall be sound and free from porosity or other defects which affect serviceability The thickness of the base metal shall not be less than 6.5 mm. The surface shall be smooth and free from craze, ships and other flaws or any other kind of defects which affect serviceability. The size of nahni trap shall be as specified and shall be of self-cleaning design.

**69.2.** The Nahni trap shall be of quality approved by the Engineer-in-charge and shall generally conform to the relevant Indian Standards.

**69.3.** The Nahni trap provided shall be with deep seal, minimum 50 mm, except at places where trap with deep seal cannot be accommodated. The cover shall be cast iron. Performed cover shall be provided on the trap of appropriate size.

**M-70. Gully Trap:**

**70.1** Gully Trap shall conform to I.S. 651-1980. It shall be sound, free defects such as fire cracks. The glaze of the traps shall be free from crazing. They shall give a sharp clear note when struck with light hammer. There shall be no broken blisters.

**70.2** The size of the gully trap shall be as specified in the item.

**70.3** Each gully trap shall have one C.I. gratings of square size corresponding to the dimensions of inlet of gully trap, it will also have a water tight. C.I. cover with frame inside dimensions 300 mm. x 300 mm., the cover with frame inside dimension, 300 mm. 300 mm., the cover weighing not less than 4:53 Kg. and the frame not less than 2.72 Kg. The grating cover and frame shall be of sound and good casting and shall have truly square machined seating faces.



**M-71. Glaze Stone Ware Pipe and Fitting:**

- 71.1.** The pipes and fittings shall be of best quality as approved by the Engineer-in-charge. The pipe shall be of best quality manufactured from stone-ware of fire clay, salt glazed thoroughly burnt through the whole thickness, of a close even texture, shall be smooth and perfectly glazed. The pipe shall be capable to withstand pressure of 1.5 mm. lead without showing sign of leakage. The thickness of the wall shall not be less than 1/12<sup>th</sup> of the internal dia. The depth of socket shall not be less than 38 mm. The socket shall be sufficiently large to allow a joint of 1 mm. around the pipe.
- 71.2.** The pipes shall generally conform to relevant I.S. 651-1980.

**M-72. Wall Peg Rail:**

- 72.1.** The aluminium wall peg rail shall have three aluminium pegs of approved quality and size. It shall be fixed on teakwood plant of size 450 mm. x 75 mm. x 20 mm. The teakwood shall be French polished or oil painted as specified.

**M-73. G.I. Waterspout:**

- 73.1.** The G.I. pipes of 40 mm. dia. shall be of medium quality and specials shall be of 'R' brand or equivalent brand of best approved quality.
- 73.2.** The pipe shall have length as required for the thickness of wall in which it is fixed. and at the 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 shall be provided as per detailed drawings or as directed.

**M-74. Asbestos Cement Pipe (A.C. Pipe):**

- 74.1.** The asbestos cement pipe of diameter as specified in the description of the item shall conform to I.S. 1626-1980. Specials like bends, shoes cowls, etc. shall conform to relevant Indian Standards. The interior of pipe shall have a smooth finish, regular surface and regular, internal diameter. The tolerance in all dimensions shall be as per I.S. 1626-Part-I 1980.

**M-75. Crydon Ball valve:**

- 75.1.** Ball valve of screwed type including polyethylene float and necessary lever etc. shall be of the size as mentioned in the description of item and shall conform to I.S. 1703-1977.

**M-76. Bitumen Felt for Water Proofing and Damp Proofing:**

- 76.1** Bitumen felt shall be on the fibre bases and shall be type 2, self-finished grade-2 and shall conform to I.S. 1322-1970.

**M-77 Selected Earth:**

- 77.1.** The selected earth shall be hat obtained from excavated material or shall have to brought from outside as indicated in the item. If item does not indicate anything, the selected earth shall have to be brought from outside.
- 77.2.** The selected earth shall be good yellow soil and shall be got approved from the Engineer-in-charge. In no case black cotton soil or similar expansive and suitable soil shall be used. It shall be clean and free from all rubbish and perishable materials, stones or brick bats. The clods shall be broken to a size of 50. mm or less, Contractor shall make his own arrangement at his own cost for land for borrowing selected earth.

The stacking of material shall be done as directed by the Engineer-in-charge in such a way as not to interfere with any constructional activities and in proper stacks.

- 77.3.** When excavated material is to be used, only selected stuff got approved from the Engineer-In-Charge shall be used. It shall be stacked separately and shall comply with all the requirements of selected earth mentioned above:

**M-78. Barbed Wire:**

- 78.1.** The barbed wire shall be of galvanised steel and it shall generally conform to I.S. 278-1978. The barbed wire shall be of type-I whose nominal diameter for line wire shall be 2.5 mm. and point wire 2.24 mm. The nominal distance between two bars 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 spacings shall be as specified above. The permissible deviation from the nominal diameter of the line wire and point wire shall not exceed + 0.08 mm.
- 78.2.** The barbs shall carry four points 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 13 mm. and not more 18 MM. The points shall be sharp and cut at an angle not greater than 35 degree of the axis of the wire forming the barbs.
- 78.3.** The line and point wire shall be circular 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 weld other than those in the rod before it is drawn. The distance between two successive splices shall not be less than 15 meters.
- 78.4.** The lengths per 100 Kg. of barbed wire I.S. type I shall be as under  
Nominal 1000 meter Minimum 834 Meter Maximum 1066 Meter.

## **Item wise Detailed Specifications for Civil work**

### **Item No. 01**

**Excavation for foundation up to 1.5 m depth including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 Meter lead. (C) Hard Murrum**

#### **1.0. Workmanship**

**1.1.** The relevant specifications of item No. 4.0.0. (A) shall be followed except that the excavation work shall be carried out up to 1.5 M lift in hard murrum.

#### **2.0. Mode of measurement & payment**

**2.1.** The relevant specifications of item No. 4.0.0. (A) shall be followed.

**2.2.** The excavation work of up to 1.5 M shall be measured under this item.

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

### **Item No. 02**

**Excavation for foundation up to 1.5 m depth including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 Meter lead. (C) Soft rock not required blasting**

#### **1.0. General**

**1.1.** Any soil which generally yields to the application of pickaxes and shovels, phawaras rakes or any such ordinsry excavating implement or organic soil gravel. silt and turf loam, clay. peat etc. falls under this category.

#### **2.0. Clearing the site**

**2.1.** The site on which the structure is to be built shall he cleared, and all obstructions, loose stone, materials and rubbish of all kinds, bush, wood and trees shall be removed as directed. The materials so obtained shall be property of the Government anit shall be conveyed and slacked as directed within 50 mm. lead. The roots of the trees coming in the sides shall be cut and coated w ith a hoi asphalt.

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

#### **3.0. Setting out.**

After clearing the site, the centre lines will be given by the Engineer-in-charge. The contractor shall assume full responsiblity for alignment, elevation and dimension of each and all parts of the work. Contractor shall supply labours, materials. lc., required for selling out the reference marks and belch marks and shall maintain them as long as required and directed.

#### **4.0. Excavation**

The excavation in foundation shall he carried out in true line and level and shall have the width and depth as shown inthe drawings or as directed. The contractor shall do the necessary shoring and shutting or providing necessary slopes to a safe angle, at his own cost. The payment tor such precaulinary measures shall be paid separately if not specified. The bottom of the cavaied area shall be levelled both longitudinally and translerely as directed by removing and watering a-s required. No emth filling will be allowed-^Or bringing it to level, if by mistake or any other reason excavalionis made deeper or wider than ttut shown on on the plan or directed. The extra depth or width shall be made up with concrete of s'ame proportion as specified for the foundation concrete at the cosi of the contractor. The excayaion uplo 1.5 m. depth shall be measured under this item.

#### **5.0. Disposal of the excavated stuff**

**5.1.** The excavated stuff of the selected type shall be used in filling the trenches and plinth or leveling the ground in layers including ramming and watering etc.

**5.2.** The balance of the excavated quantity shall be removed the excavated quantity shall be removed the excavated quantity shall be removed by the contractor from the site or work to a place as directed with lead upto 50 M. and all lift.

**6.0. Mode of measurements & payment.**

**6.1.** The measurement of excavation in trenches for foundation shall be made according to the sections of trenches shown on the drawing or as per section given by the Engineer-in-charge. No payment shall be made for surplus excavation made in excess of above requirements or due to stopping and sloping back as found necessary on account of conditions of soil and requirements of safety.

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

**Item No. 3**

**Excavation for foundation for depth from 1.5m to 3.0m including sorting out and stacking of useful materials and disposing off the excavated stuff up to 50 Meter lead. (C) Soft rock not required blasting**

**1.0. Workmanship**

**1.1.** The relevant specifications of item No. 4.0.0. (D) shall be followed except that the excavation work shall be carried out in loose or soft soil with lift 1.5 M to 3.0 M. lift in soft rock not required blasting.

**2.0 Mode of measurement & payment**

**2.1.** The relevant specification of item NO. 4.0.0. (A) shall be followed.

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

**2.3.** The rate shall be for a unit one cubic metre.one cubic metre.

**Item No. 4**

**Excavation for foundation for depth from 3.0m to 5.0m including sorting out and stacking of useful materials and disposing off the excavated stuff up to 50 Meter lead. (D) Soft rock not requiring Blasting**

**1.0. Workmanship**

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

**2.0. Mode of measurement & payment**

**2.1.** The relevant specifications of item No. 4.0.0.(A) shall be followed.

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

**2.3.** The rates shall be for a unit of one cubic metre.

**Item No:5**

**Filling in plinth with sand under floors including watering ramming, consolidating, and dressing complete.**

**1.0. Materials**

**1.1.** Sand shall conform to M 6

**2.0. Workmanship**

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

### **3.0. Mode of Measurements & Payment**

**3.1.** The relevant specifications of item No. 4.12 shall be followed.

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

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

#### **Item No: 6**

**Filling available excavated earth (excluding rock) in trenches, plinth, sides of foundations etc. in layers not exceeding 20 cm. in depth consolidating each deposited layer by ramming and watering up to optimum moisture content level.**

##### **1.0. WORKMANSHIP:**

**1.1.** The earth to be used for filling shall be free from salts, organic or other foreign matter, all clods of earth shall be broken.

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

**1.3.** The plinth shall be similarly filled with earth in layers not exceeding 20 Cms adequately watered and consolidated by ramming with iron or wooden rammers. When the filling reaches finished level, the surface shall be flooded with water for at least 24 hours and allowed to dry and then rammed and consolidated.

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

**1.5.** In the 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.

**1.6.** The excavated stuff of the selected type shall be allowed to be used in filling the trenches and plinth. Under no circumstances has black cotton soil been used for filling the plinth.

##### **2.0. MODE OF MEASUREMENT AND PAYMENT:**

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

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

#### **Item No: 7**

**Filling in plinth with murrum or selected soil in layers of 20 cm. thickness including watering, ramming, and consolidating up to optimum moisture content level. etc. Complete.**

##### **1.0. Materials**

**1.1.** Murrum shall be clean, of good binding quality and of approved quality obtained from approved pots/quarries of disintegrated rocks which contain silicons material and natural mixture of clay of calcarious origin. The size of murrum shall not be more than 20 mm.

##### **2.0. Workmanship**

**2.1.** The relevant specifications of item No. 4.12 shall be followed except that the murrum or selected soil shall be filled in foundations and plinth in 20 cms. layer including consolidating, ramming, watering, dressing etc. complete.

##### **3.0. Mode of measurements & payment**

**3.1.** The relevant specifications of item No. 4.12 shall be followed.

3.2. The rate includes the cost of collecting and caning murrum/ or selected earth of approved quality with all lead and labour required for filling trenches and plinth.

3.3. Rate shall be for a unit of one cubic meter.

#### **Item No. 8**

**Providing & laying cement concrete 1:2:4 (1 cement:2 coarse sand:4 hand broken stone aggregate 20 mm nominal size) and curing complete excluding cost of form work in (A) Foundation and plinth.**

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

#### **General:**

The concrete mix shall be designed from preliminary tests, the proportioning of cement and aggregates shall be done by weight and necessary precautions shall be taken in the production to ensure that the required work cube strength is attained and maintained. The controlled concrete shall be in grades of M-100, M-150, M-200, M-250, M-300, M-350, M-400 with prefix controlled added to it the letter 'M' refers to mix and numbers specify 28 days work cube compressive strength of 150 mm. cubes of the mix expressed in Kg/Cmt.

The proportion of cement, sand and coarse aggregates shall be determined by weight. The weight batch machine shall be used for maintaining proper control over the proportion of aggregates as per mix design.

The strength requirements of different grades of concrete shall be as under:

In all cases, the 28 days compressive strength specified in the above table above be the criteria for acceptance or rejection of the concrete.

Where the strength of a concrete mix as indicated by tests, lies in between the strength of any two grades specified in the above table, such concrete shall be classified in for all purposes as concrete belonging to the lower of the two grades between which its strength lies.

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 the supply of properly graded aggregate of uniform quality can be maintained till the completion of work. Grinding of aggregate shall be controlled by obtaining the coarse aggregates, in different sizes and being them in the right proportions as required. Aggregates of different sizes shall be stocked in separate stockpiles. The required quantity of material shall be stockpiled 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 the Engineer-in-charge to ensure that the suppliers are maintaining 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. Where the weight of cement is determined by accepting the maker's weight per bag a reasonable number of bags shall be weighted separately to check the net weight. Where cement is weighted from bulk stocks at site and not by bags, it shall be weighted separately from the aggregates. Water shall either be measured by volume in calibrated tanks or weighted. All measuring equipments shall be maintained in clean and serviceable condition. Their accuracy shall be periodically checked.

It is most important to keep the specified water cement ratio constant and at its correct value. To this end, moisture content in both fine and coarse aggregates shall be determined by the Engineer-in-charge, according to the weather conditions. The amount of mixing water shall

then be adjusted to compensate for variations in the moisture content. For the determination of moisture content in the aggregates I.S. 2389 (Part III) shall be referred to. Suitable adjustment shall also be made in the weights of aggregates due to variation in their moisture content. The minimum quantity of cement to be used in concrete shall not be less than 220 Kg/m in plain concrete and not less than 250 Kg/M3 in reinforced concrete.

**Cleaning & Treatment of forms:**

All rubbish, particularly chippings, shaving and saw dust shall be removed from the interior of the form before the concrete is placed and the form work in contact with concrete shall be cleaned and thoroughly wet or treated. The surface shall be then coated with soap solution applied before concreting is done, Soap solution for the purpose shall be prepared by dissolving yellow soap in water to get consistency of paint. Alternatively, a coat of raw linseed oil or form oil of approved manufacture may be applied in case steel shuttering is used. Soap solution or 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 reinforcement bars.

**Stripping time:**

In normal circumstances and where ordinary cement is used forms may be struck after expiry of following periods:

(a) Sides of walls columns and vertical faces of beam	24 to 48 hours.
(b) Beam soffits. (Props left under)	7 days.
(c) Removal of props slabs	
(i) Slabs spanning up to 4.5 m.	7 days.
(ii) Spanning over 4.5 m.	14 days.
(d) Removal of props to beams and Arches	
(i) Spanning up to 6 m.	14 days.
(ii) Spanning over 6 m.	21 days.

**1) Centering**

The centering to be provided shall be approved. It shall be sufficiently strong to ensure absolute safety of the form work and concrete work before, during and after pouring concrete. Watch should be kept seeing that behavior of centering and form work is satisfactory during concreting. Erection should also be such that it would allow removal of forms in proper sequence without damaging either the concrete or the forms to be removed.

The props of centering shall be provided on firm foundation or base of sufficient strength to carry the loads without any settlement.

The centering and form work shall be inspected and approved by the Engineer-in-charge before concreting. But this will not relieve the contractor of his responsibility for strength, adequacy and safety of form work and centering. If there is a failure of form work or centering, contractor shall be responsible for the damages to the work, injury to life and damage to property.

**2) Scaffolding:**

All scaffolding, hoisting arrangements and ladders etc. required for the facilitating of concreting shall be provided and removed on completion work by contractor at his own expense. The scaffolding, hoisting arrangements and ladders etc. shall be strong enough to act on and shall be subject to the approval of the Engineer-in-charge. However, contractor shall be solely responsible for the safety of the scaffolding, hoisting arrangement, ladders, work and workman etc.

The scaffolding, hoisting arrangements and ladders shall allow an easy approach to the work spot and afford easy inspection.

The rate is applicable to all conditions of working and any height. The rate shall include the cost of materials and labour for various operations involved such as:

- (a) Splayed edges, notching, allowance for overlaps and passing at angles, battens centering, shuttering, strutting, propping bolting, nailing, wedging, easing, striking and removal.
- (b) Filleting to form stop chamfered edges or splayed external angles not exceeding 20 mm. width to beams, columns and the like.
- (c) Temporary opening in the forms for pouring concrete, if required, removing rubbish etc.
- (d) Dressing with oil to prevent adhesion of concrete with shuttering, and
- (e) Raking or circular cutting.

### **3) Mode of Measurement and Payments**

The relevant specification NBO item No. 5.4.1 shall be followed except that the controller concrete R.C.C. work for work as specified in item shall be measured under this item.

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

#### **Item No. 9**

**Providing and laying cement concrete 1:3:6 (1- Cement: 3- Coarse sand: 6- Graded brick bat aggregate 40mm normal size) and curing complete excluding cost of formwork in (A) Foundation and Plinth**

#### **Materials and Workmanship**

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

#### **General:**

The concrete mix shall be designed from preliminary tests, the proportioning of cement and aggregates shall be done by weight and necessary precautions shall be taken in the production to ensure that the required work cube strength is attained and maintained. The controlled concrete shall be in grades of M-100, M-150, M-200, M-250, M-300, M-350, M-400 with prefix controlled added to it the letter 'M' refers to mix and numbers specify 28 days work cube compressive strength of 150 mm. cubes of the mix expressed in Kg/Cmt.

The proportion of cement, sand and coarse aggregates shall be determined by weight. The weight batch machine shall be used for maintaining proper control over the proportion of aggregates as per mix design.

The strength requirements of different grades of concrete shall be as under:

In all cases, the 28 days compressive strength specified in the above table above be the criteria for acceptance or rejection of the concrete.

Where the strength of a concrete mix as indicated by tests, lies in between the strength of any two grades specified in the above table, such concrete shall be classified in for all purposes as concrete belonging to the lower of the two grades between which its strength lies.

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 the supply of properly graded aggregate of uniform quality can be maintained till the completion of work. Grinding of aggregate shall be controlled by obtaining the coarse aggregates, in different sizes and putting them in the right proportions as required. Aggregates of different sizes shall be stocked in separate stockpiles. The required quantity of material shall be stockpiled for 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 the



Engineer-in-charge to ensure that the suppliers are maintaining 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. Where the weight of cement is determined by accepting the maker's weight per bag a reasonable number of bags shall be weighted separately to check the net weight. Where cement is weighted from bulk stocks at site and not by bags, it shall be weighted separately from the aggregates. Water shall either be measured by volume in calibrated tanks or weighted. All measuring equipments shall be maintained in clean and serviceable condition. Their accuracy shall be periodically checked.

It is most important to keep the specified water cement ratio constant and at its correct value. To this end, moisture content in both fine and coarse aggregates shall be determined by the Engineer-in-charge, according to the weather conditions. The amount of mixing water shall then be adjusted to compensate for variations in the moisture content. For the determination of moisture content in the aggregates I.S. 2389 (Part III) shall be referred to. Suitable adjustment shall also be made in the weights of aggregates due to variation in their moisture content. The minimum quantity of cement to be used in concrete shall not be less than 220 Kg./m in plain concrete and not less than 250 Kg/M3 in reinforced concrete.

**Cleaning&Treatment of forms:**

All rubbish, particularly chippings, shaving and saw dust shall be removed from the interior of the form before the concrete is placed and the form work in contact with concrete shall be cleaned and thoroughly wet or treated. The surface shall be then coated with soap solution applied before concreting is done, Soap solution for the purpose shall be prepared by dissolving yellow soap in water to get consistency of paint. Alternatively, a coat of raw linseed oil or form oil of approved manufacture may be applied in case steel shuttering is used. Soap solution or 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 reinforcement bars.

**Stripping time:**

In normal circumstances and where ordinary cement is used forms may be struck after expiry of following periods:

- (a) Sides of walls columns and vertical faces of beam 24 to 48 hours.
- (b) Beam soffits. (Props left under) 7 days.
- (c) Removal of props slabs
  - (i) Slabs spanning up to 4.5 m. 7 days.
  - (ii) Spanning over 4.5 m. 14 days.
- (d) Removal of props to beams and Arches
  - (i) Spanning up to 6 m. 14 days.
  - (ii) Spanning over 6 m. 21 days.

**Centering:**

The centering to be provided shall be approved. It shall be sufficiently strong to ensure absolute safety of the form work and concrete work before, during and after pouring concrete. Watch should be kept seeing that behavior of centering and form work is.

satisfactory during concreting. Erection should also be such that it would allow removal of forms in proper sequence without damaging either the concrete or the forms to be removed.

The props of centering shall be provided on firm foundation or base of sufficient strength to carry the loads without any settlement.

The centering and form work shall be inspected and approved by the Engineer-in-charge before concreting. But this will not relieve the contractor of his responsibility for strength,

adequacy and safety of form work and centering. If there is a failure of form work or centering, contractor shall be responsible for the damages to the work, injury to life and damage to property.

**Scaffolding:**

All scaffolding, hoisting arrangements and ladders etc. required for the facilitating of concreting shall be provided and removed on completion work by contractor at his own expense. The scaffolding, hoisting arrangements and ladders etc. shall be strong enough to act on and shall be subject to the approval of the Engineer-in-charge. However, contractor shall be solely responsible for the safety of the scaffolding, hoisting arrangement, ladders, work, and workman etc.

The scaffolding, hoisting arrangements and ladders shall allow an easy approach to the work spot and afford easy inspection.

The rate is applicable to all conditions of working and any height. The rate shall include the cost of materials and labour for various operations involved such as:

- (a) Splayed edges, notching, allowance for overlaps and passing at angles, battens centering, shuttering, strutting, propping bolting, nailing, wedging, easing, striking and removal.
- (b) Filleting to form stop chamfered edges or splayed external angles not exceeding 20 mm. width to beams, columns and the like.
- c) Temporary opening of the forms for pouring concrete, if required, removing rubbish etc.
- (d) Dressing with oil to prevent adhesion of concrete with shuttering, and
- (e) Raking or circular cutting.

**Mode of Measurement and Payments**

The relevant specification NBO item No. 5.4.1 shall be followed except that the controller concrete R.C.C. work for work as specified in item shall be measured under this item.

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

**Item No. 11, 12, 14 to 39**

**Providing, laying controlled cement concrete M 250, and curing complete including the cost of form work (rates for centering, shuttering, formwork staging scaffolding for considering up to 4.50 mt. height) but excluding reinforcement for reinforced concrete work in:**

**(Design Mix or RMC can be use as directed by EIC/PMC.No Extra Rate can be paid)**

- (A) Footing**
- (B) Plinth beam**
- (C) Column**
- (D) R.C.C. Wall**
- (E) Floor Beam**
- (F) Lintel**
- (G) Weathershed**

**1. Materials and Workmanship**

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

The shuttering to be provided shall be of ordinary timber planks and shall conform to M-26.

The dimensions of scantlings and battens shall conform to the design. The strength of the wood shall not be less than that assumed in the design.

**1.1. General:**

**1.1.1.** The relevant specifications of ordinary concrete shall be followed except that the concrete mix shall be designed from preliminary tests, the proportioning of cement and aggregates shall be done by weight and necessary precautions shall be taken in the production to ensure that the required work cube strength is attained and maintained. The controlled concrete shall be in grades of M-100, M-150, M-200, M-250, M-300, M-350, M-400, with prefix control added to it. The letter 'M' refers to mix, and numbers specify 28 days works cube compressive strength of 150 mm cubes of the mix expressed in Kg. / Cmt.

**1.1.2.** The porportion of cement, sand and coarse aggregates shall be determined by weight. The weight batch machine shall be used for maintaining proper control over the porportion of aggregates as per mix design.

The strength requirements of different grades of concrete shall be as under:

<b>Grade of Concrete</b>	<b>Compressive strength of 15 cms 28 days conducted in accordance Preliminary test Work test Min</b>	<b>cubes in Kg/Cmt. at with I.S. 516-1959 Min.</b>
M-150	200	150
M-200	260	200
M-250	320	250
M-300	380	300
M-350	440	350
M-400	500	400

In all cases, the 28 days compressive strength specified in the above table above be the criteria for acceptance or rejection of the concrete.

Where the strength of a concrete mix as indicated by tests, lies in between the strength of any two grades specified in the above table such concrete shall be classified in for all purposes as concrete belonging to the lower of the two grades between which its strength lies.

## **2. Workmanship:**

**2.1.** 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 the 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 being in them in the right proportions as required. Aggregates of different sizes shall be stocked in separate stockpiles. The required quantity of material shall be stockpiled for several hours, preferably a day before use. The grading of course and fine aggregate shall be checked as frequently as possible, the frequency for a given job being determined by the Engineer-in-charge to ensure that the suppliers are maintaining the uniform grading as approved for samples used in the preliminary tests.

**2.2.** In proportioning concrete, the quantity of both cement and aggregate shall be determined by weight. Where the weight of cement is determined by accepting the maker's weight per bag a reasonable number of bags shall be weighted separately to check the net weight. Water shall either be measured by volume in calibrated tanks or

weighed. All measuring equipments shall be maintained in clean and serviceable condition. Their accuracy shall be periodically checked.

- 2.3.** It is most important to keep the specified water cement ratio constant and at its correct value. To this end, moisture content in both fine and coarse aggregates shall be determined by the Engineer-in-charge, according to the weather conditions. The amount of mixing water shall then be adjusted to compensate for variations in the moisture content. For the determination of moisture content in the aggregates, I.S. 2389 (Part III) shall be referred to. Suitable adjustments shall also be made in the weights of aggregates due to variation in their moisture content. The minimum quantity of cement to be used in concrete shall not be less than 220 Kg/m in plain concrete and not less than 250 Kg/M<sup>3</sup> in reinforced concrete.

### **3. Centering:**

- 3.1.** The centering to be provided shall be approved. It shall be sufficiently strong to ensure absolute safety of the form work and concrete work before, during and after pouring concrete. Watch should be kept seeing that behavior of centering and form work is satisfactory during concreting. Erection should also be such that it would allow removal of forms in proper sequence without damaging either the concrete or the forms to be removed.
- 3.2.** The props of centering shall be provided on firm foundation or base of sufficient strength to carry the loads without any settlement.
- 3.3.** The centering and form work shall be inspected and approved by the Engineer-in-charge before concreting. But this will not relieve the contractor of his responsibility for strength, adequacy and safety of form work and centering. If there is a failure of form work or centering, contractor shall be responsible for the damages to the work, injury to life and damage to property.

### **4. Scaffolding:**

- 4.1** All scaffolding, hoisting arrangements and ladders etc. required for the facilitating of concreting shall be provided and removed on completion work by contractor at his own expense. The scaffolding, hoisting arrangements and ladders etc. shall be strong enough to act on and shall be subject to the approval of the Engineer-in-charge. However, contractor shall be solely responsible for the safety of the scaffolding, hoisting arrangement, ladders, work and workman etc.
- 4.2** The scaffolding, hoisting arrangements and ladders shall allow easy approach to the work spot and afford easy inspection.
- 4.3** The rate is applicable to all conditions of working and any height. The rate shall include the cost of materials and labour for various operations involved such as:
- a) Splayed edges, notching, allowance for overlaps and passing at angles, battens centering, shuttering, strutting, propping bolting, nailing, wedging, easing, striking and removal.
  - b) Filletting to form stop chamfered edges or splayed external angles not exceeding 20 mm. width to beams, columns and the like.
  - c) Temporary opening in the forms for pouring concrete, if required, removing rubbish etc.
  - d) Dressing with oil to prevent adhesion of concrete with shuttering, and Raking or circular cutting.

**Re-Use:**

Before re-use, all forms shall be inspected by the Engineer-in-charge and their suitability ascertained. The forms shall be scarred, cleaned, and joints gone over, repaired where required. Inside surface shall be retreated to prevent adhesion of concrete.

**5. Mode of measurement and payment:**

**5.1** The relevant specifications shall be followed except that the controller concrete R.C.C. work for work as specified in item shall be measured under this item. The rate includes the cost of form work.

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

**Item No. 13, 40 to 48**

**Providing, laying controlled cement concrete M 250, and curing complete including the cost of form work (rates for centering, shuttering, formwork staging scaffolding for considering up to 4.50 mt. height) but excluding reinforcement for reinforced concrete work in**

**(A) Slab**

**(B) Staircase**

**MATERIALS & WORKMANSHIP:**

The relevant specifications of item No.9 to 46 shall be followed.

**MODE OF MEASUREMENT AND PAYMENT:**

The relevant specifications of item No. 9 to 46 shall be followed.

The rate shall be one cubic meter.

**Item No. 49**

**Providing and laying TMT Bar FE 500/500D reinforcement for R.C.C. work and straightening, cutting, bending, binding, placing including welding in position completed up to any floor any level as per I.S. Standard Complete as directed by EIC.**

**1.0. MATERIALS:****1.1. High yield Strength Steel Deformed Bars:**

**1.1.1** High yield strength steel deformed bars are either cold twisted or hot rolled, shall conform to I.S. 1739-1966 and I.S.1139-1966 respectively.

**1.1.2** Other provision and requirements shall conform to specification NO. M-18 for Mild steel bars.

**1.2. Mild Steel Binding Wire:**

**1.2.1** The mild steel wire shall be of 1.63 mm or 1.22 mm. (16 or 18 gauge) diameter and shall conform to I.S. 280-197.

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

**2.0. WORKMANSHIP:**

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

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

**2.3.** Reinforcing steel shall conform accurately to the dimensions given in the bar bending schedules shown on relevant drawings. Bars shall be bent cold to specified shape and

dimensions or as directed using a proper bar bender, operated by hand or power to attain proper radius of bends. Bars shall not be bent or straightened in a manner that will injure the material. Bars bent during transport or handling shall be straightened before being used on the work. They shall not be heated to facilitate bending. Unless otherwise specified, a 'U' type hook at the end of each bar shall invariably be provided to main reinforcement. The radius of the bend shall not be less than twice the diameter of the round bar and the length of straight part of the bar beyond the end of the curve shall be at least four times the diameter of the round bar. In case of bars which are not round and in case of deformed bars, the diameter shall be taken as the diameter of circle having an equivalent effective area. The hooks shall be suitably encased to prevent any splitting of the concrete.

- 2.4. All the reinforcement bars shall be accurately placed in the exact position shown on the drawing and shall be securely held in position during metal hangers, supporting wires or other approved devices at sufficiently close intervals. Bars shall not be allowed to sag between supports nor displaced during concreting or any other operations of the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal supports shall not extend to the surface of concrete, except were shown on drawings. Placing of broken stone or brick and wooden blocks 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, precast mortar blocks or other approved devices. reinforcement after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement from corrosion, concrete cover shall be provided as indicated on drawings. All the bars producing 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.
- 2.5. Bars crossing each other where required shall be secured by binding wires (annealed) of size not less than 1 mm in such manner that they do not slip over each other at the time of fixing and concreting.
- 2.6. As far as possible, bars of full length shall be used. In case this is not possible, overlapping of bars shall be done directed. When practicable, overlapping bars shall not touch each other, but be kept apart by 25 mm or 1.25 mm times the maximum size of the coarse aggregate whichever is greater by concrete between them. Where not feasible, overlapping bars shall be bound with annealed wires not less than 1 mm thick twisted tight. The overlaps shall be staggered for different bears and located at points along the span where neither shear nor bending movement is maximum.
- 2.7. 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 transpit the full stresses of bars. The ends of the bars that are joined by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than normal cross-section of the bar. Threads shall be standard threads. Steel for coupling shall conform to I.S. 226
- 2.8. When permitted or specified in the drawings, joints of reinforcement bars shall be butt-welded to transmit their full stresses. Welded joints shall preferably be located at points when steel will not be subject to more than 75 percent of the maximum permissible stresses and welds so staggered that at any one section not more than 20

percent of the rods are welded. Only electric 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, the 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. 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.

- 2.9. The above specifications shall be followed except that the cold twisted steel bars shall be used with or without hooks and the ends. Deformed bars without hooks shall, however, comply with however comply with relevant anchorage requirements.

**3.0 Mode of measurement and payment:**

- 3.1 For the purpose of calculation consumption, wastage shall both be permitted beyond 5 percent. Excess consumption over 5 % will be charged at penal rate.
- 3.2 Reinforcement shall be measured in length including overlaps, separately for different diameters as actually used in the works. Where welding or coupling is resorted to in place of lap joints such joints shall be measured for a pimento as equivalent length of overlap as per design requirement. From the length so measured, the weight of reinforcement shall be calculated in tones on the same basic of as per M-18 even though steel is supplied to the contractor by the department on actual weight Length shall include hooks at the ends. Wastage and annealed steel wire for binding shall not be measured and the cost of these items shall be deemed to be included in the rate for reinforcement.
- 3.3 The rate shall be for a unit of One Kg.

**Item No. 50 to 52**

**Providing and position PVC Sleeves in RCC elements like walls, slabs, beams, etc. of 6 Kg/cm<sup>2</sup> UPVC Pipes of following make Superme/ Astaral/ Prince or equivalent as per approved make and diameter of taking out service pipelines, cables, road, infrasturcture work etc. up to 0.5 mtr. length for all floors/ all levels / all heights.**

- a) 50mm dia.
- b) 75mm dia.
- c) 110mm dia.

**1.0 Materials & Workmanship:**

1.1 Prior approval to be taken from the site engineer before cutting the reinforcement. The cutreinforcement shall be recorded separately. Surfaces around the cut reinforcement shall be properly finished as per the approval of the site engineer.

**2.0 Mode of Measurements and Payment:**

2.1 The rate shall be for a unit of one no.

**Item No. 54 to 55**

**Brick work using common burnt clay building bricks having crushing strength not less than 35 kg/Sq. Cm. in foundation and plinth in cement mortar 1:6 (1 cement: 6 fine sand) (B) Conventional (more than 10 tons)**

## **MATERIALS:**

### **1.1 WATER:**

- 1.1.1** Water shall not be salty or brackish and shall be clean, reasonably clear and free objectionable quantities of silt and traces of oil and injurious alkalis, salts, organic matter and other deleterious material which will either weaken the mortar or concrete or cause efflorescence or attack the steel in R.C.C Container for transport, storage and handling of water shall be clean. Water shall conform to the standards specified in I.S.456-1978.
- 1.1.2** If required by the Engineer-in-charge it shall be tested by comparison with distilled water. Comparison shall be made by means of standard cement tests for soundness, time of setting and mortar strength as specified in I.S.269-1976. Any indication of unsoundness, change in time of setting by 30 minutes or more or decrease of more than 10 per cent in strength of mortar prepared with water sample when compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.
- 1.1.3** Water for curing mortar, concrete or masonry should not be too acidic or too alkaline. It shall be free of elements which significantly affect the hydration reaction or otherwise interfere with the hardening of concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces.
- 1.1.4** Hard and bitter water shall not be used for curing.
- 1.1.5** Portable water will be generally found suitable for curing mortar or concrete.

### **1.2 Cement:**

Cement shall be ordinary Portland slag cement as per I.S. 269-1976 or Portland slag cement as per I.S. 455-1976.

### **1.3 Sand:**

- 1.3.1** Sand shall be natural sand, clean, well graded, hard strong durable and gritty particle free from injurious amounts of dust clay, kankar nodules, soft or flaky particles shale, alkali, salts organic matter, loam, mica or another deleterious substance and shall be got approved from the Engineer-in-charge. The sand shall not contain more than 8 percent of silt as determined by field test. If necessary the sand shall be washed to make it clean.
- 1.3.2** Coarse Sand: The fineness modulus of coarse sand shall not be less than 2.5 and shall not exceed 3, 0.

The sieve analysis of coarse shall be as under:

<b>I.S. Sieve</b>	<b>Percentage by weight</b>	<b>I.S. Sieve</b>	<b>Percentage by weight</b>
Designation	Passing Sieve	Designation	Passing Sieve
4.75 mm.	100	600 Micron	30-100
2.36 mm.	90 to 100	300 Micron	5-70
1.18 mm.	70-100	150 Micron	0-50

- 1.3.3 Fine Sand:** The fineness modulus shall not exceed 1.0. The sieve analysis of fine sand shall be as under:



I.S. Sieve	Percentage by weight	I.S. Sieve	Percentage by weight
Designation	Passing Sieve	Designation	Passing Sieve
4.75 mm.	100	600 Micron	40-85
2.36 mm.	100	300 Micron	5-50
1.18 mm.	70-100	150 Micron	0-10

#### 1.4 Bricks:

**1.4.1** The bricks shall be hand or machine moulded and made from suitable soils and kiln-burnt. They shall be free from crack and nodules of free lime. They shall have smooth rectangular faces with sharp corners and shall be of uniform colour. The bricks shall be moulded with a frog of 100 mm. X 40 mm. and 10 mm. to 20 mm. deep on one of its flat sides. The bricks shall not break when thrown on the ground from a height of 600 mm.

**1.4.2** The size of modular bricks shall be 190 mm. X 90 mm. X 90 mm.

**1.4.3** The size of the conventional bricks shall be as under:  $(9" \times 4\frac{3}{8}" \times 2\frac{3}{4}" )$  225 x 110 x 75 mm.

**1.4.4** Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the conventional size adopted in a particular work. Length: 1.8 (3.0 mm.) Width: 1/6 " (1.51 mm.) Height: 1/6" 1.50 mm.)

**1.4.5** The crushing strength of the bricks shall not be less than 35 Kg./Sq.Cm. The average water absorption shall not be more than 20 percent by weight. Necessary tests for crushing strength and water absorption etc. shall be carried out as per I.S.3493 (Part-I to IV) 1976.

#### 1.5 Cement Mortar:

**1.5.1** Preparation of Mix: 11.2.1 Cement and sand shall be mixed to specified proportion, sand being measured by measuring boxes. The proportion of cement will be by volume on the basis of 50 kg / Bag of cement being equal to 0.0342 Cu.m. The mortar may be hand mixed or machine mixed as directed.

**1.5.2** Preparation of mortar: 11.3.1 In hand mixed mortar cement and sand in the specified proportions shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3 times or more till a homogeneous mixture of uniform colour is obtained. Mixing platform shall be so arranged that no extraneous material shall get mixed with mortar or mortar 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.

**1.5.3** 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.

#### 2.0 WORKMANSHIP:

##### 2.1 Proportion:

The proportion of the cement mortar shall be 1:5 (1 cement: 5 fine sand) by volume.

##### 2.2 Wetting of bricks:

The bricks required for masonry shall be thoroughly wetted with clean water for about two hours before use or as directed. The cessation of bubbles, when the bricks are wetted with water is an indication of the thorough wetting of bricks.

### **2.3 Laying:**

Bricks shall be laid in English bond unless directed otherwise. Half or cut bricks shall not be used except when necessary to complete to bond; closer in such case shall be cut to required size and used near the ends of walls.

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

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

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

Both the faces of walls of thickness greater than 23 cms shall be kept in proper place. All the connected brick work shall be kept not more than one meter over the rest of the work. Where this is not possible, the work shall be raked back according to bond (and not left toothed) at an angle not steeper than 45 degrees.

All fixtures, pipes, outlets of water, hold fasts of doors and windows etc. which are required to be built in wall shall be embedded in cement mortar.

### **2.4 Joints:**

Bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not exceed 12 mm. The face joints shall be raked out as directed by taking 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 brick work is laid and all mortar dropping removed.

### **2.5 Curing**

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

### **2.6 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 to plinth, the inside plinth offset shall be kept lower than the outside plinth top by the thickness of the flooring.

## **3.0 MODE OF MEASUREMENTS AND PAYMENT:**

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

**3.2** No deduction shall be made from the quantity of brick work nor any extra payment made for embedding in masonry or making holes in respect of following items:

- 3.3 Ends of joints, beams, posts, girders, rafters, purlins, trusses, corbel steps etc. where cross sectional area does not exceed 500 Sq. cm.
- 3.4 Opening not exceeding 1000 Sq. cm.
- 3.5 Wall plates and bed plates, bearing of slabs, chhajjas and the like whose thickness does not exceed 10 Cms. and the bearing does not extend to the full thickness of wall.
- 3.6 Drainage holes, and recesses for cement concrete blocks to embed hold fasts for doors, windows etc.
- 3.7 Iron fixtures, pipes up to 300 mm dia hold fasts and doors and windows built into masonry and pipes etc. for concealed wiring.
- 3.8 Forming chases of section not exceeding 350 Sq. Cm. in masonry.
- 3.9 Apertures for fire places shall not be deducted nor shall extra labour required to make splaying of jambs, throating and making Arches over the aperture be paid for separately.
- 3.10 The rate shall be for a unit of one cubic meter.

#### **Item No. 56 to 60**

**Masonry work using Aerated light weight concrete block having crushing strength not less than 35 kg/sqcm for super structure above plinth level up to floor two level in cement mortar 1:5 (1 cement: 5 fine sand) complete as per Technical Specification**

##### **1. GENERAL**

This work shall consist of furnishing and placing the Masonry work using light weight. Autoclaved cellular (Aerated) concrete block having crushing strength not less than 40 kg/sqcm and density in oven dry condition between 651 to 750 Kg/cum for super structure above plinth level up to floor two level in cement mortar 1:6 (1 cement: 6 fine sand) of the shape and dimension shown in the drawings and conforming to this specification of an approved brand and make as approved by Architects / Engineer in Charge.

##### **2. TERMINOLOGY**

**2.1 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 and 215°C.

**2.2 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: 3952-1978, and of such size and mass as to permit it to be handled by one man. Furthermore, to avoid confusion with slabs and panels, the height of the block shall not exceed either its length or six times its width.

**2.3 Block Density-**The density calculated by dividing the mass of a block by the overall volume, including holes or cavities and end recess. The density of the material shall be between 651 to 750 Kg/cum.

**2.4 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, The drying shrinkage. shall be determined in the manner described in IS:6441 (Part 2)-1972.

##### **3. DIMENSIONS AND TOLERANCES**

**3.1** Concrete masonry building units shall be made in sizes and shapes to fit different construction needs. The nominal dimensions 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

**3.2** The maximum variation in the length of the units shall not be more than +5 mm and the maximum variation in the height and width of unit, not more than +3 mm.

**3.3** Subject to the tolerances specified, the faces of the masonry units shall be flat and rectangular, opposite faces shall be parallel, and all arises shall be square. The bedding surface shall be at right angles to the faces of the blocks.

#### **4. CLASSIFICATION**

**4.1** The autoclaved cellular concrete blocks shall be classified in two grades according to their compressive strengths and related density.

#### **5. MATERIALS**

**5.1 Cement:** Cement complying with any of the following Indian Standards may be used at the discretion of the manufacturer:

IS: 269-1976 Specification for ordinary and low heat Portland cement (third revision).

IS: 455-1976 Specification for Portland slag cement (*third revision*)

IS: 1489-1976 Specification for Portland pozzolana cement (second revision)

IS: 6909-1973 specification for super sulphated cement

IS: 8041-1978 Specification for rapid hardening Portland cement

IS: 8042-1978 Specification for white Portland cement

IS: 8043-1978 Specification for hydrophobic Portland cement

**5.1.1** Use of fly ash conforming to IS:3812-1981\* may be permitted to a limit of 20 percent in cement conforming to IS:269-1976. However, it shall be ensured that blending of fly ash with cement is as intimate as possible, to achieve maximum uniformity.

**5.2 Lime:** The lime shall satisfy the requirements for Class C lime Specified in IS: 7121973.

**5.3 Aggregate-**The aggregate used for the manufacture of cellular concrete blocks shall conform to the following requirements:

a) Sand-Conforming to IS: 383-1970 except for the grading which may be made to suit the product, and the silica content shall not be less than 80 percent.

b) Fly Ash-Conforming to IS:3812-1981\* with loss on ignition not more than 6 percent.

c) *Granulated Blast Furnace Slag-Generally* conforming to Notes 1 and 2 of IS:455-1976 may be used.

**5.4 Water-**The water used in the manufacture of concrete masonry units shall be free from matter harmful to concrete or reinforcement or matter likely to cause efflorescence in the units and shall meet the requirements of IS: 446-1978.

**5.5 Additives or Admixtures:** Additives or admixtures may be added either as additives to the cement during manufacture, or as admixture to the concrete mix. Additives or admixtures used in the manufacture of concrete masonry units may be:

a) Accelerating, water-reducing and air-entraining admixtures conforming to IS: 91031979.

b) Waterproofing agents conforming to IS:2645-1975, and

c) Colouring pigments.

#### **6. MANUFACTURE**

**6.1** The aerated structure or the cells of the cellular concrete blocks shall be formed by generation of a gas by chemical action, with the mix, prior to hardening with the aid of suitable chemical foaming agent and mixing devices. The cells in the block shall be distributed evenly throughout its volume. Broad principles for the manufacture of the autoclaved cellular concrete blocks are given for guidance only.

#### **7. SURFACE TEXTURE AND FINISH**

**7.1** Concrete masonry, units can be given a variety of surface textures ranging from a very fine close texture to a coarse open texture by the proper selection, grading, and proportioning of aggregates at the time of manufacture. Textures may also be developed by treating the face of the units while still green by wire brushing or combing, by slightly eroding the surface by playing a fine spray of water upon it, and by splitting. Colour may be introduced by incorporating non-fading mineral pigments in the facing concrete, or by applying a coloured cement grout or paint to the face of the units soon after they are removed from the moulds.

**7.2** It is intended to plaster concrete masonry; the block shall have a sufficiently rough surface to afford a good key to the plaster. Waterproofing admixture may be used for preparing the plaster.

## **8. PHYSICAL REQUIREMENTS**

**8.1 General**-All units shall be sound and free of cracks or other defects which interfere with the proper placing of unit or impair the strength or performance of the construction.

*Minor* chipping resulting from the customary methods of handling during delivery, shall not be deemed grounds for rejection.

**8.1.1** Where units are to be used in exposed wall construction, the face or faces that are to be exposed shall be free of chips, cracks, or other imperfections, except that if not more than 5 percent of a consignment contains slight cracks or small chippings not larger than 25 mm, this shall not be deemed grounds for rejection.

**8.2 Dimensions** -The overall dimensions of the units when measured shall be in accordance as mentioned earlier subject to the tolerances as mentioned.

**8.3 Thermal Conductivity**---The thermal conductivity shall not exceed 0.3 W/m. k when tested in accordance with IS:3346-1980

**8.4 Drying Shrinkage**-The drying shrinkage shall be not more than 0.05 percent for Grade 1 blocks and 0.10 percent for Grade 2 blocks when tested in accordance with IS: 6641 (Part-2)1972.

## **9. TEST**

**9.1 Block Density**-The block density shall be determined in the manner described in IS: 6441 (Part1)-1972\*.

\*Methods off test for autoclaved cellular concrete product: Part I Determination of unit weight or bulk density and moisture content.

**9.2 Compressive Strength**—The compressive strength shall be determined in accordance with IS: 6441 (Part 5)-1972\*.

**9.3 Thermal Conductivity**---The thermal conductivity shall be determined in accordance with IS:3346-1980.

**9.4 Drying Shrinkage**-The drying shrinkage shall be determined in accordance with IS: 6641 (Part-2)-1972.

## **10. SAMPLING**

**10.1 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 10 000 blocks or less. Each such group shall constitute a lot.

**10.2** From each lot a sample of 24 blocks shall be selected at random. In order to ensure randomness of selection, all the blocks in the lot may be arranged in a serial order. Starting from any random block every r<sup>th</sup> block may be selected till the requisite number is obtained, being an integral part of N/24, where N is the lot size.

**10.3** The required number of blocks shall be taken at regular intervals during the loading of the vehicle or the unloading of the vehicle depending on whether sample is to be taken before

delivery or after delivery. When this is not practicable, the 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.

**10.4** 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.

#### **10.5 Number of Tests**

**10.5.1** All the 24 blocks shall be checked for dimensions and inspected for visual defects.

**10.5.2** 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.

#### **11. 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, compressive strength, thermal conductivity and drying shrinkage, the mean values shall be within the range specified above.

#### **12. MANUFACTURER'S CERTIFICATE**

**12.1** The manufacturer shall satisfy himself that the masonry units conform to the requirements of this specification and, if requested, shall supply certificate to this effect to the purchaser or his representative.

#### **13. STORAGE**

**13.1** General requirements of storage of autoclaved cellular (aerated) concrete blocks shall be as described in IS: 4082-1977.

#### **14. MARKING**

**14.1** Each lot of concrete masonry units manufactured in accordance with this specification shall be suitably marked with information:

- a) The Identification of the manufacture.
- b) The grade and block density of the unit; and
- c) The month and year of manufacture.

**14.2** Each block may also be marked with the ISI Certification Mark.

NOTE- The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks). Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a license for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

#### **15. MODE OF MEASUREMENTS AND PAYMENT**

**15.1** Masonry work shall be measured in cubic meter unless otherwise specified. Dimensions shall be measured correct to the nearest to 0.01m. Areas shall be calculated to the nearest 0.01 sqm and cubic contents shall be worked out to the nearest 0.01 cum. Half brick wall thickness shall be measured separately in sqm stating the thickness.

**15.2** The measurement shall be taken for the block masonry fully completed in foundation. up to plinth or above plinth and up to floor two level including any shapes and locations as per the item description. Battered, tapered and curved portions shall be measured net as walls.

**15.3** No deduction shall be made from the quantity of brick work, nor shall any extra payment be made from bedding in masonry or making holes in respect of following items.

**15.3.1**End of joists beams, posts, girders, rafters, purlins, trusses, corbel, steps etc. where cross sectional area does not exceed 0.1 m<sup>2</sup>.

**15.3.2**Architectural openings in walls, parapet and compound walls, not exceeding 0.1 m<sup>2</sup> area.

**15.3.3**Wall plates and bed plates, bearing of slabs, chhajjas and the like whose thickness does not exceed 10 cm. and the bearing does not extend to the full thickness of wall.

**15.3.4**Drainage holes, recesses for cement concrete blocks to embed hold fasts for doors, windows etc., forming toothings, grooves etc. and providing cramps for holding stone lining.

**15.3.5**Iron fixtures, pipes up to 300 mm. dia. holdfasts and doors and windows built into masonry and sanitary and water supply pipes, etc., for concealed electrical wiring and any other fixtures or inserts.

**15.3.6**Forming chases of section not exceeding 350 cm<sup>2</sup> in cross section or 50 cm in girth.

**15.4** Apertures for fireplaces shall not be deducted nor shall extra labour required to make playing of jambs, throating and making arches over the aperture be paid for separately. The rate shall include for work of any shape e.g., pillars of any size and shape, curved or tapered walls, drip courses, projections, parapets, load bearing walls, sills, ottas, steps, tank walls, platforms and counter walls, ducts, channels and architectural mouldings like corbelling, pattas, etc.

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

#### **Item No: 61 to 65**

**Providing & fixing 15mm cement plaster in single coat on brick/concrete wall for interior plastering finished even and smooth in cement mortar 1:4 (1 cement: 4 coarse sand) including mala plaster of neat cement including finishing etc complete.**

##### **1.0. Materials**

**1.1.** Water shall conform to M-1. The cement mortar of proportion 1:3 shall conform to M-13.

##### **2.0. Workmanship**

###### **2.1. Scaffolding:**

Wooden bullies, bamboos, planks, trestles, and other scaffolding shall be sound. These shall be properly Examined before erection and use. Stage scaffolding shall be provided for ceiling plaster which shall be independent of the walls.

###### **2.2. Preparation of back-ground:**

**2.2.1.** The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence, and Other foreign matter by water or by brushing. Smooth surface shall be toughened by wire brushing if it is not hard and by hacking if it is hard. In case of concrete surface, if a chemical retarded has been applied to the form work, the surface shall be roughened by wire brushing and all the resulting dust and loose particles cleaned off and care shall be taken that none of the readers if left on the surface. Trimming of projections on brick/concrete surfaces where necessary shall be carried out to get an even surface.

**2.2.2.** Raking of joints in case of masonry where necessary shall be allowed to dry out for sufficient period before carrying out the plaster work.

**2.2.3.** The work shall not be soaked but only damped evenly before applying the plaster. If the surface becomes dry, such area shall be moistened again.

**2.2.4.** For external plaster, the plastering operation shall be started from top floor and carried downwards. For internal plastering, the plastering operations may be started wherever the building frame and cladding work are ready and the temporary supports of the ceiling resting on the wall of the floor have been removed. Ceiling plaster shall be completed before starting plaster to walls.

**2.3. Application of plaster:**

**2.3.1.** The plaster is about 15x15 cms. shall be first applied horizontally and vertically at not more than 2 meters intervals over the entire surface to serve as gauge. The surfaces of these gauges shall be truly in plane of the finished plastered surface. The mortar shall then be applied in uniform surface slightly more than the specified thickness, then brought to a true surface by working a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally, the surface shall be finished off true with a trowel or wooden float according as a smooth or a smooth or a sandy granular texture is required. Excessive troweling or overworking the float shall be avoided. All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Hounding or chamfering, corners, arises junctions etc. shall be carried out with proper templates to be size required.

**2.3.2.** Cement plaster shall be used within half an hour after addition of water. And mortar or plaster which is partially set shall be rejected and removed forthwith from the site.

**2.3.3.** In suspending the work at the end of the day, the plaster shall be left out clean to the line both horizontally and vertically, when recommencing the plaster, the edges of the old work shall be scraped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of the wall and nearer than 15 cm. to any corners or arises. It shall not be closed on the body of features such as plaster bands and cornices not at the corners or arises. Horizontal joints in plaster work shall not also occur on parapet tops and copings as these invariably lead to leakage. No portion of the surface shall be left out initially to be packed up later on.

**2.3.4.** Each coat shall be kept damp continuously till the next coat is applied or for a minimum period of 7 days. Moistening shall commence as soon as plaster is hardened sufficiently. Soaking of walls shall be avoided and only as much water as can be readily absorbed shall be used, excessive evaporation on the sunny or windward side of building in hot air or dry weather shall be prevented by hanging matting or gunny bags on the outside of the plaster and keeping them wet.

**3.0. Mode of measurements & payment**

**3.1.** The rate shall include the cost of all materials, labour and scaffolding etc. involved in the operations described under workmanship.

**3.2.** All plastering shall be measured in square meters unless otherwise specified. Length breadth or height shall be measured correct to a centimeter. Signature of Contractor Signature of Engineer-In-Charge

**3.3.** The thickness of the plaster shall be exclusive of the thickness of the key i.e., grooves or open joints in brick work, stonework etc. or space between laths. The thickness of plaster shall be average thickness with minimum 10 mm. at any point on this surface.

**3.4.** This item includes plastering up to floor two level.



**3.5.** The measurement of wall plastering shall be taken between the walls or partition (dimensions before plastering being taken) for length and from the top of floor or skirting to ceiling for height. Depth of cover of cornices if any shall be deducted.

**3.6.** Soffits of stairs shall be measured as plastering on ceilings, following soffits shall be measured separately.

**3.7.** For jambs, soffits, sills etc. for openings not exceeding 0.5 sq. met each in area for ends of joints beams, posts, girders, steps etc. not exceeding 0.5 sq. mt each in area and for openings exceeding 0.5. Sq. mt and not exceeding 3.00 sq. mt. in each area deductions and additions shall be made in the following manners.

(a) No deductions shall be made for ends of joints, beams, posts etc. and openings not exceeding 0.5 sq.mt each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings, for finish to plaster around ends of joints, beams posts etc.

(b) Deduction for openings exceeding 0.5 sq. mt but not exceeding 3 sq.mt. each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings, (i) When both faces of all walls are plastered with same plaster, deduction shall be made for one face only, (ii) When two faces of wall are plastered.

with different types of plasters or if one face is plastered and the other pointed, deductions shall be made from the plaster or pointing on the side of frame for door, window etc. on which width of reveals is less than that on the other side but no deductions shall be made on the other side. Where width of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from areas of plaster and / or pointing as the case may be.

**3.8.** For openings having door frames equal to or projecting beyond the thickness of wall, full deduction for opening shall be made from each plastered face of the wall.

**3.9.** In case of openings of area above 3 sq. mt. each, deduction shall be made for openings but jambs, soffits and sills shall be measured.

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

#### **Item No: 66 to 70**

**Providing & laying 10 mm thick cement plaster in single coat on Brick/c.c wall, ceilings and soffits of stairs for plastering and finishing even and smooth in cement Mortar 1:4 etc. complete.**

##### **1.0. Materials**

**1.1.** Water shall conform to M-1. The cement mortar of proportion 1:3 shall conform to M13.

##### **2.0. Workmanship**

###### **2.1. Scaffolding:**

Wooden bullies, bamboos, planks, trestles and other scaffolding shall be sound. These shall be properly examined before erection and use. Stage scaffolding shall be provided for ceiling plaster which shall be independent of the walls.

###### **2.2. Preparation of back-ground:**

**2.2.1.** The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface shall be toughened by wire brushing if it is not hard and by hacking if it is hard. In case of concrete surface, if a chemical retarded has been applied to the form work, the surface shall be roughened by wire brushing and all the resulting dust and loose particles cleaned off and care shall be taken that none of the residues are left on the surface. Trimming of projections on brick/concrete surfaces where necessary shall be carried out to get an even surface.

**2.2.2.** Raking of joints in case of masonry where necessary shall be allowed to dry out for sufficient period before carrying out the plaster work.

**2.2.3.** The work shall not be soaked but only damped evenly before applying the plaster. If the surface becomes dry, such area shall be moistened again.

**2.2.4.** For external plaster, the peasting operation shall be started from top floor and carried downwards. For internal plaster, the plastering operations may be started wherever the building frame and cladding work are ready and the temporary supports of the ceiling resting on the wall of the floor have been removed. Ceiling plaster shall be completed before starting plaster to walls.

**2:3. Application of plaster:**

**2.3.1.** The plaster about 15x15 cms. Shall be first applied horizontally and vertically at not more than 2 meters intervals over the entire surface to serve as gauge. The surfaces of these gauges shall be truly in plane of the finished plastered surface. The mortar shall then be applied in uniform surface slightly more than the specified thickness, then brought to a true surface by working a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally, the surface shall be finished off true with a trowel or wooden float according as a smooth or a smooth or a sandy granular texture is required Excessive troweling or overworking the float shall be avoided. All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Hounding or chamfering, corners, arises junctions etc. shall be carried out with proper templates to be size required.

**2.3.2.** Cement plaster shall be used within half an hour after addition of water. And mortar or plaster which is partially set shall be rejected and removed forthwith from the site.

**2.3.3.** In suspending the work at the end of the day, the plaster shall be left out clean to the line both horizontally and vertically, when recommencing the plaster, the edges of the old work shall be scraped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of the wall and nearer than 15 cm. to any corners or arises. It shall not be closed on the body of features such as plaster bands and cornices not at the corners or arises. Horizontal joints in plaster work shall not also occur on parapet tops and copings as these invariably lead to leakage. No portion of the surface shall be left out initially to be packed up later on.

**2.3.4.** Each coat shall be kept damp continuously till the next coat is applied or for a minimum period of 7 days. Moistening shall commence as soon as plaster is hardened sufficiently. Soaking of walls shall be avoided and only as much water as can be readily absorbed shall be used, excessive evaporation on the sunny or windward side of building in hot air or dry weather shall be prevented by hanging matting or gunny bags on the outside of the plaster and keeping them wet.

**3.0. Mode of measurements & payment**

**3.1.** The rate shall include the cost of all materials, labour and scaffolding etc. involved in the operations described under workmanship.

**3.2.** All plastering shall be measured in square meters unless otherwise specified. Length breadth or height shall be measured correct to a centimeter.

**3.3.** Thickness of the plaster shall be exclusive of the thickness of the key i.e. grooves or open joints in brick work, stone work etc. or space between laths. Thickness of plaster shall be average thickness with minimum 10 mm. at any point on this surface.

**3.4.** This item includes plastering up to floor two level.

**3.5.** The measurement of wall plastering shall be taken between the walls or partition (dimensions before plastering being taken) for length and from the top of floor or skirting to ceiling for height. Depth of cover of cornices if any shall be deducted.

**3.6.** Soffits of stairs shall be measured as plastering on ceilings, following soffits shall be measured separately.

**3.7.** For jambs, soffits, sills etc. for openings not exceeding 0.5 sq. met each in area for ends of joints beams, posts, girders, steps etc. not exceeding 0.5 sq. mt each in area and for openings exceeding 0.5. Sq. mt and not exceeding 3.00 sq. mt. in each area deductions and additions shall be made in the following manners.

(a) No deductions shall be made for ends of joints, beams, posts etc. and openings not exceeding 0.5 sq. mt each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings, for finish to plaster around ends of joints, beams posts etc.

(b) Deduction for openings exceeding 0.5 sq. mt but not exceeding 3 sq.mt. each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings, (i) When both faces of all wall are plastered with same plaster, deduction shall be made for one face only, (ii) When two faces of wall are plastered with different types of plasters or if one face is plastered and the other pointed, deductions shall be made from the plaster or pointing on the side of frame for door, window etc. on which width of reveals is less than that on the other side but no deductions shall be made on the other side. Where width of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from areas of plaster and / or pointing as the case may be.

**3.8.** For openings having door frames equal to or projecting beyond the thickness of wall, full deduction for opening shall be made from each plastered face of the wall.

**3.9.** In case of openings of area above 3 sq. mt. each, deduction shall be made for openings but jambs, soffits and sills shall be measured.

**3.10.** The rate shall be for a unit of One sq. meter.

#### **Item No: 71**

**20mm thk sandface cement plaster on walls up to all hts above ground level consisting of 12mm thk backing coat of C.M.1:3 (1 cement:3 sand) & 8mm thk finishing coat of CM (1:1) 1 cement:1 sand, etc. complete.**

##### **1.0. Materials**

**1.1.** Water shall conform to M-1. Cement mortar shall conform to M-11.

##### **2.0. Workmanship**

**2.1.** The work shall be carried out in the coats. The backing coat (base coat) shall be 12 mm. thick in C.M. 1:3. The relevant specifications of item No. 17.58 (I) shall be followed except that the thickness of back coat shall be 12 mm. average. Before the first coat hardens its surface shall be beaten up by edges of wooden tapers and close dents shall be made on the surface. The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days, depending upon the weather conditions. The surface shall not be allowed to dry during this period.

**2.2.** The second coat shall be completed to 8 mm. thickness in C.M. 1:1 as described above, including raising sand facing by bushing. The sample of sand face shall be approved before the work is started. The whole work shall be carried out uniformly as per sample approved.

##### **2.3. Curing:**

The curing shall be started overnight after finishing of plaster. The plaster shall be kept wet for a period of 7 days. During this period, it shall be protected from all damage.

### **3.0. Mode of measurement & payment**

**3.1.** The relevant specifications of item No. 17.58 shall be followed except that the sand face plaster on outside up to 10 m. above ground level shall be measured under this item.

**3.2.** The rate shall be for a unit of One sq. meter.

17.116 (A) Pointing on brick work with cement mortar 1:3 (1 cement: 3 coarse sand) flush pointing.

#### **Item No: 72**

**Providing 20 mm thick double coat mala cement plaster on interior brick / concrete work for plastering comprising of base coat of 12 mm thick cement plaster in cement mortar (1 Cement: 4 coarse sand) in rough finishing and 8 mm thick topcoat of cement mortar 1:2 (1 Cement: 2 Coarse sand) finished with trowel including scaffolding curing etc. complete.**

##### **1. Materials & Workmanship**

Water shall conform to M-1. Cement mortar shall conform to M-11.

**2.** The work shall be carried out in the coats. The backing coat (base coat) shall be 12 mm. thick in CM. 1:4 The relevant specifications of item No. 17.58 (I) shall be followed except that the thickness of back coat shall be 12 mm. average. Before the first coat hardens its surface shall be beaten up by edges of wooden tapers and close dents shall be made on the surface. The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days, depending upon the weather conditions, the surface shall not be allowed to dry during this period.

**3.** The second coat shall be completed to 8 mm. thickness in CM. 1:2 as described above, including raising sand facing by bushing. The sample of sand face shall be approved before the work is started, the whole work shall be carried out uniformly as per sample approved.

##### **4. Curing:**

The curing shall be started overnight after finishing of plaster. The plaster shall be kept wet for a period of 7 days. During this period, it shall be protected from all damage.

##### **Mode of measurements & payment**

The relevant specifications of item NO. 17.58 (I) shall be followed except that the sand-face plaster on outside up to 10 in. above ground level shall be measured under this item.

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

#### **Item No: 73**

**Providing and applying 2mm thick Texture Plaster Terre Plalette (Spectrum, Coral or equivalent) incorporating fine fillments made of polymer and aggregating natural stone powder with making grooves on base coat of 20 mm thick smooth mala plaster (which paid separately) etc. complete. Colour and shade as approved by Architect/ Engineer in Charge for all floor, all height.**

Applying and Finishing wall with Textured Exterior Paint of approved make of one coat applied @ 1 kg/ 0.50 sqmt. over and including base coat of water proofing cement paint of approved make @ 2.20 Kg/10 Sqmt. etc. complete as directed by EIC.

##### **Materials**

**1.** Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Birla White Textura (TF) material. It shall have scratch hardness of min. 3-4 N and. It should have added water 45 to 50% clean Water.

##### **Workmanship:**

1. Remove all the loosely adhering particles from the wall surface by wire brush or medium size emery stone. Clean the wall with potable water and ensure the surface is in line and level.
2. Apply the textured finish prepared as above with suitable roller over the surface to get the desired finish.
3. The slurry should be used within 2 hours of adding water. The Roller should be cleaned properly after use. Keep the Birla White Textura pack in a dry place and out of reach of children.
4. Birla White Texture Trowel Finish/Roller Finish / Spray Finish.

**Mode of measurement & payment:**

The rate shall include the cost of all material and labour involved in all the operations described above.

The rate shall be for units of one sq. meter.

**Item No. 74**

**Providing and fixing Chicken mesh jali (22 gauge) at the junction of 2 different surfaces of different material component at the time of plastering to prevent cracking in plaster surface as and were directed at all floors with all leads and lifts etc. complete. 1.0**

**Materials:**

- 1.1. Mild steel wire may be galvanised, as indicated. All finished steel wire shall be well cleanly drawn to the dimensions, and size of wire as specified in item. The wire shall be sound, free from splits, surface flaws, rough jagged and imperfect edges and other harmful surface defects and shall conform to I.S. 280-1978.

**2.0 Workmanship:**

- 2.1 G.I. welded wiremesh - 22 gauge of approved size shall be fixed between the RCC and masonry junction in proper line, level and plumb with all material, labour, tools, tackles, and equipment. Including fixing the jali with nails and washer so that it holds the jali in line and level etc complete as directed by the site-in-charge.

**3.0 Mode of measurement & Payment:**

- 3.1 The rate includes the cost of all labour, materials, tools, and plants etc. required for satisfactory completion of this item.
- 3.2 The rate shall be for a unit of one square meter.

**Item No: 75**

**Providing throating or plaster drip and molding to R.C.C. Chhajjas.**

**1.0. Materials**

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

**2.0. Workmanship**

- 2.1. The work shall be carried out as directed. The proportion of mix for finishing shall be in C.M. 1:2 by volume. Curing shall be done for not less than 7 days. The work shall be carried out in best workman like manner. The throating or plaster drip and moulding shall be one centimeter in thickness.

**Item No: 76**

**Providing 20 mm thick waterproof cement plaster using water proofing powder 1Kg/1bag of cement for all floors on brick / concrete wall work using water proofing materials in C M 1: 4 (1 cement 4 coarse sand) including finishing with a floating coat of**

**neat cement slurry etc complete for all floor and shall be guaranteed for a minimum period of 10 years after handing over the completed building by the main contractor to be finished as directed. Stamp paper guarantees 10 years to be furnished before receiving any payment from the client.**

Specification for 20 mm thick cement plaster shall conform to item no. 17.61 (II), 17.69 & item no. 17.70 of General Technical Specifications for building work.

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

**Item No: 77**

**Applying two coats of putty & two coats of primer of approved brand and manufacture on new wall surface to give an even shade including thoroughly brushing the surface free from mortar dropping and other foreign matter and sand papered smooth.**

**Materials**

1.1 Wall putty shall be of approved brand and manufacturer.

**2.0 Workmanship**

2.1 The surface shall be thoroughly cleaned of all dust, dirt, mortar cropping and other foreign matter before whitewash is to be applied.

2.2 The surface spoiled by smoke soot shall be scrapped with steel wire brushes or steel scrapers or shall be rubbed with over burnt surkhi or brick bats. The surface shall be then broomed to remove all dust.

2.3 Oil or grease spots shall be removed by suitable chemical and smooth surface shall be rubbed with wire brushes.

2.4 All unnecessary nails shall be removed, the holes, cracks, patches etc. shall be made good with material similar in composition to the surface to be prepared.

**3.0 Mode of measurements & payment**

3.1 The relevant specifications of building specification item no. 18.11 shall be followed.

3.2 The rate shall be for a unit of One Square metre.

**Item No: 79**

**Finishing wall with weatherproof low velocity ultima exterior emulsion paint on wall surface (two coats) to give a required shape even shade after thoroughly brushing the surface to remove all dirt, and remains of loose powdered materials.etc complete for all height.**

**1.0 Materials:**

1.1 The **Weatherproof exterior emulsion paint** conform shall be from an approved manufacturer and shall conform to the latest Indian Standards for various paints. Ready mixed paints as received from the manufacturer without any admixture shall be used, except for addition of thinner, if recommended by the manufacturer.

**2.0 Workmanship:**

2.1 Scaffolding: Wherever scaffolding is necessary it shall be erected in such a way that as far as possible one part of scaffolding shall rest against the surface to be white or coloured washed. A properly secured strong and well tied suspended platform (Zoola) may be used for whitewashing. Where ladders are used, pieces of old gunny bags shall be tied at top and bottom to prevent scratches to the floors and walls. For whitewashing of ceilings proper stage scaffolding shall be erected where necessary.

2.2.1 Preparation of surface: The surface shall be thoroughly cleaned of all dust, dirt, mortar cropping and other foreign matters before whitewash is to be applied.

- 2.2.2** The surface spoiled by smoke soot shall be scraped with steel wire brushes or steel scrappers or shall be rubbed with over burnt surkhi or brick bats. The surface shall be then broomed to remove all dust, dirt and shall be washed with clean water.
- 2.2.3** Oil or grease spots shall be removed by suitable chemical and smooth surface shall be rubbed wire brushes.
- 2.2.4** All unsound portion of the surface plaster shall be removed to full depth of plaster in rectangular patches and plastered again after raking the masonry joints properly. Such portion shall be wetted and allowed to dry. They shall then be given one coat of whitewash.
- 2.2.5** All unnecessary nails shall be removed, the holes cracks patches etc. shall be made good with materials similar in composition to the surface to be prepared shall be followed except that the word whitewash colour wash shall be substituted with water proofing cement paint. The surface shall be thoroughly wetted with clean water before cement water proofing paint is applied.
- 2.2** Preparation of paint: Portland cement shall be prepared by adding paint powder to water and stirring to obtain a thick paste, which shall then be diluted to a brushable consistency. Generally, equal volumes of paint powder and water make a satisfactory paint. In all cases, the manufacture's instructions shall be followed. The paint shall be mixed in such quantities as can used up within an hour of mixing as otherwise the mixture will set and thickness, affecting flowing and finish. The libs of cement paint drums shall be kept tightly when not in use.
- 2.3 Application of Paint:**
- 2.3.1** No painting shall be done when the paint is likely to be exposed to a temperature of below 7°C within 48 hours after application.
- 2.3.2** When weather conditions are such as to cause damage, the work shall be carried out "in the shadow" as far as possible. This helps the proper hardening of the paint film by keeping the surface moist for a longer period.
- 2.3.3** To maintain the uniform mixture and to prevent segregation, the paint shall be stirred frequently in the bucket.
- 2.3.4** For undercoated surfaces, the surfaces shall be treated with a minimum of two coats of waterproof cement paint. Not less than 24 hours shall be allowed between two coats. Next coat shall not be started until the preceding coat has become sufficiently hard to resist marking by the brush being used. In hot dry weather, the preceding coat shall be allowed between two coats. Next coat shall not be started until the preceding coat has become sufficiently hard to resist marking by the brush being used. In hot dry weather, the preceding coat shall be slightly moistened before applying the subsequent coat.
- 2.3.5** The finished surface shall be even and uniform in shade, without patches, brush masks, paint drops etc.
- 2.3.6** The cement paint shall be applied with a brush with relatively short stiff hog or fibre bristles. The paint shall be brushed in uniform thickness and shall be free from excessive heavy brush marks. The lamps shall be well brushed out.
- 2.3.7** Waterproof cement paint shall not be applied on surfaces already treated with whitewash colour wash, distemper dry or oil bound varnishes, paint etc. It shall not be applied on gypsum, wood and metal surfaces.
- 2.4 Curing:** Painted surfaces shall be sprinkled with water two or three times a day. This shall be done between coats and for at least two days following the final coat. The

curing shall be started as soon as the paint has hardened so as not to be damaged by the sprinkling of water, say about 12 hours after the application.

**3.0 Mode of measurements & payments:**

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

**Item No. 80**

**Providing and fixing M.S. plain grills of required pattern with M.S. flats at required spacings & frame around, square or round bars with round headed bolts and nuts or by screws including applying a priming coat of red lead paint two coat of Oil paint,**

**1.0 MATERIALS:**

**1.1 Structural Steel:**

**1.1.1** All structural steel shall conform to I.S. 226-1965. The steel shall be free from the defects mentioned in I.S. 226-1975 and shall have a smooth finish. The material shall have a smooth finish. The material shall be free from loose mill scale, rust pits or other defects affecting the strength and durability. Rivet bars shall conform to I.S. 1148-1973.

**1.1.2** When the steel is supplied by the Contractor test certificates of the manufacturer shall be obtained according to I.S. 226-1975 and other relevant Indian Standards.

**1.1.3** Oil Paints shall be of the specified colour and shade, and as approved. The ready mixed paints shall only be used. However, if ready mixed paint or specific 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.

**1.1.4** All the paints shall meet following general requirements: Paint shall not show excessive setting in a freshly opened full can and shall easily be redispersed with a paddle to a smooth homogeneous state. The paint shall show no curing, livering, caking or colour separation and shall be free from lumps and skins.

**1.1.5** The paint as received shall brush easily, possess good levelling properties and show no running or sagging tendencies.

**1.1.6** The paint shall not skin within 48 hours in a three quarters filled closed container.

**1.1.7** The paint shall dry to a smooth uniform finish free from roughness, grit, unevenness and other imperfections.

**1.1.8** Ready mixed paint shall be used exactly as received from the manufacturer and generally according to their instructions and without any admixtures whatsoever.

**2.0 WORKMANSHIP:**

**2.1** The M. S. Grill shall be prepared as per the drawings or as directed for fixing to wooden frames of windows etc.

**2.2** The grill shall be fabricated to the designs and patterns shown in the drawings and the weight shall be as directed and the joints shall be riveted or welded as shown in the plan or as directed. The grill so formed shall be fixed into the frames of the windows etc., before they are erected in position. The outside strip frame of the grill shall be housed to its full thickness into the recess cut into the frame of the windows etc. The grill shall be fixed to the frame with number of bolts and nuts or screws viz. bolt nut/screw per 30 cm. Of the length of outer strip subject to a minimum of 2 nos. on each side of the frame or as indicated in the drawings or as directed.

**2.3** The bolts and nuts or screws shall be counter sunk and shall be fixed with the top of their heads flush with the face of frame strips.

**2.4 General:**



- 1.1** The materials required for work of painting work shall be obtained directly from approved manufacturers or approved dealer and brought to the site in maker's drums, kege etc. with seal unbroken.
- 1.2** All materials not in actual use shall be kept properly protected, lids of containers shall be kept closed and surface of paint in open or partially open containers covered with a thin layer of turpentine to prevent formation of skin. The materials which have become stale 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.
- 1.3** If for any seasons, thinning is necessary, the brand of thinner recommended by the manufacturer shall be used.
- 1.4** The surface to be painted shall be thoroughly cleaned and dusted. All rust, dirt and grease shall be thoroughly removed before painting is started. No painting on exterior or other exposed parts of the work shall be carried out in wet, damp or otherwise unfavourable weather and all the surfaces shall be thoroughly dry before painting work is started.
- 1.5 Application:**
- 1.1** Brushing operations are to be adjusted to the spreading capacity advised by the manufacture of particular paint. The paint shall be applied evenly and smoothly by means of crossing and laying off. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite directions two or three times and then finally brushing lightly in 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.
- 1.2** Each coat shall be allowed to dry completely and lightly rubbed with a very fine grade of sandpaper and loose particles brushed off before next coat is applied. Each coat shall vary slightly in shade and shall be got approved from Engineer-in-charge before next coat is started.
- 1.3** Each coat except the last coat shall be lightly rubbed down with sandpaper of fine pumice stone and cleaned of dust before the next coat is applied. No hair marks from the brush or clogging of paint puddles in the corners of panels angles of mouldings etc. shall be left on the work.
- 1.4** Special care shall be taken while painting over bolts, nuts, rivets, overlaps etc. Approved best quality brushes shall be used.
- 3.0 MODE OF MEASUREMENT AND PAYMENT:**
- No payment shall be made for weight of screws, bolts, nuts & oil paint etc. Only the weight of grill shall be paid.
- The rate shall be per unit of one Kg.

**Item No. 82**

**Providing and fixing flush door both sides laminated shutter fabricated from 35 mm thick solid core malemine faced three layered pre laminated flat pressed wood based exterior grade bonded BWP/BWR synthetic resin having stamped IS 12823 grade I type II including three coats of lacquer polishing to exposed wooden surfaces and Stainless-**

**steel decorative type designs fixtures / fastening etc. including I.T.W. triangular batten patti of size 30m.m.x30m.m.etc. as per architectural detailed drawing and as directed by engineer in charge.**

Specification The shutter work shall be Carried out as per item no. 10.30, P.63 of General Technical Specifications for building work, 35mm thick shutter shall be used. The laminated sheet of best quality shall be fixed to shutter to both side & triangular beading of size 30x30 mm shall be fixed around the door frames. The lacquer polishing to be carried out on exposed surfaces. The decorative stainless-steel fixtures & fastenings are to be fixed as per detailed drawing & directed by engineer in charge.

Rate shall be for a unit of one Square Meter.

**Item No: 83**

**Providing and fixing window having extruded aluminum Colour anodized section frame main outer size 95mm x 24mm x 1.17mm @ wt.of 0.738 Kg./mt, horizontal Three track member size 92mm x 31.75mm x 1.30mm,@ Wt.1.07 Kg./mt, vertical member of size 92mm x 31.75mm x 1.50mm @ Wt. 1.06 Kg./mt with sliding shutters of horizontal member size 40 mmx18mm x1.29mm @ wt.of 0.456 Kg./mt, vertical member of size 40mm x 18mm x 1.29 mm @ wt.of 0.456Kg./mt/ with 5 mm thick transparent bronze colour tinted float glass with powder coated aluminum fittings and fixtures and transparent silicon sealant glass fixing to frame as per details etc**

Refer general technical specification booklet item 11.27.

**Mode of measurement and payment:**

Measurement will be on Sqmt.

Payment will be made on Sqmt.

**Item No. 85**

**Providing and fixing heavy duty S.S. Door Closer as directed by Engineer in Charge.**

**1. 0. Workmanship:**

- 1.1. This item provides for labour fixing door closer of any size with screws nuts etc.
- 1.2. The Door Closer shall be fixed in proper position as shown in the drawings or as directed. There shall be fixed truly vertical as the case may be.
- 1.3. The screws shall be driven home with screwdriver. In-not case the screws shall be hammered in.
- 1.4. All recesses and seats shall be cut to the exact size for counter sinking etc. where so required.
1. 5. Care shall be taken to see that no gaps are left between the fitting and the surface meant to receive the fittings,
- 1.6. The fittings shall be properly cleaned and left in their original finish after fixing.

**2.0. Mode of measurements & payment**

- (1) Cutting holes, recesses and seats involved in the process of fixing.
  - (2) Cost of filling and cushioning materials were required for per seating of new fittings.
  - (3) Cost of nail-, etc. for temporary positioning of fitting.
  - (4) Cost bf cleaning materials like old, washed dhoti, stain remover etc.
  - (5) Cost of making good the over cut recesses or holes, if any.
  - (6) Cost of making hole of required size on the wooden frame for housing the bolt for locking
- 2.2.** The rate including cost of labour involved in all operations required for proper completion of the items, including carraige, handling, fixing etc. complete.

2.3. The rate shall be for units of one number.

**Item No: 86**

Providing and fixing factory made single extruded WPC (Wood Polymer Composite) solid door/window/Ceostory windows & other Frames/Chowkhat comprising of virgin PVC polymer of K value 58- 60 (Suspension Grade), calcium carbonate and natural fibers (wood powder/ rice husk/wheat husk) and non toxic additives (maximum oxicity index of 12 for 100 gms) fabricated with miter joints after star headed SS screws having minimum frame density of 750 kg/ cum, screw withdrawal strength of 2200 N (Face) & 1100 N (Edge), minimum compressive strength of 58 N/mm<sup>2</sup>, modulus of elasticity 900 N/mm<sup>2</sup> and resistance to spread of flame of Class A category with property of being termite/borer proof, water/moisture proof and fire retardant and fixed in position with M.S hold fast/lugs/SS dash fasteners of required dia and length complete as per direction of Engineer-In- Charge. (M.S hold fast/lugs or SS dash fasteners shall be paid for separately). Note: For WPC solid door/window frames, minus 5mm tolerance in dimensions i.e depth and width of profile shall be acceptable. Variation in profile dimensions on plus side shall be acceptable but no extra payment on this account shall be made. applying PVC solvent cement and screwed with full body threaded Complete as per direction of Engineer-in-Charge.

1) Frame size 45 x 70 mm

**Materials:**

WPC Frames as per manufacturer specifications.

**Mode of measurement and payment:**

Measurement will be on **Running Meter** basis.

Payment will be made on a **Running Meter** basis.

**Item No: 87**

Providing and fixing factory made single extruded WPC (Wood Polymer Composite) solid plain flush door shutter of required size comprising of virgin polymer of K value 58-60 (Suspension Grade), calcium carbonate and natural fibers (wood powder/ rice husk/wheat husk) and non toxic additives (maximum toxicity index of 12 for 100 gms) having minimum density of 650 kg/cum and screw withdrawal strength of 1800 N (Face) & 900 N (Edge), minimum compressive strength 50 N/mm<sup>2</sup>, modulus of elasticity 850 N/mm<sup>2</sup> and resistance to spread of flame of Class A category with property of being termite/ borer proof, water/moisture proof and fire retardant and including stainless steel butt hinges of required size with necessary full body threaded star headed counter sunk S.S screws, Handles, Stopper, Door closer, Tower bolt all as per direction of Engineer-In- Charge. (Note: stainless steel butt hinges and necessary S.S screws shall be paid separately) 1) 30 mm thick.

**Materials:**

WPC Door Shutter as per manufacturer specifications.

**Mode of measurement and payment:**

Measurement will be on **Square Meter** basis.

Payment will be made on a **Square Meter** basis.

**Item No: 88**

**Providing and laying 16-18 mm thick polished granite stone machine cut in single piece (Max. available) in sill and jambs of door, window, ventilation & lift wall cladding, staircase flooring landing, risers & treads, skirting laid over 10 mm thick cement mortar 1: 3 (1 cement: 3 coarse sand) and jointed with grey cement slurry with matching pigment incl. rubbing and polishing, half rounding edge and incl. fixing of hilty fastener at every 1/3 span of sill as required size etc. complete colour and shed as approved by architect Engineer in Charge.**

The specifications for this item shall conform to item no. 14.44, of General Technical Specifications for building work. Except that the whole work is to be carried out by fixing Mirror polished granite stone 18mm thick For Door sill & jambs in Single Piece only instead of polished kota stone dedo. Rate including half round moulding of edges as directed by Engineer in Charge.

Rate shall be for a unit of one Square Meter.

**Item No. 89**

**Providing and laying Granite slab (18 mm thick) one side polished flooring over 20 mm (average) base of cement mortar 1:6 (1 cement:6 coarse sand) or L.M 1:1.5 laid and joined with grey cement slurry including rubbing and polishing complete.**

This work shall consist of furnishing and placing Granite stone slab slab flooring of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer in charge.

**1.0 MATIRIAL****1.0 GRANITE STONE SLAB**

**1.1.** Granite stone slab shall be hard even sound, and regular in shape and generally uniform in colour. The colour of the stone approved by the architect shall be allowed for use. They shall be without any soft veins cranks of flaws Granite stone slab shall be hard, even, and regular in shape and it should without fault.

**1.2.** The size of the Granite stone slab to be used for flooring shall be of size minimum 600 mm x 600 mm size or as per drawings as approved by Engineer in charge or Architect. However smaller sizes will be allowed to be used to the extent of maintaining the required pattern. Thickness shall be as specified.

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

**1.4.** The edges of Granite stone slab shall be truly Machine cut All angles and edges of the stones of shall be true, square and free chipping and surface shall be true and plain.

**1.5.** The Granite stone slab shall have machine mirror polished surface. When brought on site, The stones to be used for Flooring dedo, skirting, sink, veneering, sills, steps, etc.

**2.0 WATER**

**2.1** Water shall not be salty brackish and shall be clean reasonably clear and free objectionable quantities of silt and traces of oil injurious alkalis salts organic matter and other deleterious material which will either weaken the mortar of concrete or cause efflorescence or attack the steel in RCC container for transport storage and huddling of water shall be clean, Water shall confirm to the standard specified in I S 455 -1978

**2.2.** If required by the Engineer in charge it shall be tested by comparison with distilled water compression shall be made by means of standard cement tests for soundness time of setting and mortar strength as specified in I S 269-1976 Any indication of unsoundness charge in time

of setting by 30 minutes or more or decrease of more than 10 percent strength of mortar prepared with distilled water sample when compared with the result obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.

**2.3** Water for curing mortar concrete or masonry should not be too acidic or too alkaline.

**2.4** It shall be free of elements which significantly affect the hydration reaction or otherwise interface with the hardening of mortar or concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces.

**2.5** Hard and bitter water and sea water shall not be permitted for curing.

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

**2.7.** Storage Water shall be stored in containers/ tanks covered at top and cleaned at regular intervals in order to prevent intrusion by foreign matter or growth of organic matter Water from shallow muddy or marshy surface shall not be permitted the intake pipe shall be enclosed to exclude silt, mud grass and other solid materials and there shall be a minimum depth of 0.60 m on water below the intake at all times.

**2.8.** As a guide following concentrations represent the maximum permissible values

(a) to neutralize 200 ml sample of water using phenolphthalein as indicator, it should not require more than 2 ml of 0.1 normal NaOH

(b) To neutralize 200 ml of water using methyl orange as an indicator, it should not require more than 10 ml of 0.1 normal HCl

(c) the permissible limits for solids shall be as follows when tested in accordance with IS 3025

<b>Permissible limits (Max)</b>	
Organic	200 mg/lit
Inorganic	3000 mg/lit
Soleplates (SO <sub>4</sub> )	500 mg/lit
Chlorides (Cl)	500 mg/lit
Suspended matter	2000 mg/lit

In case of structures of length 30 m and below, the permissible limit of chlorides may be increased up to 1000 mg/lit

All samples of water (including potable water shall be tested and suitable measures taken where necessary to ensure conformity of the water to the requirements stated herein.

(d) The pH value shall not be less than 6

### **3.0 CEMENT**

**3.1.** Cement to be used in the works shall be any of the following types with the prior approval of the Engineer:

**a)** Ordinary Portland cement, 33 Grade, conforming. To IS: 269.

**b)** Rapid Hardening Portland cement, conforming to IS:8041.

**c)** Ordinary Portland cement, 43 Grade, conforming to IS: 8112.

**d)** Ordinary Portland cement, 53 Grade, conforming to IS: 12269.

**e)** Soleplate Resistant Portland cement, conforming to IS: 12330.

**3.2.** Cement conforming to IS:269 shall be used only after ensuring that the minimum required design strength can be achieved without exceeding the maximum permissible cement content of 540 kg/cum. of concrete.

**3.3.** Cement conforming to IS:8112 and IS:12269 may be used provided the minimum cement content mentioned elsewhere from durability considerations is not reduced. From strength considerations, these cements shall be used with a certain caution as high early strengths of cement in the 1 to 28-day range can be achieved by finer grinding and higher constituent ratio

of C3S/C2S, where C3S is Tri-calcium Silicate and C2S is Dicalcium Silicate. In such cements, the further growth of strength beyond say 4 weeks may be much lower than that traditionally expected. Therefore, further strength tests shall be carried out for 56 and 90 days to fine tune the mix design from strength considerations.

**3.4.** Cement conforming to IS: 12330 shall be used when sodium sulphate and magnesium sulphate are present in large enough concentration to be aggressive to concrete. The recommended threshold values as per IS:456 are sulphate concentration in excess of 0.2 per cent in soil substrata or 300 ppm (0.03 percent) in ground water. Tests to confirm actual values of sulphate concentration are essential when the structure is located near the sea coast, chemical factories, agricultural land using chemical fertilizers and sites where there are effluent discharges or where soluble sulphate bearing ground water level is high. Cement conforming to IS:12330 shall be carefully selected from strength considerations to ensure that the minimum required design strength can be achieved without exceeding the maximum permissible cement content of 540 kg/cum. of concrete.

**3.5.** Cement conforming to IS 8041 shall be used only for precast concrete products after specific approval of the Engineer in charge.

**3.6.** Total chloride content in cement shall in no case exceed 0.05 percent by mass of cement also total sulfur content calculated as sulfuric anhydride (SO<sub>3</sub>) shall in no case exceed 2.5 per cent and 3.0 percent when tri-calcium aluminate per cent by mass is up to 5 or greater than 5 respectively.

### **3.3. Storage**

Cement shall be transported, handled and stored on the site in such a manner as to avoid deterioration or contamination, Cement shall be stored above ground level in perfectly dry and watertight sheds and shall be stacked not more than eight bags high. Wherever bulk storage containers are used their capacity should be sufficient to cover the requirement at site and should be cleaned at least once every 3 to 4 months.

**3.4.** Each consignment shall be stored separately so that it may be readily identified and inspected, and cement shall be used in the sequence in which it is delivered in any way, during storage shall not be used in the works and shall be removed from the site by the contractor without charge to the employer.

The contractor shall prepare and maintain proper records on site in respect of delivery, handling, storage and use of cement and these records shall be available for inspection by the engineer in charge at all times.

**3.5.** The contractor shall make a monthly return to the engineer in charge on the date corresponding to the interim certificate date showing the quantities of cement received and issued during the month in stock at the end of the month.

## **4.0 SAND**

**4.1** Sand shall be natural sand, clean well graded, hard strong durable and gritty particles free from immure amounts of dust, clay, kankar nodules, soft or flaky particles, alkali salts, organic matter, mica or other deleterious substance and shall be got approved from the Engineer-in-charge. The sand shall not contain more than 8 percent of slit as determined by field test. If necessary, the sand.

**Coarse Sand:** The fineness modulus of coarse sand shall not be less than 2.5 and shall not exceed 3.0. The sieve analysis of coarse sand shall be as under:

<b>I. S. Sieve Designation</b>	<b>% by wt. passing</b>
4.75 mm	100
2.36mm	90 to 100
1.18 mm	70 to 100
600 MC	30 to 100
300 MC	85 to 70
150 MC	00 to 50

**4.2 FINE SAND:** The fineness module shall not exceed 1.0 the sieve analysis of fine sand be as under:

<b>IS. Sieve Designation</b>	<b>% by wt. passing</b>
4.75 mm	100
2.3 6mm	. 100
1.18 mm	75 to 100
600 MC	40 to 85
300 MC	05 to 50
150 MC	00 to 10

**4.3** Materials shall be stored to prevent the deterioration of their quality and fitness for the work. Any material which has deteriorated or has been damaged or is otherwise considered defective by the Engineer-in-charge shall not be used in the work.

## **5.0 WORKMANSHIP**

**5.1** Granite stone slab shall be of approved quality shall be laid evenly to level and slope as directed by Engineer in charge over a bed of a base layer consisting of cement mortar 1:6 (1 cement: 6 coarse sand by volume) or Lime Mortar 1:1.5 ( 1 lime:1.5 lime putty by volume)

**5.2** Granite stone slab shall be laid evenly as per detailed drawing or as directed by Engineer in charge. Width, length and shape of Granite stone shall be as per pattern shown in detailed drawing.

**5.3.** Cement and sand for base layer shall be mixed in proportions of 1:6 (1 cement:6 coarse sand by volume) Cement and sand shall be proportioned by volume after making do allowance for bulking. The required quantity of water shall then be added and the mortar. mixed to produce workable consistency before mixing platform shall be thoroughly cleaned before changing from one type of cement to another.

**5.4.** The mixing for base layer shall be done intimately, the operation shall be carried out on clean watertight platform, and cement sand shall be first mixed dry in the required proportion to obtain uniform colour and then the mortar shall be mixed for at least two minutes after addition of water. In case of cement mortar, that has suffered because of evaporation of water the same shall be re-tempered by adding water as frequently as needed to restore the requisite consistency but its re-tempering shall be permitted only within thirty minutes from the time of addition to water at the time of initial mixing.

and For Dedo it should be followed as per relevant Specification of item no 14.32

**5.5.** Cement and sand for base layer shall be mixed in proportion as specified in the item, Cement and sand shall be proportioned by volume after making do allowance for bulking. The required quantity of water shall then be added, and the mortar mixed to produce workable consistency.

**5.6.** Curing shall be started as soon as the mortar used for finished has hardened sufficiently no to be damaged when watered. It shall be kept wet for a period of at least 7 days. During this period, it shall be suitably protected from all damage.

**5.7.** During hot weather, all finished or partly finished work shall be covered or wetted in such manner as will prevent rapid drying of the flooring work.

**5.8.** Joints of Granite stone slab flooring shall be through and continuous throughout the building as directed by Engineer in charge.

**5.9.** joints shall be filled with a stiff mixture of gray cement slurry.

**5.10.** The Granite stone slab flooring work shall be finished by rubbing and mirror polishing after the work of flooring is set properly.

#### **6.0 MODE OF MEASUREMENT & PAYMENT:**

**6.1.** The unit rate Granite stone slab flooring shall include the cost of all materials, tools and plant required for mixing, laying of base layer in true level and slope as required applying & placing stones in position, finishing, curing etc flooring all over the length of walls and corners and sill of doors etc, and all other incidental expenses for producing flooring work to complete the structure or its components as shown on the drawings and according to these specifications. They shall also include the cost of making, fixing and removing all scaffolding and forms required for the work. The rate includes the cost of mirror polishing of flooring and dado work.

**6.2** Therateshall include the cost of all materials and labours involved in all the operations described above. The Kota stone flooring shall be measured in square meters correct to 2 places of decimal. Length and breadth shall be measured to correct to a centimeter and between the finished the finished face of the skirting, dado or wall plaster and no deduction shall be made nor extra paid for any opening in floors or areas up to 0.1 square meter.

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

#### **Item No. 90**

**Providing and Laying 600mm x 600 mm full body Double Charge Vitrified Glossy tiles 9 to 10 mm thick tiles for flooring including skirting over 20 mm (average) base of cement mortar 1:6 (1 cement:6 coarse sand) on new surface or fixing on existing flooring by adhesive material including and jointed with colour cement slurry including finished with flush pointing & cleaning the surface etc. complete. Color and shade as approved by architect. Approximately 20% of the area will be dark shade and dark shade shall be decided by EIC.**

##### **1.0 Materials:**

Water shall conform to M-1. Cement mortar shall conform to M-11. Matt finished Vitrified tile of antiskid from the list of approved make and of first quality.

**1.1.** Vitrified floor tiles shall be of matt finish best quality like Granamite or equivalent, as approved by the Architect and Engineer-in-charge. They shall conform to the relevant IS Codes.

**1.2.** They shall be monolithic and available in smooth, mirror-polished and anti-skid finishes, in sizes 12"x12", 8"x8" and 8"x4". They shall have a size tolerance of  $\pm 0.5\%$ , in length and width and  $\pm 5\%$  in thickness. Allowable warpage shall be  $\pm 0.2\%$ . Allowable square ness wedging shall be  $\pm 0.5\%$ . Their water absorption rate shall be less than 0.5%. They shall offer hard-working and hard-wearing floors for homes, public buildings, apartments and airports. The tiles shall be of ASTM or DIN standards.

**1.3.** They shall be extremely strong, the breaking strength of the tile being 1600 Kg/csqm., flexural strength, 200 Kg/cm<sup>2</sup>. and bonding strength of 2500 Kg/csqm. They shall offer good resistance to abrasion, i.e., greater than 100. They shall be scratch resistance; their hardness



on the Moh's scale shall be min. 7. They shall be able to resist thermal shock up to 10 cycles. They shall have a bond strength of 2500 Kg/csqm. and shall have a density of greater than 2.2 gm/cc. They shall have 0.60 co-efficient of friction for polished/unpolished surfaces.

## **2.0 Workmanship:**

### **2.1 Bedding:**

**2.1.1** The sub-grade shall be cleaned, wetted and mopped. The bedding shall then be laid evenly over the surface, as described above, tamped and corrected to desired level and allowed to harden enough to offer a rigid cushion to tiles and to enable the mason to place wooden planks across and squat on it.

**2.1.2** The white/coloured vitrified tiles shall be laid over a minimum 20 mm. thick cement mortar 1:6 bedding laid to proper slope and level. Fixing vitrified tile with cement mortar is to be done over 35 to 40 mm thick screed 1:2:4 (1 cement:2 sand:4 stone aggregate). Finishing should be done with flush pointing in white cement and pigment with residue and skirting. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of the bedding. The base shall be cleaned and well wetted, before laying. The mortar shall then be spread in thickness not less than 18 mm. at any place and average 25 mm. thick. The proportion of the cement mortar shall be as specified in the item.

### **2.2 Fixing tiles:**

**2.2.1** The tiles before laying shall be soaked in water for at least two hours. A neat grey cement grout at 3.3 Kg/Cement/m<sup>2</sup> of honey-like consistency shall be spread over the mortar bedding as directed. The edges of the tiles shall be smeared with neat cement slurry. The tiles shall then be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straight line or as per pattern.

**2.2.2** The tiles shall not have staggered joints. The Nahni trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed, they shall be cut (Sawn) to the required size and the edges rubbed smooth to ensure straight and true joints. The outlets for drainage shall be marked as per drawing and tile fixing shall be carried out accordingly after laying and testing the drainage lines. After the tiles are laid, the Finishing should be done with flush pointing in white cement and pigment with residue and skirting. The same cement slurry shall then be spread over the whole surface in a thin coat to protect the surface from abrasive damage and to fill up pinholes that may exist on the surface. White cement with or without matching pigment shall be used for pointing the joints. After fixing the tile finally in an even plane the flooring shall be kept wet and allowed to cure undisturbed for 7 days.

**2.2.3** While laying, any chiseling which may be required for making the skirting or dado flush with the plaster and/or other finishes shall be done. Necessary grooves of required size in cm., between plaster and/or other finishes, dado or skirting (if required) shall be provided. Forming machine-cut/rounded edges, gutters, sills, platforms, channels, curbing, etc. if any, if required shall be provided as per the drawing and design.

**2.2.4** All necessary slopes, gradients and levels shall be truly maintained as required and directed by the Architect and Engineer-in-charge.

### **2.3 Cleaning:**

- 2.3.1** The surplus cement grout that may have come out of the joints shall be cleared off before it sets. Once the floor has been settled, it shall be carefully washed and cleaned by oxalic acid and dried. Proper precautions and measures shall be taken to ensure that the tiles are not damaged in any way till the completion of the construction.
- 2.3.2** If any tile is disturbed or damaged it shall be refitted or replaced, properly jointed and polished.

### **3.0 Mode of Measurements and Payment:**

- 3.1** The work done shall be measured in sqm. for the visible area of work done on the floor. The length and width of the flooring shall be measured between the faces of skirting or dados or plastered face of walls as the case may be. The paving under dado or skirting shall not be measured. No deduction shall be made or extra paid for any opening in the floor of area up to 0.1 sqm. Nothing extra shall be paid for laying the floors at different levels in the same room. The dado will be measured from the finish floor level to the top of tile fixed.
- 3.2** The rate shall include the cost of all materials (inclusive of all taxes, levies, and delivery at site), labour & sundry involved in all the operations, curing etc complete, at all floors, at any height and level, as described above. It shall also include for breakage and wastage. Floating materials and the margin of profit shall also be included. All material samples shall be approved by the Architect/Engineer-in-charge before placing orders.
- 3.3** No extra shall be paid for any small quantities like narrow widths, mitred & returned ends, rounds & cutting, fixing and making good up to & around pipes, fittings and fixtures etc.
- 3.4** The rate shall include fixing the flooring in composite pattern as per the drawings, using different materials and sizes. The measurements of the different materials shall be taken category-wise separately and paid accordingly.
- 3.5** The rate shall be for a unit of one smt.

#### **Item No. 93**

**Providing and laying cement concrete flooring 1:2:4 (1-cement: 2-coarse sand: 4-graded stone aggregate 20mm nominal size) laid in one layer and finished with a floating coat of neat cement. (B) 50mm thick. (upto 10 ton)**

Detail specifications refer to item no. Sor 13-14, item no. 14.71, page no. 166 and add polypropaline nylon fibers.

#### **MODE OF MEASUREMENT AND PAYMENT:**

The rate shall be for units of one Sqmt.

#### **Item No. 94**

**Providing and laying 24" x 24" Vitrified double charge 8 mm thick tile flooring over 20 mm (average) base of cement mortar 1:6 (1cement: 6 coarse sand) or L.M 1:1.5 laid on new surface or fixing on existing flooring by adhesive material including dismentalling of existing flooring and jointed with colour cement slurry including finished with flush pointing & cleaning the surface etc. complete For Antiskid**

#### **1.0 Materials:**

Water shall conform to M-1. Cement mortar shall conform to M-11. Matt finished Vitrified tile of antiskid from the list of approved make and of first quality.

- 1.1. Vitrified floor tiles shall be of matt finish best quality like Granamite or equivalent, as approved by the Architect and Engineer-in-charge. They shall conform to the relevant IS Codes.
- 1.2. They shall be monolithic and available in smooth, mirror-polished and anti-skid finishes, in sizes 12"x12", 8"x8" and 8"x4". They shall have a size tolerance of  $\pm 0.5\%$ , in length and width and  $\pm 5\%$  in thickness. Allowable warpage shall be  $\pm 0.2\%$ . Allowable square ness wedging shall be  $\pm 0.5\%$ . Their water absorption rate shall be less than 0.5%. They shall offer hard-working and hard-wearing floors for homes, public buildings, apartments and airports. The tiles shall be of ASTM or DIN standards.
- 1.3. They shall be extremely strong, breaking strength of the tile being 1600 Kg/csqm., flexural strength, 200 Kg/cm<sup>2</sup>. and bonding strength of 2500 Kg/csqm. They shall offer good resistance to abrasion, i.e. greater than 100. They shall be scratch resistance; their hardness on the Moh's scale shall be min. 7. They shall be able to resist thermal shock up to 10 cycles. They shall have a bond strength of 2500 Kg/csqm. and shall have a density of greater than 2.2 gm/cc. They shall have 0.60 co-efficient of friction for polished/unpolished surfaces.

## **2.0 Workmanship:**

### **2.1 Bedding:**

- 2.1.1 The sub-grade shall be cleaned, wetted and mopped. The bedding shall then be laid evenly over the surface, as described above, tamped and corrected to desired level and allowed to harden enough to offer a rigid cushion to tiles and to enable the mason to place wooden planks across and squat on it.
- 2.1.2 The white/coloured vitrified tiles shall be laid over a minimum 20 mm. thick cement mortar 1:6 bedding laid to proper slope and level. Fixing of vitrified tile with cement mortar is to be done over 35 to 40 mm thick screed 1:2:4 (1 cement: 2 sand: 4 stone aggregate). Finishing should be done with flush pointing in white cement and pigment with residue and skirting. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of the bedding. The base shall be cleaned and well wetted, before laying. The mortar shall then be spread in thickness not less than 18 mm. at any place and average 25 mm. thick. The proportion of the cement mortar shall be as specified in the item.

### **2.2 Fixing tiles:**

- 2.2.1 The tiles before laying shall be soaked in water for at least two hours. Neat grey cement grout at 3.3 Kg/Cement/m<sup>2</sup> of honey-like consistency shall be spread over the mortar bedding as directed. The edges of the tiles shall be smeared with neat cement slurry. The tiles shall then be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straight line or as per pattern.
- 2.2.2 The tiles shall not have staggered joints. The Nahni trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed, they shall be cut (Sawn) to the required size and the edges rubbed smooth to ensure straight and true joints. The outlets for drainage shall be marked as per drawing and tile fixing shall be carried out accordingly after laying and testing the drainage lines. After the tiles are laid, the Finishing should be done with flush pointing in white cement and pigment with residue and skirting. The same cement slurry shall then

be spread over the whole surface in a thin coat to protect the surface from abrasive damage and to fill up pinholes that may exist on the surface. White cement with or without matching pigment shall be used for pointing the joints. After fixing the tile finally in an even plane the flooring shall be kept wet and allowed to cure undisturbed for 7 days.

**2.2.3** While laying, any chiseling which may be required for making the skirting or dado flush with the plaster and/or other finishes shall be done. Necessary grooves of required size in cm., between plaster and/or other finishes, dado or skirting (if required) shall be provided. Forming machine-cut/rounded edges, gutters, sills, platforms, channels, curbing, etc. if any, if required shall be provided as per the drawing and design.

**2.2.4** All necessary slopes, gradients and levels shall be truly maintained as required and directed by the Architect and Engineer-in-charge.

**2.3 Cleaning:**

**2.3.1** The surplus cement grout that may have come out of the joints shall be cleared off before it sets. Once the floor has set, it shall be carefully washed and cleaned by oxalic acid and dried. Proper precautions and measures shall be taken to ensure that the tiles are not damaged in any way till the completion of the construction.

**2.3.2** If any tile is disturbed or damaged it shall be refitted or replaced, properly jointed and polished.

**3.0 Mode of Measurements and Payment:**

**3.1** The work done shall be measured in sqm. for the visible area of work done in floor. The length and width of the flooring shall be measured between the faces of skirting or dados or plastered face of walls as the case may be. The paving under dado or skirting shall not be measured. No deduction shall be made or extra paid for any opening in the floor of area up to 0.1 sqm. Nothing extra shall be paid for laying the floors at different levels in the same room. The dado will be measured from the finish floor level to the top of tile fixed.

**3.2** The rate shall include the cost of all materials (inclusive of all taxes, levies, and delivery at site), labour & sundry involved in all the operations, curing etc complete, at all floors, at any height and level, as described above. It shall also include for breakage and wastage. Floating materials and the margin of profit shall also be included. All material samples shall be approved by the Architect/Engineer-in-charge before placing orders.

**3.3** No extra shall be paid for any small quantities like narrow widths, mitred & returned ends, rounds & cutting, fixing and making good up to & around pipes, fittings and fixtures etc.

**3.4** The rate shall include fixing the flooring in composite pattern as per the drawings, using different materials and sizes. The measurements of the different materials shall be taken category-wise separately and paid accordingly.

**3.5** The rate shall be for a unit of one smt.

**Item No: 95**

**Providing and laying Ceramic tiles 6mm thick in flooring treads of steps and landing laid on a bed of 12mm thick cement mortar 1:3 (1-cement: 3-coarse sand) finishing with flush pointing in white cement. (upto 10 ton)**

**1.0 Materials:**

Water shall conform to M-1. Cement mortar shall conform to M-11. Matt finished Vitrified tile of antiskid from the list of approved make and of first quality.

**1.1** Vitrified floor tiles shall be of matt finish best quality like Granamite or equivalent, as approved by the Architect and Engineer-in-charge. They shall conform to the relevant IS Codes.

**1.2** They shall be monolithic and available in smooth, mirror-polished and anti-skid finishes, in sizes 12"x12", 8"x8" and 8"x4". They shall have a size tolerance of + 0.5%, in length and width and + 5% in thickness. Allowable warpage shall be + 0.2%. Allowable square ness wedging shall be + 0.5%. Their water absorption rate shall be less than 0.5%. They shall offer hard-working and hard-wearing floors for homes, public buildings, apartments and airports. The tiles shall be of ASTM or DIN standards.

**1.3** They shall be extremely strong, breaking strength of the tile being 1600 Kg/csqm., flexural strength, 200 Kg/cm<sup>2</sup>. and bonding strength of 2500 Kg/csqm. They shall offer good resistance to abrasion, i.e. greater than 100. They shall be scratch resistance; their hardness on the Moh's scale shall be min. 7. They shall be able to resist thermal shock upto 10 cycles. They shall have a bond strength of 2500 Kg/csqm. and shall have a density of greater than 2.2 gm/cc. They shall have 0.60 co-efficient of friction for polished/unpolished surfaces.

## **2.0 Workmanship:**

### **2.1 Bedding:**

**2.1.1** The sub-grade shall be cleaned, wetted and mopped. The bedding shall then be laid evenly over the surface, as described above, tamped and corrected to desired level and allowed to harden enough to offer a rigid cushion to tiles and to enable the mason to place wooden planks across and squat on it.

**2.1.2** The white/ coloured vitrified tiles shall be laid over a minimum 20 mm. thick cement mortar 1:6 bedding laid to proper slope and level. Fixing of vitrified tile with cement mortar is to be done over 35 to 40 mm thick screed 1:2:4 (1 cement: 2 sand: 4 stone aggregate). Finishing should be done with flush pointing in white cement and pigment with residue and skirting. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of the bedding. The base shall be cleaned and well wetted, before laying. The mortar shall then be spread in thickness not less than 18 mm. at any place and average 25 mm. thick. The proportion of the cement mortar shall be as specified in the item.

### **2.2 Fixing tiles:**

**2.2.1** The tiles before laying shall be soaked in water for at least two hours. Neat grey cement grout at 3.3 Kg./Cement/m<sup>2</sup> of honey-like consistency shall be spread over the mortar bedding as directed. The edges of the tiles shall be smeared with neat cement slurry. The tiles shall then be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straight line or as per pattern.

**2.2.2** The tiles shall not have staggered joints. The Nahni trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed, they shall be cut (Sawn) to the required size and the edges rubbed smooth to ensure straight and true joints. The outlets for drainage shall be marked as per drawing and tile fixing shall be carried out accordingly after laying and testing the drainage lines. After the tiles are laid, the Finishing should be done with flush pointing in white cement and pigment with residue and skirting. The same cement slurry shall then be spread over the whole surface in a thin coat to protect the surface from abrasive damage and to fill up pinholes that may exist on the surface. White cement with or without matching pigment shall be used for pointing the joints. After fixing the tile finally in an even plane the flooring shall be kept wet and allowed to cure undisturbed for 7 days.

**2.2.3** While laying, any chiseling which may be required for making the skirting or dado flush with the plaster and/or other finishes shall be done. Necessary grooves of required size in cm., between plaster and/or other finishes, dado or skirting (if required) shall be provided. Forming machine-cut/rounded edges, gutters, sills, platforms, channels, curbing, etc. if any, if required shall be provided as per the drawing and design.

**2.2.4** All necessary slopes, gradients and levels shall be truly maintained as required and directed by the Architect and Engineer-in-charge.

### **2.3 Cleaning:**

**2.3.1** The surplus cement grout that may have come out of the joints shall be cleared off before it sets. Once the floor has set, it shall be carefully washed and cleaned by oxalic acid and dried. Proper precautions and measures shall be taken to ensure that the tiles are not damaged in any way till the completion of the construction.

**2.3.2** If any tile is disturbed or damaged it shall be refitted or replaced, properly jointed and polished.

### **3.0 Mode of Measurements and Payment:**

**3.1** The work done shall be measured in sqm. for the visible area of work done in floor. The length and width of the flooring shall be measured between the faces of skirting or dados or plastered face of walls as the case may be. The paving under dado or skirting shall not be measured. No deduction shall be made or extra paid for any opening in the floor of area upto 0.1 sqm. Nothing extra shall be paid for laying the floors at different levels in the same room. The dado will be measured from the finish floor level to the top of tile fixed.

**3.2** The rate shall include the cost of all materials (inclusive of all taxes, levies, and delivery at site), labour & sundry involved in all the operations, curing etc complete, at all floors, at any height and level, as described above. It shall also include for breakage and wastage. Floating materials and margin of profit shall also be included. All material samples shall be approved by the Architect/Engineer-in-charge before placing orders.

**3.3** No extra shall be paid for any small quantities like narrow widths, mitred & returned ends, rounds & cutting, fixing and making good upto & around pipes, fittings and fixtures etc.

**3.4** The rate shall include fixing the flooring in composite pattern as per the drawings, using different materials and sizes. The measurements of the different materials shall be taken category-wise separately and paid accordingly.

**3.5** The rate shall be for a unit of one sqm.

### **Item No. 96**

**Providing and laying-coloured glazed tiles of the size 300 mm x 450 mm x 8 mm in skirting, risers of steps and dado on 10 mm. thick cement plaster 1:3 (1 cement: 3 coarse sand) & jointed with white cement slurry.**

Specification for white glazed tiles 8mm thick shall conform to Ch.No.-14, item no. 14.32 of General Technical Specifications for building work.

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

### **Item No. 97**

**Providing and laying 19mm x 65mm round, 'D' edge and polished granite pencil patti on top, with cement paste and including backing coat in C.M. 1:4. All joints are filled with colour / epoxy grout and wiped to give sharp joints with flush pointing and washed clean with acid etc.**

Material shall be confirmed as per Manufacturer Specification and as approved by the consultant.

Work shall be carried out as per Architecture drawings & as directed by Engineer in Charge.

The rate shall be paid on Running Meter on the basis of the work done.

**Item No: 98**

**Providing and fixing Sand which type Granite platform including supplying and fixing granite stone 18 mm thick mirror polished 1st quality Granite stones in top and side position and vertical strip at front over 25 mm thick polished kotah stone platform fixing in top and sides and intermediates supports fixing with cement mortar and adhesive and finishing including cutting for fixing of sink any size (as directed by engineer incharge) at required position etc complete.**

**1.0 General**

The work shall consist of construction of sandwich type cooking platform with mirror polished Granite stone slabs jointed with cement mortar in accordance with the details shown on the drawings as approved by the engineer in charge having granite top and stainless steel sink. Only trained personnel shall be employed for construction work & supervision.

**2.0 MATERIAL**

**Granite Stone**

**2.0 HAND DRESSED MIRROR POLISHED GRANITE STONE**

**2.1.** Granite stone 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 vein's cracks or flaws.

**2.2.** The size of the stone to be used for flooring shall be of size 600 mm x 600 mm and / or size 600 mm x 450 mm as directed. However smaller sizes will be allowed to be used to the extent of maintaining the required pattern. Thickness shall be as specified.

**2.3.** Tolerance of minus 30 mm. on account of chiselling of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be +3 mm.

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

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

**2.6.** The stones shall have machine polished surface. When brought on site, the stones shall be single polished or double polished depending upon their use. The stones for paving shall generally be single polished. The stones to be used for dado, partitions skirting, sink, veneering, sills, steps, etc. where machine polishing after the stones are fixed in situ is not possible shall be double polished.

**3.0 Granite Stone Slab**

**3.1.** Granite Stone Slab shall be hard even sound, and regular in shape and thickness generally having uniform approved colour and design. The colour of the stone shall generally be as approved by the engineer in charge. They shall be without any soft veins' cracks or flaws.

**3.2.** The size of the Granite Stone to be used for top of platform shall be as per details shown on the drawings and as directed by the Engineer in Charge. However smaller sizes will not be allowed, Granite Stone shall be in a single piece only.

**3.3.** Tolerance of minus 30 mm. on account of chiselling of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be +3 mm.

3.4. The edges of Granite Stone Slab shall be truly machine cut and machine polished. All angles and edges shall be true, square and free chipping and surface shall be true and plain.

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

3.6. The stones shall have mirror polished surface. When brought on site, the stones shall be single polished or double polished depending upon their use. The stones to be used for top slab shall be double polished.

#### 4.0. WATER

4.1 Water shall not be salty brackish and shall be clean reasonably clear and free of objectionable quantities of silt and traces of oil injurious alkalis salts organic matter and other deleterious material which will either weaken the mortar of concrete or cause efflorescence or attack the steel in R C C container for transport storage and huddling of water shall be clean, Water shall conform to the standards specified in I S 455 -1978

4.2. If required by the Engineer in charge it shall be tested by comparison with distilled water compression shall be made by means of standard cement tests for soundness time of setting and mortar strength as specified in I S 269-1976 Any indication of unsoundness change in time of setting by 30 minutes or more or decrease of more than 10 percent strength of mortar prepared with distilled water sample when compared with the result obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.

4.3 Water for curing mortar concrete or masonry should not be too acidic or too alkaline.

4.4 It shall be free of elements which significantly affect the hydration reaction or otherwise interface with the hardening of mortar or concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces

4.5 Hard and bitter water and sea water shall not be permitted for curing.

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

4.7. The storage Water shall be stored in containers/ tanks covered at top and cleaned at regular intervals in order to prevent intrusion by foreign matter or growth of organic matter Water from shallow muddy or marshy surface shall not be permitted the intake pipe shall be enclosed to exclude silt, mud grass and other solid materials and there shall be a minimum depth of 0.60 m on water below the intake at all times.

4.8. As a guide following concentrations represent the maximum permissible values

(a) to neutralize 200 ml sample of water using phenolphthalein as indicator, it should not require more than 2 ml of 0.1 normal NaOH

(b) To neutralize 200 ml of water using methyl orange as an indicator, it should not require more than 10 ml of 0.1 normal HCl

(c) the permissible limits for solids shall be as follows when tested in accordance with IS 3025

#### Permissible limits (Max)

Organic	200 mg/lit
Inorganic	3000 mg/lit
Sulphates (SO <sub>4</sub> )	500 mg/lit
Chlorides (Cl)	500 mg/lit
Suspended matter	2000 mg/lit

In the case of structures of length 30 m and below, the permissible limit of chlorides may be increased up to 1000 mg/lit.

All samples of water (including potable water shall be tested and suitable measures taken where necessary to ensure conformity of the water to the requirements stated herein.



(d) The pH value shall not be less than 6

## **5.0 CEMENT**

**5.1.** The cement to be used in the works shall be any of the following types with the prior approval of the Engineer:

**a)** Ordinary Portland Cement, 33 Grade, conforming to IS:269.

**b)** Rapid Hardening Portland Cement, conforming to IS:8041.

**c)** Ordinary Portland Cement, 43 Grade, conforming to IS:8112.

**d)** Ordinary Portland Cement, 53 Grade, conforming to IS:12269.

**e)** Sulfate Resistant Portland Cement, conforming to IS:12330.

**5.2.** The Cement conforming to IS:269 shall be used only after ensuring that the minimum required design strength can be achieved without exceeding the maximum permissible cement content of 540 kg/cum. of concrete.

**5.3.** The cement conforming to IS:8112 and IS:12269 may be used provided the minimum cement content mentioned elsewhere from durability considerations is not reduced. From strength considerations, these cements shall be used with a certain caution as high early strengths of cement in the 1 to 28-day range can be achieved by finer grinding and higher constituent ratio of C3S/C2S, where C3S is Tri-calcium Silicate and C2S is Dicalcium Silicate. In such cements, the further growth of strength beyond say 4 weeks may be much lower than that traditionally expected. Therefore, further strength tests shall be carried out for 56 and 90 days to fine tune the mix design from strength considerations.

**5.4.** The cement conforming to IS: 12330 shall be used when sodium sulfate and magnesium sulfate are present in large enough concentration to be aggressive to concrete. The recommended threshold values as per IS:456 are sulfate concentration in excess of 0.2 per cent in soil substrata or 300 ppm (0.03 percent) in ground water. Tests to confirm actual values of sulfate concentration are essential when the structure is located near the seacoast, chemical factories, agricultural land using chemical fertilizers and sites where there are effluent discharges or where soluble sulfate bearing ground water level is high. Cement conforming to IS:12330 shall be carefully selected from strength considerations to ensure that the minimum required design strength can be achieved without exceeding the maximum permissible cement content of 540 kg/cum. of concrete.

**5.5.** The cement conforming to IS 8041 shall be used only for precast concrete products after specific approval of the Engineer in charge.

**5.6.** The total chloride content in cement shall in no case exceed 0.05 percent by mass of cement also total sulfur content calculated as sulfuric anhydride (SO<sub>3</sub>) shall in no case exceed 2.5 per cent and 3.0 percent when tri-calcium aluminates per cent by mass in up to 5 or greater than 5 respectively.

### **5.7. Storage**

Cement shall be transported, handled and stored on the site in such a manner as to avoid deterioration or contamination, Cement shall be stored above ground level in perfectly dry and watertight sheds and shall be stacked not more than eight bags high. Wherever bulk storage containers are used their capacity should be sufficient to cover the requirement at site and should be cleaned at least once every 3 to 4 months.

**5.8.** Each consignment shall be stored separately so that it may be readily identified and inspected, and cement shall be used in the sequence in which it is delivered in any way, during storage shall not be used in the works and shall be removed from the site by the contractor without charge to the employer.

The contractor shall prepare and maintain proper records on site in respect of delivery, handling, storage and use of cement and these records shall be available for inspection by the Engineer in Charge at all times.

**5.9** The contractor shall make a monthly return to the engineer in charge on the date corresponding to the interim certificate date showing the quantities of cement received and issued during the month in stock at the end of the month.

## **6.0 SAND**

**6.1** Sand shall be natural sand, clean well graded, hard strong durable and gritty particular free from immure amounts of dust, clay, kankar modules.

**6.2.** For masonry works sand shall conform to the requirements of IS: 2116

**6.3.** For plain and reinforced cement concrete (PCC and RCC) or prestressed concrete (PSC) works fine aggregates shall consist of clean, hard strong and durable pieces of crushed stone, crushed gravel or suitable combination of natural sand crushed stone or gravel, they shall not contain dust lumps soft or flaky materials mica or other deleterious materials in such quantities as to reduce the strength and durability of concrete, or to attack the embedded steel. Motorized sand washing machines should be used to remove impurities from sand. Fine aggregate having positive alkali-silica reaction shall not be used. All fine aggregates shall conform to IS L 383 and tests for conformity shall be carried out as per IS:2386 (Part I to VIII) The contractor shall submit to the Engineer in charge the entire information indicated in Appendix A of IS:383. The fineness modulus of fine aggregate shall neither be less than 2.00 nor greater than 3.5.

**6.3.** Sand fine aggregates for structural concrete shall conform to the following grading requirements as shown in the table below.

**6.5 Fine Sand:** The fineness module shall not exceed 1.0 the sieve analysis of fine sand be as under:

IS. Sieve Designation	% by wt. passing		
	Zone I	Zone II	Zone III
10 mm	100	100	100
4.75 mm	90-100	90-100	90-100
2.36 mm	60-95	75-100	85-100
1.18 mm	30-70	55-90	75-100
600 MC	15-34	35-59	60-79
300 MC	5-20	8-30	12-40
150 MC	0-10	0-10	0-10

**Coarse Sand:** The fineness modules of coarse sand shall not be less than 2.5 and shall not exceed.

3.0. The sieve analysis of coarse sand be as under:

I. S. Sieve Designation	% by wt. passing
4.75 mm	100
2.36 mm	90 to 100
1.18 mm	70 to 100
600 MC	30 to 100
300 MC	85 to 70
150 MC	00 to 50

## **7.0. Proportion**

**7.1.** The proportion of the cement mortar shall be 1:4 (1 part of cement by volume and 4 parts of sand by volume)

## **8.0 Stainless kitchen sink**

The kitchen sink shall be made of stainless steel and of approved brand and make as approved by Engineer in Charge.

## **9.0 Workmanship**

### **Mixing of Mortar**

**9.1.** The mixing of mortar shall be done intimately, the operation shall be carried out on clean watertight platform, and cement sand shall be first mixed dry in the required proportion turned over and over backwards and forwards several times till the mixture is of uniform colour. Thereafter, minimum quantity of water shall be added to bring the mortar to the consistency of stiff paste. and then the mortar shall be mixed for at least two minutes after addition of water.

**9.2** Mortar shall be mixed only in such quantity as required for immediate use. The mix which has developed initial set shall not be used. The initial set of mortar with ordinary Portland cement shall normally be considered to have taken place in 30 minutes after mixing.

**9.3** In case mortar has stiffened during initial setting time because of evaporation of water the same can be re-tempered by adding water as frequently as needed to restore the requisite consistency, but this re-tempering shall not be permitted after 30 minutes. Mortar unused for more than 30 minutes shall be rejected and removed from site.

**9.4.** In case of cement mortar, that has suffered because of evaporation of water the same shall be re-tempered by adding water as frequently as needed to restore the requisite consistency but its re-tempering shall be permitted only within thirty minutes from the time of addition to water at the time of initial mixing.

**9.5.** The mixing shall preferably be done in a mechanical mixer operated manually or by power. Hand mixing can be resorted to as long as uniform density of mix and its strength are assured subject to prior approval of Engineer in charge. Where permitted, specific permission is to be given by the Engineer in Charge.

**9.6.** The cement and sand shall be mixed in specified proportions given in the drawing. Cement shall be proportioned by weight, taking the unit weight of cement as 1.44 tone per cubic meter, Sand shall be proportioned by volume taking into account due allowance for bulking. All mortar shall be mixed with a minimum quantity of water to produce desired workability consistency with maximum density of mortar. The mix shall be clean and free from injurious types of soil/acid/alkali/organic matter or deleterious substances.

### **10.0 Proportion of Mix**

**10.1.** The cement and sand shall be mixed in proportions of 1:4 (1 cement:4 coarse sand). Cement and sand shall be proportioned by volume after making due allowance for bulking. The required quantity of water shall then be added, and the mortar mixed to produce workable consistency. Before mixing the platform shall be thoroughly cleaned before changing from one type of cement to another.

**10.2.** It shall be carried out on a watertight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency.

### **11.0 Curing:**

**11.1.** During hot weather, all finished or partly finished work shall be covered or wetted in such manner as will prevent rapid drying of the brick work.

**11.2.** Green cement work shall be protected from rain suitable. 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.

**11.3** Immediately after compaction, concrete shall be protected against harmful effects of weather, including rain, running water, shocks, vibration, traffic, rapid temperature charges, frost and driving out process shall be covered with wet jute bags, or the similar absorbent material approved by the Engineer-in-charge soon after the initial set, and shall be kept continuously wet for a period of not less than 14 days from the date of placement. workover-the foundation concrete may be started after 48 hours of its laying, but the curing of concrete shall be continued for a minimum period of 14 days.

**11.4** After the final set, the concrete shall be kept continuously wet if required by pounding for a period of not less than 7 days from the date of placement. Hard and bitter water shall not be used for curing.

## **12.0 Scaffolding**

**12.1** Scaffolding shall be sound strong and safe to withstand all loads likely to come upon it the holes which provide resting space for horizontal members shall be left in masonry under one meter in width or immediately near the skew backs of arches. The holes left in the masonry work for supporting the scaffolding shall be filled and made good Scaffolding shall be got approved by the Engineer in Charge However the contractor shall be responsible for its safety.

## **13.0. Finishing of Surface**

**13.1** All work shall be finished in a workman like manner with the thickness of joints manner striking or tooling as described in these above specifications.

**13.1** Kota stone of approved quality shall be laid evenly to level and slope as directed by Engineer in charge over a bed of a base layer consisting of cement mortar 1:6 (1 cement: 6 coarse sand by volume) or Lime Mortar 1:1.5 (1 lime:1.5 lime putty by volume)

**13.5.** Curing shall be started as soon as the mortar used for finished has hardened sufficiently not to be damaged when watered. It shall be kept wet for a period of at least 7 days. During this period, it shall be suitably protected from all damage.

**13.6.** During hot weather, all finished or partly finished work shall be covered or wet in such manner as will prevent rapid drying of the flooring work.

## **14.0 Mode of Measurement & Payment:**

**14.1.** The unit rate sandwich type platform shall include the cost of all materials required to produce the item of sandwich type platform including granite top and stainless steel sink, tools and plant required for mixing, placing in position, finishing as per direction of the Engineer-in-charge, curing and finishing all other incidental expenses for producing sandwich type platform of specified design to complete the structure or its components as shown on the drawings and according to these specifications. They shall also include the cost of making, fixing and removing all scaffolding and forms required for the work.

**14.2.** The sandwich type platform shall be measured for its **length** and limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one square meter.

**14.3.** The payment will be made on square meter basis of the finished work.

## **Item No. 100**

**Providing and fixing flexible Homogeneous vinyl flooring of with treatment of Polyurethane Reinforced Surface, densely compacted, Anti-Bacterial, and fungicidal and Antistatic having thickness of 2.00 mm with weight of 3150 g/m<sup>2</sup> Including 3 mm to 6 mm thick self leveling compound of BASF or equivalent make etc. complete.**

durable high performing flexible homogeneous multipurpose flooring especially recommended for hospitals, schools, offices, supermarket, and institutional buildings, where an easy to maintain, hardwearing floor covering with an attractive and modern appearance is

required. It receives Polyurethane reinforced (PUR) surface treatment. It is anti-bacterial and fungicidal. The flooring complies with the EN 685/EN 649 (34-43) and has a group P (K5) were rating. It is suitable for heavy traffic areas.

Total thickness: 2mm

Weight: 3150 g/sqmt

Width/Length: 2x 20 mtr

Classification/European: 34-43-K5

Fire Rating: Bfl – SI

Static Electrical propensity: <2

Electrical Resistance: >10<sup>9</sup>-10<sup>10</sup>

Abrasion resistance: 0.15

Abrasion group: P

Dimensional stability: < (0.40%)

Surface treatment: PUR

#### **Mode of Measurement and payment**

All work shall be measured in decimal system as fixed in its fixed in its place. The dimensions shall be measured to nearest 0.01 sqm. Area shall be worked out to the nearest 0.1 sqm.

The rate shall include the cost of all labor, tools including scaffolding.

The rate shall also include charges for disposing of the materials with all lead and lifts.

The rate also includes providing temp. Enclosures and partition where considered.

The rate shall be for a unit of one Sqmt.

#### **Item No: 101**

**Providing and laying machine cut free edges machine double polished Kota stone for shelves in cupboard and walls in single piece (Maximum 1.50 mt.) 25 mm including cutting grooves in walls and fixing the stone with neat cement slurry in true line and level etc completed as directed by E.T.C/PMC. for Shelves**

##### **Material & Workman ship:**

Polished Kotah Stone 25mm thick shall be approved quality size and specification in general for Kotah stone shall be as per Item no. M-49/ Page 16 of standards specification booklet for building works.

Polished Kotah stones are approved size shall be machine cut at front side with necessary groove shall be made in wall and polish kota stone shall be laid in line and level. Polish Kotah stone shelves shall be fixed in cement mortar 1:3 (1 cement:3 coarse sand) size of the polished kotah stone shall be obtained as per the site measurement.

Necessary polishing shall be done to polish kotah stone top and sides and as directed by Engineer-in-charge. The outer edges of stone shall be made round by polishing as directed groove made in wall.

shall made good Y fixed with white cement mixed with pigments to match with colour and stone. The work includes the cost of materials and labour with polishing complete.

##### **Measurement & Mode of Payment**

Measurements shall be taken for visible dimensions in length and width and shall be paid for a unit of 1 sqmt.

Mode of Measurement: on Smt basis of finished work.

Mode of Payment: on Smt basis of finished work.

#### **Item No. 102**

**Providing & fixing 18 mm thick of approved quality of green marble urinal partition in single piece of size 0.62 x 1.20 mt. in cement mortar 1:1 (1 cement:1 coarse sand) and finishing with white cement including polishing on both sides, finishing edges with round shape of marble etc completed as directed by E.T.C/PMC.**

As per manufacturer's Specifications.

**MEASUREMENTS**

1 Rate for providing and fixing fixtures, accessories, shall include all items and operations stated in the respective specifications and Bill of Quantities, and nothing extra is payable.

2 Rates for all items under specifications Para above shall be inclusive of cutting holes and chases and making good the same, C.P. screws, nuts, bolts, and any fixing arrangement required.

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

**Item No. 105**

**Providing & laying china mosaic flooring of approved make for plain and curved surfaces at floor, dado, otta etc. comprising of 20 to 25 mm size broken pieces of ceramic/ glazed tiles (only white colour) laid over 1:6 cement mortar bedding including applying cement slurry at the rate of 2.75 Kg. per Sq.m. on plain or sloped surfaces and filling joints with white cement. The flooring/ dado shall be tampered with wooden rammer not exceeding 2 Kg. in weight to bring the mortar up to the surface including rounding of the junctions and extending them upto 15 cm along the parapet wall. The rate shall include any type of bands, vata, any colour, any pattern or design as per drawing, curing, cleaning with water and oxalic acid etc. complete as sample approved by Architect/ EIC. (Only plan area shall be measured including vata upto 150mm height). Rates should be inclusive of acid washing and vata.**

Specification for this item shall conform to Chapter 14 sr.no.26 of General Technical Specifications for building work.

Plan Area shall be measured for payment purposes.

Rate shall be for a unit of one Square Meter.

Contractors shall have to furnish guarantee bond of 5 (five) years against leakages.

**Item No. 106**

**Providing cement vata (10 cm x 10 cm size) quarter round in cement mortar 1:1 including neat cement finishing watering etc. complete. For all floor**

Specification for this item shall conform to Chapter 17 sr.no.15 of General Technical Specifications for building work.

Rate shall be for a unit of one Running Meter.

**Item No. 107**

**Providing and fixing in position S.S. railing (considering 1mt. height) by providing vertical support of 38 mm dia. pipe on top 50 mm dia stain less steel pipe rail with starting and end point vertical post of 50 mm dia with round ball on top of post including bending welding and fixing in R.C.C./brick work as directed. (top 50 dia vertical 38mm dia at 1 mt. c/c & horizontal 3 nos 25mm dia.). (testing is required of s.s 304) for all floor**

**Material & Workmanship:**

The necessary materials like AISI 304 grade stainless steel pipes of approved quality & best quality confirming to relevant I.S code. All materials shall be got approved before starting the work. The entire work shall be carried out as per the instruction of Engineer-in-charge. Top rail of 50 mm diameter having 1.50 mm wall thickness, vertical support of 38 mm diameter stainless steel pipe having 1.50 mm with horizontal pipe of 25 mm diameter having 1.50 mm wall thickness and S.S plate of 100 mm diameter x 6.0 mm thick shall be used for executing the railing as per Architect design. The vertical support connected in R.C.C steps at 1200 mm C/C shall be fixed in R.C.C /brick wall / cement concrete masonry in line and level using necessary S.S fixtures & fastenings of the make KICH or as equivalent of approved by Engineer-in-charge shall be used. The entire railing shall be prepared as per design or as per drawing supplied or as directed by Architect.

Stainless Steel confirming to AISI 304 Grade Stainless Steel shall be completely anti-corrosive and resist the adverse effects of chemicals.

The following table presents main elements (forming the Chemical composition) of AISI 304 Grade Stainless Steel

**Chemical Composition in Percentage:**

Element %	304 Grade	Implications
Carbon	0.08	Increase in percentage decreases the corrosion resistance.
Silicon	1.00	-
Manganese	2.00	Affects the magnetic characteristic and hardness of Iron
Phosphorus	0.045	-
Sulphur	0.03	-
Chromium	16.0 to 18.0	Addition of 12% forms stainless steel from ordinary steel. Removes the corrosive effect of Carbon. Forms a passive film which prevents oxidation & consequent corrosion.
Molybdenum (MOLY)	2.00 to 3.00	Molybdenum increases the corrosion resistance to chlorides and sulphates including sulfurous acids in pulp industries. It has a superior tensile strength at high temperature as compared to 304 Grade steel. This element can resist major chemical reaction and thus being a very costly element.
Nickel	10.0 to 14.0	Nickel provides corrosion resistance, increases strength in both high & low temperature, increases toughness in low temperature and lowers the effects of work hardening. Thus, higher percentage makes the steel superior in quality.

- It can withstand the corrosion caused by atmospheric / environmental or major chemical reactions.
- It can resist high temperatures without going under any deformity which makes it highly recommended for fire safety doors in any building.
- It has remarkable creep strength and Rupture strength.
- It shall be repelled the Bacteria & shall be made higher degree of hygiene.
- It shall be of natural finish; it shall not require regular cleaning or maintenance making it most suitable for public places.
- Wall thickness of pipe shall be of 1.5 mm metal thickness instead of 1.2 mm thickness.
- It shall tolerate forceful and intense use.
- Specially developed fixing stud and grubs shall be used to ensure accurate fitting of elements and eliminates shaking of elements.

Specially developed fixing stud and grubs shall be used to ensure accurate fitting of elements and eliminates shaking of elements.

Testing shall be carried out in requisite laboratory for above chemical composition of AISI 304 Grade Stainless Steel & testing result for the same shall be submitted along with bill for claiming the amount of bill. If the results found fail, the fixtures and fastening of the same lot shall be rejected outright.

All fixtures and fastening of the make shall be of anti corrosive high grade AISI 304 stainless steels in Glossy & satin combination finish only. Fixtures and fastening of the make KICH or as equivalent of approved by Engineer-in-charge shall be fixed by KICH Company's skilled person only. Necessary bond shall be executed for lifetime guarantee for non-rusting of fixtures and fastenings.

- (m) Details/arrangements for after sales/maintenance services shall be furnished.
- (n) Work shall be carried out in co-operation and in coordination with all other agencies working at Site.
- (o) The civil work as required for fixing of railing, hold fast or other works required for the erection and completion of railing etc. shall be done by the Contractor without any extra cost.
- (p) Any damage, if caused to the existing work done by other agencies, shall be reinstated by the Contractor to its original condition without any extra cost.
  - (q) During the course of work, the Contractor shall pay due care to avoid any stains on the railing & toughen glass work and if required, the Contractors shall provide necessary protective arrangement as directed by the Architects for which no extra payments shall be made. After the installation is completed, if required by the Architects, the metal work & glass work shall be washed with mild solution of non alkali soap and water.
- (r) The Contractor shall be responsible for the rails / windows / doors / grills etc. being set straight, in plumb level and for their satisfactory operations after the fixing is completed.
- (s) Wherever required and as directed strengthening of members shall be done by providing steel/M.S. concealed members without extra cost.

#### **Laying of Stainless-Steel grill**

Stainless steel grill should be laid commencing from one end and proceeding towards the other end. The railing can be placed to different levels or patterns as directed by the Engineer in Charge. With the help of gauges, the joint width specification should be checked in the first few running meters, where it should be ensured that the railing alignment is correct. To start with, full railing section should be used; only subsequently, cutting and in filling at edges be permitted. Under no Circumstances should the railing be forced or hammered into the bedding at the stage of lying. For cutting railing, hydraulic or mechanical block cutters, or power saws are used. Cut units of any shape and size less than required should not be used. Supporting brackets made out of S.S sections fixing with anchor fastener only. 15mm thick toughened glass of approved brand, shall be fixed with approved quality & design of film on one side of toughened glass as per the direction of Engineer in charge. The balusters shall be fixed in steps of stair / C.C block masonry at 1200 mm center to center in line & level. Handrail of 38 mm diameter having 1.5mm wall thickness shall be joined with baluster by appropriate accessories required of the make KICH or as equivalent of approved by Engineer-in-charge only. The entire work shall not be executed in a loose fashion. If after erection railing is found to be damaged due to erection or due to any type of negligence of the agency, the same shall be replaced without any extra cost.



**Mode of measurement & payment:**

The rate for railing with frame shall include the cost of materials & labour involved to finish the work.

The dimensions of the grill shall be measured clear size of the frame in closed position of railing between the two outer edges of the frame.

The payment shall be made on completion of work.

The unit rate for the item shall be for a unit of one Running meter.

**Item No: 108**

**Providing and fixing in position S.S. daso by providing top 50 mm dia stain less steel pipe rail with starting and end point vertical post of 50 mm dia with wall/column including bending welding and fixing for staircase and balcony as directed. (testing is required of SS 304) for all floors.**

**Material & Workmanship:**

The necessary materials like AISI 304 grade stainless steel pipes of approved quality & best quality confirming to relevant I.S code. All materials shall be got approved before starting the work. The entire work shall be carried out as per the instruction of Engineer-in-charge. Top rail of 50 mm diameter having 1.50 mm wall thickness, vertical support of 38 mm diameter stainless steel pipe having 1.50 mm with horizontal pipe of 25 mm diameter having 1.50 mm wall thickness and S.S plate of 100 mm diameter x 6.0 mm thick shall be used for executing the railing as per Architect design. The vertical support connected in R.C.C steps at 1200 mm C/C shall be fixed in R.C.C /brick wall / cement concrete masonry in line and level using necessary S.S fixtures & fastenings of the make KICH or as equivalent of approved by Engineer-in-charge shall be used. The entire daso shall be prepared as per design or as per drawing supplied or as directed by Architect.

Stainless Steel confirming to AISI 304 Grade Stainless Steel shall be completely anti-corrosive and resist the adverse effects of chemicals.

The following table presents main elements (forming the Chemical composition) of AISI 304 Grade Stainless Steel

**Chemical Composition in Percentage:**

Element %	304 Grade	Implications
Carbon	0.08	Increase in percentage decreases the corrosion resistance.
Silicon	1.00	-
Manganese	2.00	Affects the magnetic characteristic and hardness of Iron
Phosphorus	0.045	-
Sulphur	0.03	-
Chromium	16.0 to 18.0	Addition of 12% forms stainless steel from ordinary steel. Removes the corrosive effect of Carbon. Forms a passive film which prevents oxidation & consequent corrosion.
Molybdenum (MOLY)	2.00 to 3.00	Molybdenum increases the corrosion resistance to chlorides and sulphates including sulfurous acids in pulp industries. It has a superior tensile strength at high temperature as compared to 304 Grade steel. This element can resist major chemical reaction and thus being a very costly element.
Nickel	10.0 to 14.0	Nickel provides corrosion resistance, increases strength in both high & low temperature, increases toughness in low

temperature and lowers the effects of work hardening.

Thus, higher percentage makes the steel superior in quality.

- It can withstand the corrosion caused by atmospheric / environmental or major chemical reactions.
- It can resist high temperatures without going under any deformity which makes it highly recommended for fire safety doors in any building.
- It has remarkable creep strength and Rupture strength.
- It shall be repelled the Bacteria & shall be made higher degree of hygiene.
- It shall be of natural finish; it shall not require regular cleaning or maintenance, making it most suitable for public places.
- Wall thickness of pipe shall be of 1.5 mm metal thickness instead of 1.2 mm thickness.
- It shall tolerate forceful and intense use.
- Specially developed fixing stud and grubs shall be used to ensure accurate fitting of elements and eliminates shaking of elements.

Specially developed fixing stud and grubs shall be used to ensure accurate fitting of elements and eliminates shaking of elements.

Testing shall be carried out in requisite laboratory for above chemical composition of AISI 304 Grade Stainless Steel & testing result for the same shall be submitted along with bill for claiming the amount of bill. If the results found fail, the fixtures and fastening of the same lot shall be rejected outright.

All fixtures and fastening of the make shall be of anti corrosive high grade AISI 304 stainless steels in Glossy & satin combination finish only. Fixtures and fastening of the make KICH or as equivalent of approved by Engineer-in-charge shall be fixed by KICH Company's skilled person only. Necessary bond shall be executed for lifetime guarantee for non-rusting of fixtures and fastenings.

- (m) Details/arrangements for after sales/maintenance services shall be furnished.
- (n) Work shall be carried out in co-operation and in coordination with all other agencies working at Site.
- (o) The civil work as required for fixing of daso, hold fast or other works required for the erection and completion of daso etc. shall be done by the Contractor without any extra cost.
- (p) Any damage, if caused to the existing work done by other agencies, shall be reinstated by the Contractor to its original condition without any extra cost.
- (q) During the course of work, the Contractor shall pay due care to avoid any stains on the railing & toughen glass work and if required, the Contractors shall provide necessary protective arrangement as directed by the Architects for which no extra payments shall be made. After the installation is completed, if required by the Architects, the metal work & glass work shall be washed with mild solution of non alkali soap and water.
- (r) The Contractor shall be responsible for the rails / windows / doors / grills etc. being set straight, in plumb level and for their satisfactory operations after the fixing is completed.
- (s) Wherever required and as directed strengthening of members shall be done by providing steel/M.S. concealed members without extra cost.

#### **Laying of Stainless Steel daso**

Stainless steel grill should be laid commencing from one end and proceeding towards the other end. The Daso can be placed to different levels or patterns as directed by the Engineer in Charge. With the help of gauges, the joint width specification should be checked in the first few running meters, where it should be ensured that the railing alignment is correct. To start only

subsequently, cutting and in filling at edges be permitted. Under no Circumstances should the railing be forced or hammered into the bedding at the stage of lying. For cutting, hydraulic or mechanical block cutters, or power saws are used. Cut units of any shape and size less than required should not be used. Supporting brackets made out of S.S sections fixing with anchor fastener only. Handrail of 38 mm diameter having 1.5mm wall thickness shall be joined with appropriate accessories required of the make KICH or as equivalent of approved by Engineer-in-charge only. The entire work shall not be executed in a loose fashion. If after erection it is found daso to be damaged due to erection or due to any type of negligence of the agency, the same shall be replaced without any extra cost.

**Mode of measurement & payment:**

The dimension of the shall be measured clear size of the frame in closed position of between the two outer edges of the frame.

The payment shall be made on completion of work.

The unit rate for the item shall be for a unit of one Running meter.

**Item No. 110**

**Providing and filling with scrap of AAC block (good quality) as a cinder as directed by engineer in charge in sunks in layers of 15 cm thk including watering placing ramming well etc. as directed.**

**Material:**

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

Cinder aggregates shall be well burnt furnace residue obtained from furnace using coal fuel only. it shall be sound clean free from clay, dirt ash or other deleterious matter.

**The average grading for cinder aggregates shall be as mentioned below:**

<b>I.S. Sieve Designation</b>	<b>Percentage passing</b>	<b>I.S. Sieve Designation</b>	<b>Percentage passing</b>
20 mm.	100	4.75 mm.	70
10 mm.	86	2.36 mm.	52

**Workmanship:**

The Cinder to be used for filling shall be free from salts, organic or other foreign matter, all clods of Cinder shall be broken.

**1.2.** The sunk shall be similarly filled with Cinder in layers not exceeding 15 Cms adequately watered and consolidated by ramming with iron or wooden rammers. When the filling reaches finished level, it should allow to dry after rammed and consolidated.

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

**2.1** The rate shall be for a unit of one Cubic meter.

**Item No. 111**

**Providing & fixing Steel work welded, in built up sections framed work including cutting, hoisting, fixing in position and with one coat primer & two coat oil paint as per detail drawings etc. complete. in columns, beams and joists, channels M.S. flat, Angles, Pipes, tees flats with connecting plates or angle cleats STRUCTURAL STEEL**

**1.0 MATERIALS:**

**1.1 Structural Steel:**

**1.1.1** All structural steel shall conform to I.S. 226-1965. The steel shall be free from the defects mentioned in I.S. 226-1975 and shall have a smooth finish. The material shall have a smooth

finish. The material shall be free from loose mill scale, rust pits or other defects affecting the strength and durability. Rivet bars shall conform to I.S. 1148-1973.

**1.1.2** When the steel is supplied by the Contractor test certificates of the manufacturer shall be obtained according to I.S. 226-1975 and other relevant Indian Standards.

**2.0 WORKMANSHIP:**

**2.1** The M. S. Grill shall be prepared as per the drawings or as directed for fixing wooden frames of windows etc.

**2.2** The grill shall be fabricated to the designs and patterns shown in the drawings and the weight shall be as directed and the joints shall be riveted or welded as shown in the plan or as directed. The grill so formed shall be fixed into the frames of the windows etc., before they are erected in position. The outside strip frame of the grill

shall be housed to its full thickness into the recess cut into the frame of the windows etc. The grill shall be fixed to the frame with number of bolts and nuts of screws viz. bolt nut/screw per 30 cm. Of the length of outer strip subject to a minimum of 2 nos. on each side of the frame or as indicated in the drawings or as directed.

**2.3** The bolts and nuts or screws shall be counter sunk and shall be fixed with the top of their heads flush with the face of frame strips.

**3.0 MODE OF MEASUREMENT AND PAYMENT:**

**3.1** No payment shall be made for weight of screws, bolts, nuts etc. Only the weight of grill shall be paid.

**3.2** The rate shall be for units of one Kg.

**Item No. 113**

**Providing and Fixing 10 mm thick multiwall polycarbonate roofing sheet UV resistant fixed with hilti screw and rubber silicon sealer and aluminium strip of size 50 mm x 3 mm etc complete as directed by Engineer in charge.**

**1.0 SCOPE OF ITEMS**

Item covers providing and fixing 10 mm thick multiwall Polycarbonate sheet of approved make or as suggested by Architect / Consultant. Item covers installation with necessary making frame structure, fabrication, Adjusting and cleaning. Necessary scaffolding, Labour, all an item & safety measures for satisfactory completion of item.

**2.0 Material**

**2.1** Polycarbonate sheet shall confirm IS 14443:1997

**2.2** Structural steel shall confirm M 22 from General Technical Specifications for Building Works

**3.0 Workmanship**

**3.1** As per Item No. 15.1 of 2 from General Technical Specifications for Building Works considering 10 mm thick multi wall Polycarbonate sheet instead of corrugated GI Sheet.

**3.2** Sheet shall be firmly fixed, true to the alignment by mentioned in drawing to the satisfaction of Architect or Engineering Incharge

**4.0 Mode of Measurement**

**4.1** Measurement shall be in sq. m correct to two places of decimal for the work completed as specified as para.3 above.

**4.2** Rate quoted shall be for the works including vibrators or any other materials as specified described in the respective items of work.

**5.0 Payment:**

Payment shall be made for quantity recorded in the Measurement Book as per para 4.0 above at the rate quoted by the bidder in Schedule – B of approved tender.

**Item No. 116**

**SIGNAGES HANGING FROM CEILING-** Providing, Fabricating & Fixing signage's using 304 grade Stainless steel 1.5 mm thick brushed steel finish plate (2 nos) with 8mm thk. Acrylic sheet covered with vinyl of approved colour, sandwiched between two S.S plates and fixed with s.s struds. Sandwiched plates should be fixed in 12mm X 12mm S.S 1.5mm thk. 304 grade frame and punched (laser cut) lettering carried out on both the s.s plates of required size and text as directed by Engineer and hanged to ceiling with the help of S.S 8mm thick chain at both ends with making all the fixing arrangement to the ceiling and to the plate complete. Size: 12" x 6" etc completed as directed by E.T.C/PMC.

The work should be carried out as per manufacturer's specification and directed by the Engineer in Charge.

The item will be measured and paid for in Nos.

**Item No. 119**

**Providing and fixing in position collapsible steel shutters with vertical channels 20 mm x 10 mm x 2 mm braced with flat iron diagonals 20 mm x 5 mm size with top & bottom rails of T iron 40 mm x 40 mm x 6 mm with 38 mm diameter steel pulleys complete with bolts, nuts, locking arrangements, stopper handles including applying a priming coat of red lead paint.**

The specifications for this item shall conform to item no. 11.6 of General Technical Specifications for building work.

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

**Item No. 120**

**Designing, fabricating, testing, installing and fixing in position Curtain Wall with Aluminium Composite Panel Cladding, with open grooves for linear as well as curvilinear portions of the building, for all heights and all levels etc. including**

a) Structural analysis & design and preparation of shop drawings for pressure equalisation or rain screen principle as required, proper drainage of water to make it watertight including checking of all the structural and functional design.

b) Providing, fabricating and supplying and fixing panels of aluminium composite panel cladding in pan shape in metallic colour of approved shades made out of 4mm thick aluminium composite panel material consisting of 3mm thick FR grade mineral core sandwiched between two Aluminium sheets (each 0.5mm thick). The aluminium composite panel cladding sheet shall be coil coated, with Kynar 500 based PVDF / Lumiflon based fluoropolymer resin coating of approved colour and shade on face # 1 and polymer (Service) coating on face # 2 as specified using stainless steel screws, nuts, bolts, washers, cleats, weather silicone sealant, backer rods etc.

c) The fastening brackets of Aluminium alloy 6005 T5 / MS with Hot Dip Galvanised with serrations and serrated washers to arrest the wind load movement, fasteners, SS 316 Pins and anchor bolts of approved make in SS 316, Nylon separators to prevent bi-metallic contacts all complete required to perform as per specification and drawing The item includes cost of all material & labour component, the cost of all mock ups at site, cost of all samples of the individual components for testing in an approved laboratory,

field tests on the assembled working curtain wall with aluminium composite panel cladding, cleaning and protection of the curtain wall with aluminium composite panel cladding till the handing over of the building for occupation. Base frame work for ACP cladding is payable under the relevant aluminium item.s The Contractor shall provide curtain wall with aluminium composite panel cladding, having all the performance characteristics all complete, as per the Architectural drawings, as per item description, as specified, as per the approved shop drawings and as directed by the Engineer-in-Charge. However, for the purpose of payment, only the actual area on the external face of the curtain wall with Aluminum Composite Panel Cladding (including width of groove) shall be measured in sqm. up to two decimal places.

**Scope of Item:**

Item covers providing and fixing Aluminum Composite Panel of approved make or as suggested by Architect / Consultant. Item covers installation with providing materials necessary making frame structure, fabrication, Adjusting and cleaning. Necessary scaffolding, labors all ancillary materials required to complete the item in all respect.

**1.0 Material**

2.1 Aluminum alloys used in the manufacture of extruded sections for the fabrication shall confirm to designation HE9 WP of IS:733.

2.2 Aluminum Composite Panel should have below state properties.

(A.) SURFACE PROPERTIES					
1.	Performance Test	AAMA 2605			
2.	HCL Resistance (10%)	15-minute spot no blister or color change			
3.	Mortar Resistance	24-hour surface contact, no adhesion or residue			
4.	Detergent Resistance	72-hour immersion, no change or loss of adhesion			
5.	Humidity Resistance	4000-hour 100% humidity # 8 blister size maximum			
6.	Salt Spray Resistance Scribed	4000-hour 5% solution min. 7 on scribe, 8 on field			
7.	Pencil Hardness	HB-F (minimum)			
8.	Abrasion Resistance (I / mil)	40 (minimum)			
9.	Nitric Acid Vapor Resistance	30-minute exposure, <5 E color change			
10.	Window Cleaner Resistance	24-hour spot test no visual change			
11.	Weathering	10 yrs Florida:5E maximum color change 50% gloss retention min. 8 chalk min. (6 on whites) 10% film erosion max.			
(B.) PHYSICAL PROPERTIES					
No.	Particulars	Unit	Thickness		Standard
			3 mm	4 mm	
1.	Density	g/cm <sup>3</sup>	1.52	1.37	ASTM D792
2.	Weight	kg/m <sup>2</sup>	4.55	5.48	ASTM D792
3.	Thermal Expansion (-20-600)	10-6/C	22	24	ASTM D696
4.	Thermal Conductivity (appearance)	w/m.k	-	0.15-0.19	ASTM C518
5.	Temperature for Thermal Deformation	C	-	113	ASTM D648

6.	Acoustic insulation (100-3200 HZ)	dB	24	26	ASTM E413
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### (C.) BOND INTEGRITY

No.	Particulars	Unit	Thickness		Standard
			3 mm	4 mm	
1.	Vertical Pull	kg/cm <sup>2</sup>	120	120	ASTM C-297
2.	Drum Peel	Mm N/mm	150	150	ASTM D1781
3.	Flatwise Shear	kg/cm <sup>2</sup>	88.5	86.1	ASTM C-273

### (D.) MECHANICAL PROPERTIES

No.	Particulars	Unit	Thickness		Standard
			3 mm	4 mm	
1.	Tensile Strength	kg/mm <sup>2</sup>	4.50	6.20	ASTM E-8
2.	Yield Strength	kg/cm <sup>2</sup>	4.00	5.90	ASTM E-8
3.	Flexural Rigidity	X105 kg mm <sup>2</sup>	7.30	14.00	ASTM C-393 (20 cm span)
	<b>Elongation</b>				
4.	Horizontal Elongation at breaking point	%	12%	14%	ASTM E-8
5.	Vertical Elongation at breaking point	%	11%	13%	ASTM E-8
6.	Impact Resistance	Kg	1320	1670	ASTM D732

2.3 Fixtures & Fastenings: All fixtures and fastenings shall be of good and approved quality to the satisfaction of Architect and Engineer Incharge.

2.3.1 Prior to procurement sample for each fixture and fastening shall have to get approved by the contractor from Architect and Engineer In-charge.

### 2.0 Workmanship

3.1 To make necessary framing with aluminum section specified in relevant item of schedule B with anchor fastener.

3.2 Fastener a bolt with fabricated bar.

3.3 Cut the ACP Sheet as per the pattern and fixed it on frame by screwing. Put groove between two sheets as per detail drawing and change if any suggested by an Architect or Engineer In charge during the execution of work.

3.4 Removed the film from the ACP Sheet.

3.5 Filled the grooved with silicon sealant.

3.6 Clean the surface.

3.7 Paneling shall be fixed free to the alignment and plumb and entire paneling shall be firmly fixed with existing brick work/concrete member as per direction of an Architect and/or Engineer Incharge.

### 4.0 Mode of Measurement

4.1 Measurement shall be in sq. m correct to two places of decimal for the work completed as specified as para.3 above.

4.2 Rate quoted shall be for the works including vibrators or any other materials as specified described in the respective items of work.

### 5.0 Payment:

Payment shall be made for quantity recorded in the Measurement Book as per para 4.0 above at the rate quoted by the bidder in Schedule – B of approved tender.

**Item No. 122**

**Providing and laying mirror polished kotah stone (hand dressed chissel) slab flooring over 20 mm thick base of CM 1:6 laid over and joined with grey colour cement slurry including rubbing and polishing with amery stone etc. complete. 25 mm thick**

**1.1 Water:**

**1.1.1** Water shall not be salty or brackish and shall be clean, reasonably clear and free objectionable quantities of silt and traces of oil and injurious alkalis, salts, organic matter and other deleterious material which will either weaken the mortar or concrete or cause efflorescence or attack the steel in R.C.C Container for transport, storage and handling of water shall be clean. Water shall conform to the standards specified in I.S.456-1978.

**1.1.2** If required by the Engineer-in-charge it shall be tested by comparison with distilled water. A comparison shall be made by means of standard cement tests for soundness, time of setting and mortar strength as specified in I.S.269-1976. Any indication of unsoundness, change in time of setting by 30 minutes or more or decrease of more than 10 per cent in strength of mortar prepared with water sample when compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.

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

**1.1.4** Hard and bitter water shall not be used for curing.

**1.1.5** Portable water will be generally found suitable for curing mortar or concrete.

**1.2 Cement Mortar:**

**1.2.1** Materials shall conform to item no 11 (a) cement mortar.

**1.2.2** Preparation of Mix: 11.2.1 Cement and shall be mixed to specified proportion, sand being measured by measuring boxes. The proportion of cement will be by volume on the basis of 50 kg / Bag of cement being equal to 0.0342 Cu.m. The mortar may be hand mixed or machine mixed as directed.

**1.2.3** Preparation of mortar: 11.3.1 In hand mixed mortar cement and sand in the specified proportions shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3 times or more till a homogenous mixture of uniform colour is obtained., Mixing platform shall be so arranged that no delirious extraneous material shall get mixed with mortar or mortar 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.

**1.2.4** 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.

**1.3 Polished Kotah Stones**

**1.3.1** The kotah stones shall be hard, even, sound, and regular in shape and generally green. Brown colour stones shall not be allowed for use. They shall be without any soft veins, cracks or flows.

**1.3.2** The size of the stones to be used for flooring shall be of size 600 mm x 600 mm and/or size 600 mm x 450 mm, as directed. However smaller sizes will be allowed to be used to the extent of maintaining the required pattern. Thickness shall be as specified.

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



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

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

**1.3.6** The stones shall have machine polished smooth surface. When brought on site, the stones shall be single polished or double polished depending upon its use. The stones for paving shall generally be single polished. The stones to be used for dado, skirting, platforms, sink, veneering, sills, steps, etc. Where machine polishing after the stones are fixed in situ is not possible, shall be double polished.

## **2.2 WORKMANSHIP:**

**2.1** Each slab shall be cut to the required size and shape and fine chisel dressed at all the edges. The sides thus dressed shall have a full contact if a straight edge is laid along. The sides shall be table rubbed with coarse sand before paving. All angles and edges of the slabs shall be true square and free from chippings and giving plain surface. The thickness shall be 25 mm. (Average) as specified in the item but not less than 20 mm. at any place on the slab.

**2.2** Bedding for the kota stone slabs shall be cement mortar 1:3 (1 cement: 3 coarse sand) or L.M. 1:1.5 of average thickness 20 mm. as given in the description of the item. The sub grade shall be cleaned, wetted and mopped. Mortar of the specified mix and thickness shall then be spread on an area sufficient to receive one kota stone slab. The slab shall be washed clean before laying. It shall be laid on top pressed, tapped gently to bring it in level with the other slabs. It shall be lifted and laid aside. The top surface of the mortar shall then be corrected by adding fresh mortar at hollows or depressions. The mortar shall then be allowed to harden a bit. Over this surface, cement slurry of honey like consistency shall be applied. The slab shall then be gently placed in position and tapped with wooden mallet till it is properly pedded in level with and close to the adjoining slab. The joint shall be as fine as possible. The slabs fixed to the floor adjoining the wall shall enter not less than 10 mm. under the plaster skirting or dado. The junction between the walls and floor shall be finished neatly. The finished surface shall be true to levels and slopes as directed.

**2.3** The floor shall be kept wet for a minimum period of 7 days. So that bedding and joints set properly.

**2.4** Polishing shall be normally commenced after 14 days of laying the stone slab. First polishing shall be done with ear borundum stones of 120 grade grit fitted in the heavy machine and then second polishing shall be done with carborundum stone of 220 or 350 grade grit fitted in heavy machine. Water shall be properly used during polishing. The stone shall then be washed clean with water. When directed by the Engineer-in-charge wax polish of approved quality shall be applied on the surface with the help of soft cloth over a clean and dry surface. Then the polish machine fitted with bobs shall be run over it.

**2.5** The holes required for Nahni traps, pipes any other fittings shall be made without any extra cost.

## **3.2 MODE OF MEASUREMENTS & PAYMENT:**

**3.1** The rate shall include the cost of all materials and labour involved in all the operations described above. The Kota stone flooring shall be measured in square metres correct to two places of decimal, length and breadth shall be measured correct to a centimeter and between the finished face of skirting dado or wall plaster and no deduction shall be made nor extra paid for any opening in floor of area upto 0.1 sq. mt.

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

**Item No. 123**

**Providing and laying compacted W.B.M 100 mm thick of machine crushed B.T. Metal of size of size 45 mm to 63mm with using 20% stone screenings (Grit) and stone dust as filler including spreading, watering and consolidation by vibratory roller etc. complete.**

**404. Scope of Work:**

**404.1.1.** This work shall consist of clean, crushed aggregates mechanically interlocked by rolling and bonding together with screening binding material where necessary and water laid on a properly prepared sub-grade/sub-base/base or existing pavement, as the case may be and finished in accordance with the requirements of these Specifications and inclose conformity with the lines, grades, cross-sections and thickness as per approved plans or as directed by the Engineer.

**404.1.2** It is, however, not desirable to lay water bound macadam on an existing thin blacktopped surface without providing adequate drainage facility for water that would get accumulated, at the interface of existing Bitumenous surface and waterbound macadam.

**404.2. Materials**

**404.2.1. Coarse aggregates:** Coarse aggregates shall be either crushed or broken stone, crushed slag, over burnt (Jhama) brick aggregates or any other naturally occurring aggregates such as kankar and later ite of suitable quality. Materials other than crushed or broken stone and crushed slag shall be used in sub-base courses only. If crushed gravel/shingle issued, not less than 90 percent by weight of the gravel/shingle pieces retained on 4.75 mm sieve shall have at least two fractured faces. The aggregates shall conform to the physical requirements set for thin Table 400-6. The type and size range of the aggregate shall be specified in the Contractor shall be as specified by the Engineer. If the water absorption value of the coarse aggregate is greater than 2 percent, the soundness test shall be carried out on the material delivered to site as per I.S.: 2386 (Part 5).

**404.2.2. Crushed or broken stone:** The crushed or broken stone shall be hard, durable and free from excess flat, elongated, soft and disintegrated particles, dirt and other deleterious material.

**TABLE400-6. PHYSICA REQUIREMENTS OF COARSE AGGREGATES FOR WATER BOUND MACADAM FOR SUB-BASE/BASE COURSES**

Test		Test Method	Requirements
1.	Los Angeles Abrasion value or	IS:2386 (Part-4)	40 percent (Max)
	Aggregate Impact Value	IS:2386 (Part-4) or IS:5640**	30 percent (Max)
2.	Combined Flakiness and Elongation Indices (Total)	IS:2386 (Part- I)	30 percent (Max)

Aggregate may satisfy requirements of either of the two tests.

Aggregates like brick metal, kankar, laterite etc. which gets softened in presence of water shall be tested for Impact value under wet conditions in accordance with IS:5640.

The requirement of flakiness index and elongation index shall be enforced only in the case of crushed broken stone and crushed slag.

**404.2.3. Crushed slag:** Crushed slag shall be made from air-cooled blast furnace slag. It shall be of an angular shape, reasonably uniform in quality and density and generally free from thin, elongated and soft pieces, dirt or other deleterious materials. The weight of crushed slag shall not be less than 11.2 kN per M3 and the percentage of glossy material shall not be more than 20. It should also comply with the following requirements:

- (i) Chemical stability : To comply with requirements of appendix of BS:1047
- (ii) Sulphur content : Maximum 2 percent
- (iii) Water absorption : Maximum 10 percent

**404.2.4. Overburnt (Jhama) brick aggregates:** Jhama brick aggregates shall be made from overburnt bricks or brick bats and be free from dust and other objectionable and deleterious materials.

**404.2.5. Grading requirement of coarse aggregates:** The coarse aggregates shall conform to one of the Gradings given in Table 400-7 as specified, provided; however, the use of Grading No.1 shall be restricted to sub-base courses only.

**TABLE 400-7. GRADING REQUIREMENTS OF COARSE AGGREGATES**

Grading No.	Size Range	IS Sieve Designation	Percent by weight passing
1.	90mm to 45 mm	125mm	100
		90mm	90- 100
		63mm	25- 60
		45mm	0- 15
		22.4mm	0- 5
2.	63mm to 45 mm	90mm	100
		63mm	90- 100
		53mm	25- 75
		45mm	0- 15
		22.4mm	0- 5
3.	53mm to 22.4 mm	63mm	100
		53mm	95- 100
		45mm	65- 90
		22.4mm	0- 10
		11.2mm	0- 5

**Note:** The compacted thickness for a layer with Grading I shall be 100 mm while for layer with other Gradings i.e., 2 & 3, it shall be 75 mm.

**404.2.6. Screenings:** Screenings to fill voids in the coarse aggregate shall generally consist of the same material as the coarse aggregate. However, where permitted, predominantly non-plastic material such as moorurn or gravel (other than rounded river borne material) may be used for this purpose provided liquid limit and plasticity index of such material are below 20 and 6 respectively and fraction passing 75-micron sieve does not exceed 10 percent.

Screening shall conform to the grading set for thin Table 400-8. The consolidated details of quantity of screenings required for various grades of stone aggregates are given in Table 400-9. The table also gives the quantities of materials (loose) required for 10 m<sup>2</sup> for sub-base/base compacted thickness of 100/75 mm.

The use of screenings shall be omitted in the case of soft aggregates such as brick metal, kankar, laterites, etc.as they are likely to get crushed to a certain extent under rollers.

**TABLE400-8. GRADING FOR SCREENINGS**

Grading Classification	Size of Screenings	IS Sieve Designation	Percent by weight passing the IS Sieve
A	13.2mm	13.2 mm	100
		11.2 mm	95– 100
		5.6 mm	15– 35
		180 microns	0– 10
B	11.2mm	11.2 mm	100
		5.6 mm	90– 100
		180 microns	15–35

**TABLE 400-9. APPROXIMATE QUANTITIES OF COARSE AGGREGATES AND SCREENINGS REQUIRED FOR 100/75 MM COMPACTED THICKNESS OF WATER BOUND MACADAM (WBM) SUB-BASE/BASE COURSE FOR 10M2 AREA.**

Classification	Size Range	Compacted thickness	Loose Qty.	Screenings			
				StoneScreening		CrushableType such asMoorumor Gravel	
				Grading Classification & size	For WBM Sub-base /Base Course (Loose Quantity)	Grading Classification & Size	Loose Qty.
Grading 1	90mmto 45mm	100mm	1.21 to 1.43m <sup>3</sup>	TypeA 13.2mm	0.27to 0.30m <sup>3</sup>	Not Unifom	0.30 to 0.32m <sup>3</sup>
Grading 2	63mmto 45mm	75mm	0.91 to 1.07m <sup>3</sup>	TypeA 13.2mm	0.12to 0.15m <sup>3</sup>	Not Unifom	0.22 to 0.24m <sup>3</sup>
Grading 2	63mmto 45mm	75mm	0.91 to 1.07m <sup>3</sup>	TypeB 11.2mm	0.20to 0.22m <sup>3</sup>	Not Unifom	0.22 to 0.24m <sup>3</sup>
Grading 3	53mmto 22.4mm	75mm	0.91 to 1.07m <sup>3</sup>	TypeB 11.2mm	0.18to 0.21m <sup>3</sup>	Not Unifom	0.22 to 0.24m <sup>3</sup>

**404.2.7. Binding material:** Binding material to be used for water bound macadam as a filler material meant for preventin gravelling, shall comprise of a suitable material approved by the

Engineer having a Plasticity Index (PI) value or less than 6 as determined in accordance with IS:2720 (Part-5).

The quantity of binding material where it is to be used will depend on the type of screenings. Generally, the quantity required for 75 mm compacted thickness of water bound macadam will be 0.06-0.09 m<sup>3</sup>/10m<sup>2</sup> and 0.08-0.10m<sup>3</sup>/10m<sup>2</sup> for 100 mm compacted thickness.

The above-mentioned quantities should be taken as a guide only, for estimation of quantities for construction etc.

Application of binding materials may not be necessary when the screenings used are of crushable type such as moorumor gravel.

#### **404.3. Construction Operations**

**404.3.1. Preparation of base:** The surface of the sub-grade/sub-base/base to receive the water bound macadam course shall be prepared to the specified lines and cross fall (camber) and made free of dust and other extraneous material. Any ruts or soft yielding places shall be corrected in an approved manner and rolled until firm surface is obtained, if necessary, by sprinkling water. Any sub-base/base/surface irregularities, where predominant, shall be made good by providing appropriate type of profile corrective course (levellingcourse) to Clause 501 of these Specifications.

As far as possible, laying water bound macadam course over an existing thick Bitumenous layer may be avoided since it will cause problems of internal drainage of the pavement at the interface of two courses. It is desirable to completely pick out the existing thin Bitumenous wearing course where water bound macadam is proposed to be laid over it. However, where the intensity of rain is low and the interface drainage facility is efficient, water bound macadam can be laid over the existing thin Bitumenous surface by cutting 50 mm x 50 mm furrows at an angle of 45 degrees to the centre line of the pavement at one metre intervals in the existing road. The directions and depth of furrows shall be such that they provide adequate bond age and also serve to drain water to the existing granular base course beneath the existing thin Bitumenous surface.

**404.3.1 Inverted choke:** If water bound macadam is to be laid directly over the sub-grade, without any other intervening pavement course, a 25 mm course of screenings (GradingB) or coarse sand shall be spread on the prepared sub-grade before application of the aggregates is taken up. Incase of a fine sand or silty or clayey sub-grade, it is advisable to lay 100 mininsulating layer of screening or coarse sand on top of fine-grained soil, the gradation of which will depend upon whether it is intended to act as a drainage layer as well. As a preferred alternative to inverted choke, appropriate Geosynthetics per- forming functions of separation and drainage may be used over the prepared sub-grade as directed by the Engineer. Section 700 shall be applicable for the use of Geosynthetics.

**404.3.3. Spreading coarse aggregates:** The coarse aggregates shall be spread uniformly and evenly uponthepreparedsub-grade/sub-base/base to proper profile by using templates placed across the road about 6 in a part, in such quantities that the thickness of each compacted layer is not more than 100 mm for Grading I and 75 mm for Grading 2 and 3, as specified in Clause 404.2.5. Wherever possible, approved mechanical devices such as aggregate spreaders shall be used to spread the aggregates uniformly so as to minimise the need for manual rectification afterwards. Aggregates placed at locations which are inaccessible to the spreading equipment may be spread in one or more layers by any approved means so as to achieve the specified results.

The spreading shall be done from stockpiles along the side of the roadway or directly from vehicles. No segregation of large or fine aggregates shall be allowed and the coarse aggregate as spread shall be of uniform gradation with no pockets of fine material.

The surface of the aggregates spread shall be carefully checked with templates and all high or low spots remedied by removing or adding aggregates as may be required. The surface shall be checked frequently with a straight edge while spreading and rolling so as to ensure a finished surface as per approved drawings.

The coarse aggregates shall not normally be spread more than 3 days in advance of the subsequent construction operations.

**404.3.4. Rolling:** Immediately following the spreading of the coarse aggregate, rolling shall be started with three wheeled power rollers of 80 to 100 kN capacity or tandem vibratory rollers of 80 to 100 kN static weight. The type of roller to be used shall be approved by the Engineer based on trial run.

Exception super elevated portions where the rolling shall proceed from inner edge to the outer, rolling shall begin from the edges gradually progressing towards the centre. First the edge/edges shall be compacted with roller running forward and backward. The roller shall then move inward parallel to the centreline of the road, in successive passes uniformly lapping preceding tracks by at least one-half width.

Rolling shall be discontinued when the aggregates are partially compacted with sufficient void space in them to permit application of screenings. However, where screenings are not to be applied, as in the case of crushed aggregates like brick metal, laterite and kankar, compaction shall be continued until the aggregates are thoroughly keyed. During rolling, slight sprinkling of water may be done, if necessary. Rolling shall not be done when the sub-grade is soft or yielding or when it causes a wave-like motion in the sub-grade or sub-base course.

The rolled surface shall be checked transversely and longitudinally, with templates and any irregularities corrected by loosening the surface, adding or removing necessary amount of aggregates and re-rolling until the entire surface conforms to desired crossfall (camber) and grade. In no case shall the use of screenings be permitted to make up depressions.

Material which gets crushed excessively during compaction or becomes segregated shall be removed and replaced with suitable aggregates.

It shall be ensured that shoulders are built up simultaneously along with water bound macadam courses as per Clause 407.4.1.

**404.3.5. Application of screenings:** After the coarse aggregate has been rolled to Clause 404.3.4, screenings to completely fill the interstices shall be applied gradually over the surface. These shall not be damp or wet at the time of application. Dry rolling shall be done while the screenings are being spread so that vibrations of the roller cause them to settle into the voids of the coarse aggregate. The screenings shall not be dumped in piles but be spread uniformly in successive thin layers either by the spreading motions of hand shovels or by mechanical spreaders, or directly from tipper with suitable grit spreading arrangement. The tipper operating for spreading the screenings shall be so driven as not to disturb the coarse aggregate. The screenings shall be applied at a slow and uniform rate (in three or more applications) so as to ensure filling of all voids. This shall be accompanied by dry rolling and brooming with mechanical brooms, hand brooms or both. In no case shall the screenings be applied as thick as to form cakes or ridges on the surface in such a manner as would prevent filling of voids or prevent the direct bearing of the roller on the coarse aggregate. These operations shall continue until no more screenings can be forced into the voids of the coarse aggregate.

The spreading, rolling, and brooming of screenings shall be carried out in only such lengths of the road which could be completed within one day's operation.

**404.3.6. Sprinkling of water and grouting:** After the screenings have been applied, the surface shall be copiously sprinkled with water, swept and rolled. Hand brooms shall be used to sweep the wet screenings into voids and to distribute them evenly. The sprinkling, sweeping and rolling operation shall be continued, with additional screenings applied as necessary until the coarse aggregate has been thoroughly keyed, well-bonded and firmly set in its full depth and a grout has been formed of screenings. Care shall be taken to see that the base or sub-grade does not get damaged due to the addition of excessive quantities of water during construction.

In case of lime treated soil sub-base, construction of water bound macadam on top of it can cause excessive water to flow down to the lime treated sub-base before it has picked up enough strength (is still "green") and thus cause damage to the sub-base layer. The laying of water bound macadam layer in such cases shall be done after the sub-base attains adequate strength, as directed by the Engineer.

**404.3.7. Application of binding material:** After the application of screenings in accordance with Clauses 404.3.5 and 404.3.6, the binding material where it is required to be used (Clause 404.2.7) shall be applied successively in two or more thin layers at a slow and uniform rate. After each application, the surface shall be copiously sprinkled with water, the resulting slurry swept in with hand brooms, or mechanical brooms to fill the voids properly, and rolled during which water shall be applied to the wheels of the rollers if necessary to wash down the binding material sticking to them. These operations shall continue until the resulting slurry after filling of voids, forms a wave ahead of the wheels of the moving roller.

**404.3.8. Setting and drying:** After the final compaction of water bound macadam course, the pavement shall be allowed to dry over night. Next morning hungry spots shall be filled with screenings or binding material as directed, lightly sprinkled with water if necessary and rolled. No traffic shall be allowed on the road until the macadam has been set. The Engineer shall have the discretion to stop hauling traffic from using the completed water bound macadam course, if in his opinion it would cause excessive damage to the surface.

The compacted water bound macadam course should be allowed to completely dry and set before the next pavement course is laid over it.

#### **404.4. Surface Finish and Quality Control of Work**

**404.4.1.** The surface finish of construction shall conform to the requirements of Clause 902.

**404.4.2.** Control on the quality of materials and works shall be exercised by the Engineer in accordance with Section, 900.

**404.4.3.** The water bound macadam work shall not be carried out when the atmospheric temperature is less than 00 C in the shade.

**404.4.4. Reconstruction of defective macadam:** The finished surface of water bound macadam shall conform to the tolerance of surface regularity as prescribed in Clause 902. However, where the surface irregularity of the course exceeds the tolerances or where the course is otherwise defective due to sub-grade soil mixing with the aggregates, the course to its full thickness shall be scarified over the affected area, re shaped with added material or removed and replaced with fresh material as applicable and recompactd. In no case shall depressions be filled up with screenings or binding material.

#### **404.5. Arrangement for Traffic**

During the period of construction, the arrangement of traffic shall be done as per Clause 112.

#### **404.6. Measurements for payment**

Water bound macadam shall be measured as finished work in position in cubic metres.

#### **404.7 Rate:**

The contract unit rate for water bound macadam sub-base/base course. Shall be payable in full for carrying out the required operations including arrangement of water used in the work as approved by the Engineer including full compensation for all components listed below.

- (i) Making arrangements for traffic to Clause 112 except for initial treatment to verges, shoulders and construction of diversions.
- (ii) Furnishing all materials to be incorporated in the work including all royalties, fees, rents where necessary and all lead sand lifts.
- (iii) All labour, tools, equipment and incidentals to complete the work to the specifications.
- (iv) Carrying out the work in part widths of road where directed; and carrying out the required tests for quality control.

#### **Item No.125**

**Providing and fixing pre-cast Rubber Dye/ steel Dye inter locking concrete block 60mm thick with grade of concrete M300 pneumatic compressed/ vibrated mechanically and as per approved design Confirming to IS 15658: 2006 including 35 mm Sand layer for levelling and filling the joint with sand in proper line and level as per guidelines of IRC: SP 63-2018 etc. Complete.**

##### **Material:**

Water shall confirm to M-1, sand shall confirm to M-6, Cement shall confirm to M-3. 60mm thick with grade of concrete M300 and pneumatic compressed by mechanically pressed paver block of "ALCOCK" or equivalent make of approved colour & shape having abrasion value not more than 2mm and water absorption not more than 6%.

##### **Workmanship:**

The subgrade shall be cleaned, leveled, wetted and rammed as directed. A 75mm thick layer of dry sand shall be spread over it. paver block of approved colour, shape and size, shall be laid in different pattern/design as shown in the drawing or as directed by Consulting Architect/Engineer-in-charge as directed on top, pressed, tapped gently to bring it in line and level and interlock with others. The joint shall be as fine as possible. The finished surface shall be true to levels and slopes as directed. Necessary testing of blocks is to be carried out.

##### **Mode of Measurement and Payments:**

The rate shall include the cost of all materials and labour involved in all the operations described above. The Paver block flooring shall be measured in square metres correct to two places of decimal, length and breadth shall be measured correct to a centimeter.

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

#### **Item No. 128**

**Supply & Installation external cladding using fibre cement plank of cassia/ straight grain/ teak coloured texture (External Grade) thickness 8mm and dimension 150mmX 3000mm. Fibre cement plank should be of minimum density 1300kg/ m<sup>3</sup> (±50) and comply to ASTM C 1185 and ISO 8336 part (E) for confirming durability properties and BS 476 - part 5, 6 & 7, Thermal conductivity should be minimum 0.15 W/m<sup>2</sup>K and PH value should be in the range of 7-8. Depending on height of structure Board to be fixed using Aluminium rectangular frame section of suitable gauge with minimum spacing 450mm to 600mm or as per direction of Engineer Incharge, Plank to be fixed using**



**Screws of Tensile strength 34N and Shear strength 68N on framing maintaining distance of minimum 25mm between two planks. All plank-to-plank joints to be staggered and finished.**

### **1.0 SCOPE OF ITEMS**

Item covers providing and Fixing Louvers of approved make or as suggested by Architect / Consultant. Item covers Structural Steel with painting and installation with necessary making frame structure, fabrication, Adjusting and cleaning. Necessary scaffolding & safety measures to be held by contractor.

### **2.0 Material**

2.1 Aluminum alloys used in the manufacture of extruded sections for the fabrication of doors, windows, ventilators shall conform to designation HE9 WP of IS:733.

**Panels:**6" wide and more sizes, length up to 3 mtrs

### **3.0 Workmanship**

3.1 Work includes the Painting and fixing the structural steel with alluminium frame.

### **4.0 Mode of Measurement**

4.1 Measurement shall be in sq. m correct to two places of decimal. Measurement shall be from out to out of the frames. The rate quoted shall be for the works including builder's hardware of fittings and fixtures as specified described in the respective items of work.

Payment shall be made for quantity recorded in the Measurement Book at the rate quoted by the bidder in Schedule – B

### **Item No: 129**

**STP on MBBR\_Technology (200\_KLD) PART -A, MEP WORK Planning, Designing, Detailing, Manufacturing, Supplying, Erection, Testing and Commissioning of Sewage Treatment Plant (STP) of 200 cu mt per day, including all electrical, mechanical equipment, interconnected piping, valves, pumps, instruments. Design and construction of RCC tanks i.e., oil & grease chamber, collection tank, bio reactor tank, tube settler, chlorine contact tank and final treated water tank with manhole cover & all other civil structure of the pump room of the plant to complete the job. Connection of the underground sewage line to STP as well as connection of treated water of STP to nearest drain and Bypass connection of STP to the drain point with required civil, piping work & accesories all included in the scope of work. Suitable size of Shade to be provided to cover up the entire STP plant. Aeration should be provided in both Collection as well as Bio-Reactor Tank. All wet parts should be in SS304. STP should be based on MBBR Technology including primary treatment secondary treatment and tertiary treatment of having Multi Grade Filter, Activated Carbon Filter with necessary chlorine contact system, Poly Electrolyte Dosing system complete to treat raw sewage from Domestic liquid waste with output characteristics as follows: Parameter.**

**pH:** 7 to 7.5

**B.O.D. (mg / Lit) :**< 5 to 20 mg/Lit.

**C.O.D. (mg / Lit) :**< 10 to 30 mg/Lit.

**Suspended Solids:**< 25 mg/Lit.

**Oil & Grease (mg / Lit) :**< 5 mg/Lit. It also includes the operation and maintenance costs of STP for 3 years from the actual date of completion without any extra cost.

Item carried out as per specification and instruction of Engineer in Charge

### **MODE OF PAYMENT**

The rate shall be for a unit of Number basis.

**Item No. 130 to 136**

**Providing laying and jointing in true line and level U.P.V.C. Pipe (SCH -40) line including fittings of standard make as approved by Engineer in Charge. Pipe shall be fixed on the wall with the help of clamp at every two-meter C/C or shall be concealed as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.**

**a) 15 mm dia.**

**b) 25 mm dia.**

**c) 32mm dia.**

**d) 40 mm dia.**

**e) 50mm dia.**

**f) 65 mm dia.**

**g) 80 mm dia.**

**1.0 Materials:**

**1.1** The pipe (schedule 80) of specified diameter with working pressure shall conform to ASTM –D 1785 (non-threaded). The specials and fittings required shall be of the best quality and UV stabilized so as to facilitate open fixation, conforming to ASTM–D-2466 and relevant specifications of plumbing materials.

**2.0 Workmanship:**

**2.1** The uPVC pipes of specified diameter shall be fixed as directed. Due to thermal expansion of uPVC pipes, due allowances, about 10 mm. of thermal gap, shall be made particularly in over the ground pipelines for any change in length of pipeline which may occur during installation or when pipeline is in serve.

**2.2** Above the ground installation of uPVC pipe should be undertaken after precautions are observed for their protection against dirt, sunrays, and mechanical damage. uPVC pipes are UV stabilized and shall be adopted.

**2.3** The uPVC pipelines should not be kept exposed above the ground when they pass through public places, railway lines, roads, roadside and footpaths.

**2.4** Generally, in horizontal runs, uPVC pipes shall be supported at an interval of not more than ten times the outside diameter of the pipe. In vertical lines, uPVC pipes shall be supported at an interval of 1 m to a maximum of 2m. Closer support spacing shall be provided, if recommended by the manufacturer.

**2.5** The guideline indicated by the manufacturer regarding handling, transporting, storing, laying and jointing of pipes shall be kept in view, during execution. Provision for expansion joints, air vents and proper anchorage shall be made.

**2.6** uPVC pipes shall be fixed on the wall with wooden plugs and suitable clamps.

**2.7 Jointing the pipes:**

**2.7.1** The pipes and sockets shall be accurately cut. Care shall be taken to cut the pipe square. The shortened pipe end shall be chamfered to an angle of 150 with a medium file. The ends of the pipes and fittings should be absolutely free from dirt and dust. The outside surface of the pipes and the inside of the fittings shall then be roughened with emery paper, and then solvent cement shall be applied to the matching surface i.e., to the spigot end and the sealing ring and then pass the spigot end into the socket containing the sealing ring until pushed home fully and joined. Mark the position of the socket edge on the pipe and then withdraw the pipe from the socket for the necessary thermal gap. Since solvent cement is aggressive to uPVC, care must be taken to avoid applying excessive cement to the inside of pipe sockets as any surplus cement

cannot be wiped off after jointing. Very old, hard, semi fluid solvent cement shall not be used. Empty solvent cement tins, brushes, rags of paper unpregnated 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.

**2.7.2** Threaded uPVC pipe fittings shall not be over tightened, as the threads may get damaged. The pipes shall never be threaded but suitable threaded fittings shall be used.

**2.7.3** If any manufacturer recommends its own methods of joining the same shall be adopted after necessary approval from the Engineer-in-charge or Architect.

**2.8 Laying the pipes in trenches:**

**2.8.1** The pipes shall be laid over uniform relatively soft fine-grained soil, found to be free from the presence of hard objects such as large flints, rocky projections, large tree roots etc. While laying the pipes underground, care shall be taken so that the trench shall be as narrow as possible as required for working and its bottom shall be free of stones, sharp objects etc.

**2.8.2** The pipes laid underground shall not be less than 1 meter from the ground level. The pipe shall be positioned in the trenches so as to avoid any induced stresses due to deflection. Any deviation required shall be obtained by using proper type of rubber ring joints.

**3.0 Mode of Measurements and payment:**

**3.1** The relevant specifications of item No. 1.01.a of water supply installations shall be followed except that the uPVC pipes of specified dia. shall be paid for under this item.

**3.2** The rate shall be for a unit of one rmt.

**Item No. 137 & 142**

**Providing and fixing concealed 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.**

- A) 15mm dia.
- B) 20mm dia.
- C) 25mm dia.
- D) 32mm dia.
- E) 40mm dia.
- F) 50mm dia.

**1.0 Materials:**

**1.1** The pipe (schedule 80) of specified diameter with working pressure shall conform to ASTM –D 1785 (non-threaded). The specials and fittings required shall be of the best quality and UV stabilized so as to facilitate open fixation, conforming to ASTM–D-2466 and relevant specifications of plumbing materials.

**2.0 Workmanship:**

**2.1** The CPVC pipes of specified diameter shall be fixed as directed. Due to thermal expansion of CPVC pipes, due allowances, about 10 mm. of thermal gap, shall be made particularly over the ground pipelines for any change in length of pipeline which may occur during installation or when pipe line is in serve.

**2.2** Above the ground installation of CPVC pipe should be undertaken after precautions are observed for their protection against dirt, sunrays and mechanical damage. CPVC pipes are UV stabilized and shall be adopted.

**2.3** The CPVC pipelines should not be kept exposed above the ground when it passes through public place, railway lines, roads, roadside and footpaths.

**2.4** Generally, in horizontal runs, CPVC pipes shall be supported at an interval of not more than ten times the outside diameter of the pipe. In vertical lines, uPVC pipes shall be supported at an interval of 1 m. to a maximum of 2 m. Closer support spacing shall be provided, if recommended by the manufacturer.

**2.5** The guideline indicated by the manufacturer regarding handling, transporting, storing, laying and jointing of pipes shall be kept in view, during execution. Provision for expansion joints, air vents and proper anchorage shall be made.

**2.6** CPVC pipes shall be fixed on the wall with wooden plugs and suitable clamps.

**2.7 Jointing the pipes:**

**2.7.1** The pipes and sockets shall be accurately cut. Care shall be taken to cut the pipe square. The shortened pipe end shall be chamfered to an angle of 150 with a medium file. The ends of the pipes and fittings should be absolutely free from dirt and dust. The outside surface of the pipes and the inside of the fittings shall then be roughened with emery paper, and then solvent cement shall be applied to the matching surface i.e. to the spigot end and the sealing ring and then pass the spigot end in to the socket containing the sealing ring until pushed home fully and joined. Mark the position of the socket edge on the pipe and then withdraw the pipe from the socket for the necessary thermal gap. Since solvent cement is aggressive to uPVC, care must be taken to avoid applying excessive cement to the inside of pipe sockets as any surplus cement cannot be wiped off after jointing. Very old, hard, semi fluid solvent cement shall not be used. Empty solvent cement tins, brushes, rags of paper unpregneted 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.

**2.7.2** Threaded CPVC pipe fittings shall not be over tightened, as the threads may get damaged. The pipes shall never be threaded but suitable threaded fittings shall be used.

**2.7.3** If any manufacturer recommends its own methods of joining the same shall be adopted after necessary approval from the Engineer-in-charge or Architect.

**2.8 Laying the pipes in trenches:**

**2.8.1** The pipes shall be laid over uniform relatively soft fine-grained soil, found to be free from the presence of hard objects such as large flints, rocky projections, large tree roots etc. While laying the pipes underground, care shall be taken so that the trench shall be as narrow as possible as required for working and its bottom shall be free of stones, sharp objects etc.

**2.8.2** The pipes laid underground shall not be less than 1 meter from the ground level. The pipe shall be positioned in the trenches so as to avoid any induced stresses due to deflection. Any deviation required shall be obtained by using proper type of rubber ring joints.

**3.0 Mode of Measurements and payment:**

**3.1** The relevant specifications of item No. 1.01.a of water supply installations shall be followed except that the CPVC pipes of specified dia. shall be paid under this item.

**3.2** The rate shall be for a unit of one rmt.

**Item No. 143 & 144**

**Providing and fixing to wall, ceiling, floor 10.0 Kgf/Sqcm working pressure polythelene pipes for rainwater, low density, complete with special flange compression type fittings, wall clips etc. making good wall ceiling and floor.**

**a) 110mm dia.**

**b) 75mm**

Specification for this item shall conform to item no. Ch.23-Item 23.8 General Technical Specifications for building work.

Rate shall be for a unit of one Running Meter

**Item No. 145 to 147**

**Supplying & installing Brass Ball Valve conforming to IS 778 of RB, Italy or equivalent. Ball valve must have screwed ends. The ball valve should be with stand with maximum pressure up to 16 Kg/cm<sup>2</sup>. Complete job as specified & directed.**

- a) 50mm
- b) 65mm
- c) 80mm

**1.0 Materials:**

**1.1** The gun metal gate full way wheel valve of specified dia. shall conform to IS: 778 and relevant specifications of plumbing materials. All material shall be of 1st quality of recommended make or equivalent, as approved by the Architect and Engineer-in-charge.

**2.0 Workmanship:**

**2.1** The gun metal gate valve shall be fully cleared of all foreign matter, before fixing. The fixing of valve shall be done by applying locktite 55 or Teflon tape on Male screwed ends. The jointing shall be leaking proof. A union shall be provided near each GM valve, stopcock or check valve.

**3.0 Mode of Measurements and Payment:**

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

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

**Item No. 148**

**Providing and fixing PVC SWR Nahni trap IS 14735 for drain - 100 mm diameter with jali of the following nominal diameter of self cleansing design with C.I screed down or hinged grating including the cost of cutting and making good the walls.**

**1. Materials:**

The uPVC SWR pipe of specified dia shall conform to **IS: 13592** with latest amendments type b only. The specials and fittings required shall be of the first quality and UV stabilized so as to facilitate open fixation, conforming to **IS: 14735** with latest amendments and also to relevant plumbing material specifications.

**2. Workmanship:**

**2.1** The uPVC pipes of specified dia shall be fixed as directed. Due to thermal expansion of rigid uPVC pipes and fittings Ring fit pipes and Ring or self fit fittings shall be used for vertical lines and all horizontal lines shall be with self fit pipe and fittings.

**2.2** Above ground installation of rigid uPVC pipe should be undertaken after precautions are observed for their protection against dirt, sun rays and mechanical damage. uPVC pipes are UV stabilized and may be adopted.

**2.3** Generally, in horizontal runs, uPVC pipes shall be supported at an interval of not more than 10 times the outside dia of the pipe. In vertical lines, uPVC pipes shall be supported at an interval of 1 m to a maximum of 2 m/. Closer support spacings shall be provided if recommended by the manufacturer.

**2.4** Manufacturer's guidelines regarding handling, transporting, storing, laying and jointing of pipes shall be kept in view, during execution. Provision for expansion joints, air vents and proper anchorage shall be made.

**2.5** uPVC pipes shall be fixed on the wall with clips, wooden plugs and suitable brackets/clamps.

## **2.6 Jointing the pipes:**

The pipes and sockets shall be accurately cut at a right angle to the axis. The shortened pipe end shall be chamfered to an angle of 15° with a medium file. 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 solvent cement applied to the matching surface, i.e., to the spigot end and the sealing ring. Then pass the spigot end into the socket containing the sealing ring until pushed home fully and joined. Mark the position of the socket edge on the pipe and then withdraw the pipe from the socket for the necessary thermal gap. Since solvent cement is aggressive to uPVC, care must be taken to avoid applying excessive cement to the inside of pipe sockets as any surplus cement cannot be wiped off after jointing. Very old, hard, dense solvent cement shall not be used. Empty solvent cement tins, brushes, rags of paper unpregnated 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.

If any manufacturer recommends its own methods of joining the same shall be adopted after necessary approval from the Engineer-in-charge or Architect.

## **2.7 Laying the pipes in trenches:**

The pipes shall be laid over uniform relatively soft fine-grained soil, found to be free from the presence of hard objects such as large flints, rocky projections, large tree roots etc. While laying the pipes underground, care shall be taken so that the trench shall be as narrow as possible as required for working and its bottom shall be free of stones, sharp objects, etc.

The pipes laid underground shall not be less than 1 m from the ground level. The pipe shall be positioned in the trenches so as to avoid any induced stresses due to deflection. Any deviation required shall be obtained by using proper type of rubber ring joints.

## **3. Mode of Measurements and Payment:**

The relevant specifications of item no. 3.01.A.1, of internal drainage shall be followed except that the uPVC SWR pipes of specified dia. shall be paid for under this item.

The rate shall be for a unit of one RMT.

### **Item No. 149**

**Providing and fixing 600mm x 450mm Bevelled edge mirror of superior glass mounted on 6mm thick A.C. sheet or plywood sheet and fixing to wooden pluge with C.P. brass screws and washers.**

#### **1.0 MATERIALS:**

**1.1** The 600 x 450 mm. size mirror shall be of superior glass with edge rounded off or beveled as specified. It shall be free from flaws specks, or bubbles and its thickness shall not be less than 6 mm. The glass for the mirror shall be uniformly silver plated at the back and shall be free from silver defects. Silvering shall have a protective uniform covering of red-lead paint.

#### **1.2 Plywood:**

**1.2.1** The plywood for general purpose shall conform to I.S. 303-1975. Plywood is made by cementing together thin boards or sheets of wood into panels. There are always an odd number of layers 3, 5, 7, 9 ply etc. The piles are placed so that grain of each layer is right angle to the grain in the adjacent layer.

**1.2.2** The Chief advantages of plywood over a signal board of the same thickness is the more uniform strength of the plywood, along the length and width of the plywood and grater resistance to cracking and splitting with change in moisture content.

**1.2.3** Usually synthetic resins are used for gluing, pherolic resins are usually cured in a hot press which compresses and simultaneously heats the plies between hot plates which maintain a temperature of 90 degrees C. to 140 degrees C. and a pressure of 11 to 14 kg/sq.cm. in the wood. The time of heating may be anything from 2 to 69 minutes depending upon thickness.

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

**1.2.5** According to I.S. 303-1975 the plywood for general purpose shall be of three grades **BWR, WWR** and **CWR**, depending upon the adhesives used for bonding and veneers, and it will be further classified into six types namely AA, AB, AC, BB, BC and CC based on the quality of the two faces, each face being of three kinds namely, A, B and C, After pressing, the finished plywood should be reconditioned to a moisture content not less than 8 percent and not more than 16 percent.

**1.2.6** Thickness of plywood Boards:

**TABLE**

Board	Thickness	Board	Thickness	Board	Thickness	Board	Thickness
3 ply	3 mm.	5 ply	5 mm.	7 ply.	9 mm.	9 ply.	16 mm.
	4 mm.		6 mm.		13 mm.		19 mm.
	5 mm.		8 mm.		16 mm.	11 ply	19 mm.
	6 mm.		9 mm.	9 ply.	13 mm.		22 mm.
							25 mm.

### **1.3 Asbestos Cement Sheets:**

**1.3.1** Asbestos cement sheets plain, corrugated or semi corrugated shall conform to I.S. 459-1970.

## **2.0 WORKMANSHIP:**

**2.1** The mirror of 500 mm. x 450 mm. size mounted on A. C. sheet or plywood 6 mm. thick with C. P. brass clips shall be fixed as directed, by fixing wooden plugs in wall and C. P. brass screws and washers. The work shall be carried out in best workman like manner.

## **3.0 MODE OF MEASUREMENTS & PAYMENT:**

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

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

### **Item No. 150**

**Providing and fixing wash down wall hung water closet (European type) of jaquar or equivalent with integral 'P' trap jointed within C.I pipe in C:M 1:1 including matching seat cover, chair braket, Conceled metropole of jaquar or equivalent, 2-way bibcock of jaquar or equivalent, health focuet of jaquar or equivalent with 1 m extension pipe, toilet paper holder of jaquar or equivalent with all accessories etc. complete.**

#### **MATERIALS:**

##### **1.1 European type water closet/with low level flushing:**

**1.1.1** The European type of water closet shall be white glazed porcelain first quality and shall be of wash down type conforming to I.S. 2556-1973 and I.S. 771-1979.

**1.1.2** 'S' trap shall be provided as required with water seal not less than 50 mm. The solid plastic seat and cover shall be of the best Indian make conforming to I.S. 2548-1980. They shall

be made of moulded syntactic materials which shall be tough and hard with high resistance to solvents and shall be free from blisters and other surface defects and shall have chromium plated brass hinges and rubber buffer of suitable size.

**2.0 WORKMANSHIP:** 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 fibre washers so as not to allow any lateral displacement. The joint between the trap of W.C. and soil pipe shall be made with C.M. 1:1 (1 cement:1 fine sand)

**3.0 MODE OF MEASUREMENTS & PAYMENT:**

**3.1** The rate shall include the cost of all labour for fixing pans and seat and cover, inlet, connections etc. complete including testing the same.

The rate shall include all fittings & fixtures as approved by the architect.

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

**Item No. 151**

**Providing and fixing urinals of jaquar or equivalent with integral drainpipe jointed within C.I pipe in C:M 1:1, Concealed cock, all accessories etc. complete.**

Detailed specification for this item shall be as per General Technical Specifications for Building works booklet page No 152 & item No 23.122 (A) except the fitting should be used as per Jaquar code no. or as approved.

Rate shall be for a unit of one number.

**Item No. 152**

**Providing and Fixing autoclosing concealed urinal flush valve with wall flange complete. As directed by EIC.**

As per manufacturer's Specifications.

Rate shall be for a unit of one number.

**Item No. 153**

**Providing & Fixing C.P Brass waste for washbasin or sink (a) 32 mm Dia**

**MATERIAL**

Waste Coupling shall conform to IS 3311. Waste fittings shall be of CP with thickness of CP coating not less than service Grade No.2 of IS 4827 which is capable of receiving polish and will not easily scale off. The fitting shall conform in all respect to IS 2963 and shall sound, free from laps below, holes and fittings and other manufacturing defects. External and internal surface shall be clean and smooth. They shall be neatly dressed. The waste fitting for wash basin shall be of nominal size of 32 mm and for sink shall be nominal size 50 mm.

**WORKMANSHIP**

Waste coupling shall be fixed to wash basin, sink or urinal as ordered with necessary specials. Joining shall be done with white zinc, yarn etc. A few turns of fine hemp yarn dipped in the linseed oil shall be taken over the threaded ends to obtain complete water tightness. Leaky joint shall be remade to make it leak proof.

**MODE OF MEASUREMENTS & PAYMENT:**

The rate shall be for a unit of one number.

**Item No. 154**



**Providing and fixing C.P. brass towel rail completes with C.P. Brass brackets fixed to wooden plugs with C.P. Brass screws at any floor, level and height. (B) 600mm x 20 mm size**

Specification shall conform to item no. 23.144 of General Technical Specifications for building work. The rate shall be for a unit of one No.

**Item No. 155**

**Providing and fixing screw down two-way bib taps of 15mm dia- Brass down bright polished jaquar code no. FLR-5041N.**

**GENERAL**

The item pertains to provide chromium plated brass bib tap and stop cock and angle stop cocks, free flanges (if joined to concealed pipe) including fixing.

**MATERIAL**

Bib cock (Bib tap) is drawn off tap with a horizontal inlet and free outlet and a stop cock is a valve with a suitable means of connections for insertion in a pipeline for controlling or stopping the flow. These shall be of size 15 mm sizes or as specified and shall be of screw down type. The closing device shall work by means of disc. Carrying a renewable non-metallic washer with shuts against the water pressure on seating right angles to the axis of the threaded spindle which operates it. The handle shall be crutch, butterfly or fancy design type securely fixed to the spindle. The tap shall open anti clockwise direction.

Brass bib taps and stop cocks and angle stop cocks shall conform to IS 781, they shall be polished bright. The minimum finished weight of different sizes of bib taps weight of 15 mm size bib tap and stop cock shall be as per table given below. They shall be sound and free from taps, blow whole and fitting. Internal & External surface shall be clean, smooth and free from sand and neatly dressed. Taps shall be nickel chromium plated and thickness of coating shall not be less than service grade No.2 of IS 4827 and plating shall be capable of taking high polish which shall not be easily tarnished.

MINIMUM FINISHED MASS OF BIB TAPS AND STOP VALVES AS PER IS 781:1984 (Reaffirmed 2001)

**Minimum Finished Mass**

Stop Valves				
Size	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	0.330	0.330	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

Every tap complete with its component shall withstand an internally applied hydraulic pressure of 2 MPa (20 kg/sq.cm) maintained for a period of 2 minutes during the period it shall neither leak nor sweat. The leaky joint shall be remade to make it leak proof without any extra cost from contractor.

## **FIXING**

Bib tap stop cock shall be fixed to the pipeline with C.P. brass or G.I. specials, if required or as ordered by Engineer-in-charge. Joining shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tightness.

### **THE RATE INCLUDES FOR**

1 Bib tap and stop cock, special etc.

2 All necessary labor, material and the use of tools.

The rate shall be for a unit of one number.

## **Item No. 156**

**Providing and fixing pillar tap, capstan head, screw down high pressure with screws, shanks and back nuts. (i) 15mm dia.**

Specification shall conform to item no. 233 as above work.

The rate shall be for a unit of one No.

## **Item No. 157**

**Providing and fixing tabletop wash basin on 18mm thick black shade polished granite for top with 2 Nos. of C.I. Heavy bracket with 1 Nos. of wash basin Jaquar brand or equivalent, C.P. brass Jaquar pillar cock or equivalent, angle valve or equivalent, C.P. brass extension nipple 62mm long, S.S. flange water super connection pipe 60cm. long and full thread waste coupling including, bottle trap making hole in granite for wash basin etc. complete.**

### **1.0 MATERIALS:**

**1.1** The Wash Basin Jaquar or equivalent shall be of 1st quality and made as approved by the Engineer-in-charge.

### **1.2 Wash Basin Jaquar or equivalent:**

**1.2.1** Wash basin shall be of white porcelain first quality best Indian make, and it shall conform to I.S. 2556 (Part-IV) 1972 and I.S. 771-1979.

The size of the wash basin shall be as specified in the item, Wash basin shall be of one-piece construction with continued over-flow arrangements. All internal angles shall be designed so as to facilitate cleaning. The wash basin shall have single tap hole, or two holes as specified. Each basin shall have a circular waste hole which is either rebated or beveled internally with 65 mm. diameter at top and 10 mm. depth to suit the waste fitting. The necessary stud slot to receive the bracket on the under side of the basin shall be provided. The basin shall have an internal soap holder recess which shall fully drain into the bowl.

**1.2.2** 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 basin rigidly and adequately and shall be so designed as to make the height from floor to top of basin 750mm. to 800 mm. as directed.

### **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 M. S. or C.I. brackets fixed in C.M. 1: 3 (1 cement: 3 sand). The bracket shall conform to I. S.: 775-1962. The wall plaster on the rear shall be cut to rest the top edge of the wash basin. After fixing the basin, plaster shall be made good, and surface finished to match with the existing one.

**2.2** The bracket shall be painted white with ready-mixed paint.

**2.3** The C.I. brass trap and union shall be connected to 32 mm. dia. waste pipe which shall be suitably bent towards the wall, and which shall discharge into an open drain leading to a gully trap or direct into the gully-trap on the ground floor and shall be connected to a waste pipe through a floor trap on the upper floors. C. P. brass trap and union may not be provided where the surface drain or a floor trap is placed directly under the basin and the waste is discharged vertically.

**2.4** The height of the front edge of the wash basin from the floor level shall be 80 cms.

**2.5** The necessary inlet, outlet connections and fittings such as pillar cocks. C. P. dress waste trap waste pipe, stop cock, chain wish rubber plug etc. shall be fixed.

**2.6** The payment of fittings shall be made separately under separate item.

**3.0 MODE OF MEASUREMENTS & PAYMENT:**

**3.1** The rate includes the 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.

**Item No. 158**

**Providing & Fixing soap dish of jaquar or equivalent make or as directed and complete.**

**GENERAL**

The item includes providing white soap dish holder of size as mentioned in the schedule including fixing.

**MATERIAL**

The soap Dish Holder shall be specified and of size, design and approved by the Engineer-in-charge. Soap Dish Holder shall conform to relevant IS standard and should have ISI certification mark.

**FIXING**

The soap Dish holder shall be fixed in position by means of C.P brass covers and rawl plug embedded in the wall. A soap Dish shall holder fixed into the wall with 1:2 cement mortar. The pocket shall be cut in wall, if not left, finishing the gap with white/matching cement.

**MODE OF MEASUREMENTS & PAYMENT:**

The rate shall be for a unit of one number.

**Item No. 159**

**Providing & fixing CP brass double coat hook jaquar etc. complete.**

The above CP chrome plated set is draw off tap with horizontal inlet and free outlet knurling on outer face to fix in the pipe. Mixer shall be of specified size and shall be of screw down type and shall conform to IS: 781-1984. The closing device shall work by means of a disc carrying a renewable non-metallic washer which shuts against the water pressure on a seating at right angle to the axis of the threaded spindle which operate it. The handle shall be either crutch or butterfly type securely.

**MEASUREMENTS**

**1** Rate for providing and fixing fixtures, accessories, shall include all items and operations stated in the respective specifications and Bill of Quantities, and nothing extra is payable.

**2** Rates for all items under specifications Para above shall be inclusive of cutting holes and chases and making good the same, C.P. screws, nuts, bolts and any fixing arrangement required.

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

**Item No. 160**

**Providing and fixing 2 Nos. support arms and backrest to mount at fixed height (Model R 1100 -Commander or equivalent) for handicap toilet complete as recommended by the etc completed as directed by E.T.C/PMC.**

**Material:**

All materials shall be as per manufacture specification.

**Workmanship:**

All the work shall be carried out as per the instruction and drawings supplied by the consultants at the time of execution of works. Material will be approved by the Architect & Engineer in charge.

**Mode of Measurements**

The rate shall include the cost of all materials, labours etc. complete as specified in the Item. The rate shall be measured in Number basis.

**Item No. 161**

**Providing and fixing raised toilet seat with cover for handicap toilet (Model R-35: Presalit – Commander or equivalent) as recommended by the etc completed as directed by E.T.C/PMC.**

**Material:**

All materials shall be as per manufacture specification.

**Workmanship:**

All the work shall be carried out as per the instruction and drawings supplied by the consultants at the time of execution of works. Material will be approved by the Architect & Engineer in charge.

**Mode of Measurements**

The rate shall include the cost of all materials, labours etc. complete as specified in the Item. The rate shall be measured in Number basis.

**Item No. 162**

**Providing and fixing brackets, tracks (Model R4140) with flexible feed & waste pipes for adjustable type wash basin complete as recommended, for handicap toilet (Make: Presalit – Commander or equivalent) etc completed as directed by E.T.C/PMC.**

**Material:**

All materials shall be as per manufacture specification.

**Workmanship:**

All the work shall be carried out as per the instruction and drawings supplied by the consultants at the time of execution of works. Material will be approved by the Architect & Engineer in charge.

**Mode of Measurements**

The rate shall include the cost of all materials, labours etc. complete as specified in the Item. The rate shall be measured in Number basis.

**Item No. 164**

**Constructing brick masonry road gully chamber 500 mmx450mmx600mm incl.500 mmx450mm C.I. horizontal grating with frame complete**

Specification for this item shall conform to item no. Ch.24-Item 24.40 General Technical Specifications for building work.

The rate shall be for a unit of one No.

**Item No. 165**

**Providing & fixing S.W. Gully trap with C.I. grating brick masonry chamber & watertight C.I. Cover with frame of 300x300 mm size (inside) with standard weight. Square mouth trap 100mm x 100mm size P- type**

**GENERAL**

The item includes the provision of S.W. Gully trap with C.I. frame including construction of Gully Trap Chamber.

**MATERIAL**

The Gully Trap shall be of salt glazed stoneware with 150 mm nominal square inlet or as specified in the schedule with 100mm diameter outlet. Brick work, plastering, concreting shall be as per general specifications under section-II.

**CONSTRUCTION**

- 1 Internal dimensions of the Gully trap chamber shall be as specified in the schedule.
- 2 Foundation of 1:4:8 concrete shall be 150 mm thick and shall have 100mm offset.
- 3 Brick masonry shall be of 230 mm thick in cement mortar 1:6 and masonry shall be plastered with 15mm thick plaster in 1:3 cement mortars inside and outside surface with smooth finish.

**C.I. FRAME AND COVER**

C.I. frame and cover shall be fixed with the cement concrete 1:2:4 at the top of Gully trap chamber, the weight of frame and cover shall not be less than 7.5 kg. and they shall be painted with two coats of black bitumastic paint.

**DEWATERING**

The contract rate shall include bailing or pumping out all the water till completion or work if accumulated during the progress of work either from seepage, springs, rain or any other cause.

**THE RATE INCLUDES FOR**

- 1 Supplying stoneware gully trap with C.I. frame and cover.
- 2 Concreting, brick work, plastering, fixing frame and cover.
- 3 Dewatering, if necessary, till completion of work.
- 4 All necessary materials, labor and use of tools.

**MODE OF MEASUREMENT**

The measurement shall be for unit of Gully Trap chamber of specified internal size and depth constructed including stoneware Gully Trap and C.I. frame and cover fixed.

**MODE OF PAYMENT**

The contract rate shall be for the unit of Gully Trap chamber constructed as a whole.

**Item No. 166 & 167**

**Providing and fixing Gun metal check or non-return fullway wheel valve.**

**(a) 40mm dia.**

**(b) 25mm dia.**

**1.0 Materials:**

**1.1** The gun metal gate full way wheel valve of specified dia. shall conform to IS: 778 and relevant specifications of plumbing materials. All material shall be of 1st quality of recommended make or equivalent, as approved by the Architect and Engineer-in-charge.

## **2.0 Workmanship:**

**2.1** The gun metal gate valve shall be fully cleared of all foreign matter, before fixing. The fixing of valve shall be done by applying locktite 55 or Teflon tape on Male screwed ends. The jointing shall be leaking proof. A union shall be provided near each GM valve, stopcock or check valve.

## **3.0 Mode of Measurements and Payment:**

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

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

### **Item No. 168 to 169**

**Constructing manhole with RCC top slab in 1:2:4 mix (1 cement:2 coarse and:4 graded stone aggregate 20 mm nominal size) foundation concrete 1:3:6 mix (1 cement:3 coarse sand: 6 brick bats 40 + 50 mm size) inside plastering 15mm th.with cement mortar 1:5 (1 cement:5 coarse sand) finished with a floating coat of neat cement and making channel in cement concrete 1:2:4 mix (1 cement: 2 Coarse sand:4stone aggregate 20mm nominal size) inside size 900 mm x1200 mm & 1, 5 m deep incl C.I.cover with frme size 1)A-type depth 0.90 m for 150 mm, 250 (required dia) sewer**

**i. A- type depth 0.90 metre for 150 mm diameter sewer**

**ii. Extra Rate for constructing B.B. masonry for every additional depth of 0.1mt. Or part there of over above item**

### **1.0 MATERIALS:**

Water, Cement, burnt bricks, cement mortar of specified proportion shall conform to part-1 Item no 14 (i) (1.0), Stone coarse aggregate of 20 mm. nominal size shall conform to prt-1 Item no 11.

### **1.1 Brick Bats Aggregate:**

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

**1.2** The brick bats shall be measured by volume by suitable boxes or as directed.

### **1.3 Stone Grit:**

**1.3.1** Grit shall consist of crushed or broken stone and be hard strong, dense, durable, clean, of proper gradation and free from skin or coating likely to prevent 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 I.S. 383-1970. Unless special stone of particular quarries is mentioned, grit shall be obtained from the best black trap or equivalent hard stone as approved by the Engineer-in-charge. The grit shall have no deleterious reaction with cement.

### **1.3.2 The grit shall conform to the following gradation as per sieve analysis:**

<b>I.S. Sieve</b>	<b>Percentage by weight</b>	<b>I.S. Sieve</b>	<b>Percentage by weight</b>
<b>Designation</b>	<b>through Sieve</b>	<b>Designation</b>	<b>through Sieve</b>
12.50 mm.	100%	4.75 mm.	0-20%
10.00 mm.	85-100%	2.36 mm.	0-25%

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

**1.3.4** The necessary tests for grit shall be carried out as per the requirements of I.S.2386 (Parts I to VII) 1963, as per instructions of the Engineer-in-charge. The necessity of the test will be

decided by the Engineer-in-charge. The necessity of the test will be decided by the Engineer-in-charge.

**1.4** The cast iron manhole cover of 560 mm. dia. with frame shall conform to I.S. 1726-1966.

## **2.0 WORKMANSHIP:**

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

### **2.2 Bed concrete:**

**2.2.1** The manhole shall be built on a bed of cement concrete 1: 3: 6 (1 cement: 3 coarse sand: 6 brick bats) (40 to 20 mm. nominal size) to the thickness of the bed concrete shall be 15 cms. for manhole up to 1 M. depth and 20 cms. for manholes over metre and up to 2 metres. depth and 30 cms. for manholes of greater depth.

**2.2.2** Projection of bed concrete beyond the masonry wall shall be 15 cms.

### **2.3 Walls:**

**2.3.1** The walls or manhole shall be carried out with burnt bricks using bricks, having crushing strength not less than 35 Kg./Cm<sup>2</sup> 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 full joints.

### **2.4 Plaster:**

**2.4.1.** The inside of the walls shall be plastered 15 mm. thick with C.M. 1: 5 (1 cement: 5 coarse sand) and finished with a floating coat of neat cement. All angles shall be rounded to 7.50 cms. radius and all rendered internal surfaces shall have impervious finish obtained by using a steel trowel. The external joints of masonry shall be finished smoothly.

### **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 suitably rounded off. The branch channels shall also be similarly constructed with respect to the benching but at their junction with the main channel and 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 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.

### **2.6 Cover slab:**

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

### **2.7 Testing:**

**2.7.1** Manhole shall be tested by filling with water to a depth not exceeding 1.2 M. as directed.

**2.7.2** After completion of work, manhole covers shall be sealed by means of thick grease.

## **3.0 MODE OF MEASUREMENTS & PAYMENTS:**

**3.1** The depth of manhole shall be distance between the top of the manhole cover and the invert level of the main drain. The rate includes all labour, materials, tools and plants etc. required for satisfactory completion of this item as directed above.

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

**Item No. 170 to 175**

**Constructing brick masonry chamber for underground C.I Inspection chamber and bends with bricks having crushing strength no less than 35 kg/cm<sup>2</sup> in c:m 1:5 C.I. cover with frame (light duty) 445 mm x 610 mm internal dimensions total weight of cover with frame to be not less than 38 kg (wt. of cover 23 kg. and wt of frame 15 kg) R.C.C.top slab with 1: 2: 4 mix (1 Cement:2 coarse sand: 4 grade stone aggregate 20 mm size) foundation concrete 1: 5: 10 inside plaster 15 mm thick with cement mortar 1: 3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete.**

- I. Inside dimensions 455mmx 610mm and 450mm deep for single pipeline
- II. Inside dimensions 500mmx 700mm and 450mm deep for single pipeline
- III. Inside dimensions 600mmx 850mm and 450mm deep for single pipeline
  - i. Extra over items 24.44 for every additional depth of 0.1M. of part thereof beyond 450mm depth for Brick masonry chamber. (i) for 455mm x 610mm size.
  - ii. Extra over items 24.44 for every additional depth of 0.1M. of part thereof beyond 450mm depth for Brick masonry chamber. (ii) for 500mm x 700mm size.
  - iii. Extra over items 24.44 for every additional depth of 0.1M. of part thereof beyond 450mm depth for Brick masonry chamber. (iii) for 600mm x 850mm size.

**1.0 MATERIALS:** Water, Cement, Coarse sand, Brick, Stone aggregate, Brick bat shall conform to Item no 14 (1.0, 1.1).

**1.1 Mild Steel Bars:**

**1.1.1** Mild steel bars reinforcement for R.C.C work shall conform to I.S. 432 (Part-II) 1966 and shall be tested quality. It shall also comply with relevant part of I.S. 456-1978.

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

**1.1.3** For the purpose of payment, the bar shall be measured correct up to 100 mm. length and weight payable worked out at the rate specified below:

1. 6mm. x 0.22 Kg./Rmt 8. 20mm. 2.47 Kg./Rmt
2. 8mm. x 0.39 Kg./Rmt 9. 22mm. 2.98 Kg./Rmt
3. 10mm x 0.62 Kg./Rmt 10. 25mm. 3.85 Kg./Rmt
4. 12mm x 0.89 Kg./Rmt 11. 28mm. 4.83 Kg./Rmt
5. 14mm x 1.21 Kg./Rmt 12. 32mm. 6.31 Kg./Rmt
6. 16mm x 1.58 Kg./Rmt 13. 36mm. 7.99 Kg./Rmt
7. 18mm x 3.00 Kg./Rmt 14. 40mm 9.86 Kg./Rmt.

**2.0 WORKMANSHIP:**

**2.1** C.I. inspection chamber with provision of C.I. bends of specified size with bolts, nuts and left washers for underground drain shall be enclosed in masonry chamber which shall be constructed as under:

**2.2** The excavation shall be done true to dimensions and levels shown on the plans or as directed.

**2.3** Bed concrete shall be of 15 cms. thick C.C. 1:5:10 (1 cement: 5 coarse sand: 10 graded brick bat aggregates). The projection of bed concrete beyond the masonry walls shall be 7.5 cms.

**2.4** Masonry walls and plaster work shall be carried out as per relevant specifications of item 24-40.

**2.5** The cover slab shall be constructed as per relevant specifications of 24.27 (I).

**3.0 MODE OF MEASUREMENTS & PAYMENT:**



**3.1** The earth work in excavation providing and laying C.I. inspection chamber and bends shall be measured and paid for separately.

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

**Item No. 177**

**Providing and fixing C.I Manhole cover 0.60 mt x 0.45 mt size having weight not less than 35 Kg.**

**1.0 Materials:** C.I. Manhole cover of 0.60 x 0.45 Cms. size shall be of best quality. The weight of C.I. cover and frame shall not be less than 35 Kg. The C.I. manhole cover shall be of light duty and conform relevant I.S.

**2.0. Workmanship:**

**2.1.** C.I. Manhole cover shall be fixed as per relevant specifications of item No. 24.44 except that the C.I. cover shall be fixed as and where directed.

**3.0. Mode of measurements & payment:**

**3.1.** The rate includes cost of all labour and materials required for satisfactory completion of this item.

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

**Item No. 178**

**Providing, laying, and fixing 200 mm wide PVC water stop of approved make and grade thickness in concrete work for watertight structures like retaining walls of pound water body and underground water tank including cleaning and placing in line level etc. complete, as directed.**

**MATERIALS:**

200 mm wide PVC water stop of approved make and grade thickness in concrete work for watertight structures like retaining walls of pound water body and underground water tank including cleaning and placing in line level etc. complete.

All the work shall be carried out as per the instruction and drawings supplied by the consultants at the time of execution of works. Material will be approved by the Architect & Engineer in Charge.

**Mode of Measurements**

The rate shall include the cost of all materials, labours etc. complete as specified in the Item. The rate shall be measured in Square Meter.

**Item No. 179**

**Providing and fixing double coated Sintax or equivalent PVC (ISI) water tank of required capacity each with all necessary fittings and connection etc. complete on terrace.**

**1.0 MATERIALS:**

**1.1** Approved PVC water tank of specified manufacturer

**2.0 WORKMANSHIP:**

**2.1** The water tank shall be supplied in Size As per Decided by Engineer in Charge and fixed and fitted on basis of the drawings furnished by the manufacturer, on purchase of the water tank. Whenever staging is required for installations, designs and drawings of the same up to 2.0 mt. height shall be furnished again placement of order. Installation can also be done through the trained personnel of the dealer. The work shall be carried out in best workman like manner as directed by Engineer-in-charge.

**3.0 MODE OF MEASUREMENT AND PAYMENT:**

**3.1** The rate includes all labour, materials, tools and equipment required to complete the work in a satisfactory manner.

**3.2** The rates shall be on a unit of liter basis

**3.4** The Payment shall be for a unit of liter basis.

**Item No. 180**

**Providing and fixing Stainless Steel an ISI 304 (18/8) kitchen sink as per IS: 13983 with C.I. brackets and stainless-steel plug 40 mm, including painting of fittings and brackets, cutting and making good the walls wherever required: Kitchen sink without drain board 610x510 mm bowl depth 200 mm, Kohler or Nirali Make Kitchen Sink 610 x 510mm with Sink spout of wall mounting type, NIRALI - GRACE - PLAIN**

**1.0. Materials**

**1.1.** White glazed vitreous china sink 600 mm. x 450 mm. x 150 mm. size shall conform to M-63.

**2.0. Workmanship**

**2.1.** The kitchen sink shall be supported on a pair of M.S. or C.I. brackets fixed in cement mortar 1:3 (1 cement: 3 coarse sand). The M.S. or C.I. brackets shall conform to I.S. 775-1962. The wall plaster on the rear shall be cut to rest over the top edge of the sink. After fixing the sink, plaster shall be made good, and the surface finished to match with the existing one.

**2.2.** The C.P. brass trap and union shall be connected to 40 mm. nominal bore galvanised mild steel waste pipe which shall be suitably bent towards the wall, and which shall discharge into an open drain leading to gully-trap or direct into the gully-trap on the ground on floor and shall be connected to a waste pipe through a floor trap on the upper floors. C.P. brass trap and union may not be provided where surface drain or a floor trap is placed directly under the sink and the waste is discharged to it vertically.

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

**3.0. Mode of measurements & payment**

**3.1.** The rate includes cost of all labour, materials, tools and plant and other equipment required for satisfactory completion of this item as described in workmanship.

**3.2.** The rate shall be for a unit of One number.

**Item No. 181**

**Providing & Fixing health faucet with 8 mm dia 1 mtr long flexible tube and wall hook as per eic instruction.**

As per Manufacturer's Specifications

The rate shall be measured in Number basis.

**Item No. 182**

**Providing and fixing dual flow flush valves etc. completely as directed by Engineer in Charge.**

As per Manufacturer's Specifications

The rate shall be measured in Number basis.

**Item No. 185 & 186**

**Providing and fixing ECO Drainpipes in including supporting the ECO Drainpipe on the bricks at each joint including leakproof joints ECO Drainpipe etc., complete**

(a) 200mm Dia.

(b) 300mm Dia.

Specification shall conform to item no. 24.1 of General Technical Specifications for building work. Except the material to be use Eco drain  
Rate shall be for a unit of one Running Meter.

**Item No. 187**

**Providing & Fixing C.P. Brass angle valve 15mm etc. complete.**

As per Manufacturer's Specifications

Rate shall be for a unit of Number basis.

**Item No. 188**

**Providing and fixing pre-cast concrete kerb stone of gray cement based concrete block 35cm length,30cm height and 15cm thick of M250 grade concret as per approved design and including excavation for fixing in proper line and level, filling the joint with C:M 1:3 (1cement: 3fine sand) etc complete.**

**1.0 Material:**

Water shall confirm to M-1, sand shall confirm to M-6, Cement shall confirm to M-3. Pre-cast concrete kerb stone of gray cement based concrete block 35cm length,30cm height and 15cm thick of M250 grade concreteapproved shape.

**2.0 Workmanship:**

The subgrade shall be cleaned, leveled, wetted, and rammed as directed. kerb stone of approved colour, shape and size, shall be laid in different pattern/design as shown in the drawing or as directed by Consulting Architect/Engineer in charge as directed on top, pressed, tapped gently to bring it in line and level and interlock with others. The joint shall be as fine as possible. The finished surface shall be true to levels and slopes as directed. Necessary testing of blocks is to be carried out.

**3.0 Mode of Measurement and Payments:**

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

The rate shall be for a unit of running meter.

**Item No. 189**

**Providing and Fixing ABS Plastic SPEED BUMP of Size: 750 MM x 250MM x75 MM, Per Meter # 4 Nos (2 black, 2 yellow), TOP DESIGN – LINE DESIGN ANTI SKID PATTERN FOR GRIP filling CEMENT INSIDE etc. complete as directed by Engineer-in-charge.**

Item carried out as per specification and instruction of Engineer in Charge

**MODE OF PAYMENT**

The rate shall be for a unit of Running meter

**Item No. 190 to 192**

**Providing & Fixing anchor fasteners including drilling in RCC/ Masonary Members, fastening with structural steel members etc complete.**

**(a) 8 mm. dia.**

**(b) 10 mm. dia.**

**(c) 12 mm. dia**

**1.0 MATERIALS:**

**1.1** Supplying Mechanical stud anchors (Nut Version) HSA of sizes M8 (75 mm long)/ M10 (90 mm long)/ M12 (100 & 150 mm long)/ M16 (140 mm long)/ M20 (170 mm long) of HILTI

India Pvt Ltd. or approved make. The anchor should be of cold formed carbon steel anchor, A4, Galvanised/Stainless steel and can be used for two embedment depths.

**1.2** Supplying Plastic light duty impact anchors HPS-1 of HILTI India Pvt Ltd or approved make for size ranges from 4-8 mm dia (50 to 110 mm long). The anchor should be made of polyamide sleeve PA6 grade with 4-way expansion and Galvanised coated.

**1.3** Supplying heavy duty injection adhesive for rebar fixing in Wet/Dry conditions HILTI HIT-RE 500 for dia up to 40mm of HILTI India Pvt Ltd. or approved make. The system should be made of two foils consisting of resin and a Hardener foil pack. The system can be used for rebar fixing or threaded rods viz HAS-E rods. The rate of Threaded rods used if any and reinforcements will be included.

**1.4** Supplying medium to heavy duty injection adhesive for rebar fixing in Dry conditions HILTI HIT-HY 150 for dia up to 25mm of HILTI India Pvt Ltd. or approved make. The system should be made of two foils consisting of resin and a Hardener foil pack. The system can be used for rebar fixing or threaded rods viz HAS-E rods. The installation and the setting instructions should be strictly followed as per the manufacturers recommendations. The rate of Threaded rods used if any and reinforcements will be included.

**1.5** Supplying light duty injection adhesive for fixing in hollow bricks, standard bricks, masonry, etc with HILTI HIT-HY 70 of HILTI India Pvt Ltd. or approved make. The system should be made of two foils consisting of resin and a Hardener foil pack. The system can be used for rebar fixing or threaded rods viz HAS-E rods. The installation and the setting instructions should be strictly followed as per the manufacturer's recommendations. The rate of Threaded rods used if any and reinforcements will be included.

## **2.0 MODE OF MEASUREMENT & PAYMENTS:**

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

### **Item No. 193 to 196**

**Providing & fixing of reinforcement bars (reinforcement bars shall be paid extra under relevant item of work) after drilling the hole of required diameter & depth, cleaning of the same, providing /filling the hole with Injection Mortar (HIT HY 150 of Hilti or approved equivalent), inserting reinforcement bar etc. complete as per Manufacturers & architects instruction. The work shall be carried out by the technical workmens/agency approved by the manufacturer and under technical supervision of Manufacturer of Injection grout including all materials, tool tackles, labour etc. complete**

**(a) 8 mm. dia.bar -Holes 12mm dia Depth 100mm**

**(b) 10 mm. dia.bar -Holes 14mm dia Depth 100mm**

**(c) 12 mm. dia.bar -Holes 16mm dia Depth 120mm**

**(d) 16 mm. dia.bar -Holes 20mm dia Depth 160mm**

### **1.0 MATERIALS:**

**1.1** Supplying Mechanical stud anchors (Nut Version) HSA of sizes M8 (75 mm long)/ M10 (90 mm long)/ M12 (100 & 150 mm long)/ M16 (140 mm long)/ M20 (170 mm long) of HILTI India Pvt Ltd. or approved make. The anchor should be of cold formed carbon steel anchor, A4, Galvanised/Stainless steel and can be used for two embedment depths.

**1.2** Supplying Plastic light duty impact anchors HPS-1 of HILTI India Pvt Ltd or approved make for size ranges from 4-8 mm dia (50 to 110 mm long). The anchor should be made of polyamide sleeve PA6 grade with 4-way expansion and Galvanised coated.

**1.3** Supplying heavy duty injection adhesive for rebar fixing in Wet/Dry conditions HILTI HIT-RE 500 for dia up to 40mm of HILTI India Pvt Ltd. or approved make. The system should be

made of two foils consisting of resin and a Hardener foil pack. The system can be used for rebar fixing or threaded rods viz HAS-E rods. The rate of Threaded rods used if any and reinforcements will be included.

**1.4** Supplying medium to heavy duty injection adhesive for rebar fixing in Dry conditions HILTI HIT-HY 150 for dia up to 25mm of HILTI India Pvt Ltd. or approved make. The system should be made of two foils consisting of resin and a Hardener foil pack. The system can be used for rebar fixing or threaded rods viz HAS-E rods. The installation and the setting instructions should be strictly followed as per the manufacturers recommendations. The rate of Threaded rods used if any and reinforcements will be included.

**1.5** Supplying light duty injection adhesive for fixing in hollow bricks, standard bricks, masonry, etc with HILTI HIT-HY 70 of HILTI India Pvt Ltd. or approved make. The system should be made of two foils consisting of resin and a Hardener foil pack. The system can be used for rebar fixing or threaded rods viz HAS-E rods. The installation and the setting instructions should be strictly followed as per the manufacturer's recommendations. The rate of Threaded rods used if any and reinforcements will be included.

## **2.0 MODE OF MEASUREMENT & PAYMENTS:**

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

### **Item No. 197 & 198**

**Providing laying (two level or slopes) and jointing reinforced concrete light duty, non-pressure pipes I.S. class NP-2 of the following's internal diameter with collars and butt ends prepared for collar joints including testing of joints complete.**

**250 mm & 450mm**

#### **1.0 Materials:**

**1.1** The reinforced concrete light duty non-pressure pipes of specified diameter shall conform to I.S. 458-1971.

#### **2.0 Workmanship:**

**2.1.** The relevant specifications of item No. 3 shall be followed for the work of trenches except that the excavation in trenches shall be for reinforced concrete pipes of specified diameter.

#### **2.2. Laying:**

**1.1.1** The pipes shall be lowered into the trenches carefully. Mechanical appliances may be used. Where necessary pipe shall be laid in straight lines or with easy curves and true to line and gradient as specified. The laying of pipe shall proceed upgrade of a slope. In the pipe with loose collars, the collars shall be slipped on before the next pipe is laid.

**1.1.2** 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 sands: 10 graded stone aggregate 40 mm. nominal size) or compacted sand or gravel.

**1.1.3** In case where the natural foundation is inadequate the pipe shall be laid either in concrete cradle, supported on proper foundation 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 14 th of the internal diameter of the pipe subject to a minimum of 100 mm. and maximum 300 mm. The concrete shall be extended up to the sides of the pipe at least a distance of 14 th of the outsided diameter for pipes 300 mm. and over in diameter.

**1.1.4** The pipes shall be laid in the concrete bedding before the concrete has set. 'Pipes laid trenched in earth shall be bedded evenly and firmly and as far as up to the haunches of the pipe as to safely transmit the load expected from the back fill through the pipe to the bed. This shall be done either by excavating the bottom of the trenches to fit the curve of the pipe or by

compacting the earth under round curve of the pipe to form an even bed. Necessary provision shall be made for joints wherever required.

### **1.2 Jointing:**

**2.3.1.** The joints shall be done by slipping the collar over and clearing the end of the pipe. The recess of the end of the pipe shall be filled with jute threading dipped in hot bitumen. The new pipe shall then be brought forward until the bitumen ring in recess of first pipe is set into the recess of the second pipe. This process shall be repeated for two or three pipes which shall then be jacked up so as to thoroughly compress the bitumen. The quantity of jute and bitumen shall be just enough to fill the recess when pressed hard by jacking, care being taken that no offset of the jute braiding shall be visible either outside or inside of pipe. The collar shall then be set up over the joints covering equally both the pipe and leaving an even caulking space all round. Cement and sand mortar 1:1:2 shall then be well punched or pressed home with a caulking tool within this caulking space. Care shall be taken that the underside of the joints is properly filled with mortar.

### **1.3 Curing:**

**1.3.1** Every joint shall be kept wet for about 10 days for maturing the section of the pipeline laid and jointed shall be covered immediately to protect from weather effects. A minimum bore of 100mm is considered adequate.

**1.3.2** The joints shall be left exposed for observation.

### **1.4 Testing of joints:**

**1.4.1** The testing of joints shall be done as per relevant specifications of item No. 24.1 (A) except that the testing of reinforced concrete pipes shall be done.

### **2.0 Mode of measurements & payment:**

**2.1** The relevant specification of item No. 3 shall be followed except that the rate includes for laying (to level or slope in trenches etc. measured separately) making the joints as indicated and testing to stand the water test.

**2.2** The measurements shall be net without any allowance for cutting and waste. The length of bends, junctions and other connections (measured along the centre line) shall be included in the total length of the pipes, the connections being numbered afterwards and paid for extra over pipes.

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

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

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

### **Item No. 199**

**Providing & Fixing iron steps of size 500mm x 150mm x 22.5 mm and painting with two coats of anticorrosive paint etc. complete.**

Specification shall conform to item no. 24.23 of General Technical Specifications for building work.

Rate shall be for a unit of one Number.

### **Item No: 201**

**Providing and constructing SOAK WELL of 2.50m internal dia and 5.00 depth depth internal clear dimension including the cost of excavation, PCC 1:4:8 foundation for honey combed masonry in C.M. 1:4 (1cement:4 sand), casting R.C.C. 1:2:4 (1cement:2**

sand:4 graded stone aggregate 20mm nominal size) top slab 12 thick with C.I. manhole cover 600mm x 450mm size of 35 kg. weight and 75mm dia C.I. pipe 1800mm long with 75mm dia cowel vent and filling the wall 1000mm in depth with dry brick bats including providing vata in C.M. 1:3 (1cement:3 sand), curing including cost of reinforcement etc. complete as per detailed drawing and directed by E.I.C.

**1.0 Materials:** Water conforms to M-1. Cement mortar shall conform to M-11. Burnt Bricks shall conform to M-15. RCC slab 12 mm thick shall conform to 1:2:4. Brick bat shall conform to M-14.

**2.0 Workmanship:**

**2.1** The excavation for soak well shall be carried out as per relevant specifications of part-1 item 1 except that the size of soak pit shall be such that the clear volume shall remain 2.5 mt internal dia. and 5.0 mt. depth shall be as directed.

**2.2** The periphery of the soak well shall be provided with honeycomb brick masonry bricks 23 cm. thick. The masonry wall be done with best workman like manner in true line and plumb.

**2.3** The soak well shall be filled in with brick bats of burnt brick 40 mm. nominal size in 1.0 mt. height. The work of filling brick bats shall be done in such a way that no dry masonry shall be damaged during filling of brick bats.

**2.4** The top of the soak well shall be covered with RCC slab 12 mm thick shall conform to 1:2:4. Including formwork.

**2.5** The cement mortar 1: 3 shall be used to fill up the joints and prepare vata as directed.

**2.6** The cement work shall be cured for 4 days.

**3.0 Mode of measurements & payment:**

**3.1** The rate includes the cost of all labour and materials required for satisfactory completion of this item as described above.

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

**Item No: 202**

**Construction Septick tank of the required dimension as shown and mentioned in the drawing, (inside 3.70 X 1.00 X1.5 Mtr Deep) including providing and laying 0.15 mtr thick PCC in 1:4:8 (1 Cement: 4 Coarse Sand: 8 Hand Broken stone aggregates 40mm nominal size.) and 0.10 mtr thick plain cement concrete 1:2:4 (1 cement:2 coarse sand:4 graded seone agg. 20mm nominal size) at Bottom, brick masonry Wall 23 cm thick and intermediate partition, in 11.5 cm thick wall in CM 1:4 including 12 cms thick RCC slabs in CC 1:2:4 at top, and 15 mm thick cement plaster in CM 1:3 etc complete, septick tank as per detailed drawing**

Excavation as per Item No.3,4

Cement concrete 1:3:6 as per GTS booklet Item No.5.3.13.

Brick masonry as per GTS booklet Item No.6.13. (B)

Half Brick masonry as per GTS booklet Item No.6.30. I(A)

RCC Top slab as per Item No.17

Reinforcement as per Item No.23

15 mm thick cement plaster in CM 1:4 as per Item No.27

Floating coat of neat cement slurry as per Item GTS booklet No.17.69

CI Manhole frame and cover as directed by EIC.

Rate shall be Consulted for all above items.

Rate shall be for a unit of Nos.

**Item No. 203**

**Hording Erection of approved size (10' x 5') including 2" MS square pipe/ gurder,1.5" pipe framing G.I sheet 26 or 28-gauge, Flex. as per the Architect's instructions & approval.**

Item carried out as per specification and instruction of Engineer in Charge

**MODE OF PAYMENT**

The rate shall be for a unit of Numbers.

**Item No. 204**

**Providing and fixing bright finish 2 mm thick Stainless steel (Grade 304) letters size up to 350 cm height in English language fixed in wall with screws and nails and any height including scaffolding etc complete as per instruction of Engineer-in-charge.**

S.S. letters work shall be carried out as per the instruction and drawings supplied by the consultants at the time of execution of works.

Material will be approved by the Architect & Engineer in Charge.

**Mode of Measurements**

The rate shall include the cost of all materials, labours etc. complete as specified in the Item.  
The rate shall be measured in per Running inch Basis.

**Item No: 205**

**Providing and fixing chromium plated brass half turn flush cock of approved quality including fixing in pipeline etc. complete. (ii) 25 mm dia**

As per manufacturer's Specifications.

Rate shall be for a unit of one number.

**Item No: 206**

**Providing and fixing screw down bib taps of following size: (B) Brass chromium plated screw down bib tap (I) 15 mm dia.**

Specification for this item shall conform to item no. 23.92(A)(ii), Pg. 170 of General Technical Specifications for building work.

The rate shall be for a unit of one number.