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**Name Of Work: - Construction of New Aganwadi Building at Tarsana Village, Taluka: Dabhoi, Dist: Vadodara.**

## **GENERAL TECHNICAL SPECIFICATIONS**

### **1.0 General :**

All measurements shall be made in the metric system. Different items of work shall be measured in accordance with the procedures set forth in the relevant sections read in conjunction with General Conditions of Contract. The same shall not however apply in the case of lump-sum items. All measurements and computations unless otherwise indicated shall be carried nearest to the following limits :

- (i) length and breadth..... 10 mm
  - (ii) height, depth or thickness of earthwork, sub-base, bases, surfacing, and structural members .....5 mm
  - (iii) areas, .....0.01 Sq. Metre
  - (iv) cubic contents..... 0.01 cubic metre
- in recording dimensions of work the sequence of length, width and height or depth or thickness shall be followed.

### **2.0 Measurement of lead for Materials :**

Where lead is specified in the contract for construction materials, the same shall be measured as described hereunder.

Lead shall be measured over the shortest practicable route and not the one actually taken and the decision of the Engineer-in-charge in this regard shall be taken as final. Distance upto and including 100 metres shall be measured in units of 50 metres, exceeding 100 metres but not exceeding 1 KM. in units of 100 metres and exceeding 1 km. in units of 500 metres. The half and greater than half of the units shall be reckoned as one and less than half of the units ignored. In this regard, the source of the material shall be divided into suitable blocks and for each block the distance from the centre of the block to the centre of placing pertaining to that block shall be taken as the lead distance.

### **3. Surface Regularity of Sub grade & Pavement Courses :**

The surface regularity of completed sub-base courses and wearing surfaces in the longitudinal and transverse directions shall be within the tolerances indicated in Table below. The longitudinal profile shall be checked with a 3 metre long straight edge, at the middle of each traffic lane along a line parallel to the centre line of the road. The transverse profile shall be checked with a set of three camber boards at intervals of 10 metres.

#### **PERMITTED TOLERANCES OF SURFACE REGULARITY FOR PAVEMENT COURSES**

Sr. No.	Type of Construction	Longitudinal Profile with 3 metre straight edge					Cross Profile
		Maximum Permissible undulation in mm	Maximum number of undulation permitted in any 300m. length exceeding in mm.				Maximum permissible variation from specified profile camber template-mm
			18	12	10	6	
1	2	3	4	5	6	7	8
1	Earth Sub grade	36	30	-	-	-	15
2	Granular / lime / Cement Stabilised Sub – base.	23	-	30	-	-	12
3	Water Bound Macadam with nominal size metal (20-50) mm	18	-	-	30	-	8
4	Semi – Dense Carpet @	15	-	-	-	20	6

#### **Notes:-**

1. These are for machine laid surfaces. If laid manually, due to unavoidable reason, tolerance upto 50 percent above these values in this column may be permitted. However, this relaxation does not apply to the values of

maximum undulation for longitudinal and cross profiles mentioned in columns 3 and 8 in the table.

2. Surface evenness requirements in respect of both the longitudinal and cross profiles should be simultaneously satisfied.

3. **Rectification** : Where the surface irregularity of subgrade and the various pavement courses fall outside the specified tolerances, the contractor shall be liable to rectify these in the manner described below and to the satisfaction of the Engineer-in-charge at his own cost.

(i) **Subgrade** : Where the surface is high, it shall be trimmed and suitably compacted. Where the same is low, the deficiency shall be corrected by adding fresh material. The degree of compaction and the type of material to be used shall conform to the specified requirements.

(ii) **Granular/Sub-base** : Same as at (i) above except that the degree of compaction and the type of material to be used shall conform to the specified requirements.

(iii) **Lime/Cement stabilized soil sub-base** : For Lime/Cement treated materials where the surface is high, the same shall be suitably trimmed while taking care that the material below is not disturbed due to this operation. However, where the surface is low, the same shall be corrected as described herein below.

For cement treated material, when the time elapsed between detection of irregularity and the time of mixing of the material is less than 2 hours, the surface shall be scarified to a depth of 50 mm, supplemented with freshly mixed material as necessary and recomposed to the relevant specification. When this time is more than 2 hours, the full depth of the layer shall be removed from the pavement and replaced with fresh material to specification. In either case, the area treated shall not be less than 5 metres long by 2 metres wide. This shall also apply to lime treated material except that the time criterion shall be 3 hours instead of 2 hours.

(iv) **Water Bound Macadam Base** : Where the surface is high or low, the top 75mm shall be scarified, reshaped with added material as necessary and recompacted. The area treated at a place shall not be less than 5 metres long and 2 metres wide.

(v) **Bituminous Constructions** : For bituminous constructions, other than wearing course, where the surface is low, the deficiency shall be corrected by adding fresh material and recompaction to specifications.

Where this surface is high, the full depth of the layer shall be removed and replaced with fresh material and compacted to specifications. For wearing course, where the surface is high or low; the full depth of the layer shall be removed and replaced with fresh material and compacted to specifications in all cases where the removal and replacement of a bituminous layer is involved, the area treated shall not be less than 5 metre long and not less than 1 lane wide.

#### 4. Quality Control Tests During Construction :

The materials supplied and the works carried out by the Contractor shall conform to the enclosed relevant specifications. For ensuring the requisite quality of construction, the materials and works shall be subjected to quality control test as described hereinafter, by the Engineer-in-charge. The testing frequencies set forth are the desirable minimum and the Engineer-in-charge shall have the full authority to carry out test as frequently as he may deem necessary to satisfy that the materials at work comply with the appropriate specifications. Test procedures for the various quality control tests are indicated in the respective sections of the specifications or for certain tests within this section. Where no specific testing procedure is mentioned, the test shall be carried out as per prevalent accepted engineering practice to the directions of the Engineer-in-charge.

#### 5. Tests on Earthwork for Embankment Construction :

##### 5.1 Borrow Material :

- (a) Sand Content (IS : 2720 Part IV)  
Two test per 8000 Cubic Metres of soil.
- (b) Plasticity Test (IS : 2720 Part-V)  
Each type to be tested. Two tests per 8000 Cubic Metres of soil.
- (c) Density test (IS : 2720 Part VII)  
Each soil type to be tested. Two tests per 8000 Cubic Metres of soil.
- (d) Moisture Content Test (IS : 2720 Part-II)  
One test for every 250 Cubic Metres of soil.

##### 5.2 Compaction Control :

Control shall be exercised by taking at least one measurement of density for each 1000 square metres of compacted area, or closer as required to yield the minimum number of test results for evaluating day's work on statistical basis. The determination of density shall be in accordance with IS : 2720 (Part XXVMI). Test locations shall be chosen only through random sampling techniques. Control shall not be based on the result of any one test but on the mean value of a set of 5-10 density determinations. The number of tests in one set of measurements shall be 5 as long as it is felt that sufficient control over borrow material and the method of compactions is being exercised. If considerable variations are observed between individual density results, the minimum number of tests in one set of measurement shall be increase to 10. The acceptance of work shall be subject to the condition that the mean dry density equals or exceeds the specified density and the standard

deviation for any set of results is below 0.08 gm/cc. However for earthwork in shoulders and in top 500 mm portion of the embankment below the sub grade, at least one density measurement shall be taken for every 500 square meters of the compacted area provided further that the number of the tests in each set-of measurement shall be at least 10. In other respects, the control shall be similar to that described earlier.

**6. Following materials shall conform to the Indian Standards shown against them :**

- (1) ....Cement.....
- (2) ....Sand for masonry.
- (3).....Sand for concrete.
- (4).....Coarse aggregate.
- (5).....Mild Steel...
- (6) ....High yield strength deformed bars
  - (a) Hot Rolled..... IS : 1139
  - (b) Cold Twisted..... IS : 1786

**7. Barrel thickness of pipes of different class shall be as under :**

Sr. No.	Internal Diameter of pipe in mm	Barrel thickness (in mm).		
		NP1	NP2	NP2
1	80	25	25	-
2	100	25	25	-
3	150	25	25	-
4	250	25	25	-
5	300	30	30	-
6	350	32	32	75
7	400	32	32	75
8	450	35	35	75
9	500	-	35	75
10	600	-	40	80
11	700	-	40	80
12	800	-	45	90
13	900	-	50	100
14	1000	-	55	100
15	1100	-	60	115
16	1200	-	65	115

## GENERAL TECHNICAL SPECIFICATIONS FOR BUILDING WORKS

### GENERAL:

1. In the specifications "as directed" / "approved" shall be taken to mean "as directed" / "approved by the Engineer-in-Charge".
2. Wherever a reference to any Indian Standard appears in the specifications, it shall be taken to mean as a reference to the latest edition of the same in force on the date of agreement.
3. In "Mode of Measurement" in the specifications wherever a dispute arises in the absence of specific mention of a particular point of aspect the provisions on these particular points, or aspects in the relevant Indian Standards shall be referred to
4. All measurements and computations, unless otherwise specified, shall be carried out nearest to the following limits:
  - (i) Length, width and depth (height) 0.01 meter
  - (ii) Areas 0.01 Sq.Mt.
  - (iii) Cubic Contents 0.01 Cu.Mt.

In recording dimensions of work the sequence of length, width and height (depth) or thickness shall be followed.

5. The distance which constitutes lead shall be determined along the shortest practical route and note necessarily the route actually taken The decision of the Engineer-in-charge in this regard shall be taken as final.
6. Where no lead is specific, it shall mean "all leads"
7. Lift shall be measured from plinth level.
8. Up to "floor two level" means actual height of floor (Maxi 4 M) up to 3 Mt. above plinth level.
9. Definite particulars covered in the items of work, though not mentioned or elucidated in it specifications shall be deemed to be included therein.
10. Reference to specifications of materials as made in the detailed specification of the items of works is in the form of a designation containing them kuber of the specification of the material and prefix 'M' e.g. 'M-5',
11. Approval to the samples of various materials given by the Engineer-in-charge shall not absolve the contractor from the responsibility of replacing defective material brought on site or materials used in the work found defective at a later date. The contractor shall have no claim to any payment or compensation whatsoever on account of any such materials being rejected by the Engineer-in-charge.
12. The contract rate of the item of work shall be for the work completed in all aspects.
13. No collection of materials shall be made before it is got approved from the Engineer-in-charge.
14. Collection of approved materials shall be done at site of work in a systematic manner. Materials shall be stored in such a manner as to prevent damage, deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work.
15. Materials, if and when rejected by the Engineer-in-charge, shall be immediately removed from the site of work.
16. No materials shall be stored prior to, during and after execution of a structure in such a way as to cause or lead to damage or overloading of the various components of the structure.
17. All works shall be carried out in a workmanlike manner as per the best techniques for the particular item.
18. All tools, templates, machinery and equipment for correct execution of the work as well as for checking lines, levels, alignment of the works during execution shall kept in sufficient numbers and in good working condition on the site of the work.
19. The mode, procedure and manner of execution shall be such that it does not cause damage or over-loading of the various components of the structure during execution or after completion of the structure.
20. Special modes of construction not adopted in general Engineering practice if proposed to be adopted by the Contractor, shall be considered only if the contractor provides satisfactory evidence that such special mode of construction is safe, sound and helps in speedy construction and Completion of work to the required strength and quality. Acceptance of the

same by the Engineer-in-Charge shall not, however absolve the contractor of the responsibility of any adverse effects and consequences of adopting the same in the course of execution of completion of the work.

21. All installations pertaining to water supply and fixtures there of as well as drainage lines and sanitary fittings shall be deemed to be completed only after giving satisfactory tests by the contractor.
22. The contractor shall be responsible for observing the rules and regulations imposed under the "Minor Minerals Act", and such of the laws and rules prescribed by Government from time to time.
23. All necessary safety measures and precautions {including those laid down in the various relevant Indian Standards) shall be taken to ensure the safety of men. Materials and machinery on the works as also of the work itself.
24. The testing charges of all materials shall be borne by the Contractor.
25. Approval to any of the executed items for the work does not in any relieve the contractor of his responsibility for the correctness, soundness and strength of the structure as per the drawings and specifications.

## **SPECIFICATIONS OF MATERIALS**

### **M-1 Water**

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

### **M-2. Lime**

- 2.1. Lime shall be hydraulic lime as per I.S. 712-1973 Necessary tests shall be carried out as per I.S. 6932 (Parts I to X) 1973
- 2.2. The following field tests for limes are to be earned out:
  - (1) A very rough idea can be formed about the type of lime by its visual examination i.e. fat

lime bears pure white colour, lime in form of porous lumps of dirty white colour indicates quick lime, and solid lumps are the un burnt lime stone.

- (2) Acid tests for determining the carbonate content in lime Excessive amount of impurities and rough determination of class of lime.

**2.3.** Storage shall comply with J.S. 712-1973 The slaked lime, if stored, shall be kept in a weather proof and 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. 8042-E-1978.,

### **M-5. Coloured Cement**

**5.1.** Coloured cement shall be with white of 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 add cement shall be properly ground to have a uniform colour and shade. The pigments shall have such properties to provide for durability under exposure to sunlight and weather.

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

### **M-6 Sand**

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

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

I.S. Sieve Designation	Percentage by Weight Passing sieve	I.S. Sieve Designation	Percentage by Weight 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 Designation	Percentage by Weight Passing through	I.S. Sieve Designation	Percentage by Weight Passing through
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
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#### **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 will measuring cylinder. The method of determining silt contents by fields test is given as under :

**7.2.** A sample of stone dust to be tested shall be placed without drying in 200 mm. measuring cylinder. The quantity of the sample shall be such that it fills the cylinder up to 100 mm. mark. The clean water shall be added up to 150 mm. mark. The mixture shall be stirred vigorously and the content allowed to settle for 3 hours.

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

**7.4.** The fineness modules of stone dust shall not be less than 1.80.

#### **M-8. Stone Grit**

**8.1.** Grit shall consist of crushed or broken stone and be hard, strong, dense, durable, clean of proper gradation and free from skin or coating likely to prevent proper adhesion of mortar Grit shall generally be cubical in shape and as far as possible flakey elongated pieces shall be avoided. It shall generally comply with the provisions of I.S. 383-1970. Unless special stone of particular quarries is mentioned grit shall be obtained from the best black trap or equivalent hard stone as approved by the Engineer-in-charge. The grit shall have no deleterious with cement.

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

I.S. Sieve Designation	Percentage Passing through sieve	I.S. Sieve Designation	Percentage by Weight Passing through 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

**8.3** The crushing strength of grit will be such as to allow the concrete in which it is 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 VIII) 1963 as per instructions of the Engineer-in-charge. The necessity of test will be decided by the Engineer-in-charge.

#### **M-9. Cinder**

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

**9.2.** Cinder aggregates shall be well burnt furnace residue obtained from furnace using coal fuel only it shall be sound clean and tree from clay dirt, ash or other deleterious matter.

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

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	32

**M-10 Lime Mortar**

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

Sand shall conform to specification M-6.

**10.2. Proportion of Mix:**

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

**10.3. Preparation of mortar:**

10.3.1. Lime mortar shall be prepared by wet process as per I S 1625-1971 .Power driven mill shall be used for preparation of lime mortar. The slaked lime shall be placed in the mill in an even layer and ground for 180 revolutions with a sufficient water. Water shall be added as required during grinding (care being taken not to add more water) that will bring the mixed material to a consistency of stiff paste. Thoroughly wetted sand shall then be added evenly and the mixture ground for another 180 revolutions.

**10.4. Storage:**

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

**10.5. Use:**

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

**M-11. Cement Mortar**

11.1. Water shall conform to specification M-1. Cement shall conform to specifications M-3 and Sand shall conform to M-6

**11.2. Proportion of Mix**

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

**11.3. 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 deleterious extraneous material shall get mixed with mortar or mortar shall flow out. While mixing, the water shall be gradually added and thoroughly mixed to form a stiff plastic mass of uniform colour so that each particle of sand shall be completely covered with a film of wet cement. The water cement ratio shall be adopted as directed

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

**M-12. Stone Coarse Aggregate for Nominal Mix Concrete**

12.1. Coarse aggregate shall be of machine crushed stone of black trap or equivalent and be hard strong, dense, durable, clean and free from skin and coating likely to prevent proper adhesion of mortar.

12.2. The aggregate shall generally be cubical in shape unless special stones of particular quarries are



mentioned aggregates shall be machine crushed from the best black trap or equivalent hard stone as approved. Aggregate shall have no deleterious reaction with cement. The size of the coarse aggregate for plain cement and ordinary reinforced cement concrete shall generally be as per the table given below.

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.

**TABLE**

I.S. Sieve Designation	Percentage passing for single sized aggregates of Nominal size			I.S. Sieve Designation	Percentage passing for single sized aggregates of Nominal size		
	40 mm	20 mm	16 mm		40 mm	20 mm	16 mm
80 mm	-	-	-	12.5 mm	-	-	-
63 mm	100	-	-	10 mm	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	2.35 mm	-	-	-
16 mm	-	-	85-100				

**Note :** This percentage may be varied some what by the Engineer-in-charge when considered necessary for obtaining better density and strength of concrete.

- 12.3.** The grading test shall be taken in the beginning and at the change of source of materials. The necessary tests, indicated in I.S. 383-1970 and 456-197f shall have to be carried out to ensure the acceptability. The aggregates shall be stored separately and handled in such a manner as to prevent the intermixing of different aggregates. If the aggregates are covered with dust, they shall be washed with water to make them clean. .

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

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

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

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

#### **M-15. Bricks**

- 15.1.** The bricks shall be hand or machine molded and made from suitable soils and kiln burnt. They shall be free from cracks and flaws and nodules of free lime they shall have smooth rectangular faces with sharp corners and shall be of uniform colour.

The bricks shall be moulded with a frog of 100 mm. x 40 mm. and 10 mm. to 20 mm. deep on one of its

flat sides. The bricks shall not break when thrown on the ground from a height of 600 mm.

- 15.2. The size of modular bricks shall be 190 mm.x 90 mm.x 90 mm.
- 15.3. The size of the conventional bricks shall be as under :  
( 9" x 4.3/8" x 2,3/4" ) 225 x 110 x 75 mm.
- 15.4. Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the conventional size adopted in a particular work.  
Length + 1/8" ( 3.0 mm.) Width  $\pm$  1/16" ( 1.50 mm. ) Height + 1/16" ( 1.50 mm. )
- 15.5. The crushing strength of the bricks shall not be less than 35 Kg/Sq. Cm. The average water absorption shall not be more the 20 percent by weight Necessary tests for crushing strength and water absorption etc. shall be carried out as per I.S. 3495 ( Part-I to IV ) - 1976

**M-16. Stone**

- 16.1. The stone shall be of the specified variety such as Granite/Trap Stone/ Quartzite or any other type of good hard stones. The stones shall be only from the approved quarry and shall be hard sound, durable and free from defects like cavities, cracks, sand holes, flaws injurious veins, patches of loose or soft materials etc. and weathered portions and other structural defects Or imperfections tending to affect their soundness and strength. The stone with round surface shall not be used. The percentage of water absorption shall not be more than 5% of dry weight. When tested in accordance with I.S. 1124-1974. The minimum crushing strength of stone shall be 200 Kg/Sq. Cm. unless otherwise specified.
- 16.2. The samples of the stone to be used shall be got approved before the work is started
- 16.3. The Khanki facing stone shall be dressed by chisel as specified in the item for khanki facing in required shape and size. The face of the stone shall be-so dressed that the bushing on the exposed face shall not project by more than 40 mm. from the general wall surface and on face to be plastered it shall not project by more than 19 mm. nor shall it have depressions more than 10 mm. from the average wall surface.

**M-17. Laterite Stone**

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

**M-18. Mild Steel Bars**

- 18.1. Mild steel bars reinforcement for R.C C. work shall conform to I.S. 432 (Part -II) 1966 and shall be of tested quality. It shall also comply with relevant part of I.S. 456-1978.
- 18.2. All the reinforcement shall be clean and free from dirt, paint, grease, mill scale or loose or thick rust at the time of placing
- 18.3. For the purpose of payment, the bar shall be measured correct up to 10 mm. length and weight payable worked out at the rate specified below :

1.	6 mm	0.22 Kg./Rmt.	8.	20 mm.	2.47 Kg/Rmt.
2.	8 mm	0.39 Kg./Rmt.	9.	22 mm.	2.98 Kg/Rmt.
3.	10 mm	0.62 Kg./Rmt.	10.	25 mm.	3.85 Kg/Rmt.
4.	12 mm	0.89 Kg./Rmt.	11.	28 mm.	4.83 Kg/Rmt.
5.	14 mm	1.21 Kg./Rmt.	12.	32 mm.	6.31 Kg/Rmt.
6.	16 mm	1.58 Kg./Rmt.	13.	36 mm.	7.99 Kg/Rmt.
7.	18 mm	2.00 Kg./Rmt.	14.	40 mm.	9.86 Kg/Rmt.

#### **M-19. High Yield Strength Steel Deformed Bars**

- 19.1.** High yield strength steel deformed bars shall be either cold twisted other rolled and shall conform to I.S. 1786-1966 and I.S. 1139-1966 respectively.
- 19.2.** Other provisions and requirements shall conform to specification No. M-18 for Mild Steel Bars.

#### **M-20. High Tensile Steel Wires**

- 20.1.** The high tensile wires for use in pre stressed concrete work shall conform to I.S.2090-1962.
- 20.2.** The tensile strength of the high tensile steel bars shall be as specified in the item. In absence of the given strength the minimum strength shall be taken as per Para 6-1 of the I.S. 1785-1962. Testing shall be done as per I.S. requirements.
- 20.3.** The high tensile steel shall be free from loose mill scale, rust, oil, grease, or any other harmful matter. Cleaning of steel bars may be carried out by immersion in solvent solution, wire brushing or passing through a pressure box containing Carborundum.
- 20.4.** The high tensile wire shall be obtained from manufacturers. in coils having diameter not less than 350 times the diameter of wire itself so that wire springs back straight on being uncoiled .

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

- 21.1.** The mild steel wire shall be of 1.63 mm. or 1.22 mm. ( 16 to 18 gauge ) diameter and shall conform to I.S. 280-1972.
- 21.2.** The use of black wire will be permitted for binding reinforcement bars. It shall be free from rust oil paint, grease loose mill scale or any other undesirable coating which may prevent adhesion of cement mortar.

#### **M-22. Structural Steel**

- 22.1.** All structural Steel shall conform to I S. 226-1985: The steel shall be free from the defects mentioned in I.S 226-1975 and shall have a smooth finish. The material shall be free from loose mill scale, rust pits or other defects affecting the strength and durability. River bars shall conform to I.S. 1148-1973.
- 22.2.** When the steel is supplied by the Contractor test certificate of the manufacturers shall be obtained according to I.S. 226-1975 and other relevant Indian Standards.

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

- 23.1.** The galvanised iron sheets shall be plain or corrugated sheets of gauges as specified in item The G.I. Sheets shall conform to I.S.277-1977. The sheets shall be undamaged in carnage and handling either by rubbing off of zinc coating or otherwise. They shall have clean and bright surface and shall be free from dents, bends, holes, rust or white powdery deposit.
- 23.2.** The length and width of G.I. sheets shall be as directed as per site condition.

#### **M-23.A : G.I. Valleys gutter, ridges**

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

process of bending.

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

**M-24. Asbestos Cement Sheets**

- 24.1.** Asbestos cement sheets plain, corrugated or semi-corrugated shall conform to I.S.459-1970 The thickness of the sheets shall be as specified in the item. The sheets shall be free from all defects such as cracks, holes, deformities chipped edges or otherwise damaged.

**24.2. Ridges & Hips :**

- 24.2.1.** Ridges and hips shall be of same thickness as that of A.C. sheets. The types, of ridges shall be suitable for the type of sheets and location.
- 24.2.2.** Other accessories to be used in roof such as flashing pieces eaves filler pieces, valley gutters, north light, and ventilator curves, barge boards etc, shall be of standard manufacture and shall be suitable for the type of sheets and location.

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

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

**M-26. Shuttering**

- 26.1.** The shuttering shall be either of wooden planking of 30 mm. minimum thickness with or without steel lining or of steel plates stiffened by steel angles The shuttering shall be supported on battens and beams and props of vertical bullies properly cross braced together so as to make the centering rigid. In places of bullies props, brick pillar of adequate section built in mud mortar may be used.
- 26.2.** The form work shall be sufficiently strong and shall be able to resist forces caused by vibration of live load of men working over it and other incidental loads associated with it. The shuttering shall have smooth and even surface and its joints shall permit leakage of cement grout.
- 26.3.** If at any stage of work during or after placing concrete in the structure, the form work sags or bulges out beyond the required shape of the structure, the concrete shall be removed and work redone with fresh concrete and adequately rigid form work The complete form work shall be got inspected by and got approved from the Engineer-in charge, before the reinforcement bars are placed in position.
- 26.4.** The props shall consist of bullies having 100 mm .minimum diameter measured at mid length and 80 mm. at thin end shall be placed as per design requirement. These shall rest squarely on wooden sole plates 40 mm. thick and minimum bearing area of 0-10 sq.m laid on sufficiently hard base.
- 26.5.** Double wedges shall further be provided between the sole plate and the wooden props so as to facilitate tightening and easing of shuttering without jerking the concrete
- 26.6.** The timber used in shuttering shall not be so dry as to absorb water from concrete and swell or bulge nor so green or wet as to shrink after erection. The timber shall be properly sawn and planed on the sides and the surface coming in contact with concrete wooden form work with metal sheet lining or steel plates stiffened by steel angles shall be permitted
- 26.7.** As far as practicable, clamps shall be used to hold the forms together and use of nails and spikes avoided.
- 26.8.** The surface of timber shuttering that would come in contact with concrete shall be well wetted and

coated with soap solution before the concreting is done Alternatively coat of raw linseed oil or oil of approved manufacture may be applied in place of soap solution In case of steel shuttering either soap solution or raw linseed oil shall be applied after thoroughly cleaning the surface. Under no circumstances black or burnt oil shall be permitted.

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

**M- 27. Expansion Joints - Permoulded filler**

- 27.1.** The item provides for expansion joints in R.C C. frame structures for internal joints, as well as exposed joints, with the use of promoulded bituminous joint filler.
- 27.2.** Premoulded bituminous joints filler i.e. performed strip of expansion joints filler shall not get deformed, or broken by twisting bending or other handling when exposed to atmospheric condition. Pieces of joints filler that have been damaged shall be rejected
- 27.3.** Thickness of the per-moulded joints filler shall be 25 mm. unless otherwise specified.
- 27.4.** Premoulded bituminous joints filler shall conform to I S 1838-1961

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

- 28.1.** The item provide for expansion joints in R.C.C. frame structure for internal joints, as well as exposed joints, with the use of premoulded bituminous joints filler.
- 28.2.** Copper sheet shall be of 1.25 mm. width and or 1 25 mm. width and the " U " shape in the middle. Copper strip shall have holdfast of 3 mm diameter copper rod fixed to the plate soldered on strip at intervals of about 30 cm or as shown in the drawing or as directed. The width of each flange ( horizontal side ) of the copper plate Jo be embedded in the concrete work shall be 25 mm depth of "U" to be provided in the expansion joint, in the copper plate shall be of 25 mm.

**M-29. Teak wood**

- 29.1.** The teak wood shall be of good quality as required for the item to be executed. When the kind of wood is not specifically mentioned, good Indian teak wood as approved shall be used.
- 29.2.** Teak wood shall generally be free from large, loose dead or cluster knots, flaws, shakes, warps, twists, bends or any other defects. It shall generally be uniform in substance and of straight fibers as far as possible. It shall be free from rot decay, harmful fungi and other defects of harmful nature which will affect the strength, durability or its usefulness for the purpose for which it is required. The colour shall be uniform as for as possible. Any effort like painig using any adhesive materials made to hide the defects shall render the pieces liable to rejection by the Engineer-in-charge.
- 29.3.** All scantlings, planks etc. shall be sawn in straight lines and planes in the direction of grains and of uniform thickness.
- 29.4.** The tolerances in the dimensions shall be allowed at the rate of 1.5 mm per face to be planed.
- 29.5. First class teak wood**
- 29.5.1.** First class teak wood shall have no individual hard and-sound knots, more than 6 sq. cm. in size and the aggregate area of such knots shall not be more than 1% of area of piece, The timber shall be closed grained.
- 29.6. Second Class Teak Wood:**
- 29.6.1.** No individual hard and sound knots shall be more than 15 sq. cms. in size and aggregates area of such knots shall be not exceed 2% of the area of piece.

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

The non-teak wood shall be chemically treated, seasoned as per I.S. Specifications and of good quality. The type of wood shall be got approved before collecting the same on site. Fabrication of wooden members shall be started only after approval. For this purpose wood of Bio, Kalai, Sires, Saded, Behda, Jamun, Sisoo will be used for door where as only Kalai, Sires, Halda, Kalam etc. will be permitted for shutters after proper seasoning and chemical treatment.

The non-teak wood shall be free from large loose dead of cluster knots, flows, shakes, warps, bends or any other defects, It shall be uniform in substance and of straight fibers as far as possible. It shall be free from rots, decay, harmful fungi and other defects of nature which will effect the strength, durability or its usefulness for the purpose for which it is required. The colour of wood shall be uniform as far as possible. The scantlings planks etc. shall be sawn in straight lines and planes in the direction of grain and of uniform thickness. The department will use the Agency to produce certificate from Forest Department in event of dispute and the decision of the Department shall be final and binding to the contractor. The tolerance in the dimension shall be allowed at 1.5 mm. per face to be planed.

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

- 30.1.** The solid core type flush door shutters shall be of decorative or non-decorative type as specified in the drawing. The size and thickness of the shutter shall be as specified in drawings or as directed. The timber species for core shall be used as per I.S.2202 ( part -I ) 1980. The timber shall be free from decay and insect attack. Knots and knot holes less than half the width of cross-section of the members in which they occur may be permitted. Pitch pockets, pitch streaks and harmless pin holes shall be permissible except in the exposed edges of the core members. The commercial plywood, cross-bands shall conform to I.S. 303-1275.
- 30.2.** The face panel of the shutters shall be formed by gluing by the hot press process on both faces of the core with either plywood or cross-bands and face veneers. The hopping, rebating, opening of glazing, venation etc., shall be provided if specified in the drawing.
- 30.3.** All edges of the door shutters shall be square. The shutters shall be free from twist or warp in its plane. Both faces of the shutters shall be sand papered to smooth even texture.
- 30.4.** The shutters shall be tested for-
  - (1) End immersion test:** The test shall be carried out as per I.S.2202 ( part-1 ) 1980. There shall be no delamination at the end of the test.
  - (2) Knife Test :** The face panel when tested in accordance with I.S 1659-1979 shall pass the test.
  - (3) Glue adhesion test :** The flush door shall be tested for glue adhesive test in accordance with I S 2202 ( part -I ) 1980. The shutters shall be considered to have passed the test, if no delamination occurs in the glue lines in the plywood and if no single determination more than 80 mm in length and more than 3 mm in depth has occurred in the assembly glue lines between the plywood face and the style and rail. Delamination at the corner shall be measured continuously around the corner. Delamination at the knots, knot hole and other permissible wood 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 Nominal thickness  $\pm 1.2$  mm. In Nominal height  $\pm 3$  mm
- 30.6.** The thickness of the shutter shall be uniform throughout with a permissible variation of not more than 0.8 mm. when measured at any points.

**M-31. Aluminum doors, windows, ventilators**

- 31.1.** Aluminum alloy used in the manufacture of extruded window sections shall conform to I.S. designation

HEAWP of I.S. 733-1975 and also to I S. Designation WVG-WP of I.S 1285-1975 The section shall be as specified in the drawing and design. The fabrication shall be done as directed

- 31.2. The hinges shall be cast or extruded aluminum hinges of same type as in window but of larger size.
- 31.3. The hinges shall normally be of 50 mm. projecting type. Non-projecting type of hinges may also be used if directed. The handles of door shall be of specified design A suitable lock for the door Operable either from outside or inside shall be provided. In double shutter door, the first closing shutter shall have concealed aluminum alloy bolt at top and bottom.

#### **M-32. Rolling Shutters**

- 32.1. The rolling shutters shall conform to I.S.6248-1979 Rolling shutters shall be supplied of specified type with accessories. The size of the rolling shutters shall be specified in the drawings. The shutters shall be specified in the drawings. The shutters shall be constructed with interlocking lath sections formed from cold rolled steel strips not less than 0.9 mm. thick and 80 mm. wide for shutters up to 3.5 m .width not less than 1.25 mm. thick and 80 mm wide for shutters 3.5 m. in width and above unless otherwise specified.
- 32.2. Guide channels shall be of mild steel deep channel section and of rolled pressed or built up (fabricated) joint less construction The thickness of sheet used shall not be less than 3.15 mm.
- 32.3. Hood covers shall be made of M S. Sheets not less than 0.90 mm. thick. For shutters having width 3.5 Meter and above, the thickness of M.S. sheet for the hood cover shall be not less than 1 25 mm.
- 32.4. The spring shall be of best quality and shall be manufactured from tested high tensile spring steel wire of strip of adequate strength to balance the shutters in all position. The spring pipe shaft etc. shall be supported on strong M S of malleable C I. brackets. The brackets shall be fixed on or under the lintel as specified with raw plugs and screws bolts etc.
- 32.5. The rolling shutters shall be of self rolling up to 8 Sq. m. clear area without ball bearing and up to 12 Sq.m. clear area with ball bearing. If the rolling shutters are of larger, then gear operated type shutters shall be used.
- 32.6. The locking arrangement shall be provided at the bottom of shutter at both ends The shutters shall be opened from outside.
- 32.7. The Shutters shall be completed with door suspension shafts, looking arrangements, pulling hooks, handles and other accessories.

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

- 33.1. The collapsible steel gate shall be in one or two leaves and size as per approved drawings or as specified. The gate shall be fabricated from best quality mild steel channels, flats etc. Either steel pulleys or ball-bearings shall be provided in every double channel Unless otherwise specified the particulars of collapsible gate shall be as under.
  - (a) Pickets : These shall be of 20 mm. M.S. channels of heavy sections unless otherwise shown on drawings. The distance centre to centre of pickets shall be 12 cms .with an opening or 10 Cms
  - (b) Pivoted M.S. flats shall be 20 mm x6 mm
  - (c) Top and bottom guides shall be from tee of flat iron of approved size.
  - (d) The fittings like stoppers fixing, locking cleats, brass handles and cast iron rollers shall be of approved design and size

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

- 34.1 Welded steel wire fabric for general purpose shall be manufactured form cold drawn steel wire "as drawn" or galvenised steel conforming to I.S. 226-1975 with longitudinal and transverse wire securely

connected at every intersection by a process of electrical resistance welding and conforming to I.S.4948-1974. it shall be fabricated and finished in workmanlike manner and shall be free from injurious defects and shall be rust proof The type of mesh shall be oblong or square as directed The mesh sizes and sizes if wire for square 3b well as oblong welded steel wire fabric shall be as directed The steel wire fabric in panels shall be in one whole piece in each panel as far as stock sizes permit.

**M-35 Expanded Metal Sheets**

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

**M-36. Mild Steel Wire ( Wire Gauze Jali )**

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

**M-37. Plywood**

- 37.1.** The plywood for general purpose shall conform I.S. 303-17-1975.  
Plywood is made by cementing together than boards or starts 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 at right angles to the grain in the adjacent level.
- 37.2.** The chief advantages of plywood a single board of the same thickness is the more uniform strength of the plywood, along the length and width of the plywood and greater resistance to cracking and splitting with change in moisture content.
- 37.3.** Usually synthetic resins are used to gluing, phenolic resins are usually cured in a hot press which compresses and simultaneously heats the plies between hot plates which maintain a temperature of 90 degree C to 140 degree C and a pressure of 11 to 14 Kg/ Sq. Cm on the wood. The time of heating may be anything from 2 to 60 minutes depending upon thickness
- 37.4.** When water glue are used the wood absorbs so much water that the finished plywood must be dried carefully. When synthetic resins are used as adhesive the finished plywood must be exposed to an atmosphere of controlled humidity until the proper amount of moisture has been absorbed.
- 37.5.** According to I.S. 303-1975 the plywood for general purpose shall be of the grades namely BWR, WWR and CWR depending up to the adhesives used for bonding the veneers and it will be further classified into six types namely AA, AB, AC, BB, BC and CC based on the quality of the two faces each face being of three kinds namely A, Band C After pressing, the finished plywood should be reconditioned to a moisture content not less than 8 percent and not more than 16 percent.
- 37.6.** Thickness of plywood Boards

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		25 mm



**M-38. Glass**

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

**38.2. Sheet Glass**

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

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

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

**38.3. Plate Glass:**

**38.3.1.** When plate glass is specified it shall be "polished patent plate glass" of best quality It shall have both the surface ground flat and parallel and polished to obtain clear undisturbed vision and reflection The plate glass shall be of the thickness mentioned in the item or as shown in the detailed drawing or as specified. In absence of any specified thickness, the thickness of plate glass to be supplied shall be 6 mm. and a tolerance of 0.20 mm shall be admissible

**38.4. Obscured Glass:**

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

**38.5. Wired Glass:**

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

**M-39. Acrylic Sheets**

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

**M-40. Particle board**

**40.1.** The particle boards used for face panels shall of best quality free from any defects. "I he particle boards shall be made with phenolmaldehyde adhesive The particle boards shall conform I S 3087-1905

"Specification for wood particle board for general purpose" The size and the thickness shall be as indicated.

**M-41. Expanded polystyrene or framed styroper slabs**

- 41.1. The expanded polystyrene ceiling boards and tiles shall be of approved make and shall be of sizes, thickness, finish and colour as indicated. It shall be of high density and suitable for use as insulating material. The insulating material shall be like slabs of Thermocole etc.

**M-42. Resign bonded fiber glass.**

- 42.1. The resign bonded fiber glass tiles or roils shall be of approved make and shall be of sizes. thickness and finish as indicated.
- 42.2. For test of Mineral wool thermal insulation [Blanket I S 3144-1965 shall be followed
- 42.3. Insulation wool blanks shall be with the following coverings on one or both sides as indicated
- (1) Bituminous Hessian Kraft paper suitable for use in position where moisture has to be excluded.
  - (2) Hessian cloth or Kraft paper for keeping out dust
  - (3) G.I wire netting, suitable for surfaces to be plaster over

**M-43. Fixtures and fastenings**

**43.1. General:**

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

**43.2. Holdfasts:**

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

**43.3. Butt hinges:**

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

**43.4. Siding door bolts (Aldrops):**

- 43.4.1. The aldrops as specified in the item shall be used and shall be got approved.

**43.5. Tower bolts (Barrel Type):**

- 43.5.1. Tower bolts as specified in the item shall be used and shall be got approved

**43.6. Door Latch:**

- 43.6.1. The size of door latch shall be taken as the length of latch.

**43.7. Bathroom Latch:**

- 43.7.1. Bathroom latch shall be similar to tower bolt.

**43.8. Handle:**

The size of the handles shall be determined by the inside grip length of the handles. Handles shall have

a base plate of length 50 mm. more than the size" of the handle.

**43.9. Door Catch:**

**43.9.1.** Door stoppers shall be either floor door stopper type or door catch type Floor stopper shall be of overall size as specified and-shall have a rubber cushion.

**43.10. Door Stoppers:**

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

**43.11. Wooden Door Stop with hinges:**

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

**43.12. Casement Window Fastener:**

**43.12.1.** Casement window fastener for single leaf window shutter shall be left or right handed as directed.

**43.13. Casement stays (Straight Red Stay):**

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

**43.14. Ventilator Catch:**

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

**43.15. Pivot:**

**43.15.1.** The base and socket plate shall be made from minimum 3 mm. thick plate: and projected pivot shall not be less than 12 mm 'diameter and 12 mm. length and shall be firmly riveted to the base plate in case of iron pivot and in single piece plate in the case of brass pivot.

**M-44. Paints:**

**44.1. (A) Oil paints :**

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

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

(i) Paint shall not show excessive setting in a freshly opened full can and shall easily be ready spread with a paddle to a smooth homogeneous state. The paint shall show no curdling, levering caking or colour separation and shall be free from lumps and skins.

(ii) The paint as received shall brush easily, possess good leveling properties and show no running or sagging tendencies.

(iii) The paint shall not skin within 48 hours in a three quarters filled closed container.

(iv) The paint shall dry to a smooth uniform finish free from roughness, grit unevenness and other imperfections.

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

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

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

**M-45. French Polish**

- 45.1.** The French polish of required tint and shade shall be prepared with the below mentioned ingredients and other necessary materials:

(i) Denatured spirit of approved quality (ii) Chandras (iii) Pigment.

- 45.2.** The French polish so prepared shall conform to I S : 348-1 9C8.

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

- 46.1.** The marble chips shall be of approved quality and shades. It shall be hard, sound, dense and homogeneous in texture with crystalline and coarse grains It shall be uniform in colour and free from stains cracks, .decay and weathering.
- 46.2.** The size of various colours of marble chips ranging from the smallest up to 20 mm shall be used where the thickness of top wearing layer is 6 mm size The marble chips of approved quality and colours only as per grading as decided by the Engineer-in-charge shall be used for marble mosaic tiles or works.
- 46.3.** The marble chips shall be machine crushed. They shall be free from foreign matter, dust etc. Except as above, the chips shall conform to I S 2114-1962

**M-47. Flooring Tiles****47.1. (A) Plain Cement tiles;**

- 47.1.1.** The plain cement tiles shall be of general purpose type. These are the tiles in the manufacture of which no pigments are used. Cement used in the manufacture of tiles shall be as per Indian Standards.
- 47.1.2.** The tiles shall be manufactured from a mixture of cement and natural aggregates by pressure process. During manufacture the tiles shall be subjected to pressure of not less than 140 Kg/Sq. Cm. The proportion of cement to aggregate in the backing of the tiles shall be not less than 1 .3 by weight The wearing face, through the tiles are of plain cement, shall be provided with stone chips of 1 to 2 mm. size. The proportions of cement to aggregate in the wearing layer of the tiles shall be three parts of cement to one parts chips by weight. The minimum thickness of wearing layer shall be 3 mm. The colour and texture of wearing layer shall be uniform throughout its face and thickness. On removal from mould, the tiles shall be kept in moist condition continuously at least for seven days and subsequently, if necessary, for such long period as would ensure their conformity to requirements of I.S.1237-1980 regarding strength resistance to wear and water absorption.
- 47.1.3** The wearing face of the tiles shall he plane, free from projections, depressions and cracks and shall be reasonably parallel to the back face of the tile. All angles shall be right angle and all edges shall be sharp and true.
- 47.1.4.** The size of tiles generally be square shapes 24.85 Cm x24.85 Cm. or 25 Cm x 25 Cm The thickness of tiles shall be 20 mm.
- 47.1.5.** Tolerance of length and breadth shall be plus of minus one millimeter Tolerance on thickness shall be plus 5mm.
- 47.1.6.** The tiles shall satisfy the tests as regards transverse strength, resistance to wear and water absorption as per I.S 1237-1980.
- 47.2. (B) Plain Coloured Tiles:**
- 47.2.1.** The tiles shall have the same specification as for plain cement tiles as per (A) above expect that they shall have a plain wearing surface wherein pigments are used. They shall conform it I.S. 1237-1980.

**47.2.2.** The pigments used for colouring cement shall not exceed 10 percent by weight of cement used in the mix. The pigments, synthetic or otherwise, used for colouring tiles shall have permanent colour and shall not contain materials detrimental to concrete

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

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

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

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

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

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

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

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

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

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

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

**47.4.4.** Tiles shall conform to relevant I.S 1237-1980. 47.5.

**47.5. (E) Chequered Tiles For Stair Cases :**

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

- (1) The length of a tile including nosing shall be 300 mm
- (2) The minimum thickness shall be 28 mm
- (3) The nosing shall have also the same wearing layer as at the top.
- (4) The nosing edge shall be rounded
- (5) The front portion of the tile for a minimum length of 75 mm. from and including the nosing shall have grooves running parallel to nosing and at centers not exceeding 25 mm Beyond that the tiles shall have normal chequer pattern.

**M-48. Rough Kotah Stone**

**48.1.** The Kotah stones shall be hard even, sound, and regular in shape and generally uniform in colour. The

colour of the stone shall generally be green Brown coloured shall not be allowed for use They shall be without any soft veins, cracks or flaws.

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

#### **M-49. Polished Kotah Stoics**

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

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

- 50.1.** Dholpur stone slab shall be of best quality as approved by the Engineer-in-charge. The stone slab shall be without any veins, cracks, and flaws The stone slab shall be even sound and durable regular in shape and of uniform colour
- 50.2.** The size of the stone shall be as specified in the item or detailed drawing or as approved by the Engineer-in-charge. The thickness of the stone shall be as specified in the item of work with the permissible tolerance of plus or minus 2 mm. The provision in respect of polishing as for polished kotah stone shall apply to polished Dholpur stone also. All angles and edges of the face of the stone slab shall be fine chiseled or polished as specified in the item of work and all the four edges shall be machine cut All angles and edges of the stone slab shall be true and plane.
- 50.3.** The sample of stone shall be got approved by the Engineer-in-charge for a particular work It shall be ensured that the stones to be used in a particular work shall not differ much in shade or tint from the approved sample.

#### **M-51. Marble Slab**

- 51.1.** Marble slab shall be white or of other and of best quality as approved by the Engineer-in-charge
- 51.2.** Slabs shall be hard, close, uniform and homogeneous in texture. They shall have even crystalline grain and free from defects and cracks. The surface shall be machine polished to an even and perfect plane surface and edges machine cut true and square. The rear face shall be rough to provide key for the mortar.
- 51.3.** Marble slabs with natural veins, if selected shall have to be laid as per the pattern given by the Engineer-in-charge.  
Size of the slab shall be minimum 460 mm x 450 mm and preferably 600 mm x 600 mm. However, smaller sizes will be allowed to be used to the extent of maintaining required pattern.
- 51.4.** The slab shall not be thinner than the specified thickness at its thinnest part. A few specimens of finished

slab to be used shall be deposited by the Contractor in the office for reference

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

**M-52. Granite Stone slab**

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

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

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

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

**53.1.** P.V.C. sheets for P.V.C., floor covering shall be of homogenous flexible type conforming to I S 3462-1966. The P.V.C. covering shall neither develop any toxic effect while put to use nor shall give off any disagreeable odour.

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

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

(a) Thickness + 0.15 mm.

(b) Length or Width

(1) 300 mm. Square tiles      ± 0.20 mm.      (3) 900 mm Square tiles      ± 0.60 mm.

(2) 600 mm. Square tiles      ± 0.40 mm.      (4) Sheets and roll      ± 0.10 percent.

**53.4. Adhesive:**

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

**M-54. Facing Tiles**

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

**54.2.** The standard size of facing brick tiles shall be 19 x 9 x 4 cms. The facing brick tiles shall be provided with frog which shall conform to I.S. 11077-1976.

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

Size	Tolerance for	
	1st Class Brick	2nd Class Brick
19 cm.	± 6 mm	± 10 mm
9 cm.	± 3 mm	± 7 mm
4 cm.	± 1.5 mm	± 3 mm

**54.4.** The tolerance for distortion or warpage of face or edges of individual brick from a plane surface and from a straight line respectively shall be as follows:

Facing dimensions	Permissible tolerance
Max. below 19 cms.	Max. 2.5 mm
- do - above 19 cm.	Max. 3.0 mm

**54.5.** The average compressive strength obtained as a sample of five tiles when tested in accordance with the procedure laid as per I S 1077-1976 shall be not less than 175 Kg/Sq Cm. The average compressive strength of any individual bricks shall be not less than 160 Kg / Sq.Cm.

**54.6.** The average water absorption for five bricks tiles shall not exceed 12 percent of average weight of brick before testing. The absorption for each individual bricks shall not exceed 25 percent.

**54.7.** The brick tiles when tested in accordance with I.S. 1077-1976, the rate of efflorescence shall not be more than "Slightly effloresced"

**M-55. White glazed tiles**

**55.1.** The tiles shall be of best quality as approved by the Engineer-in-charge. They shall be flat and true to shape. They shall be free from cracks, crazing sports chipper) edges and corners. The glazing shall be of uniform shade.

**55.2.** The tiles shall be nominal size of 150 mm x 150 mm unless otherwise, specified. The maximum variation the stated sizes other than the thickness of tile shall be plus or minus 1.5 mm. The thickness of tile shall be 6 mm. Except as above the tiles shall conform to I.S. 1977-19/0.

**M-56. Galvanised iron pipes and fittings**

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

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

**57.1.** A bib cock is a draw off tap with a horizontal inlet and free outlet A stop cock is a valve with suitable means of connection for insertion in a pipe line for controlling or stopping the flow.

**57.2.** They shall be of screw down type and of brass chromium plated and of diameter as specified in the description of the item. They shall conform to I S. 781-1977 and they shall be of best Indian make. They shall be polished bright.

**57.3.** The minimum finished weight of bib cock and stop cock shall be as given below :

Diameter	Bib Cock	Stop Cock	Diameter	Bib Cock	Stop Cock
8 mm	0.25 Kg.	0.25 Kg.	15 mm	0.40 Kg.	0.40 Kg.
10 mm	0.30 Kg.	0.35 Kg.	20 mm	0.75 Kg.	0.75 Kg.

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

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

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

**59.1.** Wash basin shall be of white porcelain first quality best Indian make and it shall conform to I.S. 2556 (Part -IV) -1972 and I.S. 771-1979. The size of the wash basin shall be as specified in item. Wash basin shall be of one piece construction with continued over flow arrangements All internal angles shall be designed so as to facilitate cleaning. Wash basin shall have single tap hole as specified. Each basin shall have a circular waste hole which is either riveted or beveled internally with 65 mm. diameter at top



and 10 mm. depth to suit the waste fitting. The necessary stud slot to receive the bracket on the under side of the basin shall be provided Basin shall have an internal soap holder which shall fully drain into the bowl.

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

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

- 60.1.** The European type water closet shall be white glazed porcelain first quality and shall be of wash down type conforming to I.S. 2556-1973 and I.S. 771-1979.
- 60.2.** 'S' trap shall be provided as required with water seal not than 50 mm. The solid plastic seat and cover shall be of best Indian make conforming to I.S 2548-1980. They shall be made of moulded synthetic materials which shall be tough and hard with high resistance to solvents and shall be free from blisters and surface defects and shall have chromium plated brass hinges and rubber buffer of suitable size.

**M-61. Orrissa type water closet**

- 61.1.** The Specification of Orrissa type white glazed water closet of first quality shall conform to I.S. 2256 (Part-III) -1981 and relevant specification of Indian type water closet except that pan will be with the integral squatting pan of size 580 mm x 400 mm with raised footrest.

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

- 62.1.** The Indian type white glazed water closet of first quality shall be of size as specified in the item and conforming to I.S. 771-1979 and I.S. 2556 – (Part-II) 1981. Each pan shall have integral flushing. It shall also have an inlet at black an or front for connecting flush pipes as directed. The inside of the bottom of the pan shall have sufficient slope from the front towards the outlet and surface shall be uniform and smooth. Pan shall be provided with 100 mm. diameter 'P' or 'S' trap with approximately 50 mm. Water seal and 50 mm. diameter vent horn.

**M-62. A. Foot Rests**

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

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

- 63.1.** The glazed earthen-ware sink shall be of specified size, colour and quality. They sink shall conform, to I.S. 771 Part – II – 1979. The brackets for sinks shall conform to I.S 775-1970.
- 63.2.** The pipes shall conform to I.S. 1239-part-I 1973 and I.S. 404-1962 for steel and lead pipes respectively. 32 mm. brass waste coupling of standard pattern with brass chain and rubble 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 fiat back or corner type as specified in the item and shall conform to I.S 771-1979. It shall be of best Indian make and size as specified and approved by the Engineer-in-charge. The flat back of corner type urinal must be of 1st quality free from any defects, cracks etc.

**M-65. Low level Enamel flushing tank**

- 65.1.** The low level enamel flushing tank shall be of 15 liters capacity. It shall conform of I S 774-1971. The flushing cistern shall be of best quality and free from any defects. The flushing tank shall have outlet 32 mm. diameter. The outlet shall be connected with W.C. pan by lead pipe or P.V.C. pipe as specified. The flushing tank shall be provided with inlet and outlet for fixing G.I. inlet pipes and over-flow pipes.

The flushing cistern shall be provided with chromium plated handle for flushing The flushing tank shall be provided with bracket of cast iron so that it can be fixed on wall at specified height. The brackets shall conform to I.S. 775-1970.

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

**66.1.** The cast iron flushing cistern shall be of 15 liters capacity. It shall conform to I.S. 774-1971. The flushing cistern shall be of best quality free from any defects. The flushing cistern shall have outlet of 32 mm diameter. The lead pipe shall conform to I.S 404 (Part-I) - 1962; For fixing G.I. inlet pipes and overflow pipe 20 mm. dia. inlet and outlet shall be provided The flushing cistern shall be provided with galvanised iron chain and pull of sufficient length and shall be got approved from the Engineer-in-charge. The cast iron flushing cistern shall be painted with one coat of anticorrosive paint and two coats of 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 flush cock (Heavy weight) shall be of gun metal chromium plated of diameter as specified in the description of the item. The flush cock shall conform to relevant Indian Standard.

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

**68.1.** All soil water, vent and anti syphonage pipes and fitting shall conform to I S.1729-1964. The pipes shall have spigot and socket ends with head on spigot end. The pipes and fitting shall be true to shape smooth, cylindrical, their inner and outer surfaces being as nearly as' practicable concentric. They shall be sound and nicely cast and shall be free from cracks, laps, pinholes or there imperfection and shall be neatly dressed and carefully fettled.

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

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

**68.4. Tolerances :**

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

Sr. No.	Nominal dia. of Bore	Thickness	Overall	Weight of Pipe	
			1.5 m long	1.8 m long	excluding ears 2 m. long
1.	75 mm	5.0 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. length will be allowed For fittings tolerance in lengths shall be plus 25 mm. and minus 10 mm.

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

**M-69. Nahni Trap**

**69.1.** Nahni trap shall be of cast iron and shall be sound and free from porosity or other defects which affect serviceability The thickness of the base metal shall not be less than 6.5 mm The surface shall be smooth and free .form craze, chips and other flaws or any other kind of defects which affect

serviceability The size of nahn trap shall be specified and shall be of self cleaning design.

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

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

**M-70. Gully Trap**

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

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

**70.3.** Each gully trap shall have one C.I. grating of square size corresponding to the dimensions, of inlet of gully trap. It will also have a water tight C.I. cover with frame inside dimensions 300 mm. x 300 mm. the cover with frame inside dimensions 300 mm. x 300 mm. the cover and weighing not less than 4.53 Kg. and the frame not less than 2.72 Kg. The grating cover and frame shall be of sound and good casting and shall have truly square machined seating faces.

**M 71. Glazed Stone Ware pipe And Fittings**

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

**71.2.** The pipes shall generally conform to relevant I S 651-1980.

**M-72. Wall Peg Rail**

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

**M-73. G.I. Water Spot**

**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 outside end tee bend cut at half the length shall be provided and at other end coupling shall be provided to have better fixing. The water spout shall be provided as per detailed drawing or as directed.

**M-74. Asbestos Cement pipe (A.C. pipe)**

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

**M-75. Crydon Ball valve**

**75.1.** Ball valve of screwed type including polythene float and necessary level etc shall be of the size as

mentioned in the description of item and shall conform to I.S 1703-1977

**M-76. Bitumen Felt For Water proofing And Damp Proofing**

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

**M-77. Selected Earth**

- 77.1.** The selected earth shall be that obtained from excavated material or shall have to be brought from outside as indicated in the items If item does not indicate anything the selected earth shall have to be brought from outside.
- 77.2.** The selected earth shall be good yellow soil and shall be got approved from the Engineer-in-charge. In no case black cotton soil or similar expansive and shrinkable soil shall be used. It shall be clean and free from all rubbish and perishable materials, stones or brick bats. The clods shall be broken to a size of 50 mm or less. Contractor shall make his own arrangement at his own cost for land for borrowing selected earth. The stacking of material shall be done as directed by the Engineer-in-charge in such a way not to interfere with any construction all activities and in proper stacks.
- 77.3.** When excavated material is to be used only selected stuff got approved from the Engineer-in-charge shall be used. It shall be stacked separately and shall, comply with all the requirements of selected earth mentioned above.

**M-78. Barbed Wire**

- 78.1.** The barbed wire shall be of galvanized steel and it shall generally conform to I.S. 278-1978. The barbed wire shall be of types-I whose nominal diameter for line wire shall be 2.5 mm. and point wire 2.24 mm. The nominal distance between two barbs shall be 75 mm unless otherwise specified in the item. The barbed wire shall be formed by twisting together two fine wires. One containing the barbs. The size of the line and point wires and barb spacing shall be as specified above. The permissible deviation from the nominal diameter of the line wire and point wire shall not exceed  $\pm 0.08$  mm
- 78.2.** The barbs shall carry four points and shall be formed by twisting two point wires, each two turns tightly round one line wire making altogether four complete turns. The barbs shall have a length of not less than 13 mm and not more than 18 mm. The point shall be sharp and cut at an angle not greater than 35 degree of the axis of the wire forming the barbs.
- 78.3.** The line and point wires shall be circular in section, free from scale and other defects and shall be uniformly galvanized. The line wire shall be in continuous length and shall not contain any welds other than those in the rod before it is drawn. The distance between two successive splices shall not be less than 15 meters.
- 78.4.** The lengths per 100 Kg. of barbed wire I.S. type I shall be as under:
- |                    |                   |                     |
|--------------------|-------------------|---------------------|
| Nominal 1000 meter | Minimum 934 meter | Maximum 1066 Meter. |
|--------------------|-------------------|---------------------|

**Item No. 1 :- Demolition including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift. (i) R.C.C. work**

**1.0. Workmanship**

1.1. The relevant specifications of item 20.1 (i) shall be followed except that demolition of R.C.C. work is to be done.

**2.0. Mode of measurements and payment**

2.1. The relevant specifications of item 20.(i) shall be followed except that the demolition of reinforced concrete structure is to be done. The unserviceable materials shall be disposed of at all leads and lifts. The rate excludes scraping straightening of reinforcement but includes cutting of reinforcement.

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

**Item No. 2 :- Demolition of Brick work and stone masonry including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift.(ii) In Cement Mortar.**

**1.0. Workmanship**

1.1. The relevant specifications of item 20.1.(i) shall be followed except demolition of brick or stone masonry in cement mortar is to be done.

**2.0. Mode measurements and payment**

2.1. The relevant specifications of item 20.11 (ii) shall be followed. The unserviceable materials shall be stacked as directed by Engineer-in-charge with all leads and lifts.

**Item No. 3 :- Dismantling tiled of stone floors laid in mortar including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift.**

**1.0. Workmanship**

1.1. The relevant specification of item 20.1 (i) shall be followed except the dismantling of tiled or stone floors laid on mortar shall be done. Dismantling implies carefully taking up or down or removing without damage. The articles shall be passed by hand where necessary and lowered and where these are fixed by nail, screws, bolts etc., these shall be taken out with proper tools.

**2.0. Mode of measurements and payment**

2.1. The supporting materials such as joints, beams if any etc. shall be measured separately. The relevant specifications of item No. 20.1 (i) shall be followed, The rate shall include stacking the unserviceable materials as directed with all lead and lift.

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

**Item No. 4 :- Dismantling doors, windows, ventilators etc. (wood or steel) shutters including chow khats architraves, holdfasts and other attachment etc. complete and stacking them within all lead and lift.(i) Not exceeding 3 Sq. M. in area.**

**1.0. Workmanship**

The relevant specifications of item No. 20.1 (i) shall be followed except that the door, windows, ventilators etc. (wood or steel) shutters including chowkhats, architraves, hold fasts and other attachments etc. are to be dismantled.

**2.0. Mode of measurements & payment**

2.1. The relevant specifications of item No. 20.1 (i) shall be followed.

2.2. The doors, windows, ventilator etc. not exceeding 3 sq. mt. in area (each) including shutters and chow khats. Architraves, hold fasts and other attachments to frames etc. will be dismantled and measured under this item.

2.3. The rate includes stacking the serviceable materials as and where directed with all leads and lifts.

2.4. The rate shall be for a unit of One number.

**Item No. 5 :- Dismantling steel work including distempering and stacking the materials with all lead and lift.**

**1.0. Materials**

1.1. The relevant specifications of item No. 20.1 (i) shall be followed except that the dismantling of steel work shall be carried out.

**2.0. Mode of measurements and payment**

2.1. The relevant specifications of item No. 20.1 (i) shall be followed.

2.2. The weight of the member shall be computed from standard table unless the actual weight can be readily determined.

2.3. Riveted works where rivets are required to be cut. the same shall be carried out under this item and nothing extra shall be paid.

2.4. In framed still gate, the weight of any covering material or filling such as iron sheets and expanded metal shall be added to the weight of the main articles if such covering is not ordered to be taken out separately.

2.5. The rate includes stacking the materials as and where directed with all leads and lifts.

2.6. The rate shall be for a unit of one Kg.

**Item No. 6 :- Excavation for foundation upto 1.5 m depth including sorting out and stacking of useful materials and disposing off the excavated stuff upto 50 Meter lead. (D) Soft rock not requiring Blasting**

**AND**

**Item No. 7 :- Excavation for foundation for depth from 1.5 m to 3.0 m including sorting out and stacking of useful materials and disposing off the excavated stuff upto 50 Meter lead. (D) Soft rock not requiring Blasting.**

## **1.0 GENERAL**

**1.1** Any soil which generally yields to the application of pickaxes and shovels phawarh as takes or any such ordinary excavating implement or organic soil gravel silt sand turf loan clay peat etc fall under this category

**1.2.** Excavation for structures shall consist of the removal of material for the construction of Buildings, in accordance with the requirements, of these specifications and the lines and dimensions shown on the drawings or as indicated by the Engineer-in-charge. The work shall be include all necessary sheeting, shoring, bracing, draining and pumping and the removal of all logs, stumps, shrubs and other deleterious matter and obstruction necessary for the foundations, trimming bottoms of excavations; back filling and clearing up the site and the disposal of all surplus material.

**1.3.** The depth to which the excavation is to be carried out shall be is shown on the drawings, unless the type of materia1s. encountered is such as to required changes, in which case the depth shall be as ordered by the Engineer-in-charge.

**1.4.** Excavation shall be taken to the with of the lowest step of the footing. The contractor at his own expense shall put up necessary shoring, strutting and planking or cut slopes to a safer angle or both with due regard to the safety of personal and works and to the satisfaction of the Engineer-in-charge.

**1.5.** Where water is met with in excavation due to stream flow, seepage, springs, rain or other reasons, the contractor shall take adequate measures such as bailing pumping, to keep the foundation trenches dry when so required and to protect the green concrete/ masonry against damage by erosion or sudden rising of water level. The methods to be adopted in this regard and other details thereof shall be left to the choice of the contractor but subject to approval of the Engineer-in-charge. Approval of the Engineer-in-charge shall, however not relieve the contractor of the responsibility for *the* adequacy of dewatering, and production arrangements and for the quality and safety of the works.

**1.6.** Pumping from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of movement of water through any fresh concrete. No pumping shall be permitted during the placing of concrete or for any period of at least 24 hours thereafter, unless it is done from a suitable sump separated from the concrete work by a water tight wall or other similar means.

**1.7.** The bottom of the foundation shall be leveled both longitudinally and transversely or stepped as directed by the Engineer-in-charge. Before foundation concrete is laid, the surface shall be slightly watered and rammed. In the event of excavation having been made

deeper than that shown on the drawings or as otherwise ordered by the Engineer-in-charge, the extra depth shall be made up with concrete or masonry of the foundation grade, at the cost of the contractor. Ordinary filling shall not be used for the purpose to bring the foundation to level if there are any slips or blows in the excavation, these shall be removed by the contractor at his own cost.

**1.8.** Near towns, villages and all frequented places, trenches and foundation pits shall be securely fenced, provided with proper caution signs and marked with red lights at night to avoid accidents. The contractor shall take adequate protective measures to see that the excavation operations do not affect or damage adjoining structures

**1.9.** Back filling shall be done with approved materials after concrete or masonry is fully set and carried out in such a way as not to cause undue thrust on any part of the structure. All space between foundation masonry or concrete and the sides of excavation shall be refilled to the original surface, making due allowance for settlement in 250mm loose layers, which shall be watered and compacted.

**1.10.** All the excavated materials shall be the property of the Government. Where the excavated material is to be used in the filling of plinth, it shall be directly deposited at the required location, within 100 meters lead.

**1.11.** All useful materials not intended for use in the filling, shall be stacked neatly on Government land as directed by the Engineer-in-charge within 100 meters lead. Unsuitable and surplus materials not intended for use shall be disposed off as directed by the Engineer-in-charge

## **2.0 CLEANING SITE**

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

## **3.0 WORKMAN SHIP**

**3.1.** After the site has been cleared the limits of excavation shall be set out true to lines, curves, slopes, grades and sections as shown on the drawings or as directed by the Engineer-in-charge. The contractor shall provide all labour, survey instruments and materials such as strings, pegs, nails, bamboos, stones, lime, mortar, concrete etc. required in connection with the setting out of works and the establishment of bench mark, centre line stones and other marks and stakes as long as in the opinion of the Engineer-in-charge, they are required for the work.

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



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

#### **4.0. SETTING OUT**

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

#### **5.0. DISPOSAL OF THE EXCAVATED STUFF**

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

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

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

**6.1.** Excavation for structures shall be measured in cubic meters for each class of materials encountered, limited to the dimensions shown on the drawing or as directed by the Engineer-in-charge. Excavation over increased width cutting of slopes, shoring, shuttering and planking shall be deemed as convenience for the contractor in executing the work and shall not be measured and paid for separately.

The contract under rate for the items of excavation for structures shall be paid in full for carrying out the required operations including:

1. Setting out and fixing bench marks and centre lines stones.
2. Construction of necessary shoring and bracing and their subsequent removal.
3. Removal of all logs, stumps, grubs and other deleterious matter and obstructions for placing the foundations including trimming of bottoms of excavations;
4. Foundation sealing, dewatering including pumping;
5. Back filling ,clearing up the site and disposal of all surplus material within all lifts and lead up to 100 meters;
6. All labour, materials, tools equipment, safeguards and incidentals necessary to complete the work to the specification.

**6.2.** Excavation shall be for soil such as vegetation or organic soil, turf, sand, silt, loam, clay, mud, black cotton soil, soft shale or soft murrum, a mixture of these and similar material which yields to the ordinary application of pick and shovel, or other ordinary digging equipment Removal of gravel or any other nodular material having diameter in anyone direction not exceeding 75mm. occurring in such strata shall be deemed to be covered under this category. The classification of excavation shall be decided by the Engineer-in-charge and his decision shall be final and binding on the contractor.

**6.2.** The excavation work shall be measured for its length breadth and depth, limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one cubic meter.

**6.3.** The payment will be made on Cubic Meter basis of the finished work.

**Item No. 3 :- Filling in foundation and plinth with sand in layers of 20 cm. Thickness including watering ramming and consolidating etc. comp.**

**1.0. Materials**

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

**2.0. Workmanship**

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

**3.0. Mode of Measurements & Payment**

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

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

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

**Item No. 8 :- Filling in foundation and plinth with sand in layers of 20 cm. Thickness including watering ramming and consolidating etc. comp.**

**1.0. Materials**

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

**2.0. Workmanship**

The relevant specifications of item No. 4.12 shall be followed except that sand shall be filled in under floors,

including watering, ramming, consolidating and dressing etc , complete.

**3.0. Mode of Measurements & Payment**

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

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

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

**Item No. 9 :- Filling foundation and plinth with murrum or selected soil in layer of 20 cm in thickness including ramming watering and consolidating etc. complete**

### **1.0. Materials**

**1.1.** Murrum shall be clean, of good binding quality and of approved quality obtained from approved pots/ quarries of disintegrated rocks which contain silicon material and natural mixture of clay of clariions 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 cost of collecting and carting murrum / or selected earth of approved quality with all lead and labour required for filling in trenches and plinth.

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

**Item No. 10 :-"Anti-Termite System: Providing and laying of permanent piping technology anti-termite treatment before flooring work by installing LLDP (Low linear density polyethylene) tube of 8 mm O.D. & 6.4 mm I.D. with inbuilt pressure compensation chip every 30 cm interval in the tube, having working pressure of 2 Kg/cm<sup>2</sup> and release rate of 1.9 ltr/hour fixed by P-clips and nails.**

The LLDP pipe shall be installed at the entire periphery of the building and at internal network of building at a depth of 20 to 200 mm under floor at every 2 to 3 mtr. c/c distance (adjusted as per building layout) & ends of loop pass through a PVC elbow of minimum 32 mm ID at junction box of wall and floor level, entering into a steel reinforced grooved flexible pipe of minimum 22 mm ID leading into junction box and the loops shall terminate in junction boxes & test every junction during injecting chemicals for termite control treatment.

The anti-termite chemical Imidacloprid 30.5% SC mix as per IS- 6313 (part III) shall be injected by the pressure pump diluted with water @ 10.5 ml/5 ltr of water at the rate of 2 Kg/sq.cm @ 5 Ltr/SMT. The contractor shall submit approved line plan for piping system and junction boxes dully approved by Engineer-in-Charge with bond of 5 year warranty. (II)Anti Termite chemical injected area (Chemical injecting incl. labor cost)"

### **1.0 MATERIALS**

The piping system shall consist of LLDP (Low Linear Density Polyethylene) tube of 8 mm O.D. and 6.4 mm I.D. having inbuilt pressure compensation chip at every 300 mm interval with working pressure of 2 Kg/cm<sup>2</sup> and discharge rate of 1.9 litre/hour.

The anti-termite chemical shall be Imidacloprid 30.5% SC or equivalent approved chemical conforming to IS:6313 (Part-III).

Junction boxes, PVC elbows, steel reinforced flexible pipes, P-clips, nails and all accessories shall be of approved quality.

### **2.0 WORKMANSHIP**

The LLDP piping system shall be installed before flooring work along the entire periphery and internal network of the building as per approved layout and manufacturer's recommendations.

The pipe network shall be fixed at a depth of 20 mm to 200 mm below finished floor level and spaced at 2 to 3 metre centres or as approved by the Engineer-in-Charge.

The loops shall terminate in accessible junction boxes through PVC elbows and reinforced flexible pipes complete with all necessary fittings.

Each junction and piping loop shall be tested before chemical injection to ensure proper flow and leak-free operation.

Anti-termite chemical shall be injected through the piping network using pressure pump at a pressure of 2 Kg/cm<sup>2</sup>. The chemical shall be diluted and applied strictly as per manufacturer's recommendations and approved specifications.

The contractor shall submit detailed layout drawings showing pipe routing and junction box locations for approval prior to execution.

The contractor shall provide a minimum five-year warranty bond for the anti-termite treatment system.

**3.0 MODE OF MEASUREMENT & PAYMENT**

The rate shall include the cost of LLDP piping, junction boxes, fittings, chemical, pressure injection, testing, labour, tools and plant, approved drawings, warranty bond and all incidental expenses required for satisfactory completion of the work.

The anti-termite treatment area shall be measured in square metres of actual chemical injected area completed and approved.

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

Payment shall be made on square metre basis of completed and approved work.

**Item No. 11 :- Providing and laying cement concrete 1:3:6 (1-Cement : 3- coarse sand : 6- hand broken stone aggregates 40 mm nominal size) and curing complete excluding cost of formwork in Foundation and Plinth**

**Materials**

**Water**

1.1 Water shall not be salty brackish and shall be clean reasonably clear and free objectionable quantities of silt and traces of oil 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 confirm to the standard specified in I S 455 -1978

1.2 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.

1.3 Water for curing mortar concrete or masonry should not be too acidic or too alkaline

1.4 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

1.5 Hard and bitter water shall not be used for curing

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

**2.0 Cement**

2.1 Cement shall be ordinary Portland slag cement as per IS 1624 -1974 or Portland slag cement as per IS 455-1976

2.2 Cement shall be stored above the ground level in perfectly dry and water tight sheds. Wherever bulk storage containers are used, their capacity should be sufficient to cater to the requirements at site and should be cleaned at least once every 3 to 4 months. The aggregate shall be stored in such a way as to prevent admixture of foreign materials. Different size of fine or coarse aggregate shall be stored in separate stock-piles sufficiently away from the each other to prevent intermixing the materials.

**3.0 Sand**

Sand shall be natural sand, clean well graded, hard strong durable and gritty particular free from immures amounts of dust, clay, kankar modules, soft: or flaky particles shall alkali salts, organic matter, learn 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 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
2.36mm	90 to 100
1.18 mm	70 to 100
600 MC	30 to 100
300 MC	85 to 70
150 MC	00 to 50

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
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

#### 4.0 Stone Coarse aggregate for Nominal mix concrete:

Coarse aggregate shall be machine crushed stone of black trap and hard, strong, dense, durable, clean and free from disintegrated pieces, organic and other deleterious matter. .

The aggregate shall be generally be cubical in shape unless special stones of particular quarries are mentioned. Aggregate shall be machine crushed from the best black trap. Aggregate shall have no deleterious reaction with cement. The size of the coarse aggregate for plain cement concrete and ordinary reinforced cement shall generally as per the table given below

IS Sieve designation	% passing for single sized aggregate of nominal size		
80mm			
63 mm	100	-	-
40mm	85-100	100	0
20mm	0-20	85-100.	100
16mm	-	-	85-100

IS Sieve designation	% passing for single sized aggregate of nominal size		
12.5 mm			
10mm	0.5	0.20	0.30
4.75 mm	-	0.5	0.5
2.35 mm	-	-	-

**Note:** This percentage may be varied some what by the Engineer-in-charge when considered necessary containing better and strength of concrete.

The grading test shall be taken in the beginning and at the change of source of material as indicated in I.S. 383-1970 and I.S. 456-1978. Aggregate shall be stored separately and handled in such a manner so as to prevent the intermixing diff aggregate if the aggregate are covered with dust, they shall be washed with water to make them clean.

1.6 All materials shall be stored as to prevent their 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.

## Workmanship

Before starting concreting, the road of foundation trenches shall be cleared of all loose materials, leveled, watered & rammed as directed

**Mixing:** The concrete shall be mixed in a mechanical mixer. If Quantity of cement concrete is very small, after taking prior permission of Engineer in charge. Mixing shall be done on a smooth watertight platform large enough to allow efficient turning over the ingredients of concrete before and after adding water, Mixing platform shall be so arranged so that no foreign material shall get mixed with concrete nor does the mixing water flow out. Cement in required number of bags shall be placed in a uniform layer on top of the measured quantity of fine and coarse aggregate, which shall also be spread in a layer of uniform thickness on the mixing platform, Dry coarse and fine aggregate and cement shall then be mixed thoroughly by turning over to get a mixture of uniform colour. Enough water shall then be added gradually and the mass turned over till a mix of required consistency is obtained. In hand mixing quantity of cement shall be increased by 10 per cent above that specified.

**11. For mass concrete work. :** The concrete shall be mixed in a mechanical mixer. The method of transporting and placing concrete shall be approved by the Engineer-in charge. Concrete shall be so transported and placed so that no contamination, segregations or loss of its constituent material takes place. All form work and reinforcement contained in its' shall be cleaned and made free from standing water, dust, snow or ice immediately before placing of concrete. No concrete shall be placed in any part of the structure until the approval of the Engineer-in-charge has been obtained.

**12.** Unless otherwise agreed to by the Engineer-in-charge, concrete shall not be dropped into place from a height exceeding 2 meters. When chutes are used they shall be kept clean and used in such a way as to avoid segregation. When concreting has to be resumed on a surface which has hardened, it shall be roughened, kept clean, thoroughly wetted, and covered with a 13 mm. thick layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself. This 13mm. layer of mortar shall be freshly mixed and placed immediately before placing of new concrete. Where concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes, care being taken to avoid dislodgement of any particles of coarse aggregate. The Surface shall then be thoroughly wetted, all free water removed, and the coated with neat cement grout. The first layer of concrete to be placed on this surface shall not exceed 150mm. in thickness, and shall be well rammed against old work particular attention being given to corners and Close spots.

**Form work if required:** Form work shall include all temporary or permanent forms required for forming the concrete. Together with all temporary construction required for their support. Forms for concrete shall be constructed of metal or timber suitably lined and be of substantial and rigid construction true to shape and dimensions shown on the drawings. Where metal forms are used, all bolts and rivets shall be countersunk and well ground to provide a smooth plane surface. Where timber is used it shall be well season.

**14.** The Engineer-in-charge shall be informed in advance by the contractor of his intention of strike any formwork. While fixing the time for removal of formwork, due consideration shall be given to local conditions, character of the structure. The weather and other conditions that



influence the setting of concrete and of the materials used in the mix. Vertical forms of beams, columns and walls may be removed after 2 days. All form work shall be removed without causing any damage to the concrete.

15. The unit rate concrete shall include the cost of all materials, tools and plant required for mixing, placing in position, compacting, finishing as per direction of the Engineer-in-charge, curing and all other incidental expenses for producing concrete of specified strength 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 of all centering and forms required for the work.

16. The payment will be made on Cubic Meter basis of the finished work.

## **2.1. General**

Before stating concrete the bed of foundation trenches shall be cleared of all loose materials leveled watered and rammed as directed.

### **Proportion of Mix**

The proportion of cement sand and coarse aggregate shall be one part of cement. 5 (five) parts of sand and 10 (Ten) parts of stone aggregates and shall be measured by volume.

#### **Mixing :**

2.3.1. The concrete shall be mixed in a mechanical mixer at the site of work Hand mixing may however be allowed for smaller quantity of work if approved by the Engineer-in-charge. When hand mixing is permitted by the Engineer-in-charge in case of break-down of machineries and in the interest of the work. It shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. However in such case 10% more cement than otherwise period 1 1/2 to 2 minutes. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the purpose.

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

### **Transporting & Placing the Concrete:**

The concrete shall be handed from the place of mixing to the final position in not more than 15 minutes by the method as directed and shall be placed into its final position compacted and finished within 30 minutes of mixing with water i.e. before the setting commences.

The concrete shall be laid in layers of 15 cms to 20 cms.

The concrete shall be rammed with heavy iron rammers and rapidly to get the required compaction and to allow all the interstices to be filled with mortar.

#### **Curing :**

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

**Mode of Measurement & Payment :**

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

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

Item No 12 :- Providing and laying controlled cement concrete M.250 and curing complete including the cost of formwork and excluding reinforcement for reinforced concrete work in (A) Foundations, footings, and Mass concrete. footing

AND

Item No 13 :- Providing and laying controlled cement concrete M-250 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in (D) Columns up to Plinth Level.

AND

Item No 14 :- Providing and laying controlled cement concrete M-200 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in (D) Columns on Ground Floor.

AND

Item No 15 :- Providing and laying controlled cement concrete M-200 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in (D) Columns on Terrace Floor.

**1.0. Materials**

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

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

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

**2.0. General**

2.1. The concrete mix shall be designed from preliminary tests. The proportion of the concrete mix shall be 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) by volume concrete work shall have exposed concrete surface or as specified in the item.

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

2.3. The proportion of cement, sand and coarse aggregate shall be determined of weight. The weigh batch machine shall be used for maintaining proper control over the proportion of aggregates as per mix design. The strength requirements of different grades of concrete shall be as under:

**Grade of Concrete**

**Compressive strength of 15 cms. cubes in kg/cmt. at 28 days, conducted in accordance with I.S. 516-1959.**

**Preliminary test Min.**

**Work Test Min.**

<b>M 150</b>	200 <sup>4</sup>	150
<b>M 200</b>	260	200
<b>M 250</b>	320	250
<b>M 300</b>	380	300
<b>M 350</b>	440	350
<b>M 400</b>	500	400

In all cases, the 28 days compressive strength specified in above be the criteria for acceptance or rejection of the concrete. Where the strength of a concrete mix as indicated by tests, lies in between the strength of any two grades specified in the above table, such concrete shall be classified in for purpose as concrete belonging to the lower of the grades between which its strength lies.

### **3.0. Workmanship**

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

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

**3.3.** It is most important to keep the specified water cement ratio constant and at its correct value. To this end, moisture content in both fine and coarse aggregates shall be determined by the Engineer-in-charge according to the weather conditions. The amount of mixing water shall then be adjusted to compensate for variations in the moisture content. For the determination of moisture content in the aggregates I.S. 2386 (Part-III) shall be referred to. Suitable adjustments shall also be made in the weights of aggregates due to variation in their moisture content. Minimum quantity of cement to be used in controlled concrete shall not be less than 220 kg./m<sup>3</sup> in plain concrete and not less than 250 kg/m<sup>3</sup> in reinforced concrete.

**3.4** The form work shall conform to the shape lines and dimensions as shown on the plans and be constructed as to remain sufficiently rigid during the placing and compacting of the concrete. Adequate arrangements shall be made by the contractor to safe-guard against any settlement of the form-work during the course of concreting and after concreting. The form work of shuttering, centering, scaffolding, bracing etc. shall be as per design.

### **4.0. Clearing and Treatment of forms:**

**4.1.** All rubbish, particularly chipping shaving and saw dust shall be removed from the interior of the form before the concrete work is placed and the-form in contact with concrete shall be cleaned and thoroughly wetted or treated. The surface shall be then coated with soap solution applied before concreting is done. Soap solution for the purpose shall be prepared by dissolving yellow soap in water to get consistency of paint. Alternatively a coat of raw linseed oil shall be applied after thoroughly cleaning the surface. Care shall be taken that the coating does not get on construction joint surface and reinforced bars..

### **5.0 Stripping time:**

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

- (a) Sides of walls columns and vertical faces of beams.....24 to 48 hours.
- (b) Beam soffits, (props, left under).....7 days.
- (c) Removal of props slabs:
  - (i) Slabs spanning up to 4.5. m.....7 days.
  - (ii) Spanning over 4.5 mm.....14 days.
- (d) Removal of props t beams and Arches:
  - (i) Spanning up to 6 mm.....14 days.
  - (ii) Spanning over 6 m.....21 days.
- 6.0 Procedure when removing the form work :**
- 6.1.** All form work shall be removed without such shock or vibrations as would damage the reinforced concrete surface. Before the soffits form work and struts are removed, the soffits and the concrete surface shall be exposed where necessary in order to ascertain that the concrete has sufficiently hardened.
- 7.0 Centering:**
- 7.1.** The centering to be provided shall be got approved. It shall be sufficiently strong to ensure absolute safety of the form work and concrete work before, during and after pouring concrete. Watch should be kept to see that behavior or centering and form work is satisfactory during concreting. Erection should also be such that it would allow removal of forms in proper sequence without damaging either the concrete or the forms to be removed.
- 7.2.** The props of centering shall be provided on firm foundation or base of sufficient strength to carry the loads without any settlement.
- 7.3.** The centering and form work shall, be inspected and approved by the Engineer-in-charge before concreting. But this will not relieve the contractor of his responsibility for strength, adequacy and safety of form work and centering. If there is a failure of form work or centering, contractor shall be responsible for the damages to property.
- 8.0 Scaffolding:**
- 8.1.** All scaffolding, hoisting arrangements and ladders etc. required for the facilitating of conceding shall be provided and removed on completion of work by contractor at his own expense. The scaffolding, hoisting arrangements and ladders etc. shall be strong enough to with stand all live, dead and impact loads expected to act and shall be subject to the approval of the Engineer-in-charge. However contractor shall be solely responsible for the safety of the scaffolding, hoisting arrangement, ladders, work and workman etc.
- 8.2.** The scaffolding, hoisting arrangements and ladder shall allow easy approach to the work spot and afford easy inspection.
- 8.3.** The rate is applicable to all condition of working and height up to 4 mts. The rate shall include the cost of materials and labour for various operations involved such as :
  - (a) Splayed edges, notching, allowance for overlaps and passing at angles, battens centering, shuttering propping, bolting, wedging easing, striking and removal.
  - (b) Filleting to form stop chamfered edges or splayed external angles not exceeding 20 mm: width to beams, columns and the like.
  - (c) Temporary openings in the forms for pouring concrete, if required removing rubbish etc.
  - (d) Dressing with oil to prevent adhesion of concrete with shuttering and.
  - (e) Raking or circular cutting.
- 9.0 Re-Use:**
- 9.1.** Before re-use, all from shall be inspected by Engineer-in-charge and their suitability ascertained. The forms shall be scarred, cleaned and joints are gone over, repaired where required. Inside surface shall be retreated to prevent adhesion of concrete.
- 10.0. Mode of measurement & payment**
- 10.1.** The consolidated cubical contents of concrete work as specified in item shall be measured. No deduction shall be made for
  - (a) Ends of dissimilar materials such as joints, beams, posts, girders, falters, purling trusses, corbels and steps etc. up to 500 Sq, Cm. in section.
- 10.2.** Form work shall be measured as the area in square meters to shuttering in contract with concrete except in the case of inclined member and portion of curved profile and upper side in which case on area of underside shall be measured for payment.
- 10.3.** Form work to secondary beams shall be measured up to the sides of main beams but no deduction shall be made form the form work of the main beam at the inter section point. No

deduction shall be made from the form work of a column at inter section of beams.

- 10.4.** The rate includes cost of all materials labour, tools and plant required for mixing, placing in position, vibrating and compacting, finishing, as directed, curing and all other incidental expenses for producing concrete of specified strength. The rate includes the cost of form work.
- 10.5.** The rate shall be for a unit of **one cubic meter**.

**Item No 16 :- Providing and laying controlled cement concrete M-250 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in (C) Ground Beam and Plinth Beam**

Specification of **Item No. ...15....** shall be followed for the execution of this item except the size of **Providing and laying controlled cement concrete M-200 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in (D) Columns on Terrace Floor.** shall be considered.

➤ **Measurements for Payment:**

The measurement for standard cautionary, mandatory and information sign shall be in **Number** of different types of signs supplied and fixed as per above details and specifications.

➤ **Rate:**

The contract unit rate shall be payment in full for the cost of making the road sign, including all materials, installing it at the site and incidentals to complete the work in accordance with the specifications.

**Item No 17 :- Providing and laying controlled cement concrete M-150 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in (C) Plinth Slab**

Specification of **Item No. ...16....** shall be followed for the execution of this item except the size of **Providing and laying controlled cement concrete M-250 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in (C) Ground Beam and Plinth Beam** shall be considered.

➤ **Measurements for Payment:**

The measurement for standard cautionary, mandatory and information sign shall be in **Number** of different types of signs supplied and fixed as per above details and specifications.

➤ **Rate:**

The contract unit rate shall be payment in full for the cost of making the road sign, including all materials, installing it at the site and incidentals to complete the work in accordance with the specifications.

**Item No 18 :- Providing and laying controlled cement concrete M.200 and curing complete including the cost of formwork and excluding reinforcement for reinforced concrete work in (C) Beam at Ground Floor**

**1.0. Materials & Workmanship**

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

**2.0. Mode of measurements & payment**

2.1. The relevant specifications of item No. 5.8.1. shall be followed.

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

**Item No 19 :- Providing and laying controlled cement concrete M-200 and curing etc. complete including the cost of form work and reinforcement for reinforced concrete work in (C) Chhajja at Ground floor**

**1.0. Materials & Workmanship**

1.1. The relevant specifications of item No. 581. shall be followed for concrete work, relevant specifications of item No. 17.59.(I) for finishing work and relevant specifications of item No. 9.1. shall be followed form work and centring work The concrete work shall be followed for the form work and centring work for exposed concrete work.

**2.0. Mode of measurement & payment**

2.1. The relevant specification of item No. 5.3.1. shall be followed except that the item includes the cost form work for exposed concrete work

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

**Item No 20 :- Providing and laying controlled cement concrete M-200 and curing etc. complete including the cost of form work and reinforcement for reinforced concrete work in (C) Lintel at Ground floor**

**1.0. Materials & Workmanship**

1.1. The relevant specifications of item No. 581. shall be followed for concrete work, relevant specifications of item No. 17.59.(I) for finishing work and relevant specifications of item No. 9.1. shall be followed form work and centring work The concrete work shall be followed for the form work and centring work for exposed concrete work.

**2.0. Mode of measurement & payment**

2.1. The relevant specification of item No. 5.3.1. shall be followed except that the item includes the cost form work for exposed concrete work

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

**Item No 21 :- Providing and laying controlled cement concrete M.200 and curing complete including the cost of formwork and excluding reinforcement for reinforced concrete work in (C) Ground floor Slab**

**1.0. Materials & Workmanship**

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

**2.0. Mode of measurements & payment**

2.1. The relevant specifications of item No. 5.8.1. shall be followed.

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



## **Item No 22 :- Providing TMT Bar FE 500D reinforcement for R.C.C. work including bending, binding and placing in position complete upto floor two level**

### **1.0. GENERAL**

This work shall consist of furnishing and placing **TMT Fe-500D Conforming to IS 1786 2008** reinforcement, bars (intentioned) of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer in charge.

### **2.0. MATERIAL**

#### **2.1. TMT Bars**

Reinforcements shall be **TMT Fe-500D** steel bars. They may be uncoated or coated 'with epoxy or with approved protective coatings.

2.2. TMT bars reinforcement for RCC work shall conform to IS 1786 FE-415 and shall be of tested quality. It shall also comply with relevant part of IS 456-1966

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

2.4. All steel shall be procured from original producers no re-rolled steel shall be incorporated in the work

2.5. Only new steel shall be delivered to the site every bar shall be inspected before placing to its position and defective brittle or burnt bar shall be discarded cracked ends of bars shall be discarded

#### **3.0. Pitch**

3.1. Distance between bars shall be as specified in drawings and as directed by the Engineer in Charge. all bars shall be placed at an accurate distance from each other and shall be bind tightly to maintain the desired pitch Suitable means shall be provided for holding bars securely in position

#### **4.0. Binding wire**

4.1. Mild steel binding wire shall be of 1.63 mm or 1.22 mm (16 to 18 gauge diameter and shall conform IS 280-1972

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

4.3. Only new binding wire shall be delivered to the site all binding wire shall be inspected before binding to its position and defective brittle, rusted, used wire, shall be discarded

### **5.0. PROTECTION OF REINFORCEMENT**

5.1. Uncoated reinforcing steel shall be protected from rusting or chloride contamination. Reinforcements shall be free from rust, mortar, loose mill scale, grease, oil or paints. This may be ensured either by using reinforcement fresh from the factory or thoroughly cleaning all reinforcement to remove rust using any suitable method such as sand blasting, mechanical wire brushing, etc. as directed by the Engineer. Reinforcements shall be stored on bricks, racks or platforms and above the ground in a clean and dry condition and shall be suitably marked to facilitate inspection and identification.

5.2. Portions of uncoated reinforcing steel and dowels projecting from concrete shall be protected within one week after initial placing of concrete with a brush coat of neat cement mixed with water to a consistency, of thick paint. This coating shall be removed by lightly tapping with a hammer or other tool not more than one week before placing of the adjacent pour of concrete. Coated reinforcing steel shall be protected against damage to the coating. If the coating on the bars is damaged during transportation or handling and cannot be repaired, the same shall be rejected.

## **6.0. Workmanship**

6.1. The work shall consist of furnishing and placing reinforcement to the shape and dimensions shown as on the drawings or as directed by The Engineer in charge.

6.2. Reinforcing steel shall conform accurate to the dimensions given in the bar bending schedules shown on relevant drawing

## **7.0. BENDING OF REINFORCEMENT**

7.1. Bar bend g schedule shall be furnished by the Contractor and got approved by the Engineer before start of work.

7.2. Reinforcing steel shall conform to the dimensions and shapes given in the approved Bar bending Schedules.

7.3. Bars shall be bent cold to the specified shape and dimensions or directed by the Engineer using a proper bar bender operated by hand power to obtain the correct radius of bends and shape. Bars, shall not be bent or straightened in a manner that will damage parent material or the coating bars bent during transport or handling shall, be straightened before being used on work and shall not be heated to facilitate straightening.

## **8.0. PLACING OF REINFORCEMENT**

8.1. The reinforcement cage should generally be fabricated in the yard at ground level, and then shifted and placed in position. The reinforcement shall be placed strictly, in accordance with the drawings and shall be assembled in position, only when structure is otherwise ready for placing of concrete. Prolonged time gap, between assembling of reinforcements and casting of concrete, which may result in rust formation on the surface, shall not be permitted.

8.2. Reinforcement bars shall be placed accurately in position as shown on the drawings. The bars, crossing one another shall be tied together at every intersection with binding wire (annealed), conforming to IS:280 to make the skeleton of the reinforcement rigid such that the reinforcement does not get displaced during placing of concrete, or any other operation. The diameter of binding wire shall not be less than 1 mm.

8.3. Bars shall be kept in position usually by the following methods:

In case of beam and slab construction, industrially produced polymer cover blocks of thickness equal to the specified cover shall be placed between the bars and formwork subject to satisfactory evidence that the polymer composition is not harmful to concrete and reinforcement. Cover blocks made of concrete may be permitted by the Engineer, provided they have the same strength and specification as those of the member.

8.4. In case of dowels for Columns and walls the vertical reinforcement shall be kept in position by means of timber templates with slots in them accurately or with cover blocks tied to the reinforcement. Timber templates shall be removed after the concreting has progressed up to a level just below their location.

8.5. Layers of reinforcements shall be separated by spacer bars at approximately One meter intervals. The minimum diameter of spacer bars shall be 12 mm or: equal to maximum size of main reinforcement or maximum size of coarse aggregate, whichever is greater. Horizontal reinforcement shall not be, allowed to sag between supports.

8.6. Necessary stays, blocks, metal chairs, spacers, metal hangers, supporting wires etc, or other subsidiary, reinforcement shall be provided to fix the reinforcements firmly in its correct position.

8.7. Use of pebbles, broken stone, metal pipe, brick, mortar or wooden blocks etc as devices for positioning reinforcement shall not be permitted.

8.8. Bars coated with epoxy or any other approved protective coating shall be placed on supports that

do not damage the coating. Supports shall be installed in a manner such that planes of weakness are not created in hardened concrete. The coated reinforcing steel shall be held in place by use of plastic or plastic coated binding wires especially manufactured for the purpose.

8.9. Placing and fixing of reinforcement shall be inspected and approved by the Engineer before concrete is deposited.

## 9.0. Lapping

9.1. All reinforcement shall be furnished in full lengths as indicated on the drawing. No splicing of bars, except where shown on the drawing; will be permitted without approval of the Engineer. The lengths of the splice shall be as indicated on drawing or as approved by the Engineer. Where practicable, overlapping bars shall not touch each other, and shall be kept apart by 25 mm or 1 1/4 times the maximum size of coarse aggregate, whichever is greater. If this is not feasible, overlapping bars shall be bound with annealed steel binding wire, not less than 1 mm diameter and twisted tight in such a manner as to maintain minimum clear cover to the reinforcement from the concrete surface. Lapped splices shall be staggered or located at points, along the span where stresses are low.

## 10.0 Welding

10.1 Splicing by welding of reinforcement will be permitted only if detailed on the drawing or approved by the Engineer. Weld shall develop an ultimate strength equal to or greater than that of the bars connected.

10.2. While welding may be permitted for TMT reinforcing bars conforming to IS: 432, welding of deformed bars conforming to IS: 1786 shall in general be prohibited. Welding may be permitted in case of bars of other than S 240 grade including special. Welding grade of S 415 grade bars conforming to IS: 1786, for which necessary chemical analysis has been secured and the carbon equivalent (CE) calculated from the chemical composition using the formula:

$$CE = C + \frac{Mn}{6} + \frac{Cr + Mg + V}{5} + \frac{Ni + Cu}{15}$$

is 0.4 or less.

10.3. The method of welding shall conform to IS: 2751 and IS: 9417 and to any supplemental specifications to the satisfaction of the Engineer

10.4. Bars shall be bent cold to the specified shape and dimensions or as directed by Engineer in charge using the proper bender tool, 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 in the work. Bars shall not be heated to facilitate bending.

10.5. Unless otherwise specified a 'U' type hook at the end of each bar shall invariably be provided to main reinforcement. The radius of the bend shall not be less than twice the diameter of the round bar and the length of the straight part of the bar beyond the end of the curve shall be at least four times of 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 spitting of the concrete.

10.6. All reinforcement bars shall be accurately placed in exact position shown on the drawings and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm in size and by using say blocks or metal chairs spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals, Bars shall not be allowed to sag between supports not displaced during concreting or any other operations of the work All devices used for positioning shall be of not corrodible material wooden and metal supports shall not extended to the surface of the concrete, except where shown in drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed. Pieces of broken stone or brick and wooden blocs shall not be used Layers of bars shall be separated by spacer bars pre-cast mortar blocks or other

approved devices. Reinforcement after bending 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 form corrosion, concrete cover shall be provided as indicated on drawings. All bars protruding from concrete and to which other bars are to be sliced and which are likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout

10.7. Bars crossing each other where required shall be secured by binding wire (annealed) of size not less than 1 mm in such a manner that they do not slip over at the time of fixing and concreting.

10.7. As far possible bars of full length shall be used In case this is not possible, overlapping of bars shall be done as directed by the Engineer in charge When practicable overlapping bars shall not touch each other, but be kept apart by 25 mm Where no feasible overlapping bars shall be bound with annealed wires not less than 1 mm thick twisted tight The overlaps shall be staggered for different bars and located at points along the span where neither sheer not bending moments is maximum.

10.8. Whenever indicated on drawing or desired the Engineer in charge bars shall be jointed by coupling which shall have a cross section sufficient to transmit the full stresses of bars The end of the bars that are joined by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than the normal cross section of the bar. Threads shall be standards threads Steel for coupling shall conform to IS 226.

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

## 11.0 MODE OF MEASUREMENTS & PAYMENT

11.1. For the purpose of payment the bar shall be measured correct up to 10 mm length and weight payable works out at the rate specified below

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

11.1. Excess consumption over 5% will be charged at penal rate.

11.2. Reinforcement shall be measured in length excluding overlaps, No steel shall be given for lap but work may be carried out as per detailed drawings. Where welding or coupling is resorted to, in place lap joints, such joints shall be measured for payment as equivalent length of overlap as per design requirement. From the length so measured, the weight of reinforcement shall be calculated in tones on the same basis of as per table given above 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.

11.3. The rate for reinforcement includes cost of steel binding wires, but excluding Lap Length its carting with all leads and lifts, cutting, bending, placing in position, binding and fixing in position as shown on the drawings and as directed. It shall also include all devices for keeping reinforcement in approved position, cost of joining as per approved method and all wastage and spacer bars.

11.4. The rate shall be for a unit of One **Kg.**

**Item No 23 :- Steel work, welded in built up sections framed work including cutting, hoisting, fixing in position and applying a priming coat of red lead paint. (A)In beams and joists, channels angles Tees, flats, with connecting plates or angle cleats as in main and cross beams. Hip and jack rafters, purlins connected to common rafters and the like**

### **1.0 Materials & Workmanship**

- 1.1. The relevant specification of item No. 11.2 (A) shall be followed except that the steel work shall be done by welding.
- 1.2. Welding shall generally be done by electric process. Gas welding shall be resorted to, using oxyacetylene flame with specific prior approval. Gas welding shall not be permitted for structural steel work.
- 1.3. The work shall be done as shown in the shop drawings which should clearly indicate various details of the joints to be welded, shop and site welded as well as type of electrodes to be used, symbol for welding on plans and shop drawings shall be according to I.S. 813-1961. As far as possible every effort shall be made to limit the welding that must be done after improper welding that is likely to be done due to heights and difficult positions on scaffoldings etc. The welding work shall conform to I.S. 816-1969.
- 1.4. Preparation of surfaces : Surfaces which are to be welded together shall be free from loose mill scale, rust, paint, grease or other foreign matter. A coating of boiled linseed oil shall be permitted.
- 1.5. Assembly for welding : Before welding is commenced, the plates shall first be brought together and firmly clamped or spot welded at specified distance. This temporary connection has to be strong enough to hold the plates accurately in place without displacement.
- 1.6. Precautions : All operations connected with welding and cutting equipment shall conform to safety requirement given in I.S. 818-1968.

The following points shall be borne in mind during the process of welding:

- (b) Arc length voltage and amperage shall be suited to the thickness of material type of groove and other circumstances of the work.
- (c) The segments of welding shall be such that where possible the members which offer the greatest resistance to compression are welded first.
- 1.7. The defective welds which shall be considered harmful to the structural strength shall be cut out and reworked.
- 1.8. Finished welds and adjacent parts shall be protected with clean boiled linseed oil and after all slag has been removed. Welds and adjacent parts shall be painted after the

same are approved.

- 1.9. All the members shall be thoroughly cleaned of rust-scales, dust etc. and given a priming coat of red lead paint before fixing them in position.

Testing of welding to be added in the specification I.N. 12.2.2.12-(i) to (viii)

**2.0. Mode of measurements & payment**

- 2.1. The relevant, specification of item No. 11.2 (I) shall be followed.
- 2.2. The rate shall be for unit of one quintal.

**Item No 24 :- Painting two coats (excluding priming coat) on new steel and other metal surface with enamel paint, brushing, interior to give an even shade including cleaning the surface an even shade including cleaning the surface of all dirt, dust and other foreign matter.**

### **1.0. Materials**

The enamel paint shall conform to M-44 B.

### **2.0. Workmanship**

2.1. General: The materials required for work of painting work shall be obtained directly from approved manufacturers or approved dealer and brought to the site in maker's drums; kegs. etc. with seal unbroken.

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

2.1.3. If for any reasons, things is necessary, the brand of thinner recommended by the manufacturer shall be used.

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

#### **2.2. Application of paint:**

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

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



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

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

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

3.1. The relevant specifications of item No. 19.12 shall be followed for mode of measurements and payment. The rate is excluding priming coat.

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

**Item No 25 :- Providing and fixing M.S. grills of required pattern to wooden frames of windows etc. with M.S. flats at required spacings and frame around, square or round bars with round headed bolts and nuts or by screws (A) Plain Grill.**

**1.0. Materials**

The structural steel shall conform to M-22

**2.0. Workmanship**

- 2.1. The M.S. Grill shall be prepared as per the drawing or as directed for fixing to wooden frames of windows etc.
- 2.2. The grill shall be fabricated to the designs and patterns shown in the drawings and the weight shall be as directed, and the joints shall be reverted or welded as shown in the plan or as directed. The grill so formed shall be fixed into the frames of the windows etc. before they are erected in position. The outside strip frame of the grill shall be housed to its full thickness into the recess cut into the frame of the windows etc. The grill shall be fixed to the frame with number of bolts and nuts or screws viz. bolt nut/screw per 30 cm. of the length of outer strip subject to minimum of 2 Nos. on each side of the frame or as indicated in the drawing or as directed.
- 2.3. The bolts and nuts or screws shall be counter sunk and shall be fixed with the top of their heads flush with the face of the frame strips.

**3.0. Mode of measurements & payment**

- 3.1. No payment shall be made for weight of screws, bolts nuts etc. only weight of grill shall be paid.
- 3.2. The rate shall be for a unit of one kg.

**Item No 26 :- Providing and fixing 90cm high Stainless steel railing made from anti corrosive 304 grade S. S. pipe of 50mm dia. (16 Gauge) as hand rail with S. S. 304 grade Balusters / Posts of Pipe 50mm dia. (16 Gauge) as a vertical support fixed in RCC slab at 1.2m c/c including two horizontal S. S. pipes of 16mm dia. (16 Gauge) at equal Distance fixed by 18.75mm dia (16 Gauge) S. S. pipe with baluster including accessories as per Detailed Drawing as directed etc. complete.**

### **1. Scope of Work**

The work shall consist of **design (where required), supply, fabrication, transportation, handling, loading, unloading, erection, installation, testing and commissioning of 900 mm high Stainless-Steel Railing** complete in all respects at all levels and locations shown in the drawings or as directed by the Engineer-in-Charge.

The contractor shall provide all labour, materials, tools, tackles, machinery, scaffolding, consumables and accessories necessary for satisfactory completion of the work.

The railing shall be fabricated from **AISI 304 Grade Stainless Steel** and installed complete with handrail, balusters/posts, horizontal members, connectors, base plates, anchor fasteners, end caps and all accessories as specified herein.

### **2. Applicable Codes and Standards**

Unless otherwise specified, the work shall conform to the latest editions of the following standards:

- IS 6911 – Stainless Steel Plate, Sheet and Strip
- ASTM A554 – Welded Stainless Steel Mechanical Tubing
- ASTM A276 – Stainless Steel Bars and Shapes
- ASTM A240 – Stainless Steel Plates and Sheets
- ASTM A967 – Passivation of Stainless Steel
- IS 800 – General Construction in Steel
- National Building Code (NBC)
- CPWD Specifications (Latest Edition)
- Relevant BIS Standards

In case of conflict, the decision of the Engineer-in-Charge shall be final.

### **3. Material Specifications**

#### **3.1 Stainless Steel Grade**

All stainless steel members shall be manufactured from **AISI 304 Grade Stainless Steel** having:

- Chromium : 18–20%
- Nickel : 8–10.5%
- Corrosion resistant
- Rust resistant
- Suitable for exterior applications

Material certificates from the manufacturer shall be submitted before execution.

No stainless steel of Grade 202 or inferior grade shall be permitted.

#### **3.2 Hand Rail**

- Outside Diameter : 50 mm
- Thickness : 16 Gauge (Minimum 1.6 mm)
- Finish : Satin (No.4) unless otherwise specified
- Continuous throughout the length.

#### **3.3 Balusters / Vertical Posts**

- Pipe Diameter : 50 mm

- Thickness : 16 Gauge
- Height : Suitable to provide finished railing height of 900 mm.
- Spacing : Maximum 1.20 metre centre to centre.

### 3.4 Horizontal Members

Two numbers stainless steel pipes shall be provided.

- Diameter : 16 mm
- Thickness : 16 Gauge
- Equal spacing throughout.

### 3.5 Connector Members

- Diameter : 18.75 mm
- Thickness : 16 Gauge

Connector members shall securely connect the horizontal rails with vertical balusters.

### 3.6 Base Plate

Each post shall be provided with stainless steel base plate.

Minimum Size :

100 mm × 100 mm × 8 mm thick

Base plates shall be machine cut and welded concentrically with posts.

### 3.7 Anchor Fasteners

Posts shall be fixed using:

- Stainless Steel Anchor Bolts M12  
or
- Chemical Anchor Fastening System approved by the Engineer.

Minimum embedment depth shall be 75 mm.

### 3.8 Accessories

The item shall include:

- Stainless steel end caps
- Elbows
- Connectors
- Decorative covers
- Base cover plates
- Fasteners
- Nylon bushes
- Welding consumables
- Polishing materials
- All accessories required for complete installation.

Nothing extra shall be paid.

## 4. Fabrication

Fabrication shall be carried out only in an approved fabrication workshop.

All cutting shall be done by mechanical cutting machines.

Edges shall be smooth without burrs.

Pipe bending shall be done by hydraulic pipe bending machines.

No flattening of pipes shall be permitted.

Dimensions shall be accurate.

The railing shall be fabricated in panels as approved.

## 5. Welding

All welding shall be carried out by **TIG (Argon Arc) Welding** only.

Only stainless-steel compatible filler rods shall be used.

Welds shall be:

- Continuous
- Smooth
- Uniform
- Free from pinholes
- Crack free
- Fully fused

Exposed weld joints shall be ground and polished until invisible.

## **6. Surface Finish**

Entire railing shall be machine polished.

Finish shall be:

- Satin Finish (No.4)

unless otherwise specified.

There shall be:

- No scratches
- No dents
- No grinding marks
- No weld discoloration
- No rust stains

Protective film shall remain until completion.

## **7. Installation**

Posts shall be fixed accurately in line and level.

Spacing shall not exceed 1.20 metre centre to centre.

Posts shall be anchored into RCC slab using approved anchor bolts or chemical anchors.

Base plates shall be fully tightened.

Cover plates shall completely conceal anchor bolts.

Finished railing shall be rigid without vibration.

## **8. Workmanship**

Workmanship shall be of the highest standard.

The contractor shall ensure:

- Proper alignment
- Uniform spacing
- Verticality
- Level handrail
- Smooth joints
- Neat polishing

Visible weld marks shall not be accepted.

## **9. Protection During Execution**

Completed railing shall be protected using PVC wrapping or equivalent protection until handing over.

Damage caused during subsequent construction shall be rectified by the contractor at his own cost.

## **10. Quality Assurance**

Before installation the contractor shall submit:

- Manufacturer's Test Certificate
- Grade Certificate (SS-304)
- Thickness Certificate

- Inspection Reports  
Engineer-in-Charge may randomly verify:
- Pipe thickness
- Material grade
- Welding quality
- Surface finish

Any material failing inspection shall be removed immediately.

### **11. Inspection and Acceptance**

The completed railing shall satisfy the following:

- Correct dimensions
- Correct height
- Proper alignment
- Vertical posts
- Smooth handrail
- Proper anchorage
- No looseness
- Uniform finish
- No scratches
- No dents
- No corrosion
- Invisible weld joints

Any defective work shall be dismantled and replaced without extra payment.

### **12. Measurement**

Measurement shall be made in **Running Metres (Rmt)** of completed railing measured along the centre line of the handrail.

No deduction shall be made for joints, bends or fittings.

### **13. Rate**

The accepted rate shall be deemed to include:

- Supply of SS-304 pipes
- Base plates
- End caps
- Connectors
- Elbows
- Fasteners
- Chemical anchors
- TIG welding
- Grinding
- Buffing
- Satin polishing
- Fabrication
- Transportation
- Loading and unloading
- Hoisting
- Installation
- Alignment
- Scaffolding
- Labour
- Machinery
- Consumables
- Quality testing

- Protection
- Cleaning
- All incidental charges
- Complete finished work as per drawings, specifications and directions of the Engineer-in-Charge.

No extra payment shall be made on any account.

#### **14. Mode of Payment**

Payment shall be made only for the completed and approved railing measured in **Running Metres (Rmt)**.

The rate shall be inclusive of all materials, labour, fabrication, fittings, fixing, polishing, testing, transportation, taxes, royalties, wastage and all incidental expenses required for complete execution of the work.

#### **15. Warranty**

The contractor shall warrant the railing for **12 months** from the date of completion against:

- Manufacturing defects
- Welding failure
- Loose fixing
- Surface defects attributable to workmanship

Any defects observed during the warranty period shall be rectified by the contractor at no additional cost to the Employer.

**Item No. 27 :-** 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) Conventional

**AND**

**Item No. 28 :-** Brick work using common burnt clay building bricks having crushing strength not less than 35 Kg/Sq.cm. in super structure above plinth level upto floor two level in cement mortar 1:6 (1cement : 6 fine sand) Conventional (Ground Floor)

**AND**

**Item No. 29 :-** Brick work using common burnt clay building bricks having crushing strength not less than 35 Kg/Sq.cm. in super structure above plinth level upto floor two level in cement mortar 1:6 (1cement : 6 fine sand) Conventional (Terrace Floor)

#### **1.0. Materials**

Bricks shall conform to M-15. Cement mortar shall conform to M-11.

#### **2.0. Workmanship**

##### **2.1. Proportion:**

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

##### **2.2. Wetting of bricks:**

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

##### **2.3. Laying:**

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

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

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

**2.3.4.** The brick shall be laid with frog up wards. A set of tools comprising of wooden straight edges, 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.

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

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

**2.4. Joints:**

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

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

**2.5. Curing:**

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

**2.6. Preparation of foundation bed:**

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

- 2.7.** The frames of doors, windows, cupboards etc. shall be housed into the brick work at the correct location and level as directed. The heavy steel doors, window frames etc. shall be built in with work, but for ordinary steel doors and windows required opening for frames, hold-fasts, etc., shall be in the wall and frame embedded later on in order to avoid damage to the frames.

- 2.8.** Necessary scaffolding shall be provided. The supports of the scaffolding shall be sound and strong tied, together with horizontal pieces over which the scaffolding plunks shall be fixed. Simple scaffolding shall be allowed normally. In this case scaffolding hole shall rest in hole header horizontal coarse only. Minimum number of holes be left in brick work for supporting horizontal scaffolding poles. The contractor is

responsible for providing and maintaining sufficiently strong scaffolding so as to withstand all loads likely to come upon it.

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

**3.0. Mode of measurements & payment**

- 3.1.** The masonry work of G.F. & First floor shall be measured and paid under this item rate includes cost of all materials & labour.

- 3.2.** Brick work in parapet shall be included in the corresponding masonry item of floor immediately below the floor above which the parapet is built.

- 3.3.** No deduction shall be made from quantity of brick work nor any extra payment made for embedding in masonry of marking holes in respect of following item.

(1) Ends of joints, beams, posts, girders, rafters, purlins trusses corbel, steps, etc. where cross sectional area does not exceed 500 sq.cm.

(2) Opening not exceed in 1000 sq.cm.

(3) Wall plate sand bed plates bearing of slab, chhajjas, and like whose thickness does not exceed 10 cms. and the bearing does not extend the full thickness of wall.

(4) Drainage holes and recesses for cement concrete blocks to embed hold fasts for doors, window etc.

(5) Iron fixtures, pipes up to 300 mm. dia. hold fasts of doors, and window built into masonry and pipes etc. for concealed wiring.

(6) Forming charges of section not exceeding 350 sq.cm. in masonry.

(7) Apparatuses for fire places shall not be deducted nor shall extra labour required to make splaying of jumps, throating and making trenches over the aperture be paid for separately.

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

**Item No. 30 :- Half brick masonry in common burnt clay building bricks having crushing strength not less than 35Kg/Sm. In C.M 1:4(1cement: 4 coarse sand) in super structure. Conventional for Ground floor.**

**1.0. Materials**

Bricks shall conform to M-15. Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Cement mortar shall conform to M-11.

**2.0. Workmanship**

- 2.1. Relevant specifications of bricks, wetting and laying of bricks, joints, curing etc shall conform to **Item No. 6** except that the brick work of half brick shall be carried out.
- 2.2. Cement mortar used in masonry work shall be in proportion of 1 part of cement and 4 parts of coarse sand by volume.
- 2.3. All bricks shall be laid stretcher wise, breaking joints with those in the upper and lower courses. The wall shall be taken truly plumb. All courses shall be said truly horizontal and all vertical joints shall be truly vertical. The bricks shall be laid with frogs upwards. A set of masons tools shall be maintained on work as required for frequent checking. After every three course 2 nos. of 6mm mild steel round bars shall be embedded in cement mortar.

**3.0. Mode of measurement and payment**

- 3.1. The half brick masonry work in [superstructure](#) shall be measured under this item the limiting dimensions shall not exceed those shown in the plan or as directed. Any work done extra over the specified dimensions shall be ignored.
- 3.2. The relevant specifications of **Item No. 6** shall be followed. The length shall be measured nearest to one cm.
- 3.3. The rate includes the cost of providing 2 nos. of 7mm dia. mild steel round bars after every 4th course.
- 3.4. The rate shall be for a unit of one sq. meter.

**Item No. 31: - Providing and fixing 150 mm wide, approved quality chicken wire mesh at junction of brick work and RCC work or two dissimilar surfaces, at all heights fixed by nails, rowal plugs or tag by cement mortar 1:3 before applying the plaster, including curing etc. complete**

### **1. Scope of Work**

The work shall consist of supplying, cutting, positioning and securely fixing 150 mm wide galvanized chicken wire mesh over all junctions between brick masonry and reinforced cement concrete (RCC) members, or between any two dissimilar construction materials, before application of plaster. The work shall include all labour, materials, tools, tackles, scaffolding, transportation, cutting, wastage, fixing arrangements, curing and all incidental operations required to complete the work in accordance with the approved drawings, these specifications and the directions of the Engineer-in-Charge.

The purpose of the mesh is to control shrinkage and differential movement cracks that may develop at the interface of dissimilar materials.

### **2. Applicable Standards**

The work shall conform to the latest editions of the following standards:

- IS 277 – Galvanized Steel Sheets
- IS 280 – Mild Steel Wire for General Engineering Purposes
- IS 1608 – Mechanical Testing of Metals
- IS 1661 – Application of Cement and Cement-Lime Plaster
- CPWD Specifications (Latest Edition)
- Relevant BIS Standards

Where any discrepancy exists, the decision of the Engineer-in-Charge shall prevail.

### **3. Material Specifications**

#### **3.1 Chicken Wire Mesh**

The mesh shall be manufactured from hot-dip galvanized mild steel wire.

Minimum requirements shall be:

- Width: 150 mm
- Wire Diameter: 0.70 mm to 0.90 mm (minimum 22 SWG or equivalent)
- Hexagonal Opening: 12 mm to 20 mm
- Zinc Coating: Minimum 120 g/m<sup>2</sup>
- Uniform galvanizing free from rust, cracks, broken wires or manufacturing defects

PVC-coated or non-galvanized mesh shall not be accepted unless specifically approved.

#### **3.2 Fixing Materials**

The mesh shall be fixed using approved corrosion-resistant fasteners, including:

- Galvanized steel nails
- Rowel plugs
- Plastic wall plugs
- Screws with washers
- GI staples
- MS/GI tags or binding wire

The fixing method shall ensure firm and permanent attachment without sagging or displacement.

### **3.3 Mortar**

Where specified, fixing shall be carried out using Cement Mortar 1:3 (1 Cement: 3 Fine Sand) prepared with clean potable water.

Materials shall conform to:

- Cement: OPC/PPC conforming to relevant BIS standards
- Sand: Clean, well-graded river sand or approved manufactured sand

## **4. Surface Preparation**

Before fixing the mesh:

- All masonry and RCC surfaces shall be cleaned.
- Loose mortar, laitance, dust, oil and other contaminants shall be removed.
- Surface projections shall be chipped off.
- Honeycombed concrete shall be repaired before fixing the mesh.
- Surfaces shall be inspected and approved by the Engineer-in-Charge.

## **5. Installation**

The mesh shall be fixed centrally over the junction so that approximately 75 mm of its width covers each adjoining surface.

The mesh shall be stretched tightly and fixed continuously without wrinkles or sagging.

Fasteners shall be provided at intervals not exceeding 300 mm c/c, with additional fasteners at corners, ends and changes in direction to ensure rigidity.

Where one length of mesh joins another, an overlap of at least 50 mm shall be provided.

No loose or partially fixed mesh shall be accepted.

## **6. Plastering**

After fixing the mesh:

- Cement mortar plaster shall be applied immediately or within the approved construction sequence.
- The mesh shall be fully embedded within the plaster thickness.
- The mesh shall not remain exposed after completion.

- Plaster shall be compacted thoroughly around the mesh to eliminate voids.

## **7. Curing**

After plastering, curing shall be carried out by continuous sprinkling of clean water for a minimum period of 7 days, unless otherwise specified.

Proper curing shall be maintained to avoid shrinkage cracks.

## **8. Workmanship**

The workmanship shall be of the highest standard.

The contractor shall ensure:

- Correct positioning
- Uniform width
- Tight fixing
- Proper overlaps
- Adequate anchorage
- Complete embedment in plaster
- No exposed mesh after plastering
- Crack-free finished surface

Poor workmanship shall be rejected.

## **9. Quality Control**

The Engineer-in-Charge may inspect:

- Galvanizing quality
- Mesh width
- Wire diameter
- Fixing arrangement
- Overlap length
- Fastener spacing
- Surface preparation
- Mortar quality
- Embedment before plastering

The contractor shall produce manufacturer's test certificates for the galvanized mesh whenever demanded.

## **10. Inspection and Acceptance**

The work shall be accepted only if:

- Approved galvanized mesh has been used.
- Width is 150 mm throughout.
- Mesh is properly centered over the junction.
- Fastening is secure without sagging.

- Required overlaps have been provided.
- Mesh is completely embedded in plaster.
- Finished plaster is smooth and free from cracks attributable to poor installation.

Any defective work shall be removed and replaced by the contractor at no extra cost.

### **11. Measurement**

Measurement shall be made in Square Metres (Smt) of completed mesh fixed over the junctions, measured along the centre line of the joint.

No separate measurement shall be made for:

- Nails
- Screws
- Rowel plugs
- Washers
- Tags
- Binding wire
- Overlaps
- Cutting
- Wastage
- Scaffolding
- Mortar used for fixing
- Surface preparation
- Labour
- Curing
- Testing

### **12. Rate**

The accepted rate shall be deemed to include:

- Supply of approved galvanized chicken wire mesh
- Cutting to required size
- Transportation, loading and unloading
- Surface preparation
- Rowel plugs, screws, nails, washers, tags and binding wire
- Cement mortar 1:3 for fixing where required
- Fixing, stretching and alignment
- Overlaps
- Scaffolding
- Labour, tools and plants
- Curing

- Cleaning
- Testing
- All taxes, royalties, wastage, incidental charges and contingencies
- Complete execution as per drawings, specifications and the directions of the Engineer-in-Charge.

No additional payment shall be made for any item or operation necessary to complete the work.

### **13. Warranty**

The contractor shall remain responsible during the Defects Liability Period for any cracks or defects arising due to improper fixing of the chicken wire mesh. Such defects shall be rectified at the contractor's own cost to the satisfaction of the Engineer-in-Charge.



**Item No. 32: - Providing 15mm thick cement plaster in single coat on Rough (Similar)side of single or half brick walls / concrete wall for interior plastering and finished even and smooth along with floating coat of neat cement slurry etc. comp. in (ii) Cement mortar 1:4 (1-cement :4-sand) 1) Plaster at Ground Floor**

**AND**

**Item No. 33: - Providing 15mm thick cement plaster in single coat on Rough (Similar)side of single or half brick walls / concrete wall for interior plastering and finished even and smooth along with floting coat of neat cement slurry etc. comp. in (ii) Cement mortar 1:4 (1-cement :4-sand) 2) Plaster at Terrace Floor**

### **General**

This work shall consist of Providing **Providing 15 mm thick cement plaster in single coat** of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer in charge.

### **Material**

#### **1.0 CEMENT**

**1.1.** 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*.

**1.2.** 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.

**1.3.** 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  $C_3S/C_2S$ , where  $C_3S$  is Tri-calcium Silicate and  $C_2S$  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.

**1.4.** Cement conforming to *IS: 12330* shall be used when sodium soleplate and magnesium soleplate are present in large enough concentration to be aggressive to concrete. The recommended threshold values as per *IS:456* are soleplate 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 soleplate 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 soleplate 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.

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

**1.6.** 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 ( $\text{SO}_3$ ) shall in no case exceed 2.5 per cent and 3.0 percent when tri-calcium aluminate per cent by mass in up to 5 or greater than 5 respectively

### **1.7. 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 water tight sheds and shall be stacked not more than eight bags high. Wherever bulk storage containers are used their capacity should be sufficient to cover to the requirement at site and should be cleaned at least once every 3 to 4 months

**1.8.** 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

**1.9.** 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.

## **2.0 SAND**

**2.1** Sand shall be natural sand, clean well graded, hard strong durable and gritty particular free from immure amounts of dust, clay, kankar modules

**2.2.** For masonry works sand shall conform to the requirements of IS: 2116

**2.3.** For plain and reinforced cement concrete (PCC and RCC) or pre stressed 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.

**2.4.** Sand fine aggregates for structural concrete shall conform to the following grading requirements as shown in the table below

**2.5 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
2.3 6mm	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:

<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

### **3.0. WATER**

**3.1** 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 R C C container for transport storage and huddling of water shall be clean, Water shall confirm to the standard specified in I S 455 -1978

**3.2.** 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.

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

**3.4** 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

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

**3.6** Potable water will generally found suitable for curing mortar or concrete

**3.7.** 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

**3.8.** 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 required 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
Sulphates (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

#### **4.0 WORKMANSHIP**

**4.1** Sand shall be screened and shall be free from all impurities like dust and loose particles pieces of stone or kankar or gravel, and all type of organic materials

**4.2.** 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 platform shall be thoroughly cleaned before changing from one type of cement to another.

**4.3.** The mixing shall be done intimately, The operation shall be carried out on clean water tight 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 minute from the time of addition to water at the time of initial mixing.

**4.4.** For a surface which is to be subsequently plastered the joints shall be squarely raked out to a depth of 15mm. With the mortar is till green. The raked joints shall be well brushed to remove dust and loose particles and the surface shall be throughway washed with water, and wetted

**4.5.** Cement and sand shall be mixed in proportion as specified in the item, 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.

**4.6.** The mixing shall be done intimately. by hand infixing,. The operation shall be carried out on a clean watertight platform, and cement and sand shall be first mixed dry in the required proportion to obtain mortar that has stiffened because of evaporation of water, the same shall be re-tempered by adding water as frequently as needed to restore the requisite consistent but this re-tempering shall be permitted only within thirty minutes from the time of addition of initial mixing.

**4.7.** Plastering shall be started from top and worked down. All long holes shall be properly filled in advance of the plastering as the scaffolding is being taken down.

Wooden screeds 75mm. wide and of the thickness of the plaster shall be fixed vertically 2.5- meters to 4 meters apart to act as gauges and guides in applying the plaster. The mortar shall be laid on the wall between the screeds using the plaster float and pressing the mortar to the raked joints are properly filled.

**4.8.** The plaster shall then be finished off with a wooden straight edge reaching across the screeds. The straight edge shall be worked on the screeds with a small upward and side way motion 50mm or 75mm at a time. Finally, the surface shall be finished off with a plaster's wooden float. Metal floats shall not be used.

**4.9.** When recommencing plastering beyond the work suspended earlier the edge of the old plaster shall be scrapped, cleaned and wetted before plaster is applied to the adjacent areas. No portion of the surface shall be left out initially or be patched by later on. The plaster shall be finished to a true

and plumb thickness of plaster shall not be less than the thickness specified in the item with tolerance of 3mm th which appear in the surface and all portions, which sound hollow as directed by the Engineer- in charge

**4.10.** 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 damages;

**4.11.** Stage scaffolding shall be provided for the work. This shall be independent of the structure.

**4.12.** Green work shall be protected from rain by suitable covering. Plaster work is cement of composite mortar shall be kept constantly moist on all faces for a minimum period of seven days. The top of the masonry work shall be left flooded with water at the close of the day.

**4.13.** 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.

**4.14.** The scaffolding shall be sound and strong to withstand all loads to come upon it. The holes which provide resting space for horizontal members shall not be left in masonry under one meter in width or immediately near the skew backs or arches. The holes left in the masonry work for supporting the unfolding shall be filled and made good.

## **5.0 PROPORTION OF MIX**

**5.1.** The proportion of cement and sand shall be one part of cement. 3 (Three) parts of sand and shall be measured by volume.

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

**6.1.** The unit rate Plaster shall include the cost of all materials, tools and plant required for mixing, applying & placing in position, compacting, finishing as per direction of the Engineer-in-charge, curing and all other incidental expenses for producing plaster work of specified thickness 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 of all scaffolding and forms required for the work.

The rate of plastering shall include the cost of all labour, materials tools and plant scaffolding and all incidental expenses as described herein above.

**6.2.** The plaster work shall be measured for its **length** and **height**, limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one squire meter.

**6.3.** The payment will be made on square Meter basis of the finished work.

**Item No. 34: - Providing 10 mm thick smooth cement plaster in single coat for plastering on ceiling and soffits of stairs and finished even and smooth along with floating coat of neat cement slurry etc. comp. (i) Cement mortar 1:4 (1 cement: 4 sand). 1) Plaster at Ground Floor**

**1.0. Materials**

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

**2.0. Workmanship**

**2.1. Scaffolding:**

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

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

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

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

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

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

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

2.3.1. The plaster about 15x15 cms. shall be first applied horizontally and vertically at not more than 2 meters intervals over the entire surface to serve as gauge. The surfaces of these gauges shall be truly in plane of the finished plastered surface. The mortar shall then be applied in uniform surface slightly more than the specified thickness, then brought to a true surface by working a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally, the surface shall be

finished off true with a trowel or wooden float according as a smooth or a smooth or a sandy granular texture is required Excessive troweling or overworking the float shall be avoided. All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Hounding or chamfering, corners, arises junctions etc. shall be carried out with proper templates to be size required.

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

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

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

**3.3.** Thickness of the plaster shall be exclusive of he 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 ravel, 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. 35 :- 20mm thick double coat sand faced cement gutka plaster on walls up to height 10 meters above ground level consisting of 12mm thick backing coat of C.M. 1:3 (1-cement: 3-sand) and 8mm thick finishing coat of C.M. 1:1 (1-cement: 1-sand) including 1cm x 1cm grooves etc. complete.**

#### **1.0. Materials**

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

#### **2.0. Workmanship**

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

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

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

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

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

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

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

**Item No. 31: - Providing throating or plaster drip and molding to R.C.C. Chhajja.**

#### **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 thwarting or plaster drip and mounding shall be one centimetre in thickness.

3.0 The rate shall be for a unit one Rmt

### **Item No. 36: - Providing throating or plaster drip and moulding to R.C.C. Chhajja..**

#### **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 centimetre in thickness.

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

3.1. The relevant specification of item No 5.4.18 shall be followed for mode of measurements and payment except that it excludes the cost of form work.

#### **3.2. The rate shall be for a unit or one Rmt**

**Item No. 37: - Applying two coats of (white cement based) or (acrylic lappy (putty)) or equivalent and two coats of primer of approved brand and manufacture on new wall surface to give an even shade including thoroughly brushing the surface free from mortar dropping and other foreign matter and sand papered smooth. for All floor.**

#### **1. Scope of Work**

The work shall consist of surface preparation, supplying and applying two coats of approved quality white cement-based wall putty or acrylic wall putty, followed by two coats of premium quality wall primer on new internal plastered wall and ceiling surfaces of all floors, complete in all respects as per the approved drawings, manufacturer's recommendations and directions of the Engineer-in-Charge.

The work shall include all labour, materials, scaffolding, tools, plants, mixing, application, curing (where required), surface preparation, protection, cleaning and finishing necessary for completion of the work.

The finished surface shall be smooth, level, free from undulations and suitable for receiving the final decorative paint.

#### **2. Applicable Standards**

The work shall conform to the latest editions of the following standards:

- IS 15489 – White Cement Based Wall Putty
- IS 5410 – Cement Paint
- IS 3536 – Ready Mixed Paints and Primers
- IS 1661 – Application of Cement and Cement-Lime Plaster
- CPWD Specifications (Latest Edition)
- Relevant BIS Standards
- Manufacturer's Specifications

In case of conflict, the Engineer-in-Charge's decision shall be final.

### 3. Materials

#### 3.1 Wall Putty

The putty shall be either:

- White Cement Based Wall Putty conforming to IS 15489

OR

- Acrylic Wall Putty of approved make

The putty shall possess:

- Excellent adhesion
- High whiteness
- Smooth finish
- Crack resistance
- Water resistance
- Good workability
- Low shrinkage

Approved Makes (or equivalent approved by the Engineer-in-Charge):

- Birla White
- JK Wall Putty
- Asian Paints
- Berger
- Nerolac
- Dr. Fixit
- Dulux

Only unopened manufacturer's sealed bags/containers shall be used.

#### 3.2 Wall Primer

Primer shall be:

Premium quality water-based acrylic wall primer suitable for interior plaster surfaces.

Properties:

- Alkali resistant
- Anti-fungal
- Good adhesion
- Uniform coverage
- Quick drying

Approved Makes:

- Asian Paints
- Berger
- Nerolac
- Dulux
- Indigo
- Shalimar

- Equivalent approved brand

### **3.3 Water**

Only clean potable water shall be used for mixing and application.

### **4. Surface Preparation**

Before commencement of work, all surfaces shall be carefully prepared.

The contractor shall:

- Remove loose mortar particles.
- Remove dust and dirt.
- Remove oil, grease and foreign matter.
- Fill honeycombs and depressions.
- Repair damaged plaster.
- Remove projections.
- Rub the surface using emery paper or carborundum stone.
- Ensure complete curing of plaster before putty application.

The plaster shall normally be cured for not less than 28 days before commencement.

Surface moisture shall comply with manufacturer's recommendations.

### **5. Application of Putty**

The putty shall be mixed strictly according to the manufacturer's instructions.

Only sufficient quantity required for immediate use shall be prepared.

Putty shall be applied using stainless steel putty knives or trowels.

First Coat

- Uniform application
- Approximate thickness: 1.0 mm
- Allowed to dry completely

After drying:

- Entire surface shall be rubbed with emery paper.
- Dust shall be removed.

Second Coat

Second coat shall be applied uniformly.

Total finished thickness shall generally be 1.5–2.0 mm unless otherwise specified.

Entire surface shall again be rubbed smooth using fine emery paper.

The finished surface shall be:

- Smooth
- Level
- Free from pinholes
- Free from undulations
- Free from cracks

### **6. Application of Primer**

After complete drying of putty and approval of the surface, primer shall be applied.

### First Coat

Primer shall be applied uniformly using:

- Roller
- Brush
- Spray

The primer shall be allowed to dry completely.

Any imperfections shall be rectified.

### Second Coat

Second coat shall be applied only after complete drying of the first coat.

Finished primer surface shall exhibit:

- Uniform colour
- Uniform film thickness
- No roller marks
- No brush marks
- No patchiness
- No peeling
- No blistering

## 7. Drying Time

Drying intervals shall strictly follow the manufacturer's recommendations.

No subsequent coat shall be applied until the previous coat has completely dried.

## 8. Workmanship

The workmanship shall be of the highest standard.

The contractor shall ensure:

- Uniform finish
- Smooth surface
- Proper edge finishing
- Uniform thickness
- No visible joints
- No scratches
- No sagging
- No peeling
- No bubbling
- No powdering
- No patchiness

All corners and edges shall receive equal attention.

## 9. Protection

Finished surfaces shall be protected from:

- Rain
- Dust

- Moisture
- Mechanical damage
- Water leakage
- Construction activities

Adjacent finished works shall be covered during execution.

Any damaged portion shall be redone at the contractor's cost.

## **10. Quality Control**

The Engineer-in-Charge may inspect:

- Brand approval
- Batch numbers
- Manufacturer's certificates
- Surface preparation
- Thickness
- Number of coats
- Drying interval
- Adhesion
- Smoothness
- Finish quality

Random measurements of dry film thickness may be carried out whenever required.

## **11. Inspection and Acceptance**

The completed work shall satisfy the following requirements:

- Approved materials used.
- Two complete coats of putty applied.
- Two complete coats of primer applied.
- Uniform smooth finish.
- Proper adhesion.
- No visible joints.
- No cracks.
- No peeling.
- No blistering.
- No colour variation.
- No pinholes.
- Surface ready for final painting.

Any defective work shall be removed and redone entirely by the contractor without additional payment.

## **12. Measurement**

Measurement shall be made in Square Metres (m<sup>2</sup>) of the actual surface area treated.

Measurements shall be taken for completed finished work.

No deduction shall normally be made for openings up to the limits specified in the applicable standard

method of measurement.

No separate measurement shall be made for:

- Surface cleaning
- Sand papering
- Filling minor imperfections
- Mixing
- Scaffolding
- Protection
- Labour
- Wastage
- Curing where applicable
- Touch-up work
- Cleaning after completion

### **13. Rate**

The accepted rate shall include:

- Supply of approved white cement-based wall putty or acrylic wall putty
- Supply of approved wall primer
- Surface preparation
- Cleaning
- Sand papering
- Mixing
- Two coats of putty
- Two coats of primer
- Labour
- Tools and plants
- Scaffolding
- Water
- Protection of finished work
- Cleaning of site
- Testing and quality control
- Transportation
- Loading and unloading
- Royalties, taxes, duties
- Wastage
- All incidental charges necessary to complete the work as per drawings, specifications and directions of the Engineer-in-Charge.

No additional payment shall be made for any operation required for satisfactory completion of the work.

**Item No. 38: - Wall painting (three coats) with plastic emulsion paint of approved brand and manufacture on undecorated wall surface to give an even shade including thoroughly brushing the surface free from mortar droppings and other foreign matter and sand papered smooth.**

**AND**

**Item No. 39: - Wall painting (two coats) with plastic emulsion paint of approved brand and manufacture on undecorated ceiling surface to give an even shade including thoroughly brushing the surface free from mortar droppings and other foreign matter and sand papered smooth.**

### **1.0. Materials**

Water shall be conforming M-1. The plastic emulsion shall conform to I.S.: 5411-1969 (part-I).

### **2.0. Workmanship**

**2.1. Scaffolding:** The relevant specifications of item-No. 18.11 Para 2.1 shall be followed.

**2.2. Preparation of surface:** The relevant specification of item No. 18.44 Para 2.2 shall be followed.

### **2.3. Preparation of Mix:**

This shall be done as per manufacturer's instructions. The thinning of emulsion is to be done with water and not with turpentine. The quantity of thinner to be added shall be as per manufacturer instructions.

### **2.4. Application:**

2.4.1. Before pouring into small containers for use, the paint shall be stirred thoroughly in item container. When applying also, the paint shall be continuously stirred in the smaller container, so that its consistency is kept uniform.

2.4.2. The paint shall be laid on evenly and smoothly by means of crossing and laying off the crossing and consist of covering the area over with paint, brushing the surface hard for the first time over and then, brushing alternately in opposite direction two or three times and then finally brushing lightly in direction at right angles to the same. In this process, no brush Marks shall be left after the laying off is finished. No hair marks from the brush or clogging of paint puddles in the corners of panels, angles of mouldings, etc. shall be left on the work. The full process of crossing and laying off will constitute one coat.

**2.4.3.** The paint shall be applied with brush or rollers. For undecorated surfaces, the surface shall be treated with minimum two coats of cement water proofing paint. The second or subsequent coat shall not be started until the proceeding coat as become sufficiently hard to resist marking by brushing being used.



**2.4.4.** The surface on finishing shall present a flat velvety smooth finish. It shall be even and uniform in shade without patches, brush marks, paint drops etc.

**2.5. Precautions:**

(a) Old brushes if they are to be used with emulsion paints, shall be completely dried of turpentine or oil paint by washing in warm soap water. Brushes shall be quickly washed in water immediately after use and kept immersed in water during break periods to prevent the paint from hardening on the brush.

(b) In the preparation of wall for plastic emulsion painting, no oil base putty shall be used in filling cracks, holes etc.

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

(d) Washing of surfaces treated with emulsion paint shall not be done within 3 to 4 weeks of application

**2.6. Protective payment:** The relevant specifications of item No. 18.11 shall be followed.

3.0. Mode of measurements and payment

3.1. The relevant specifications of item No. 18.11 shall be followed.

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

**Item No. 40: - Finishing wall with Weather proof exterior 100% acrylic emulsion paint With one coat of primer on wall surface to give an required shape even shade after thoroughly brushing the surface to remove all dirt, and remains of loose powdered materials. etc complete for All floor.**

### **1.0. Materials**

1.1. The water shall conform to M-1. Cement water proofing paint shall conform to I.S. 5410-1969.

### **2.0. Workmanship**

**2.1. Scaffolding :** The relevant, specifications of item No. 18.11 shall be followed.

### **2.2. Preparation of surface :**

The relevant specifications of item No. 18.11 shall be followed except that the word white wash colour wash shall be substituted with water proofing cement paint. The surface shall be thoroughly wetted with clean water before cement water proofing paint is applied.

**2.3. Preparation of paint:** Portland cement paint shall be prepared by adding paint powder to water and stirring to obtain a thick paste, which shall then be diluted to a brush able consistency. Generally, equal volumes of paint powder and water make a satisfactory paint. In all cases, The manufacturer's instructions shall Site followed. The paint shall be mixed in such quantities as can used up within an hour of mixing as otherwise the mixture will set and thickness, affecting flowing and finish. The lids of cement paint drums shall be kept tightly when not in use.

### **2.4. Application of Paint:**

2.4.1. No painting shall be done when the paint is-likely to be exposed to a temperature of below 70 c within 48 hours after application.

2.4.2. When weather conditions are such as to cause be carried out in the shadow as far as possible. This helps the proper hardening of the paint film by keeping the surface moist for a longer period.

2.4.3. To maintain the uniform mixture and to prevent segregation, the paint shall be stirred frequently in the bucket.

2.4.4. For undecorated surfaces, the surface shall be treated with minimum two coats of water proof cement paint. Not less than 24 hours shall be allowed between two coats. Next coat shall not be started until the proceeding coat has become sufficiently hard to resist marking by the brush being used. In hot dry weather, the proceeding coat shall be slightly moistened before applying the subsequent coat.

2.4.5. The finished surface shall be even and uniform in shade, without patches, brush masks, paint drops etc.

2.4.6. The cement paint shall be applied with a brush with relatively short stiff hog or fiber

bristles. The paint shall be brushed in uniform thickness and shall be free from excessively heavy brush marks. The lamps shall be brushed out.

2.4.7. Water proof cement paint shall not be applied on surface already treated with white wash, colour wash, distemper dry or oil bound varnishes, paint etc. It shall not be applied on gypsum, wood and metal surfaces.

**2.5. Curing:** Painted surfaces shall be sprinkled with water two or three times a day. This shall be done between coats and for at least two days following the final coat. The curing shall be started as soon as the paint has hardened so as not to be damaged by the sprinkling of water say about 12 hours after the application.

2.6. Protection measures shall be taken as per item No. 18.11 Para 2.6.

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

3.1. The relevant specifications of item No. 18.11. shall be followed.

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

**Item No. 41: - Providing And filling with good quality cinder(steam coal) as directed by engineer in charge in sunks in layers of 15 cm thick, including watering, placing ,ramming well etc as directed, for all floor.**

Providing and Filling with Good Quality Cinder (Steam Coal Cinder) Under Floors

### **1. Scope of Work**

The work shall consist of supplying, transporting, stacking, spreading, watering, laying, compacting and filling approved quality cinder (steam coal cinder) in sunken portions, plinth areas or floor depressions in layers not exceeding 150 mm compacted thickness, including dressing, levelling, watering, ramming, consolidation, testing, finishing and all labour, materials, tools, plants, transportation and incidental works complete in accordance with the approved drawings, specifications and directions of the Engineer-in-Charge.

The filling shall provide a stable, lightweight and well-compacted base for subsequent floor construction.

### **2. Applicable Standards**

The work shall conform to the latest editions of the following standards:

- IS 2720 – Methods of Test for Soils
- IS 456 – Plain and Reinforced Cement Concrete
- IS 1200 – Method of Measurement
- CPWD Specifications (Latest Edition)
- National Building Code (NBC)

### **3. Material Specifications**

The filling material shall consist of good quality steam coal cinder obtained from approved thermal power plants or approved sources.

The cinder shall be:

- Clean.
- Dry.
- Lightweight.
- Well burnt.
- Porous.
- Free from clay.
- Free from soil.
- Free from ash lumps.
- Free from brick bats.
- Free from stones.
- Free from organic matter.

- Free from combustible impurities.
- Free from harmful salts and deleterious materials.

The cinder shall be well graded to facilitate proper compaction.

Only material approved by the Engineer-in-Charge shall be used.

#### **4. Preparation of Surface**

Before commencement of filling:

- The area shall be cleaned thoroughly.
- Loose material shall be removed.
- Standing water shall be removed.
- The surface shall be properly dressed and levelled.
- Soft pockets shall be removed and made good.

The Engineer-in-Charge shall inspect and approve the prepared surface before filling begins.

#### **5. Filling**

The cinder shall be spread uniformly over the prepared surface.

The filling shall be carried out in layers not exceeding 150 mm compacted thickness.

Each layer shall be:

- Spread uniformly.
- Watered adequately.
- Properly rammed.
- Mechanically or manually compacted.
- Levelled before placing the next layer.

The next layer shall not be placed until the previous layer has been approved by the Engineer-in-Charge.

#### **6. Watering**

Each layer shall be sprinkled uniformly with clean water to facilitate proper settlement and compaction.

Excessive watering resulting in floating of fine particles shall not be permitted.

#### **7. Compaction**

Compaction shall be carried out using:

- Hand rammers.
- Plate compactors.
- Mechanical compactors where accessible.

Compaction shall continue until no further settlement occurs and the surface becomes firm and stable.

#### **8. Finished Surface**

After completion, the surface shall be:

- Properly compacted.
- True to line.
- True to level.
- Uniformly finished.
- Free from depressions.
- Free from soft spots.
- Ready to receive the next flooring layer.

## **9. Tolerances**

The completed filling shall conform to the following tolerances:

- Finished Level :  $\pm 10$  mm
- Surface Evenness : Maximum 5 mm deviation under a 3 m straight edge.
- Layer Thickness : As specified.

## **10. Workmanship**

The work shall be carried out by experienced labour under proper supervision.

The completed filling shall:

- Be uniformly compacted.
- Be free from voids.
- Be free from segregation.
- Be properly consolidated.
- Provide a stable foundation for flooring.

Any loose or defective portion shall be removed and replaced by the contractor without additional cost.

## **11. Quality Control**

The Engineer-in-Charge shall inspect:

- Source of cinder.
- Material quality.
- Cleanliness.
- Layer thickness.
- Moisture content.
- Compaction.
- Finished levels.
- Surface evenness.

Any rejected material shall be removed from the site immediately.

## **12. Protection**

The completed filling shall be protected from:

- Rainwater.

- Construction traffic.
- Disturbance.
- Contamination with soil or debris.

Damaged areas shall be repaired by the contractor without additional cost.

### **13. Measurement**

The item shall be measured in Cubic Metres (Cum) of compacted cinder filling actually completed and accepted by the Engineer-in-Charge.

The quantity shall be calculated based on the finished compacted dimensions.

No deduction shall be made for minor embedded services occupying negligible volume as per IS 1200.

### **14. Rate**

The quoted rate per Cubic Metre (Cum) shall include:

- Supply of approved quality steam coal cinder.
- Loading at source.
- Transportation to site.
- Unloading and stacking.
- Surface preparation.
- Spreading in layers.
- Watering.
- Ramming and compaction.
- Dressing and levelling.
- Testing and quality control.
- Labour, tools, tackles, plants and machinery.
- Cleaning after completion.
- Protection of completed work.
- All taxes, royalties, duties, GST, handling charges, wastage and incidental expenses.
- Complete compacted cinder filling ready for the subsequent floor construction as directed by the Engineer-in-Charge.

No extra payment shall be made for transportation, loading, unloading, watering, ramming, compaction, levelling, testing, protection or any incidental work necessary for the satisfactory completion of the cinder filling.

**Item No. 42: - Providing and fixing flush door shutters, solid core construction with frame of first-class hardwood with cross board and face veneer or plywood face panels, including anodized aluminum butt hinges with necessary screws. (B) Non-decorative type and block board core anodized aluminum butt hinges in flush door shutters (2) 35 mm thick.**

### **1.0. Materials**

Flush door shall conform to M-30. Plywood shall conform to M-37. Anodised aluminum butt hinges shall conform to M-43.

### **2.0. Workmanship**

2.1. The relevant specifications of item No. 10.23 shall be followed except that the shutters be non-decorative type and block board core with face veneer or plywood with 35 mm. thickness.

2.2. Ready-made shutters shall be of correct size and shall fit into the door or other openings without excessive scraping of edges. Adding of battens etc., to make up to the size shall not be allowed.

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

3.1. The relevant specification of item No. 10.12 A (I) shall be followed.

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



**Item No. 43: - Providing and fixing FRP frame size 100x50 mm and 28mm thick FRP depress panel shutter having extra reinforcement on sides & edges in Gel coat finish. The core of the shutter & frame is to be filled up with injected fire-retardant grade polyurethane foam done in situ along with embedded wooden pieces for stiffening & also taking hinges & fixtures. The whole FRP frame & shutter is to be water proof weather proof, termite proof & resistance to mild acid/alkali. Rates are to be inclusive of S.S hinges with necessary screws & aluminum fixtures & fastenings & fastener sleeve. Providing and fixing flush door shutters, solid core construction with frame of first-class hardwood with cross board and face veneer or plywood face panels, including anodized aluminum butt hinges with necessary screws. (B) Non-decorative type and block board core anodized aluminum butt hinges in flush door shutters (2) 35 mm thick.**

### **1. Scope of Work**

The work shall consist of **design (where required), manufacture, supply, transportation, loading, unloading, handling, fixing, testing and commissioning of Fibre Reinforced Plastic (FRP) Door Frame and FRP Door Shutter** complete in all respects including all accessories, hardware, fittings and fasteners as shown on drawings and as directed by the Engineer-in-Charge.

The work includes:

- FRP Door Frame
- FRP Door Shutter
- Polyurethane Foam Filling
- Reinforcement
- Stainless Steel Hinges
- Aluminium Fixtures
- Locking Arrangement
- Fasteners
- Necessary Cutting
- Fitting
- Alignment
- Testing
- Finishing
- Complete Installation

Nothing extra shall be paid for any item necessary to complete the work.

### **2. Applicable Standards**

The work shall conform to the latest editions of:

- IS 4020

- IS 14856 (FRP Door Shutters)
- IS 2202
- IS 6315
- IS 204
- IS 1003
- CPWD Specifications
- Relevant BIS Standards

### **3. Material Specifications**

#### **3.1 FRP Door Frame**

Door frame shall be manufactured from **Glass Fibre Reinforced Plastic (FRP)**.

Frame Size

- 100 mm × 50 mm

Minimum Wall Thickness

- 5 mm

Frame shall be moulded in one piece wherever possible.

Finish

- Smooth Gel Coat Finish

Colour

- Approved by Engineer-in-Charge.

#### **3.2 FRP Door Shutter**

Thickness

- 28 mm

Construction

Factory moulded FRP depressed panel shutter.

The shutter shall have:

- Reinforced edges
- Reinforced corners
- Reinforced hinge side
- Reinforced lock side

The shutter shall be perfectly straight.

Warping shall not exceed permissible limits.

#### **3.3 Core Filling**

The entire cavity shall be filled with

**Injected Fire-Retardant Polyurethane Foam**

The foam shall:

- Completely fill cavity

- Be void free
- Have uniform density
- Be moisture resistant
- Be termite resistant
- Be fire retardant

Minimum Density

40 kg/m<sup>3</sup>

### **3.4 Wooden Reinforcement**

Seasoned hardwood reinforcement blocks shall be embedded inside shutter.

Reinforcement shall be provided at:

- Hinges
- Tower bolt
- Door stopper
- Lock
- Handle
- Aldrop

The reinforcement shall be completely bonded.

### **3.5 Gel Coat**

Both faces shall receive UV stabilized gel coat.

The finish shall be

- Smooth
- Glossy
- Uniform

There shall be:

- No air bubbles
- No cracks
- No pin holes
- No fibre exposure

## **4. Performance Requirements**

The complete door shall be

- Waterproof
- Weather Proof
- Corrosion Resistant
- Termite Proof
- Fungus Resistant
- Mild Acid Resistant

- Mild Alkali Resistant
- Rot Proof
- Borer Resistant

## **5. Hardware**

The following shall be included:

Stainless Steel Hinges

- SS304 Grade
- Minimum 3 Hinges

Aluminium Fixtures

Including

- Tower Bolt
- Aldrop
- Door Handle
- Door Stopper
- Necessary Screws
- Anchor Fasteners
- Fastener Sleeves

All hardware shall be approved by Engineer.

## **6. Installation**

Frames shall be fixed perfectly plumb.

Anchor fasteners shall be provided at maximum 600 mm spacing.

Gap between wall and frame shall be filled using approved polymer mortar or PU Foam.

Frames shall be rigid.

No movement shall be permitted.

## **7. Workmanship**

The contractor shall ensure

- Proper alignment
- Correct level
- Smooth operation
- Proper clearance
- Uniform gap
- Easy opening and closing

No rubbing shall occur.

## **8. Inspection**

Engineer shall verify

- Frame size

- Thickness
- Foam filling
- Reinforcement
- Hardware
- Finish
- Alignment
- Verticality

Defective doors shall be replaced.

## **PART – B : SOLID CORE FLUSH DOOR**

### **1. Scope**

Providing and fixing **35 mm thick solid core flush door shutter** with hardwood frame, block board core and plywood face including hinges and necessary hardware.

### **2. Applicable Standards**

The work shall conform to

- IS 2202 (Flush Doors)
- IS 303
- IS 710
- IS 1003
- IS 848
- IS 204
- CPWD Specifications

### **3. Door Shutter**

Thickness

35 mm

Type

Non-Decorative Flush Door

Construction

Solid Core Block Board

Moisture Content

8–12%

### **4. Core Material**

Seasoned Hardwood Block Board

Density

Minimum 650 kg/m<sup>3</sup>

Free from

- Knots

- Splits
- Decay
- Insect attack

## **5. Face Panels**

Commercial Plywood

Minimum 3 mm each side

Bonding

BWP/BWR Adhesive conforming to IS 848.

## **6. Frame**

First Class Hardwood

Species approved by Engineer.

Moisture Content

Maximum 12%

Frame shall be treated against

- Termites
- Borers
- Fungus

## **7. Adhesive**

Synthetic Resin Adhesive

Conforming to IS 848.

## **8. Hardware**

Anodized Aluminium Butt Hinges

Minimum 3 Nos.

Complete with

- Screws
- Fixtures
- Fasteners

All hardware shall be approved make.

## **9. Installation**

Frame shall be securely fixed.

Door shall operate freely.

Clearances shall conform to IS Standards.

No twisting shall occur.

## **10. Finish**

Surface shall be smooth.

There shall be

- No warping
- No swelling
- No delamination
- No open joints
- No visible defects

## 11. Quality Control

Contractor shall submit

- Manufacturer Certificate
- Timber Treatment Certificate
- Plywood Test Certificate
- Adhesive Certificate

Random inspection may be carried out.

## 12. Measurement

Measurement shall be made in **Square Metres (m<sup>2</sup>)** of finished door shutter.

Door frame shall be measured separately only if specifically provided under a separate BOQ item.

No separate payment shall be made for

- Hinges
- Screws
- Fasteners
- Cutting
- Fitting
- Alignment
- Hardware included in the BOQ item
- Labour
- Scaffolding
- Transportation
- Wastage

## 13. Rate

The accepted rate shall include:

- Supply of all materials
- Manufacture
- Transportation
- Loading and unloading
- FRP frame
- FRP shutter

- Polyurethane foam filling
- Hardwood reinforcement
- Gel coat finish
- Flush door shutter
- Hardwood frame
- Plywood face panels
- Adhesives
- Stainless steel hinges
- Aluminium fixtures
- Screws
- Fasteners
- Anchor bolts
- Installation
- Testing
- Cleaning
- Protection
- Labour
- Tools and plants
- Scaffolding
- Taxes, royalties, duties and all incidental charges necessary for complete execution of the work.

No extra payment shall be made for any item required for complete installation.



**Item No. 44: - 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**

**AND**

**Item No. 45: - Providing and fixing standard extruded of aluminum section of size 63mm x 38.10mm x 1.2mm @ Wt. 0.643 Kg/mt with color anodized aluminum frame for ventilation with 5 mm thick frosted glass as details etc complete for Ventilation**

## **1.0 MATERIALS**

### **1.1 Aluminium Sections**

The aluminium alloy used for manufacture of window sections shall conform to IS:733 and IS:1285 or latest revisions thereof. The sections shall be extruded from approved aluminium alloy suitable for architectural applications.

The outer frame shall be of size 100 mm × 45 mm fabricated from minimum 1.8 mm thick aluminium extruded sections.

The casement shutters shall be of size 47 mm × 75 mm fabricated from minimum 1.5 mm thick aluminium extruded sections.

The louver frame sections shall be of size 50 mm × 25 mm or as shown in approved drawings.

All aluminium sections shall be straight, true to size, free from dents, cracks, scratches, twists, corrosion and manufacturing defects.

### **1.2 Powder Coating**

All aluminium sections shall be powder coated in approved shade and colour. The coating thickness shall not be less than 50 to 60 microns and shall provide uniform appearance, durability and weather resistance.

### **1.3 Glass**

The central glazed portion shall be provided with 5 mm thick clear float glass or 6 mm thick toughened glass as specified in the item, drawings or directed by the Engineer-in-Charge.

The glass shall be of approved make and quality, free from bubbles, waviness, scratches, cracks and other defects.

### **1.4 Louvers**

Aluminium or glass louvers shall be of approved make, size and thickness as shown in drawings. Louvers shall be properly fixed within louver frames and shall operate smoothly where openable louvers are specified.

### **1.5 Gaskets and Sealants**

EPDM gaskets, wool pile, glazing rubber, silicone sealants and weather sealing materials shall be of approved make and suitable for external weatherproof applications.

### **1.6 Hardware and Fixtures**

Friction stays, handles, locks, locking arrangements, cleats, brackets, screws, anchor fasteners and all accessories shall be of approved make and corrosion-resistant material. All hardware shall be compatible with aluminium window systems.

## **2.0 WORKMANSHIP**

### **2.1 General**

The work shall include fabrication, supply, transportation and installation of powder coated aluminium glazed casement windows complete in all respects as shown in approved drawings and directed by the Engineer-in-Charge.

### **2.2 Fabrication**

All aluminium members shall be accurately cut, machined, fabricated and assembled to the required dimensions.

Corners and joints shall be properly cleated, crimped or mechanically fixed to form rigid and watertight assemblies.

The fabrication shall ensure smooth operation of shutters and proper alignment of all members.

### **2.3 Fixing of Window Frame**

The outer frame shall be fixed true to line, level and plumb using approved anchor fasteners, brackets and fixing arrangements.

Adequate packing and shimming shall be provided wherever required to ensure proper alignment.

The gaps between frame and masonry/concrete surfaces shall be sealed with approved silicone sealant.

### **2.4 Casement Shutters**

Openable casement shutters shall be fitted with approved friction stays, handles and locking devices.

The shutters shall operate smoothly without distortion, rattling or excessive play.

All moving parts shall be properly adjusted after installation.

### **2.5 Glazing**

Glass shall be fixed using approved glazing beads, EPDM gaskets and silicone sealants.

The glazing system shall provide complete weatherproofing and prevent ingress of water, dust and air.

All glass edges shall be properly protected and no damaged or chipped glass shall be accepted.

## **2.6 Louver Panels**

Top and bottom louver panels shall be fabricated and installed as shown in drawings.

Louvers shall be securely fixed and aligned uniformly throughout the window assembly.

Openable louvers, where specified, shall operate freely and shall be provided with suitable operating arrangements.

## **2.7 Finishing**

All exposed surfaces shall be cleaned after installation.

Protective tapes, labels and temporary coverings shall be removed after completion of work.

Any damage caused during fixing shall be rectified to the satisfaction of the Engineer-in-Charge.

## **3.0 MODE OF MEASUREMENT & PAYMENT**

The unit rate shall include the cost of powder coated aluminium sections, glazing, louvers, EPDM gaskets, wool pile, glazing beads, silicone sealants, friction stays, handles, locks, brackets, anchor fasteners, hardware fittings, fabrication, transportation, erection, fixing, testing, cleaning, making good adjoining surfaces and all labour, tools, plants and incidental expenses required for completion of the work.

The window shall be measured for the actual area fixed in position, calculated as overall width multiplied by overall height of the outer frame.

No separate payment shall be made for hardware fittings, louvers, glazing beads, sealants, gaskets, anchor fasteners, fixing arrangements, making good surfaces or any ancillary items required for satisfactory completion of the work.

The rate shall be for a unit of one square metre of completed and approved aluminium glazed casement window work.

Payment shall be made on the basis of actual measured area of completed work accepted by the Engineer-in-Charge.

**Item No. 46: - P & L 24" x 24" vitrified 8 mm thick tile flooring 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 dismantling of existing flooring and jointed with color cement slurry including finished with flush pointing & cleaning the surface etc. complete for antiskit**

**AND**

**Item No. 47: - Providing and laying Vitrified tiles 8 to 10 mm thick , in skirting risers of steps and dedo on 10mm thick cement plaster 1:3 (1-cement : 3-coarse sand) and jointed with white cement slurry**

**1.0. Materials**

Water shall conform to M-1. Cement mortar shall conform to M-11. **24" x 24" size full body vitrified tiles 8mm thick** shall conform to relevant Indian standard. The size & colour of vitrified tiles shall be approved by Engineer in charge.

**2.0. Workmanship**

**2.1. Bedding :**

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

**2.1.2.** The **vitrified flooring tiles** shall be laid on cement mortar bedding of 20 mm (average) thick base of cement mortar 1:6 (1 cement : 6 coarse sand) and laid over and jointed with white cement slurry. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of bedding. The base shall be cleared and well wetted. The mortar shall then be spread in thickness not less than 10 mm. at any place and average 20 mm thickness. The proportion of the cement mortar shall be as specified in the item.

**2.2. Fixing tiles :**

**2.2.1.** The tiles before laying shall be soaked in water for at least two hours. Neat gray cement grout at 33 kg/Cement/Sq.mt. of honey like consistency shall be spread over the mortar bedding as directed. The edges of the tiles shall be smeared with neat cement slurry. The tiles shall be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straight line or as per pattern.

**2.2.2.** The tiles shall not have staggered joints. The joints shall be true to centre line both ways. The Nahni trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed they shall be cut

(Swan) to the required size and the edges rubbed smooth to ensure straight and true joints. The joints shall be filled with grey cement grout with wire brush or trowel to a depth of 5 mm. and loose material removed. White cement shall be used for pointing the joints. After fixing the tiles finally in an even plane the flooring shall be kept wet and allowed to nature undisturbed for 7 days. The pattern shall be approved by Engineer in charge.

### **2.3. Cleaning :**

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

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

3.1. The work done shall be measured in sq.mt. for visible area of work done. The length and width of the flooring shall be measured not between the faces of skirting or dedos or plastered face of wall as the case may be. The paving under dedo or skirting shall not be measured. No deduction shall be made not extra paid for any opening in the floor of area upto 0.1 sq.mt. Nothing extra shall be paid for laying the floors at different levels in the same rooms.

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

**Item No. 48:-** Providing and laying Machine cut, free edges, mirror polished Granite Slab flooring over 18mm (Average) thick base of cement mortar 1:6 (1-cement : 6-coarse sand) laid over and jointed with grey cement slurry mixed with pigment to match the shade of slab including rubbing and polishing etc. complete. (A) 18mm thick

**AND**

**Item No. 49:-** Providing and laying Machine cut, free edges, mirror polished Granite Slab 18mm thick in risers of steps, skirting Dedo and pillars laid on 10mm thick cement mortar 1:3 (1-Cement : 3 coarse sand) and jointed with gray cement slurry mixed with pigment to match the shade of slab including rubbing and polishing etc. complete

**1.0. Materials**

- 1.1. Water shall conform to M-1. Lime mortar shall conform to M-10. Cement mortar shall conform to M-11. **black madras Granite stone** shall conform to M-49,
- 1.1. Granite stone slab shall be hard even sound, and regular in shape and generally uniform in colour. The colour of the stone shall generally be green. Brown coloured shall not be allowed for use. They shall be without any soft veins cracks or flaws 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 600 mm x 600 mm and or as approved by Engineer in charge or Architect. However smaller sizes will be allowed to be used to the extent of maintaining required pattern. Thickness shall be as specified.
- 1.3. Tolerance of minus 30 mm. on accounts of chisel dressing of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be +3 mm.
- 1.4. The edges of Granite stone slab 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.
- 1.5. 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.
- 1.6 The stones shall have machine polished surface. When brought on site, the stones shall be single polished or double polished depending upon its use. The stones for paving shall generally be single polished. The stones to be used for dedo, skirting, sink, veneering, sills, steps etc. where machine polishing after the stones are fixed in situ is not possible shall be double polished.

**2.0. Workmanship**

- 2.1. Each slab shall be cut to the required size and shape and fine chisel dressed at all the edges. The sides true 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 a plane surface. The thickness shall be 20 mm. (average) as specified in the item but not less than 25 mm. at any place of the slab.

- 2.2. Bedding for the polished blue Granite stone slabs shall be of cement mortar 1:6 (1 cement : 6 coarse sand) or L.M. 1:1.5 of average thickness 20 mm given in the description of the item. Sub grade shall be cleaned wetted and mopped mortar of the specified mix and thickness shall then be spread on an area sufficient to receive one blue Granite stone slab. The slab shall be washed clean before laying. It shall be laid on top, pressed, tapped gently to bring it in level with the other slabs. If shall then be lifted and laid aside. Top surface of the mortar shall then be corrected by adding fresh mortar at hollows or depressions. The mortar shall then be allowed to harden bit. Over this surface, cement slurry of honey-like consistency shall be applied. The slab shall then be gently placed in position and tapped with wooden mallet till it is properly padded in level with and close to the adjoining slab. The joint shall be as fine as possible. The slabs fixed in the floor adjoining, the walls shall enter not less than 10 mm. under the plaster, skirting or dedo. The junction between the wan and floor shall be finished neatly. The finished surface shall be true to levels and slopes as directed.
- 2.3. The floor shall be kept wet for a minimum period of 7 days so that bedding and joints set properly
- 2.4. Polishing shall be normally commenced after 14 days of laying the stone slab. First polishing shah be done with carborundum stones of 120 grade grit fitted in the heavy machine and then second polishing shall be done with carborundum stone of 220 to 350 grade grit fitted in heavy machine. Water shall be properly used during polishing. The stone shall then be washed clean with water When directed by the Engineer-in-charge, wax polish of approved quality shall be applied on the surface with the help of soft cloth over a clean and dry surface. Then the polishing machine fitted with bobs shall be run over it.
- 2.5. The holes required for Nahni traps, pipes and any other fittings shall be made, without any extra cost.
- 3.0. **Measurement & payment**
- 3.1. The rate shall include the cost of all materials and labour involved in all the operations described above. The Granite stone flooring shall be measured in square meters correct to two places decimal, length and breadth shall be measured correct to a centimeter and between the finished face of skirting dedo plaster and no deduction shall be made nor extra paid for any opening in floor of areas upto 0.1 sq.
- 3.2. The rate shall be for a unit of one **sq. meter**.

**Item No. 50:- 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.**

### **1.0. Materials**

Water shall conform to M-1 Cement mortar shall conform to M-11 White glazed tiles shall conform to M-55

### **2.0. Workmanship**

#### **2.1. Bedding :**

- 2.1.1. The sub grade shall be cleaned, wetted and mopped. The bedding shall then be laid evenly over the surface tamped and corrected to desired level and allowed to harden enough to offer a rigid cushion to tiles and to enable the monsoon to place wooden planks across and squat on it.
- 2.1.2. The white glazed tiles shall be laid on cement mortar bedding of 12 mm. thick in C.M. 1:3. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of bedding. The base shall be cleared and well wetted. The mortar shall then be spread in thickness not less than 10 mm. at any place and average 12 mm. thickness. The proportion of the cement mortar shall be as specified in the item.

#### **2.2. Fixing tiles :**

- 2.2.1. The tiles before laying shall be soaked in water for at least two hours. Neat gray cement grout at 33 kg/Cement/Sq. mt. of honey like consistency shall be spread over the mortar bedding as directed. The edges of the tiles shall be smeared with neat cement slurry. The tiles shall be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be. no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straight line or as per pattern.
- 2.2.2. The tiles shall not have staggered joints. The joints shall be true to centre line both ways. The Nahni trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed they shall be cut (Swan) to the required size and the edges rubbed smooth to ensure straight and true joints. The joints shall be filled with grey cement grout with wire brush or trowel to a depth of 5 mm. and loose material removed. White cement shall be used for pointing the joints. After fixing the tiles finally in an even plane the flooring shall be kept wet and allowed to nature undisturbed for 7 days.

#### **2.3. Cleaning :**

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

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

- 3.1. The work done shall be measured in sq. mt. for visible area of work done. The length and width of the flooring shall be measured not between the faces of skirting or dedos or plastered face of wall as the case may be. The paving under dedo or skirting shall not be measured. No deduction shall be made not extra paid for any opening in the floor of area-up to 0.1 sq.mt. Nothing extra shall be paid for laying the floors at different levels in the same rooms
- 3.2. The rate shall be for a unit of one sq. meter.



**Item No. 51:- 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.**

### **1.0. Materials**

Water shall conform to M-1 Cement mortar shall conform to M-11 White glazed tiles shall conform to M-55

### **2.0. Workmanship**

#### **2.1. Preparation of Surface:**

In case of brick masonry wall, the joints shall be raked out to a depth of least 15 mm. while the masonry is being laid. In case of concrete wall the surface shall be chiseled and roughed with wire brushes. The surface shall be cleaned and wetted thoroughly before commencing the laying work.

#### **2.2. Laying ;**

2.2.1. The wall surface shall be covered with 10 mm. thick plaster of cement mortar 1:3 mix and allowed to harden. The plaster shall be roughened with wire brushes both way. The back of tiles shall be floated with grey cement slurry set and edges with white cement slurry in bedding mortar. The tiles shall be gently tapped in position on after the other keeping the joints as thin as possible. Top of skirting or dedo shall be truly horizontal and the joints vertical or as per required pattern.

2.2.2. Risers of steps, skirting and dedo shall rest on top of treads or flooring. Where full size tiles cannot be fixed, They shall be cut to the required size and the edges be smoothened.

2.2.3. The joints shall be cleaned and flush pointed with white cement. The surface shall be kept wet for seven days. After curing the surface shall be washed clean.

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

3.1. The rate shall include the cost of all materials and labour required for various operations described above. Risers of steps: skirting and dedo shall be measured in square meters, length and height shall be measured along the finished face of the skirting or dedo including curves, where special such as covers. internal and external angles, etc., used. The length and height shall be measured correct to the centimetre except in case of risers and skirting where height shall be measured correct to 3 mm

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

**Item No. 52:-** Providing and laying polished Kota stone slab flooring over 20mm (Average) thick base of cement mortar 1:6 (1-cement : 6-coarse sand) or L.M. 1:1.5 laid over and jointed with grey cement slurry including rubbing and polishing etc. complete. (B) 30 mm thick

**1.0. Materials and workmanship**

1.1. The relevant specifications of item No 14 43 (A) shall be followed except that the thickness of stone shall be 30 mm.

**2.0. Mode of measurements & payment**

2.1. The relevant specifications of item No 14.43 (A) shall be followed.

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

**Item No. 53:-** Providing and fixing mirror polished 18 mm thick Granite with full round edge and polished of approved quality in cladding on sill and around the doors/ windows/ ventilation with 20 mm thick cement plaster CM (1:4) and fixing with cement slurry & adhesive including moulding of exposed edges as directed by engineering in charge etc. complete.

- Polished or honed Granite tiles are calibrated & gauged with a tolerance of +/- 0.5mm. The sides are sawn to perfect right angle and top edges are micro beveled
- Granite being natural stone, variation to shade & pigmentation within a batch is a natural occurrence and accepted by the industry as normal. This variation adds unique beauty to the finished surface
- It is recommended to consider 5% to 10% additional material to the coverage area depending on the style of installation to allow for wastage due to cutting of tiles to fill corners and defects in natural stone tile
- Granite tiles can be but joined or grout joined to suit installation style. It is recommended to make a dry run to match flow of pattern to avoid cross setting.
- Please review typical installation photos to get a better understanding of the finished floor.
- Polished or Honed Granite tiles are not recommended for outdoor flooring. Moist/wet flooring can be highly slippery. Flamed or bush hammered finish is recommended for outdoor flooring.
- Water based penetrating sealer is recommended to protect from staining. Please follow manufacturer's instruction for application.
- Water based penetrating sealer/enhancer is recommended for deeper & vibrant coloration of the finished floor. It is recommended to do a test on a small hidden area or some waste tiles before applying to entire floor.

**Mode of Payment:** The measurement shall be in Sqmt of Marbo granite tiles supplied and fixed in position

**Item No. 54:-** Providing and laying 40 mm thick IPS (Indian Patent Stone) flooring in cement concrete 1:2:4 (1-cement : 2-coarse sand : 4-graded stone aggregate of 20 mm nominal size) laid in one layer over prepared base and finished with a smooth floating coat of neat cement mixed with approved yellow colour pigment of required shade at 0.35 kg/Sq.m to obtain uniform colour and finish, including surface preparation, compacting, trowel finishing, curing and complete as directed by Engineer-in-Charge. Providing and fixing mirror polished 18 mm thick Granite with full round edge and polished of approved quality in cladding on sill and around the doors/ windows/ ventilation with 20 mm thick cement plaster CM (1:4) and fixing with cement slurry & adhesive including moulding of exposed edges as directed by engineering in charge etc. complete. Providing and laying polished Kota stone slab flooring over 20mm (Average) thick base of cement mortar 1:6 (1-cement: 6-coarse sand) or L.M. 1:1.5 laid over and jointed with grey cement slurry including rubbing and polishing etc. complete. (B) 30 mm thick

### 1. Scope of Work

The work shall consist of **providing all labour, materials, machinery, tools, plants, transportation, loading, unloading, laying, compacting, finishing, curing, protection and all incidental works** necessary for constructing **40 mm thick Indian Patent Stone (IPS) flooring in Cement Concrete 1:2:4 (1 Cement : 2 Coarse Sand : 4 Graded Stone Aggregate of 20 mm nominal size)** over the prepared base, complete with a smooth floating coat of neat cement incorporating approved yellow colour pigment, as shown on the drawings and directed by the Engineer-in-Charge.

The rate shall include complete execution of the flooring ready for use, including preparation of the base, finishing, curing and protection of the finished work.

### 2. Applicable Standards

The work shall conform to the latest editions of the following standards:

- IS 456 – Plain and Reinforced Concrete – Code of Practice
- IS 383 – Coarse and Fine Aggregates for Concrete
- IS 269 / IS 8112 / IS 12269 – Ordinary Portland Cement
- IS 650 – Standard Sand (where applicable)
- IS 2571 – In-situ Cement Concrete Flooring
- IS 1237 – Cement Concrete Flooring Tiles (for workmanship reference)
- CPWD Specifications (Latest Edition)
- Relevant BIS Standards

Where any discrepancy exists, the decision of the Engineer-in-Charge shall be final.

### 3. Materials

#### 3.1 Cement

Cement shall be:

- Ordinary Portland Cement (OPC 43 Grade or 53 Grade)

or

- Portland Pozzolana Cement (PPC)

conforming to the relevant BIS Standards.

Cement shall be fresh, dry and free from lumps.

#### 3.2 Fine Aggregate

Fine aggregate shall consist of clean coarse river sand or approved manufactured sand conforming to IS 383.

The sand shall be:

- Hard
- Clean
- Well graded
- Free from clay, silt, salts and organic impurities.

#### 3.3 Coarse Aggregate

Coarse aggregate shall consist of machine-crushed hard stone conforming to IS 383.

Nominal Size:

**20 mm**

Aggregate shall be:

- Clean
- Hard

- Durable
- Angular
- Free from dust and deleterious matter.

### 3.4 Water

Water used for mixing and curing shall be clean, potable and free from harmful salts, oils, acids and organic matter.

### 3.5 Colour Pigment

Approved **yellow mineral oxide pigment** of high-quality, alkali-resistant and light-fast properties shall be used.

The pigment shall:

- Be compatible with cement.
- Produce a uniform shade.
- Be resistant to fading.
- Be free from harmful impurities.

Dosage:

**0.35 kg per square metre** uniformly mixed with the neat cement finishing coat.

Only approved brands shall be used.

## 4. Concrete Mix

Concrete shall be proportioned as:

**1 Cement : 2 Coarse Sand : 4 Graded Stone Aggregate**

Concrete shall be machine mixed wherever possible.

Hand mixing shall be permitted only with prior approval and with an additional 10% cement.

The water-cement ratio shall generally not exceed **0.50** unless otherwise approved.

Concrete shall be mixed until a uniform consistency is achieved.

## 5. Preparation of Base

Before laying IPS flooring:

- Base concrete shall be cleaned thoroughly.
- Dust, laitance, grease and loose particles shall be removed.
- Surface shall be roughened where necessary.
- Honeycombs and depressions shall be repaired.
- Base shall be wetted adequately without leaving standing water.
- Cement slurry shall be brushed over the prepared surface immediately before laying IPS.

No flooring shall be laid over a contaminated or loose base.

## 6. Laying of IPS Flooring

Concrete shall be laid to a uniform thickness of **40 mm**.

The flooring shall be laid in alternate panels wherever required to minimize shrinkage cracks.

Suitable dividing strips, if shown in drawings, shall be fixed accurately before concreting.

Concrete shall be compacted thoroughly using wooden or mechanical tampers.

Proper levels, slopes and alignment shall be maintained throughout.

The finished floor shall be free from undulations.

## 7. Floating Coat

Immediately after initial compaction, a floating coat of neat cement mixed with approved yellow pigment shall be applied uniformly over the surface.

Pigment Quantity:

**0.35 kg per square metre**

The finishing coat shall be worked into the surface using steel trowels to produce a dense, smooth and uniform finish.

The colour shall remain consistent throughout the flooring without patches or streaks.

## 8. Finishing

The finished surface shall be:

- Smooth
- Dense
- Uniform in colour
- Even
- Free from trowel marks
- Free from cracks
- Free from depressions
- Free from laitance

- Slip resistant to normal pedestrian use

Corners and edges shall be neatly finished.

Construction joints shall be straight and properly aligned.

### **9. Curing**

The flooring shall be protected from foot traffic until initial setting.

Curing shall commence after the surface has sufficiently hardened.

Continuous curing shall be carried out using clean water for a minimum period of **14 days**.

The flooring shall remain continuously moist throughout the curing period.

### **10. Protection**

Freshly laid flooring shall be protected against:

- Rain
- Dust
- Mechanical damage
- Impact
- Premature loading
- Chemical contamination

Barricading shall be provided wherever necessary.

Any damaged portion shall be removed and relaid by the contractor without additional payment.

### **11. Workmanship**

The workmanship shall be of the highest standard.

The contractor shall ensure:

- Uniform thickness of 40 mm
- Correct levels
- Proper slopes where specified
- Uniform colour
- Proper compaction
- Smooth finish
- Sharp edges
- Accurate panel layout
- Crack-free surface

No segregation, honeycombing or surface defects shall be permitted.

### **12. Quality Control**

The Engineer-in-Charge may inspect:

- Cement quality
- Aggregate grading
- Concrete mix proportion
- Thickness of flooring
- Pigment dosage
- Surface finish
- Levels and slopes
- Colour uniformity
- Curing arrangements

The contractor shall submit manufacturer's certificates for the pigment whenever required.

### **13. Inspection and Acceptance**

The completed flooring shall be accepted only if:

- Thickness is 40 mm throughout.
- Concrete mix is 1:2:4.
- Colour is uniform.
- Surface is smooth and even.
- No visible cracks, crazing or laitance are present.
- Proper curing has been carried out.
- Levels and slopes conform to drawings.
- Surface is free from hollowness and loose patches.

Defective flooring shall be dismantled and replaced by the contractor at no additional cost.

### **14. Measurement**

Measurement shall be made in **Square Metres (m<sup>2</sup>)** of finished flooring.

The measured area shall be the actual finished floor area.

No separate measurement shall be made for:

- Surface preparation
- Cement slurry
- Pigment
- Floating coat
- Panel formation
- Finishing
- Trowelling
- Curing
- Protection
- Scaffolding
- Labour
- Wastage
- Testing
- Cleaning

#### **15. Rate**

The accepted rate shall include:

- Supply of cement
- Coarse sand
- 20 mm graded stone aggregate
- Approved yellow colour pigment
- Water
- Surface preparation
- Cement slurry
- Machine mixing
- Transportation
- Loading and unloading
- Laying
- Compacting
- Floating coat
- Steel trowel finishing
- Curing for 14 days
- Protection of finished flooring
- Cleaning
- Labour
- Tools and plants
- Scaffolding (where required)
- Quality testing
- Royalties
- Taxes
- Duties
- Wastage
- All incidental expenses necessary to complete the work in accordance with the drawings, specifications and directions of the Engineer-in-Charge.

No additional payment shall be made for any operation required for satisfactory completion of the work.

**Item No. 55:-** Providing and laying tactile tile (for vision impaired persons as per standards) of size 300x300x9.8 mm having with water absorption less than 0.5% and conforming to IS:15622 of approved make in all colours and shades in for outdoor floors such as footpath, court yard, multi modals location etc., laid on 20 mm thick base of cement mortar 1:4 (1 cement: 4 coarse sand) in all shapes & patterns including grouting the joints with white cement mixed with matching pigments etc. complete as per direction of Engineer-in-Charge.

(300 × 300 × 9.8 mm Outdoor Tactile Warning/Directional Tiles)

### 1. Scope of Work

The work shall consist of supplying, transporting, handling, laying, jointing, curing and finishing tactile paving tiles for guidance of visually impaired persons at footpaths, pedestrian walkways, public buildings, bus terminals, railway stations, parks, hospitals, schools, government offices, multimodal transport facilities and other public places, complete in all respects as per the drawings, specifications and directions of the Engineer-in-Charge.

The contractor shall provide all labour, materials, tools, plants, machinery, transportation, testing, wastage, loading/unloading, curing and all incidental works necessary for satisfactory completion of the item.

### 2. Applicable Standards

The work shall conform to the latest editions of the following standards:

- IS 15622 – Ceramic Tiles
- IS 1237 – Cement Concrete Flooring Tiles (where applicable)
- IS 383 – Coarse and Fine Aggregates
- IS 269 / IS 8112 / IS 12269 – Ordinary Portland Cement
- IS 650 – Standard Sand
- IS 9103 – Concrete Admixtures (if required)
- Harmonized Guidelines and Standards for Universal Accessibility in India
- National Building Code (NBC) – Latest Edition
- CPWD Specifications – Latest Edition
- Rights of Persons with Disabilities (RPWD) Act Guidelines
- IRC Guidelines for Universal Accessibility (where applicable)

### 3. Material Specifications

#### A. Tactile Tiles

The tactile tiles shall be:

- Factory manufactured.
- First quality vitrified/porcelain tactile tiles.
- Size:
  - **300 mm × 300 mm**
- Thickness:
  - **9.8 mm minimum**
- Water absorption:
  - **Less than 0.5%**
- Conforming to **IS 15622**
- Anti-skid surface.
- UV resistant.
- Weather resistant.
- Frost resistant.
- Acid and alkali resistant.
- Wear resistant.
- Suitable for outdoor pedestrian traffic.

The tactile profile shall consist of:

- Warning (Dot Type)
- Directional (Bar Type)

as shown in approved drawings.

#### B. Colour

Approved by Engineer-in-Charge.

Generally:

- Yellow
- Ivory

- Grey
- Buff

or any approved contrasting colour.

Colour shall be uniform throughout the tile body.

### **C. Surface Finish**

- Matt finish
- Anti-slip
- Textured finish
- Uniform colour
- Free from cracks
- Free from chips
- Free from pinholes
- Free from warpage

### **4. Physical Requirements**

The tactile tiles shall satisfy:

Water absorption:

Less than 0.5%

Breaking strength:

As per IS 15622

Abrasion resistance:

Suitable for heavy pedestrian traffic

Slip resistance:

Minimum R11 or equivalent

Flexural strength:

As per IS 15622

Chemical resistance:

Resistant to mild acids and alkalis.

### **5. Cement Mortar Bed**

Tiles shall be laid over: 20 mm thick cement mortar Mix: **1:4**

(Cement: Coarse Sand)

Materials:

Cement:

OPC/PPC approved brand.

Sand:

- Clean
- Well graded
- River sand
- Free from clay
- Organic impurities

### **6. Surface Preparation**

The base shall be:

- Properly compacted
- Clean
- Free from dust
- Free from oil
- Free from loose particles
- Levelled
- Checked for line and slope.

Uneven portions shall be corrected before laying.

### **7. Laying Procedure**

The mortar shall be spread uniformly.

Tiles shall be laid:

- To true line
- Correct level
- Required gradient
- Required pattern

Each tile shall be tapped gently using rubber mallet.

No hollow sound shall be permitted.



The tactile pattern shall be perfectly aligned.

Directional tiles shall point towards intended movement.

Warning tiles shall be installed before:

- Staircases
- Crossings
- Ramps
- Elevators
- Escalators
- Hazard locations

Spacing shall comply with Universal Accessibility Guidelines.

### **8. Jointing**

Joint width:

Maximum **2–3 mm**

Joints shall be filled with:

White cement

mixed with

Matching colour pigment.

All joints shall be completely filled.

Excess grout shall be cleaned immediately.

### **9. Cutting**

Edge tiles shall be machine cut.

Hand broken tiles shall not be accepted.

Cut edges shall be smooth.

### **10. Curing**

The flooring shall be cured for minimum:

**7 days**

No traffic shall be permitted during curing.

### **11. Tolerances**

Surface Level:

±3 mm

Alignment:

±2 mm

Joint Width:

Uniform throughout.

### **12. Quality Control**

The Engineer may require testing for:

- Water absorption
- Dimensions
- Thickness
- Flexural strength
- Slip resistance
- Surface hardness
- Abrasion resistance

Defective tiles shall be replaced at contractor's cost.

### **13. Workmanship**

The finished flooring shall be:

- Even
- Level
- Free from lipping
- Free from cracks
- Uniform in colour
- Properly bonded
- Free from hollow sound

Misaligned tactile patterns shall be rejected.

### **14. Protection**

Completed flooring shall be protected using:

- Barricades
- Warning tape

- Protective covering until final handover.  
Any damaged tile shall be replaced without extra cost.

**15. Measurement**

The work shall be measured in **Square Metres (Sq.m)**.

The measured area shall be the actual finished surface.

No deduction shall be made for openings up to **0.10 Sq.m**.

**Item No. 56:- Providing and laying broken chine mosaic flooring for terrace using 12 mm to 20 mm broken pieces of glazed tiles to be laid over cement mortar 1:3 to plain or slope and to be tempered to bring mortar creme out upto surface using white cement including rounding off junctions and extending them upto 15 cm along the wall,clearing with water and oxalic acid etc. as directed**

## **1.0 Material**

Water Shall confirm Material Specification no M- 1 Cement Shall confirm Material Specification no M- 3 Sand Shall confirm Material Specification no M- 6  
Crushed stone aggregates Shall confirm Material Specification no M- 12 Brick aggregates Shall confirm Material Specification no M- 14  
White Cement Shall confirm Material Specification no M- 4

Water proofing compound shall be done as per Specification no 17.70 Page No. 121

Chemicals and compounds of approved shall be of approved quality and make. The proportion of the compound shall be of specified proportion as specified by the manufacturer

## **2.0 Workmanship**

Cleaning the slab surface by mechanical means or wire brush to remove old paint, dust, dirt and all loose material

(a) providing first layer of C.M. 1 4 of 40 mm thickness mixed with water proofing compound at rate prescribed by manufacturer, including putting of brick bats of average thickness 40 mm Well immersed in water laid uniformly on first layer of mortar including applying cement slurry @ rate of

0.08 bag sqm. on fixed layer of brick bats including maintaining necessary slope

providing second layer 40 mm thick C.M 1 4 mixed with water proofing compound as directed, including finishing smooth with cement slurry as directed complete.

using 12 mm to 20 mm broken pieces of Glazed tiles to be laid over cement mortar 1 3 to plain or slope and to be tempered to bring mortar creme out up to surface using white cement including rounding off junctions and extending them up to 15 cm along the wall, clearing with water and oxalic acid etc.as directed.

after finishing the whole terrace shall be flooded with water for a period of two weeks as directed

The waterproofing material of approved quality shall be mixed with the cement slurry as per specified proportion as directed by the manufacturer of the compound and as directed by the engineer in charge the mixture shall be applied uniformly to the surface in required coats as directed by the engineer in charge

A guarantee bond on appropriately stamped paper shall be given by the contractor to the department in the manner and form prescribed below

## **FORM OF GUATANTEE BOND**

I We .....(Contractor)

hereby guarantee that water proofing work will remain leakage proof for period of 5 years after completion of the work of water proofing treatment as per the terms and conditions of the contract and leakage that might be caused in building where the water proofing treatment is done we hereby Guarantees to make good any loss of damages suffered by the Government of Gujarat and further guarantee to redo effective work without claiming any extra cost

2.1 This guarantee shall remain in force for the period of 5 years from the completion of the work under the contract and it shall remain binding to the contractor for period of 5 Years.

2.2 The deposit at the rate of 50% of the cost of this item the running and final bills shall be recovered and retained for the first one years after completion of the guarantee period balance of guarantee period and shall be refunded only after the completion of the guarantee period.

### **3.0 MODE OF MEASUREMENT and PAYMENT**

3.1 The unit rate of water proofing treatment shall include the cost of all materials, tools and plant chemicals and compounds required for water proofing, Applying the same to specified surface as per drawings, finishing, painting with three coats, etc, and all other incidental expenses for producing water proofing 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 of all scaffolding and forms required for the work.

The rate of water proofing shall include the cost of all labour, materials chemicals and compounds tools and plant scaffolding and all incidental expenses as described herein above.

3.2 The water proofing work shall be measured for its length and width, limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one sq.meter

3.3 The payment will be made on sq. meter basis of the finished work.

**Item No. 57:- Providing erecting and fixing double coated Syntex PVC. (ISI) water tank of required capacity each with all necessary fittings and connection etc. complete on terrace.**

### **General**

This work shall consist of **Providing and fixing P V C water tank of specified capacity with necessary G I fittings including 25 mm dia G.I. over flow pipe, ball valve**, of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer in charge.

#### **PVC Water tank**

PVC Water tank of specified capacity and of I.S.I. mark of approved in liters of approved make and quality equivalent to syntax product

Net capacity shall be net volume of water stored between the lowest level of overflow and lowest specified level.

#### **Nipple**

Galvanize pipe nipple shall be of approved make and of best quality Relevant specification given in Booklet of Building specification shall be applied for the execution of this item

#### **Ball valve**

Ball valve shall confirm specification no 23.00.5 (A) on page 172 of specification booklet for building works

Ball valve shall be of approved make and of best quality. Relevant specification given in Booklet of Building specification shall be applied for the execution of this item

#### **Connections**

Connections shall be of approved make and of best quality. Relevant specification given in Booklet of Building specification shall be applied for the execution of this item

#### **WORKMAN SHIP**

Tank shall be approved quality and as per IS standard make. Material used in manufacturing tank shall be confirmed to relevant IS code. The material of tank and lead and fittings which may come in contact of water should be such that it does not impart any taste, colour or odor. It does not have any toxic effect and it does not contaminate the water. Thereby making it unpotable.

The tank shall be fixed properly in a level position and making all required necessary correction like inlet outlet flushing overflow and air vent. Tank shall be satisfying the standards of public health.

#### **Mode of Measurement & Payment:**

The payment will be made on **capacity in litter's** basis of the finished work.

All necessary labour materials Equipment tools and plant, conveyance

including loading and unloading etc shall be provided by the Contractor as directed by the Engineer in charge

The item shall be measured for its **capacity in liters** limiting dimensions to those specified on plan or as directed.

The rate shall be for a unit of **one Litter**.

**Item No. 58:- Providing laying and jointing in true line and level 40mm dia. U.P.V.C. Pipe (SCH-40) for cold water including fittings 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 cancelled as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.**

The relevant specifications of Building Booklet It. No.23.8. (D) Page No.162 shall be followed expect use level 40mm dia. U.P.V.C. Pipe (SCH- 40) for cold water including fittings make PRINCE SUPREME ASTRAL FINOLEX or equivalent and Pipe shall be fixed on the wall with the help of clamp at every two-meter C C or shall be concerned as directed as approved by Engineer In Charge and instead of 6 kgs sq.cm. working pressure polythene pipes of 40mm dia.

**Item No. 59:- Providing laying and jointing in true line and level 25mm dia. U.P.V.C. Pipe ( SCH-40) for cold water including fittings make as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two metre C/C or shall be cancelled as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.**

The relevant specifications of Building Booklet It. No.23.8.(B) Page No.162 shall be followed expect use level 25mm dia. U.P.V.C. Pipe ( SCH- 40) for cold water including fittings make PRINCE SUPREME ASTRAL FINOLEX or equivalent and Pipe shall be fixed on the wall with the help of clamp at every two metre C C or shall be concerned as directed as approved by Engineer In Charge and instead of 6 kgs sq.cm. working pressure polythene pipes of 25mm dia.

**Item No. 60:- Providing laying and jointing in true line and level 15mm dia. U.P.V.C. Pipe (SCH-40) for cold water including fittings 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 cancelled as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.**

The relevant specifications of Building Booklet It. No.23.8.(A) Page No.162 shall be followed expect use level 15mm dia. U.P.V.C. Pipe ( SCH- 40) for cold water including fittings make PRINCE SUPREME ASTRAL FINOLEX or equivalent and Pipe shall be fixed on the wall with the help of clamp at every two meter C C or shall be concerned as directed as approved by Engineer In Charge and instead of 6 kgs sq.cm. working pressure polythene pipes of 20mm dia

**Item No. 61:-** 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. [E] 40mm.

**AND**

**Item No. 62:-** 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. [C] 25mm.

**AND**

**Item No. 63:-** 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.

#### **1.0. Materials**

1.1. The low-density polythene pipe of specified diameter with 6 Kg/Sq. Cm, working pressure shall conform to I.S. 3076-1968. The specials and fittings required shall be of best quality.

#### **2.0. Workmanship**

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

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

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

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

-20 mm. dia 500 mm. -25 mm. dia 750.mm. -32 mm. dia.900 mm.

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

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

2.7. P.V.C. pipes shall be fixed on wall with wooden plugs and suitable plastic clamps.

#### **2.8. Jointing the pipes :**

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

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

#### **2.9. Laying pipes in Trenches :**

2.9.1. The pipes shall be laid over uniform relatively soft fine trained soil found to be free of presence of hard object such as large flints, rocky projections, large tree roots etc. The width of the trenches shall be minimum width required for working.

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

### 3.0. Mode of measurements & payment

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

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

**Item No. 64:- Providing laying (to level or slopes) and jointing reinforced concrete Light duty non-pressure pipes I.S. class NP2 of the following internal diameter with collars and butt ends prepared for collar joints including testing of joints complete.(D) 300mm**

**1.0. Materials :** The reinforced concrete light duty non-pressure pipes of specified diameter shall conform to I.S. 458-1971.

### 2.0. Workmanship

2.1. The relevant specifications of item No. 24.1. A shall be followed for work of trenches except that the excavation in trenches shall be for reinforced concrete pipes of specified diameter.

### 2.2. Laying

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

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

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

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

### 2.3. Jointing

2.3.1. The joints shall be done by slipping the collar over and clear of the end of the pipe. The recess of the end of the pipe shall be filled with jute braiding in hot bitumen. The new pipe shall then be brought forward until the bitumen ring in recess of first pipe is set into the recess of the second pipe. The process shall be repeated for two or three pipes which shall then jacked up so as to thoroughly compress the bitumen. The quantity of jute and bitumen shall be just enough to fill the recess when pressed hard by jacking, care being taken that no offset of the jute braiding shall be visible either outside or inside of pipe. The collar shall then be set up over the joints covering equally both the pipe and leaving, an even caulking space all round. Cement and sand mortar: 1: 1.1/2 shall then be well punched or pressed home with a caulking tool within this caulking space. Care shall be taken that the underside of the joints is properly filled with mortar.

### 2.4. Curing

2.4.1. Every joints shall be kept wet for about 10 days for maturing. The section of the pipe line laid and jointed shall be covered immediately to protect from weather effects. Minimum bore of 100 mm. is considered adequate



**2.4.2. The joints shall be left exposed for observation.**

**2.5. Testing of Joints :**

**2.5.1.** The testing of joints shall be done as per relevant specifications of item No. 24.1 (A) **except that** the testing of reinforced concrete pipes shall be done.

**3.0. Mode of measurements & payment**

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

**3.2.** The measurements shall be net without any allowance for cutting and waste. The length of bends, junctions and other connections (measured along the centre line) shall be included in the total length of the pipes, the connections being numbered afterwards and paid for extra over pipes.

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

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

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

**Item No. 65:- Providing and fixing cast iron spigot and socket soil, waste and ventilating pipes of the following nominal size.(C) 100mm dia.**

**1.0. Materials**

1.1. The specified dia. C.I. Spigot and socket soil or waste pipe shall conform M-68.

**2.0. Workmanship**

**2.1.** The fixing of C.f. spigot and sockets soil, waste and ventilating pipe shall be carried out as per relevant specifications of item 15.93 (B) except the C.I. spigot and socket shall be fixed. The joints shall be filled with cement mortar 1:2 (1 cement: 2 sand) and spun yarn. The joints shall be filled with cement mortar 1:2 (1 cement: 2 sand) and spun yarn. The pipes without care shall be fixed to wall with M.S. clamps the pipes will be secured with 40 mm before steel or iron barrel distance pieces or bolts and stout galvanised iron nails 10 cms long into hand wool plug fixed in walls. Access doors to fittings shall be provided with 3 mm. rubber insertion packing and secured without screws to make air and water tight

**2.2. All soil pipes shall be earned up above the roof and shall have a wire ball on guarded or a cowl.**

**2.3.** The ventilating pipe or shaft shall be carried out to a height of at least one meter above the outer covering of the roof of the building or in the case of windows in a gable wall or a dormer windows, it shall be carried up to a ridge of the roof or at least two meters above the top of the windows. In case of flat roof to which access for use is provided, it shall be carried out up to a height of at least one meter above the parapet or two meters measured vertically from the top of any windows or opening which any exist up to a horizontal distance of five meters from the vent pipe into such building and in no case shall be carried out to a height less than three meters.

**2.4.** Where ventilating pipes are carried in pipe shafts, the shaft shall be of a minimum size of one meter. If the shafts are also used to give light and air to rooms, the ventilating pipes must be carried out to a horizontal distance at root level not less than five meters from the site of the shaft.

**2.5.** The sand cast iron pipes above parapet shall be fixed with M.S. clamps and stays. The clamps shall be made from 1.5 mm. thick MS flat or 3 mm. width band to the required shape and size to fit tightly on the sockets when tightened with screw bolts. It shall be formed of two semi-circular pieces with flanged ends on both sides, with holes to fit in the screw bolts and nuts 40 mm. dia. M.S. Bars, one end of the stay shall be bent to form a hook to be fixed with clamps by means of bolts and the other end shall be bent for embedding in wall in cement concrete block of size 200 mm. x 100 mm. x 100 mm. in 1:2:4 mix. The concrete shall be finished to match the surrounding surfaces.

**2.6.** The connection between the main pipe and branch pipes shall be made by using branches and bends with access doors for cleaning

**2.7.** The waste from lavatories, kitchens basins, sinks, baths and other floor traps shall be separately connected to respective stacks of upper floor. The waste stack of lavatories shall be connected directly to main hole while the waste stack of other shall be separately discharged over gulley trap.

**3.0. Mode of measurements and payment**

**3.1.** The length of pipe shall be measured including all fittings along its length in running meters correct to a centimetre. No allowance shall be made for the portion of pipe length entered in the sockets of the adjacent pipe or fittings.

**3.2.** The rate includes all labour, and materials, tools and plant etc. required for satisfactory completion of this item.

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

**Item No. 66:- 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.**

**1.0. Materials**

**1.1.** The cast iron (spun) Nahni trap shall conform to M-69. The C.I. hinged or screwed down cover shall be of best quality

**2.0. Workmanship**

**2.1. The Nahni trap with 100 mm. dia inlet and 50 mm. dia. outlet shall be fixed as per drawing or as directed.**

**2.2.** The Nahni trap shall be jointed with C.I. Pipe, 75 mm. dia. with lead joints. The lead joints shall be done in conformation with I.S. 782.-1976.

**3.0. Mode of measurements and payment**

**3.1.** The rate includes cost of all labour, materials, tools and plants etc. required for satisfactory completion of this item including lead, jointing and testing.

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

**Item No. 67:- Provision, Supplying and fixing White vitreous ching W.C. squatting pan Orrisa type 580 x 400 size with 100mm P or S trap, 25mm dia. C. P. Brass flush valve and G. I. inlet connection etc. comp. (A) Vitreous ching long pattern white or color.**

**1.0. Materials**

1.1. The pair of white vitreous china foot-rests shall conform to M-62 Cement mortar shall conform to M-11.

**2.0. Workmanship**

2.1. After laying the floor, the floor shall be suitably sloped so that the waste water is drained into the pan A pair of foot-rests of size 250 mm. x 130 mm. x 30 mm. of white vitreous china shall be set in cement mortar 1:3 (1 cement; 3 coarse sand). The foot-rests shall be fixed at a distance of 175 mm. from the inner edge of the back side of the pan and shall be fixed at convenient angle.

**3.0. Mode of measurements & payment**

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

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

**Item No. 68: - Providing and fixing brass screw down stop tap.(A) 15mm dia.**

**1.0. Materials:** 15 mm. dia. brass screw down with bright polished finished shall conform to I.S. 781-1977. The bib cock shall be best Indian make and quality.

**2.0. Workmanship**

2.1. The screw down bib cock 15 mm. as specified above shall be fixed as directed. The threaded portion shall be smeared with white or red lead and around with a few turns of fine-spun yarn round the screwed end of the pipe. The bib cock shall be then screwed and fixed to water tight position.

**3.0. Mode of measurements and payment**

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

3.2. The rate shall be for a unit of One Number.

**Item No. 69: - Providing and fixing ball cock of approved. quality as directed.(A) Copper Metal (ii) 50mm dia.**

**1.0. Materials :**

The ball cock of specified diameter shall conform to M-75

**2.0. Workmanship**

The ball cock of specified diameter shall be fixed as directed. The fixing of ball cock shall be carried out as per relevant specification of item No. 23 (A) for joints etc.

**3.0. Mode of measurement & payment**

3.1. The rate includes-cost of all materials and labour involved for carrying out satisfactory work.

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

**Item No. 70: - Providing and fixing washbasin with single hole for pillar tap with C.I. or M.S. brackets painted white including putting holes and making good the same but excluding fittings.(A) Vitreous China:(ii) Flat Back washbasin 550 mm x v 400mm size. (i) In white colour.**

### **1.0. Materials**

1.1. The white glazed earthenware wash basin shall be 550 mm. x 400mm. of 1st quality and make as approved by the Engineer-in-charge. The wash basin shall conform to M-59.

### **2.0. Workmanship**

2.1. The washbasin shall be fixed on the wall as and where directed. The wash basin shall be supported on a pair of M.S. or C.I. brackets fixed in C.M. 1:3 (1 cement : 3 sand). The bracket shall conform to I.S. : 775-1962. The wall plaster on the rear shall be cut to rest the top edge of the washbasin. After fixing the basing, plaster shall be made good and surface finished to match the existing one.

2.2. The brackets shall be painted white with ready-mixed paint.

2.3. The C.I. brass trap and union shall be connected to 32 mm. dia. waste pipe which shall be suitably bent towards the wall and which shall discharge into an open drain leading to a gully trap or direct in to gully-trap on the ground floor and shall be connected to a waste pipe through a floor trap on the upper floors. C.P. brass trap and union may not be provided where the surface drain or a floor trap is placed directly under the basin and the waste is discharged in to vertically.

2.4. The height of the front edge to the wash basin from the floor level shall be 80 cms.

2.5. The necessary inlet, outlet connections and fittings such as pillar cocks, CP dress waste trap waste pipe, stop cock, chain with rubber plug etc. shall be fixed.

2.6. The payment of fittings shall be made separately under separate items.

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

3.1. The rate includes cost of all labour, materials, tool3 and plant etc. required for satisfactory completion of this item as specified in workmanship.

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

**Item No. 71: - Providing and fixing C.P. brass waste for washbasin or sink. (A) 32mm dia.**

**1.0. Materials**

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

**2.0. Workmanship**

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

**3.0. Mode of measurement & payment**

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

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

**Item No. 72: - Providing and fixing M.I. fisher union for washbasin or sink. (A) 32mm dia.**

**1.0. Materials**

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

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

**3.0. Mode of measurements and payment**

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

**Item No. 73: - Providing and fixing 600mm x 450mm beveled edge mirror of superior glass mounted on 6mm thick A.C. sheet or plywood sheet and fixing to wooden plug with C.P. brass screws and washers.**

**1.0. Materials**

1.1. The 600 mm. x 450 mm. size mirror shall be of superior glass with edge rounded over beveled as specified. It shall be free from flaws specks, or bubbles and its thickness shall not be less than 6 mm. The glass for the mirror shall be uniformly silver plated at the back and shall be free from silvering defects Silvering shall have a protective uniform covering of red lead paint. The 6 mm thick plywood shall conform to M-37. The 6 mm. thick A.C. sheets shall conform to M-24.

**2.0. Workmanship**

2.1. The mirror of 600 mm. x 450 mm. size mounted on A.C. Sheet or plywood 6 mm thick with C.P. brass clips shall be fixed as directed, by fixing wooden plugs in wall and C.P brass screws and washers. The work shall be carried out in best workman like manner.

**3.0. Mode of measurements & payment**

3.1. The rate includes cost of all labour and materials, tools and plant etc. required for satisfactory completion of this item. The rate shall be for a unit of One number

**Item No. 74: - Providing and fixing screw down bib taps of following size.(A) Brass screw down bib tap polished bright. (i) 20mm dia.**

**1.0. Materials and Workmanship**

The relevant specifications of item 23.92 (A) (i) shall be followed except that the bib taps of 20 mm. dia shall be fixed.

**2.0. Mode of measurements & payment**

2.1. The relevant specifications of item 23.92 A(i) shall be followed.

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

**Item No. 75: - Providing and fixing pillar tap, capstan head, screw down high pressure with screws, shanks and back nuts. (i) 15mm dia.**

**1.0. Materials:** 15 mm. dia. brass screw down with bright polished finished shall conform to I.S. 781-1977. The bib cock shall be best Indian make and quality.

**2.0. Workmanship**

2.1. The screw down bib cock 15 mm. as specified above shall be fixed as directed. The threaded portion shall be smeared with white or red lead and around with a few turns of fine spun yarn round the screwed end of the pipe. The bib cock shall be then screwed and fixed to water tight position.

**3.0. Mode of measurements and payment**

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

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

**Item No. 76: - Providing and fixing Rubber plug for sink or wash basin.**

**1.0. Material:** The rubber plug for sink or wash hand, basin shall be best quality and make as approved by the Engineer-in-charge.

**2.0. Workmanship -**

2.1. The rubber plug with plain shall be fixed in wash basin or sink as directed.

**3.0. Mode of measurements and payment**

3.1. The rate shall be for a unit of One number.

**Item No. 77: - Providing and fixing S.W. gully trap with C.I. grating brick masonry chamber and water tight C.I. cover with frame of 300mm x 300mm size (inside) with standard weight (i) Square mouth traps (B) 150mm x 100mm size P or R type**

**1.0. Materials :** (1) Water shall conform to M-1. (2) Cement mortar of proportion 1:5 shall conform to M-11. (3) Burnt brick shall conform to M-15. (4) The S.W. Galley trap of 150 mm. x 100 mm. size shall confirm to .M-70.

**2.0. Workmanship**

2.1. Excavation for gully trap shall be done true to dimensions and levels as indicated on plans or as directed. The excavation work shall generally be done as per relevant specifications of item 4.0.0. of earth work.

**2.2. Fixing:**

2.2.1. The gully trap shall be fixed over cement concrete 1:5:10 (1 cement : 5 sand : 10 graded brick bats aggregate 40 mm nominal size) foundation. 650 square and 100 mm. thick The depth of top of concrete below the ground level shall be 675 mm. The jointing of gully outlet to the branch drain shall be done similar to jointing of S.W. pipe ac; described in item No. 24.1 (A).

**2.3. Brick masonry chamber :** After fixing and testing gully and branch drain, a brick masonry 300 x 330 mm. inside with bricks in CM 1:5 (1 cement : 5 sand) shall be built with a 100 mm. brick work round OH; gully trap from the top of bed concrete up to ground level. The space between the chamber walls and the trap shall be filled with cement concrete 1:5:10. The upper portion of the chamber i.e. above the top level of the trap shall be plastered inside with cement mortar 1:3 (1 cement: 3 sand) finished with floating coat of neat cement. The corners and bottom of the chamber shall be rounded of so as to slope towards the grating.

**2.4.** C.I. cover with frame 300 mm, x 300 mm. (inside) size shall then be fixed on the top of the brick masonry with C.C. 1:2:4 ( 1 lent : 2 coarse sand : 4 graded aggregate 20 mm. nominal size) 40 mm. thick and rendered smooth. The finished top of the cover shall be left about 40 mm. above the adjoining ground level so as to exclude the surface water from entering the gully trap.

**3.0. Mode of measurements & payment**

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

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



**Item No. 78:** - Constructing brick masonry chamber for underground C.I. Inspection chamber and bends with bricks having crushing strength not less than 35Kg/Cm<sup>2</sup> in C.M. 1:5 C.I. cover with frame (Light duty) 455mm x 610mm internal dimensions total weight of cover with frame to be not less than 38Kg. (Wt. of cover 23 Kg.) and Wt. of frame 15Kg. ) (R.C.C. top slab with 1:2:4 mix (1-cement :2- coarse sand :4-graded stone aggregate 20mm size) foundation concrete 1:5:10 inside plaster 15mm thick with cement mortar 1:3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete.(i) Inside dimensions 455mmx 610mm and 450mm deep for single pipe line.

**1.0. Materials :** Water shall conform to M-1. Cement shall conform to M-3. Coarse sand shall conform to M-5. Brick shall conform to M-15. Stone aggregate shall conform to M-12. Brick bat shall conform to M-14 M.S. bar shall conform to M-18.

**2.0. Workmanship**

**2.1.** C.I. inspection chamber with provision of C.I. bends of specified size with bolts, nuts and felt washers for underground drain shall be enclosed in masonry chamber which shall be constructed as under:

**2.2.** The excavation shall be done true to dimensions and level shown in one the plans or as directed.

**2.3.** Bed concrete shall be 15. Cms, thick C.C. 1:5:10 (1 cement : 5 coarse sand : 10 graded brick bat aggregates. The projection of bed concrete beyond the masonry walls shall be 7.5 cms.

**2.4.** Masonry walls and plaster work shall be carried out as per relevant specifications of item 24.40.

**2.5.** The cover slab shall be constructed as per relevant specifications of 24.27 (I).

**3.0. Mode of measurements and payment**

**3.1.** The earth work in excavation, providing and laying C.I. inspection chamber and bends shall be measured and paid for separately.

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

**Item No. 79:** - Constructing brick masonry chamber for underground C.I. Inspection chamber and bends with bricks having crushing strength not less than 35Kg/Cm<sup>2</sup> in C.M. 1:5 C.I. cover with frame (Light duty) 455mm x 610mm internal dimensions total weight of cover with frame to be not less than 38Kg. (Wt. of cover 23 Kg.) and Wt. of frame 15Kg. ) (R.C.C. top slab with 1:2:4 mix (1-cement :2- coarse sand :4-graded stone aggregate 20mm size) foundation concrete 1:5:10 inside plaster 15mm thick with cement mortar 1:3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete.(ii) Inside dimensions 500mm x 700 mm and 450mm deep for pipe line with one or two inlets.

**1.0. Materials and Workmanship :** The relevant specifications of item 72 shall be followed except that the inside dimension of brick masonry chamber shall be 500 mm. x 700 mm. and 450 mm. deep for pipe the with on two inlets.

**2.0. Mode of measurement and payment**

2.1. The relevant specifications of item 24.44 (I) shall be followed. 2.2 The rate shall be for a unit of one number.

**Item No. 80:** - (B) Providing sock pit of 5.00 Cu.M. Volume including excavating and filling brickbats with dry masonry work at top for 45cm. height including covering the top with stone including providing vatas in C.M. 1:3 with finishing curing etc. complete as directed.

**1.0. Materials :** Water shall conform to M-1. Cement mortar con form to M-11. Burnt Bricks shall conform to M-15. Rough stone slab 40 x 50 mm. thick shall conform to M-48. Brick bat shall conform to M-14.

**2.0. Workmanship**

2.1. The excavation for soak pit shall be carried out as. per relevant specifications of item. 4.G0.1 (A) except that the size of soak pit such that the cleat volume 'Shall\* remain 5 cum. The diameter and depth shall be as directed.

2.2. The periphery of the sock pit shall be provided with dry masonry wall with burnt bricks in 23 cms. thick. The masonry wall shall be done with best workman like manner in true line and plumb.

2.3. The soak pit shall be filled in with brick bats of burn brick 40 mm. nominal size in 45 cms. height. The work of filling brick-bats shall be done in such a way that no dry masonry shall be damaged during filling of brick bats.

2.4. The top of the soak pit shall be covered with rough kotah stone slab 40 to 50 mm. thickness. The length of the stone shall be in single piece in length.

2.5. The cement mortar 1:3 shall be used to fill up the joints and preparing vata as directed.

2.6. The cement work shall be cured for 4 days.

**3.0. Mode of measurements and payment**

3.1. The rate includes costs of all labour and material required for satisfactory completion o this item as described

**Item No. 81:** - Constructing a cooking platform 70 cm. width and 70 cm high resting on B.B. Masonry walls 23 cm. thick in C.M.(1:6) with (ii) Fixing black kadappa stone 30mm thick laid on precast R.C.C. (1:2:4) slab with plastering on exposed faces of wall in C.M. (1:4) etc complete.as directed by engineer In charge

**1.0. Materials and Workmanship**

1.1. The relevant specification of item No. 22.00.3 (I) shall be followed except that the cooking platform shall be constructed by providing black kadapa stone of 25 mm. to 30 mm. thickness on pre cast R.C.C. 1:2:4 slab 8 cms. thick. The black stone shall be provided in single piece up to 1.8 M in length and specified width. AH the exposed edges of stone shall be machine cut.

**2.0. Mode of measurement and payment**

2.1. The relevant specifications of item 22.00.3.(I) shall be followed.

2.2. The rate includes providing machine cut edges on exposed face of kadapa stone.

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

## **SPECIFICATION OF**

## **ITEM NO.82 & 99**

**AS PER ATTACHED ELECTRICAL SPECIFICATION**

**Item No.100: - Excavation for foundation up to 1.5 m depth including sorting out and stacking of useful materials and disposing off the excavated stuff upto 50 Meter lead.(C) Hard Murrum**

**1.0. Hard murrum.**

The hard murrum shall be clean of good binding quality and of approved quality obtained from approved quarries of disintegrated rocks which contain sons materials and natural mixture of clay of clarions origin The size of hard murrum shall not be more than 20 mm.

**2.0. Workmanship**

The relevant specification of item No. 4.0..0.(A) shall be followed except that the excavation work shall be carried in hard murrum.

**3.0. Mode of measurements & Payments**

3.1. The relevant specifications of item No. 4 0.0. (A) shall be followed.

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

**Item No.101: - Filling available excavated earth (excluding rock) in trenches ,plinth, sides of foundations etc.in layers not exceeding 20cm in depth consolidating each deposited layer by ramming & watering.**

**1.0. Workmanship**

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

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

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

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

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

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

**2.0. Mode of Measurements & Payment**

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

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

**Item No.102:** - Providing and laying controlled cement concrete M-200 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in (D) Columns on Ground Floor.

**AND**

**Item No.103:** - Providing and laying controlled cement concrete M-200 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in (C) Coping

**Same as per item no 21**

**Item No.104:** - Providing and fixing pre-cast concrete kerb stone of gray cement based concrete block 30cm length, 30cm height and 15cm thick of M200 grade concrete 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.

Providing and Fixing Precast Concrete Kerb Stone (300 mm × 300 mm × 150 mm) of M-200 Grade

### **1. Scope of Work**

The work shall consist of providing, manufacturing, supplying, transporting and fixing precast cement concrete kerb stones of 300 mm length × 300 mm height × 150 mm thickness, manufactured from M-200 grade concrete, including excavation, preparation of foundation, laying, alignment, jointing, haunching (where specified), backfilling, curing, finishing and all labour, materials, tools, plants, transportation and incidental works complete in accordance with the approved drawings, specifications and directions of the Engineer-in-Charge.

The kerb stones shall be installed along roads, footpaths, walkways, parking areas, medians, landscaped areas and similar locations to provide edge restraint to pavements.

### **2. Applicable Standards**

The work shall conform to the latest editions of the following Indian Standards:

- IS 15658 – Precast Concrete Blocks for Paving
- IS 456 – Plain and Reinforced Concrete
- IS 383 – Coarse and Fine Aggregates
- IS 10262 – Concrete Mix Proportioning
- IS 516 – Methods of Test for Concrete
- IS 269 / IS 8112 / IS 12269 – Ordinary Portland Cement
- IS 1786 – High Strength Deformed Steel Bars (where reinforcement is specified)
- IS 1200 – Method of Measurement
- MORTH Specifications (Latest Revision)
- CPWD Specifications (Latest Edition)

### **3. Material Specifications**

#### **A. Cement**

Cement shall be Ordinary Portland Cement (OPC) 43 Grade or 53 Grade, or Portland Pozzolana Cement (PPC) conforming to the relevant IS Standards.

The cement shall be fresh, dry, free from lumps and stored in accordance with IS requirements.

#### **B. Fine Aggregate**

Fine aggregate shall consist of clean, hard, well-graded natural river sand or crushed sand conforming to IS 383.

It shall be free from:

- Clay.
- Silt.
- Organic impurities.
- Salts.
- Deleterious materials.

### **C. Coarse Aggregate**

Coarse aggregate shall conform to IS 383 and consist of crushed hard stone of nominal size 10 mm to 20 mm.

The aggregate shall be:

- Hard.
- Durable.
- Angular.
- Free from dust.
- Free from organic matter.

### **D. Water**

Water used for concrete and curing shall be clean and fit for construction purposes, conforming to IS 456.

### **4. Concrete**

Kerb stones shall be manufactured using M-200 grade cement concrete (minimum characteristic compressive strength of 20 MPa at 28 days).

Concrete shall be produced in a batching plant or approved precast manufacturing unit using controlled batching, machine mixing and vibration.

The concrete shall achieve dense, homogeneous and durable construction.

### **5. Kerb Stone Dimensions**

Each precast kerb stone shall have the following finished dimensions:

- Length : 300 mm
- Height : 300 mm
- Thickness : 150 mm

Permissible dimensional tolerance shall be:

- Length :  $\pm 3$  mm
- Height :  $\pm 3$  mm
- Thickness :  $\pm 3$  mm

The finished surfaces shall be smooth, dense and free from honeycombing, cracks or chipped edges.

### **6. Manufacture**

Kerb stones shall be manufactured by vibro-compaction or hydraulic pressing in steel moulds to obtain uniform dimensions and high density.

The kerb stones shall be properly cured for a minimum of 14 days before dispatch.

The finished units shall have:

- Uniform colour.
- Smooth finish.
- Sharp arrises.
- Dense concrete.
- High durability.

### **7. Excavation**

Excavation shall be carried out to the required width and depth for accommodating the kerb stone and its foundation.

The excavation shall be:

- True to line.
- Properly levelled.
- Free from loose material.

The excavated bottom shall be compacted before placing the bedding.

### **8. Bedding**

Unless otherwise specified, the kerb stones shall be laid on a 100 mm thick Plain Cement Concrete (PCC) bed in C.C. 1:3:6 or as shown in the approved drawings.

The PCC shall be properly compacted and levelled.

## 9. Fixing

The kerb stones shall be fixed:

- True to line.
- True to level.
- In proper alignment.
- In required curvature where necessary.

The kerb stones shall be placed firmly over the prepared concrete bed and adjusted to the required position before initial setting of the concrete.

The exposed top shall maintain a uniform finished level.

## 10. Jointing

The joints between adjacent kerb stones shall be:

- Uniform.
- Approximately 5 mm to 10 mm wide.

The joints shall be filled completely with cement mortar 1:3 (1 Cement : 3 Fine Sand).

Excess mortar shall be cleaned immediately after pointing.

## 11. Haunching

Where specified in the drawings, the rear side of the kerb stones shall be supported by PCC or concrete haunching to ensure proper stability.

The haunching shall be compacted and finished neatly.

## 12. Backfilling

After fixing, the sides shall be backfilled with approved earth or granular material in layers and compacted properly.

The backfill shall be finished flush with the surrounding surface.

## 13. Curing

The PCC bedding and mortar joints shall be cured continuously with clean water for a minimum period of 7 days.

The contractor shall protect the kerb stones from disturbance during the curing period.

## 14. Finished Surface

The completed kerb line shall be:

- Straight.
- Uniform.
- Smooth.
- True to line and level.
- Properly jointed.
- Free from rocking.
- Free from chipped edges.

The alignment shall be checked using string lines or approved surveying equipment.

## 15. Workmanship

The work shall be executed by skilled personnel experienced in precast concrete works.

The finished kerb stones shall:

- Be firmly fixed.
- Be uniformly aligned.
- Have clean joints.
- Be free from cracks.
- Be free from movement.
- Provide a neat finished appearance.

Any damaged kerb stone shall be removed and replaced without additional cost.

## 16. Quality Control

The Engineer-in-Charge shall inspect:

- Concrete grade.

- Dimensions.
- Surface finish.
- Compressive strength.
- Water absorption.
- Alignment.
- Joint width.
- Mortar quality.
- Bedding.
- Curing.
- Overall workmanship.

Test certificates for concrete strength shall be furnished whenever required.

### **17. Measurement**

The item shall be measured in Running Metres (RM) along the centre line of the completed kerb stones fixed in position and accepted by the Engineer-in-Charge.

The measurement shall include excavation, bedding, fixing and jointing.

No separate measurement shall be made for:

- Excavation.
- PCC bedding.
- Cement mortar joints.
- Haunching (if included in the item).
- Backfilling.
- Curing.
- Cutting of kerb stones.
- Wastage.

### **18. Rate**

The quoted rate per Running Metre (RM) shall include:

- Supply of precast M-200 grade concrete kerb stones of size 300 mm × 300 mm × 150 mm.
- Manufacture using machine vibration/hydraulic pressing.
- Transportation, loading and unloading.
- Excavation and preparation of foundation.
- 100 mm thick PCC 1:3:6 bedding.
- Alignment and fixing.
- Joint filling with cement mortar 1:3.
- Concrete haunching where specified.
- Backfilling and compaction.
- Water curing.
- Cleaning and protection.
- Labour, tools, plants, machinery and scaffolding.
- Quality control and testing.
- All taxes, royalties, duties, GST, wastage and incidental expenses.
- Complete installation in all respects as directed by the Engineer-in-Charge.

No extra payment shall be made for excavation, PCC bedding, mortar joints, cutting, alignment, transportation, curing, backfilling, haunching (where included), loading/unloading or any incidental work necessary for the satisfactory completion of the precast concrete kerb stone work



**Item No.105:** - 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.

#### **General**

This work shall consist of providing and laying **60 mm thick Rubber Dyed interlocking concrete block paving tiles** specification & samples over a base layer of 35 mm thick layer of sand of the shape and dimensions shown on the drawings and conforming to these specifications or as approved by the Engineer in charge.

#### **1.0 MATERIAL**

Water shall conform to M-1. Cement shall conform to M-3.

#### **1.0 Rubber Dyed interlocking concrete block paving tiles**

Rubber Dyed interlocking concrete block paving tiles shall be of approved size brand and make as approved by Engineer in charge.

- 1.1** The size shape and design of rubber Dyed interlocking concrete block paving tiles shall generally be as per manufacturers product or as directed by the Engineer in charge and Architect.
- 1.2** The rubber Dyed interlocking concrete block paving tiles shall satisfy the tests as regards compress strength transverse strength resistance to wear and water absorption.
- 1.3** The colour size shape and design of the rubber Dyed interlocking concrete block paving tiles shall be directed by Engineer or Architect.
- 1.4** The rubber Dyed interlocking concrete block paving tiles shall be of best quality as approved by the Engineer In charge. They shall be flat and true to shape. They shall be free from cracks, crazing spots, chipped edges and corners. The glazing shall be of uniform shade.

#### **2.0 SAND**

- 2.1** Sand shall be natural sand, clean well graded, hard strong durable and gritty particular free from immures amounts of dust, clay, kankar modules.
- 2.2.** For masonry works sand shall confirm to the requirements of IS: 2116.
- 2.3.** For plain and reinforced cement concrete (PCC and RCC) or pre stressed concrete (PSC) works fine aggregates shall consist of clean, hard strong and durable prices 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.
- 2.4.** Sand fine aggregates for structural concrete shall conform to the following grading requirements as shown in the table below.
- 2.5 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
2.3 6mm	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
2.36mm	90 to 100
1.18 mm	70 to 100
600 MC	30 to 100
300 MC	85 to 70
150 MC	00 to 50

### 3.0 WORKMANSHIP

- 3.1 The **rubber Dyed interlocking concrete block paving tiles** shall be laid on a layer **3.5 cm thick** layer of coarse sand. The slope in the floors shall be provided in the sub grade. The base layer shall be properly watered, rammed and consolidated. Before laying the pavers blocks, it shall be moisture. Plinth masonry offset shall be depressed so as to allow the sub grade concrete to rest on it.
- 3.2 **Rubber Dyed interlocking concrete block paving tiles** of approved quality shape and design and shall be laid evenly to level and slope as directed by Engineer in charge over a bed of a base layer consisting of **35mm thick sand layer**.
- 3.3 **Laying:** The **rubber Dyed interlocking concrete block paving tiles** shall be laid in plain, diagonal or other pattern as directed. The cement concrete blocks shall be laid properly and set home by gentle taping.
- 3.4 **End portion of pavement shall be finished with C.M. 1:3 as per detailed drawing etc. complete.**

### 4.0 MODE OF MEASUREMENT AND PAYMENT

- 4.1 The unit rate **rubber Dyed interlocking concrete block paving tiles** flooring shall include the cost of all materials, tools and plant required for supplying and laying material like brick bats sand pavers blocks, laying of base layer in true level and slope as required applying & placing pavers blocks in position, compacting, finishing, curing.
- 4.2 The length and breadth shall be measured correct to a Square meter 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, dedo 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.
- 4.3 The rate shall be for a unit of **one Square meter**.

**Item No. 106: - Providing and creating educational information, learning charts, child-friendly graphics, alphabet charts, number charts, village scenes, thematic illustrations, photographs and other approved designs directly on wall surfaces by hand painting using approved quality weather-resistant acrylic/emulsion paints of required shades and colours, including surface preparation, sketching, lettering, artistic work, colouring, finishing wherever required, and all labour, materials, scaffolding, tools & tackles, transportation and incidental charges complete as directed by the Engineer-in-Charge.**

Providing and Creating Educational Wall Paintings, Learning Charts, Child-Friendly Graphics and Thematic Murals

### **1. Scope of Work**

The work shall consist of designing, preparing, supplying, creating and executing educational wall paintings, learning charts, child-friendly graphics, alphabet charts, number charts, village scenes, environmental themes, thematic illustrations, educational diagrams, motivational messages, cultural artwork, photographs, artistic murals and other approved educational designs directly on wall surfaces by hand painting using approved quality weather-resistant acrylic/emulsion paints in required colours and shades. The work shall include surface preparation, crack filling, putty work wherever required, primer application, base coat, artistic sketching, lettering, freehand painting, colour filling, outlining, detailing, finishing, protective coating where specified, cleaning, scaffolding, transportation and all labour, materials, tools, plants and incidental works complete in accordance with the approved drawings and directions of the Engineer-in-Charge.

The work shall be executed by experienced artists having adequate experience in educational and public artwork, and all designs shall be prepared strictly as approved by the Engineer-in-Charge before commencement of painting.

### **2. Applicable Standards**

The work shall conform to the latest editions of the following standards:

- IS 15489 – Acrylic Emulsion Paint
- IS 5410 – Cement Primer
- IS 2932 – Enamel Paints (where applicable)
- IS 2395 – Methods of Test for Paints
- CPWD Specifications (Latest Edition)
- National Building Code (NBC)
- Manufacturer's specifications for paint application

### **3. Surface Preparation**

Before commencement of painting, the wall surface shall be thoroughly cleaned of dust, dirt, grease, loose paint, algae, fungus, laitance and other foreign materials. Cracks, holes and surface imperfections shall be repaired using approved wall putty or polymer-modified repair mortar. Uneven portions shall be rubbed smooth with emery paper, and the entire surface shall be prepared to provide a sound, clean and uniform base suitable for painting. Where required, one coat of approved cement primer shall be applied before execution of the artwork.

### **4. Materials**

All paints shall be first-quality exterior or interior grade weather-resistant acrylic emulsion paints of approved make such as Asian Paints, Berger, Nerolac, Dulux or equivalent approved brand. The paints shall possess excellent colour retention, UV resistance, water resistance, fungus resistance and durability suitable for the intended location.

Pigments shall be bright, fade-resistant and non-toxic. Only fresh materials from sealed containers shall be used. No unauthorized thinning or mixing shall be permitted.

### **5. Design Requirements**

The artwork shall include educational and awareness-related themes approved by the Engineer-in-Charge, including but not limited to:

- English Alphabet (A–Z)
- Gujarati/Hindi Alphabet
- Number Charts
- Multiplication Tables
- Mathematical Symbols
- Fruits and Vegetables
- Birds and Animals
- Domestic and Wild Animals
- Solar System
- Human Body Parts
- Good Habits
- Hygiene and Sanitation
- Road Safety
- Traffic Signs
- National Symbols
- Freedom Fighters
- Maps
- Trees and Environment
- Water Conservation
- Swachh Bharat Messages
- Save Water
- Save Trees
- Village Life
- Cultural Heritage
- Festivals
- Inspirational Quotations
- Educational Illustrations
- Child-Friendly Characters
- Cartoon Figures
- Sports Activities
- Scientific Diagrams
- Health Awareness
- Yoga
- Digital Learning Themes
- Government-approved awareness campaigns
- Any other artwork approved by the Engineer-in-Charge.

## **6. Sketching**

The complete artwork shall first be marked on the wall using approved grid methods, projection methods or freehand sketching. The layout shall be checked and approved before colour application. Proper proportions, spacing, lettering size and alignment shall be maintained throughout the work.

## **7. Painting Work**

Painting shall be executed manually by skilled artists using brushes, rollers and other approved artistic tools. Colours shall be applied uniformly to obtain smooth, sharp and vibrant finishes. Multiple coats shall be applied wherever required to achieve complete opacity and uniform appearance.

The finished artwork shall exhibit:

- Sharp outlines
- Uniform colour shades
- Correct proportions
- Attractive appearance
- Smooth finish

- Accurate lettering
- Proper perspective
- Neat finishing
- Excellent readability

No brush marks, paint runs, blotches, patchiness or visible corrections shall be permitted.

### **8. Lettering**

All educational text, captions and quotations shall be hand-painted using approved fonts. The lettering shall be:

- Uniform in size
- Clearly readable
- Correctly aligned
- Free from spelling mistakes
- Grammatically correct
- Approved by the Engineer-in-Charge before execution

### **9. Colour Scheme**

The colour combinations shall be bright, attractive and child-friendly. Colours shall provide sufficient contrast with the background for easy visibility and shall remain aesthetically pleasing under outdoor exposure. The colour scheme shall be approved by the Engineer-in-Charge before commencement of work.

### **10. Protective Finish**

Where specified, a transparent UV-resistant acrylic protective coating or clear varnish compatible with the paint system shall be applied after complete drying of the artwork to improve durability, washability and resistance to weathering, dust and fading.

### **11. Workmanship**

The entire artwork shall be executed by experienced artists with high standards of workmanship. The completed paintings shall be free from visible defects such as uneven colouring, overlapping, smudging, peeling, blistering, cracks, fading or paint stains. All edges shall be clean and neatly finished.

Any portion rejected by the Engineer-in-Charge due to poor workmanship, incorrect design or colour mismatch shall be repainted entirely at the contractor's cost.

### **12. Quality Control**

The Engineer-in-Charge shall inspect and approve:

- Surface preparation
- Design layout
- Sketching
- Colour selection
- Paint quality
- Paint thickness
- Artistic quality
- Lettering accuracy
- Educational content
- Final appearance
- Uniformity of finish

Only approved artwork shall be accepted for payment.

### **13. Protection**

Freshly painted surfaces shall be protected from dust, rain, direct contact and mechanical damage until completely dry. Necessary barricading or warning signs shall be provided wherever required. Any damage occurring before handing over shall be rectified by the contractor without additional cost.

### **14. Measurement**

The work shall be measured in Square Metres (Sq.m.) of the actual painted area completed and accepted by the Engineer-in-Charge.

Measurement shall include the complete finished artwork, including background painting, illustrations, lettering, decorative borders, educational graphics and all associated artistic work. No separate measurement shall be made for individual figures, text, colour variations, sketches, motifs, borders, primer coats, surface preparation or protective coatings.

**Item No. 107: - Preparing and making Scribble Wall on wall surfaces using approved green chalk paint finishing, which is suitable for writing and drawing. Cost include surface preparation, cleaning and smoothening, application of required primer or base coat when needed and finally applying the approved green chalk paint for making a smooth, durable and uniform writable surface. The above work will include finishing of border, labour, materials, tools, scaffolding, transportations, etc., all included as per directions by the Engineer-in-Charge.**

### **1. Scope of Work**

The work shall consist of preparing, treating and converting existing wall surfaces into Scribble Walls (Chalk Writing Walls) by applying approved quality green chalk paint finish suitable for repeated writing and drawing with ordinary classroom chalk. The work shall include cleaning of the wall surface, repairing minor defects, crack filling, putty application wherever required, rubbing and smoothening, application of suitable primer/base coat, application of approved green chalk paint in required number of coats, border finishing, curing where applicable, cleaning of the work area and all labour, materials, tools, scaffolding, transportation and incidental works complete in accordance with the drawings, specifications and directions of the Engineer-in-Charge.

The finished Scribble Wall shall provide a smooth, durable, non-glossy, dust-resistant and reusable writing surface suitable for educational institutions, Anganwadi Centres, classrooms, learning centres and public educational facilities.

### **2. Applicable Standards**

The work shall conform to the latest editions of the following standards:

- IS 15489 – Acrylic Emulsion Paint
- IS 5410 – Cement Primer
- IS 2395 – Methods of Test for Paints
- CPWD Specifications (Latest Edition)
- National Building Code (NBC)
- Manufacturer's specifications for chalkboard/chalk paint application

### **3. Surface Preparation**

Before application of the chalk paint system, the wall surface shall be thoroughly cleaned to remove dust, dirt, grease, oil, loose particles, old peeling paint, efflorescence, fungus and any foreign material. Loose plaster shall be removed, and all cracks, holes and surface imperfections shall be repaired using approved wall putty or polymer-modified repair mortar. The repaired surface shall be rubbed smooth with emery paper to obtain an even and uniform finish. The wall shall be dry, sound and free from moisture before commencement of painting.

### **4. Primer / Base Coat**

Wherever required, one coat of approved cement primer or manufacturer-recommended base primer compatible with the chalk paint system shall be applied uniformly over the prepared surface. The primer shall be allowed to dry completely before subsequent coats. The primer shall improve adhesion, durability and uniform absorption of the finishing coats.

## **5. Chalk Paint**

The Scribble Wall shall be finished using approved quality green chalkboard/chalk paint specially manufactured for creating writable and erasable surfaces.

The chalk paint shall possess the following properties:

- Smooth matte finish.
- Excellent chalk adhesion.
- Easy erasability with dry or damp cloth.
- Non-reflective surface.
- Scratch-resistant.
- Durable under repeated writing and cleaning.
- Good hiding power.
- Uniform green colour.
- Low VOC and environmentally friendly.
- Free from peeling, blistering and cracking.

The chalk paint shall be of approved make such as Asian Paints, Berger, Nerolac, Dulux or other equivalent approved brand specifically designed for chalkboard applications.

## **6. Application**

The chalk paint shall be applied strictly in accordance with the manufacturer's recommendations using brushes, rollers or spray equipment as approved.

A minimum of two finishing coats or the number of coats recommended by the manufacturer shall be applied over the prepared primer/base coat to achieve a smooth, uniform and opaque finish. Each coat shall be allowed to dry completely before applying the subsequent coat.

The finished surface shall be:

- Uniform in colour.
- Smooth.
- Free from brush marks.
- Free from roller marks.
- Free from pinholes.
- Free from sagging.
- Free from patchiness.
- Suitable for repeated chalk writing.

## **7. Border Finishing**

The Scribble Wall shall be finished with a neat border of approved width, colour and design as shown in the drawings or directed by the Engineer-in-Charge. The border shall have clean, straight edges with sharp paint lines and shall enhance the appearance of the finished writing panel.

## **8. Conditioning of Writing Surface**

After complete curing and drying of the chalk paint, the finished surface shall be conditioned in



accordance with the paint manufacturer's recommendations before being put into use. Where recommended, the surface shall be lightly seasoned using the side of a chalk stick and wiped clean to improve writing performance and prevent permanent chalk marks.

### **9. Workmanship**

The work shall be executed by skilled painters experienced in chalkboard paint applications. The finished Scribble Wall shall be perfectly smooth, level and free from visible defects. The writing surface shall permit easy writing, clear visibility and effortless cleaning without leaving permanent marks or ghosting.

Any defective, uneven or damaged portion shall be completely redone by the contractor at his own cost.

### **10. Quality Control**

The Engineer-in-Charge shall inspect and approve:

- Surface preparation.
- Smoothness of wall.
- Primer application.
- Chalk paint quality.
- Colour uniformity.
- Number of coats.
- Border finish.
- Writing performance.
- Ease of cleaning.
- Final appearance.

Only surfaces meeting the specified quality requirements shall be accepted.

### **11. Protection**

Freshly painted Scribble Walls shall be protected from dust, rain, moisture, scratches and mechanical damage until fully cured. No writing shall be permitted until the manufacturer's recommended curing period has elapsed.

Any damaged portion before handing over shall be repaired without additional cost.

### **12. Measurement**

The work shall be measured in Square Metres (Sq.m.) of the actual finished Scribble Wall area completed and accepted by the Engineer-in-Charge.

The measured area shall include the complete writable chalk-painted surface together with the finished border.

No separate measurement shall be made for:

- Surface preparation.
- Crack repairs.
- Putty.
- Primer.
- Base coat.

- Chalk paint coats.
- Border finishing.
- Conditioning.
- Scaffolding.
- Protection.

### **13. Rate**

The quoted rate per Square Metre (Sq.m.) shall include:

- Cleaning and preparation of wall surface.
- Removal of loose paint and defective material.
- Crack filling and minor surface repairs.
- Putty application wherever required.
- Rubbing and smoothening.
- Supply and application of approved primer/base coat.
- Supply and application of approved green chalkboard/chalk paint in the required number of coats.
- Conditioning of the writing surface as recommended by the manufacturer.
- Border painting and finishing.
- Labour, tools, rollers, brushes and all consumables.
- Scaffolding and staging.
- Transportation, loading and unloading.
- Cleaning after completion.
- Protection of completed work until handover.
- All taxes, royalties, duties, GST, wastage and incidental expenses.
- Complete finished Scribble Wall ready for use in all respects as directed by the Engineer-in-Charge.

No extra payment shall be made for surface preparation, crack repairs, putty, primer, multiple paint coats, border finishing, conditioning, scaffolding, touch-up painting, protection or any incidental work necessary for completing the Scribble Wall to the required standard

**Item No. 108: - Providing and fixing Fabric Finished Pin-Up Board of approved quality and size with fabric covered soft board/cork board surface mounted on suitable backing material and frame, including necessary base fittings, screws, fixtures, supports and all accessories required for complete installation as per approved drawing and specifications. The rate shall include all materials, labour, tools & tackles, transportation and incidental charges complete as directed by Engineer-in-Charge.**

### **1. Scope of Work**

The work shall consist of providing, fabricating, supplying, transporting and fixing **Fabric Finished Pin-Up Boards** of approved size, design and quality complete with fabric-covered soft board/cork board surface, backing board, frame, fixing brackets, fasteners and all necessary accessories. The work shall include cutting to required dimensions, edge finishing, mounting on walls, alignment, testing, cleaning and all labour, materials, tools, scaffolding, transportation and incidental works complete in accordance with the approved drawings, specifications and directions of the Engineer-in-Charge.

The completed Pin-Up Board shall provide a durable, smooth and resilient surface suitable for repeated pinning of notices, educational materials, charts, artwork and display items without damage to the board surface.

### **2. Applicable Standards**

The work shall conform to the latest editions of the following standards wherever applicable:

- **IS 303** – Plywood for General Purposes
- **IS 1328** – Block Boards
- **IS 710** – Marine Grade Plywood (where specified)
- **IS 848** – Synthetic Resin Adhesives
- **IS 2046** – Decorative Laminates (where applicable)
- National Building Code (NBC)
- CPWD Specifications (Latest Edition)
- Manufacturer's specifications for notice boards and pin-up boards

### **3. Materials**

The Pin-Up Board shall consist of the following components:

#### **(a) Soft Board / Cork Board**

The writing/display surface shall be manufactured from approved quality:

- Natural cork sheet, or
- Resin-bonded soft board, or
- High-density fibre pinning board,

having a minimum thickness of **9 mm**, suitable for repeated insertion and removal of drawing pins without permanent damage.

The board shall:

- Be resilient.
- Recover after pin removal.

- Be free from cracks.
- Be free from dents.
- Be free from surface defects.
- Have uniform density.

#### **(b) Fabric Finish**

The display surface shall be covered with approved quality:

- Felt fabric, or
- Velvet fabric, or
- Polyester fabric, or
- Woven fabric,

of approved colour and shade.

The fabric shall be:

- Colour fast.
- Fade resistant.
- Tear resistant.
- Wrinkle free.
- Smooth.
- Firmly stretched.
- Properly bonded.

No wrinkles, bubbles or loose fabric shall be accepted.

#### **(c) Backing Board**

The backing shall consist of:

- **12 mm thick BWR/BWP plywood**, or
- MDF board, or
- HDHMR board,

of approved quality.

The backing shall provide adequate rigidity to prevent bending or warping.

#### **(d) Frame**

The board shall be enclosed in an approved frame made from:

- Powder-coated aluminium section, or
- Natural anodized aluminium section, or
- Seasoned hardwood, or
- Decorative PVC section,

as specified in the drawings.

Minimum frame width:

**20–25 mm**

The frame shall have:

- Mitred corners.
- Neat joints.

- Smooth finish.
- No sharp edges.

#### **4. Adhesive**

The fabric shall be bonded using approved synthetic resin adhesive conforming to **IS 848**.

The adhesive shall provide permanent bonding without wrinkles or peeling.

#### **5. Surface Finish**

The completed board shall have:

- Smooth surface.
- Uniform colour.
- Tight fabric.
- Clean edges.
- Neatly finished corners.
- Attractive appearance.

No stains, folds, cuts or visible adhesive marks shall be permitted.

#### **6. Fabrication**

The board shall be fabricated accurately to the approved dimensions.

The fabric shall be stretched evenly over the soft board and securely fixed at the rear.

The frame shall be securely fixed around the perimeter.

The complete assembly shall be rigid and free from distortion.

#### **7. Fixing**

The Pin-Up Board shall be fixed firmly to masonry, RCC or partition walls using:

- Stainless steel screws.
- Brass screws.
- Nylon wall plugs.
- Aluminium brackets.
- Concealed fixing clips.
- Anchor fasteners.

The fixing arrangement shall be capable of supporting the board safely without vibration or movement.

All fasteners shall remain concealed wherever possible.

#### **8. Alignment**

The completed board shall be:

- Fixed true to line.
- Perfectly level.
- Properly centred.
- Firmly secured.
- Flush against the wall.

No visible gaps shall exist between the board and wall.

#### **9. Workmanship**

The work shall be executed by skilled carpenters and installers.

The finished Pin-Up Board shall be:

- Free from warping.
- Free from loose fabric.
- Free from wrinkles.
- Free from scratches.
- Free from dents.
- Neatly framed.
- Ready for immediate use.

Any damaged or defective portion shall be replaced at the contractor's expense.

## **10. Quality Control**

The Engineer-in-Charge shall inspect:

- Dimensions.
- Thickness.
- Soft board quality.
- Fabric quality.
- Colour.
- Adhesive bonding.
- Frame finish.
- Corner joints.
- Fixing arrangement.
- Alignment.
- Overall appearance.

Any board failing inspection shall be rejected.

## **11. Protection**

The installed Pin-Up Board shall be protected from:

- Dust.
- Moisture.
- Impact.
- Scratches.
- Construction damage.

Protective covering shall remain until completion of adjacent works.

## **12. Measurement**

The item shall be **measured in Square Metres (Sq.m.)** of the actual exposed face area of the Pin-Up Board fixed in position and accepted by the Engineer-in-Charge.

The area shall be calculated based on the finished visible dimensions of the board.

No separate measurement shall be made for:

- Frame.
- Backing board.

- Fabric.
- Adhesive.
- Fasteners.
- Brackets.
- Supports.
- Cutting.
- Fixing.
- Transportation.

### 13. Rate

The quoted **rate per Square Metre (Sq.m.)** shall include:

- Supply of approved soft board/cork board.
- Approved fabric covering.
- BWR/BWP plywood, MDF or HDHMR backing board.
- Aluminium, PVC or hardwood frame.
- Synthetic resin adhesive.
- Cutting and fabrication.
- Edge finishing.
- Corner joints.
- Stainless steel screws, wall plugs, brackets and fixing accessories.
- Installation complete.
- Transportation, loading and unloading.
- Labour, tools, tackles and scaffolding.
- Cleaning and protection.
- Testing and quality control.
- All taxes, royalties, duties, GST, wastage and incidental expenses.
- Complete finished Pin-Up Board in all respects as directed by the Engineer-in-Charge.

The quoted rate shall be **inclusive of all materials, fabrication, fixing, framing, accessories and labour**, and **no extra payment shall be made** for backing board, fabric, frame, adhesive, fasteners, transportation, scaffolding, touch-up work or any incidental item necessary for satisfactory completion of the work.

**Item No. 109: - Providing and fixing Child Height Measuring Scale / Growth Chart of approved quality having measuring range of approximately 0.30 m to 1.50 m or as approved, made from durable printed P.V.C./sun board or equivalent market available material with clear graduation markings in centimeters and child-friendly graphics, having smooth finished edges and complete with necessary fixing arrangements, screws, adhesive and accessories including all materials, labour, transportation and incidental charges complete as directed by Engineer-in-Charge."**

### **Providing and Fixing Child Height Measuring Scale / Growth Chart**

#### **1. Scope of Work**

The work shall consist of providing, manufacturing, supplying, transporting and fixing **Child Height Measuring Scale / Growth Chart** of approved design, quality and dimensions, suitable for use in Anganwadi Centres, Bal Mandirs, schools, health centres, child care institutions and other educational facilities. The work shall include preparation of artwork, digital printing, fabrication, edge finishing, fixing to wall surfaces, alignment, cleaning and all labour, materials, tools, transportation, scaffolding (where required) and incidental works complete in accordance with the approved drawings, specifications and directions of the Engineer-in-Charge.

The completed Height Measuring Scale shall be durable, child-friendly, easy to read, resistant to fading, moisture and normal wear, and shall provide accurate height measurement for children.

#### **2. Applicable Standards**

The work shall conform to the latest editions of the following standards wherever applicable:

- National Building Code (NBC)
- CPWD Specifications (Latest Edition)
- Manufacturer's Specifications for PVC/Sunboard Printing Materials
- IS 2380 – Outdoor Weathering of Plastics (where applicable)
- Relevant Indian Standards for Digital Printing and PVC Sheet Materials

#### **3. Material Specifications**

The Height Measuring Scale shall be manufactured from approved quality:

- **High-density PVC Sheet**
- **Sunboard**
- **Foam PVC Board**
- **ACP-backed Printed Board**, or
- Other approved equivalent material.

The material shall be:

- Waterproof.
- Termite proof.
- Moisture resistant.
- Warp resistant.
- Crack resistant.
- Smooth finished.



- Durable.
- Suitable for indoor use.
- Capable of retaining colour for long periods.

The minimum thickness shall generally be **3 mm to 5 mm**, unless otherwise approved by the Engineer-in-Charge.

#### 4. Dimensions

The Height Measuring Scale shall have:

- Measuring Range:
  - **0.30 metre to 1.50 metre**, or as approved.
- Width:
  - Approximately **150 mm to 300 mm**, depending upon the approved design.
- Thickness:
  - Minimum **3 mm**.

Dimensions may be modified as per the approved drawings.

#### 5. Printing

The scale shall be digitally printed using high-resolution UV-resistant printing technology.

The printing shall include:

- Centimetre graduations.
- Numerical markings.
- Child-friendly colours.
- Educational graphics.
- Cartoon characters.
- Animal illustrations.
- Nature themes.
- Fruits, flowers or educational elements.
- Government-approved logos wherever required.

Printing shall be:

- Waterproof.
- Fade resistant.
- Scratch resistant.
- Smudge resistant.
- Easy to clean.

The scale markings shall remain clearly visible throughout the service life.

#### 6. Graduation Markings

The measuring scale shall be permanently printed with:

- Graduations at every **1 centimetre**.
- Numerical markings at every **10 centimetres**.
- Clear zero reference level.

- Easy-to-read numbering.
- Permanent calibration.

The graduations shall be accurate within **±2 mm** over the full measuring range.

## **7. Edge Finish**

All edges and corners shall be:

- Machine cut.
- Smooth finished.
- Rounded.
- Free from burrs.
- Free from sharp edges.

The finished board shall be safe for use by children.

## **8. Surface Finish**

The exposed surface shall be:

- Smooth.
- Uniform.
- Gloss or matte finish as approved.
- Scratch resistant.
- Easy to clean.
- Free from bubbles.
- Free from wrinkles.
- Free from printing defects.

## **9. Fixing**

The Height Measuring Scale shall be securely fixed vertically on a finished wall surface using approved methods such as:

- Stainless steel screws.
- Nylon wall plugs.
- Industrial adhesive.
- Double-sided heavy-duty adhesive tape (where approved).
- Concealed fixing clips.

The bottom reference point shall be fixed exactly at the approved floor level to ensure accurate measurement.

The board shall be perfectly vertical and securely fixed without vibration or movement.

## **10. Alignment**

Before fixing, the contractor shall verify:

- Finished floor level.
- Vertical alignment.
- Zero reference point.
- Correct measuring range.

The completed scale shall be:

- True to plumb.
- Correctly positioned.
- Easily accessible.
- Clearly visible.

### **11. Workmanship**

The work shall be carried out by skilled personnel experienced in installation of educational display systems.

The completed Height Measuring Scale shall be:

- Accurately calibrated.
- Firmly fixed.
- Neatly aligned.
- Free from defects.
- Free from scratches.
- Free from dents.
- Attractive in appearance.

Any damaged or defective material shall be replaced by the contractor at his own cost.

### **12. Quality Control**

The Engineer-in-Charge shall inspect:

- Material quality.
- Board thickness.
- Printing quality.
- Colour.
- Graduation accuracy.
- Graphic quality.
- Fixing arrangement.
- Vertical alignment.
- Surface finish.
- Overall appearance.

Any board failing to satisfy the specified requirements shall be rejected.

### **13. Protection**

After installation, the Height Measuring Scale shall be protected against:

- Mechanical damage.
- Scratches.
- Dust.
- Moisture.
- Construction activities.

Protective covering shall remain until handing over the completed work.

### **14. Measurement**

The item shall be **measured in Number (Each)** of completed Height Measuring Scale / Growth Chart

fixed in position and accepted by the Engineer-in-Charge.

The rate shall include complete fabrication, printing, fixing and all accessories.

No separate measurement shall be made for:

- Printing.
- Graphics.
- Screws.
- Adhesives.
- Wall plugs.
- Edge finishing.
- Transportation.
- Fixing accessories.

### 15. Rate

The quoted **rate per Number (Each)** shall include:

- Supply of approved PVC/Sunboard/Foam PVC board or equivalent material.
- Digital high-resolution UV-resistant printing.
- Educational graphics and child-friendly artwork.
- Permanent centimetre graduation markings.
- Calibration and layout.
- Machine cutting and edge finishing.
- Screws, wall plugs, industrial adhesive and fixing accessories.
- Installation complete.
- Transportation, loading and unloading.
- Labour, tools, tackles and scaffolding where required.
- Cleaning after installation.
- Protection until handing over.
- Quality control and testing.
- All taxes, royalties, duties, GST, wastage and incidental expenses.
- Complete finished Child Height Measuring Scale / Growth Chart in all respects as directed by the Engineer-in-Charge.

The quoted rate shall be **inclusive of all materials, artwork, digital printing, calibration, fabrication, fixing and accessories**, and **no extra payment shall be made** for graphics, edge finishing, adhesive, screws, transportation, scaffolding, protection, touch-up work or any incidental item necessary for the satisfactory completion of the work

**Item No. 110: - Providing, supplying, installing, testing and commissioning LED Display Screen of approved make/brand having minimum 32 inch screen size or as approved, Full HD (1920 × 1080) resolution, LED display technology with inbuilt speakers, HDMI and USB connectivity, wall mounting arrangement with necessary brackets, power cable, remote control and all accessories required for complete installation and proper functioning including transportation, labour, testing and commissioning complete as directed by Engineer-in-Charge.**

### **Providing, Supplying, Installing, Testing and Commissioning 32-Inch LED Display Screen**

#### **1. Scope of Work**

The work shall consist of providing, supplying, transporting, installing, testing and commissioning **LED Display Screen** of approved make and model having **minimum 32-inch screen size** or higher as approved by the Engineer-in-Charge. The work shall include supply of all accessories, wall mounting brackets, power cables, connectors, remote control, installation hardware, electrical connections, testing, commissioning, demonstration, cleaning and handing over complete in all respects in accordance with the approved drawings, manufacturer's recommendations and directions of the Engineer-in-Charge.

The contractor shall provide all labour, materials, tools, tackles, transportation, scaffolding, testing instruments and all incidental items necessary for satisfactory completion of the work.

#### **2. Applicable Standards**

The equipment shall conform to the latest editions of the following standards wherever applicable:

- **IS 616** – Safety Requirements for Audio, Video and Similar Electronic Apparatus
- **IS 13252 (Part 1)** – Information Technology Equipment – Safety Requirements
- **BIS Certification (ISI Registration)** for LED Television/Display
- **Bureau of Energy Efficiency (BEE)** Star Rating (where applicable)
- **IEC 62368-1** – Audio/Video, Information and Communication Technology Equipment Safety
- National Building Code (NBC)
- CPWD Specifications (Latest Edition)

#### **3. General Requirements**

The LED Display Screen shall be brand new, unused, of the latest model in regular production, and manufactured by an ISO 9001 certified manufacturer. The equipment shall be complete with all standard accessories required for satisfactory operation and shall be suitable for continuous use in educational institutions, Anganwadi Centres, classrooms, training rooms and public buildings.

Only approved makes such as **Samsung, LG, Sony, Panasonic, Philips, Acer, BenQ, ViewSonic, Xiaomi, TCL** or other equivalent approved brands shall be accepted.

#### **4. Display Specifications**

The LED Display Screen shall have the following minimum specifications:

- Screen Size : **32 inches (minimum)**
- Display Technology : **LED Backlit LCD**
- Native Resolution : **Full HD (1920 × 1080 pixels)** or higher

- Aspect Ratio : **16:9**
- Refresh Rate : **Minimum 60 Hz**
- Brightness : **Minimum 250 cd/m<sup>2</sup>**
- Contrast Ratio : Manufacturer's Standard
- Viewing Angle : **Minimum 178° Horizontal and Vertical**
- Response Time : **8 milliseconds or better**
- Display Colours : Minimum **16.7 Million Colours**
- Anti-glare Screen : Preferred

The display shall provide sharp images with uniform brightness and colour reproduction.

## 5. Audio System

The display shall be provided with:

- Built-in stereo speakers.
- Minimum **20 Watts RMS total output** (2 × 10 W) or manufacturer's standard for the selected model.
- Clear sound reproduction suitable for classroom use.

## 6. Connectivity

The LED Display Screen shall be provided with the following minimum input/output ports:

- HDMI Ports : Minimum **2 Nos.**
- USB Ports : Minimum **1 No.**
- AV Input : As per manufacturer.
- Audio Output : 3.5 mm or Optical Audio (if available).
- RF Input : As applicable.
- Ethernet Port : Where Smart Display is supplied.
- Wi-Fi and Bluetooth : Where Smart Display is supplied.

All ports shall be functional and easily accessible.

## 7. Power Supply

The display shall operate on:

- **Single Phase AC Supply**
- **220–240 Volts**
- **50 Hz**

The equipment shall have built-in protection against voltage fluctuations and shall comply with applicable electrical safety standards.

## 8. Wall Mounting Arrangement

The display shall be mounted using heavy-duty powder-coated steel wall mounting brackets suitable for the screen size and weight.

The mounting arrangement shall include:

- Universal wall bracket.
- Anchor fasteners.
- Stainless steel bolts and nuts.

- Wall plugs.
- Levelling adjustments.
- Safety locking mechanism.

The mounted display shall remain rigid, level and vibration free.

## **9. Accessories**

The following accessories shall be supplied with each display:

- Original Remote Control.
- Batteries.
- Power Cord.
- User Manual.
- Warranty Card.
- Wall Mounting Bracket.
- Mounting Hardware.
- HDMI Cable (minimum 1.5 m).
- Cable Clips or Conduit for neat cable management where required.

## **10. Installation**

The LED Display Screen shall be installed at the location shown in the approved drawings or as directed by the Engineer-in-Charge.

Installation shall include:

- Wall marking.
- Drilling.
- Fixing wall bracket.
- Mounting display.
- Power connection.
- Signal cable connection.
- Cable dressing.
- Functional testing.

All cables shall be neatly concealed in PVC casing-capping or conduit wherever specified.

## **11. Testing and Commissioning**

After installation, the contractor shall carry out complete testing and commissioning, including:

- Power ON/OFF operation.
- Display quality.
- Resolution verification.
- Audio testing.
- HDMI operation.
- USB operation.
- Remote control functions.
- Speaker performance.
- Brightness adjustment.

- Colour calibration.
- Stability of mounting.

Any defects noticed during testing shall be rectified without additional cost.

## 12. Workmanship

The installation shall be carried out by trained technicians.

The completed installation shall be:

- Properly aligned.
- Firmly fixed.
- Free from vibration.
- Neatly wired.
- Fully operational.
- Free from visible damage.
- Clean and aesthetically finished.

## 13. Quality Control

The Engineer-in-Charge shall inspect:

- Manufacturer's make and model.
- BIS Certification.
- Screen size.
- Resolution.
- Display quality.
- Audio quality.
- Connectivity ports.
- Mounting arrangement.
- Functional performance.
- Installation quality.

Only equipment meeting the specified requirements shall be accepted.

## 14. Warranty

The LED Display Screen shall be supplied with a **minimum 3-year comprehensive onsite warranty** from the date of commissioning, covering the display panel, electronics, power supply, speakers, remote control receiver and all manufacturing defects.

During the warranty period, repairs or replacement of defective components shall be carried out by the manufacturer or authorized service provider without any additional cost to the Employer.

## 15. Protection

The installed display shall be protected from dust, moisture, impact and construction activities until final handing over. The original protective film shall be removed only after completion of installation and successful testing.

## 16. Measurement

The item shall be **measured in Number (Each)** of complete LED Display Screen installed, tested, commissioned and accepted by the Engineer-in-Charge.



The measurement shall include the display, wall mounting arrangement, accessories, testing and commissioning.

No separate measurement shall be made for:

- Wall brackets.
- Remote control.
- Power cord.
- HDMI cable.
- Mounting hardware.
- Testing.
- Commissioning.
- Cable management.
- Transportation.

## 17. Rate

The quoted **rate per Number (Each)** shall include:

- Supply of approved 32-inch or larger Full HD LED Display Screen.
- Built-in speakers.
- Wall mounting bracket and fixing hardware.
- Power cable, remote control and batteries.
- HDMI cable and all standard accessories.
- Transportation, loading and unloading.
- Installation, alignment and cable management.
- Testing and commissioning.
- Demonstration to the user.
- Labour, tools, tackles and scaffolding.
- Cleaning after installation.
- Comprehensive onsite warranty.
- All taxes, duties, royalties, GST, insurance, handling, wastage and incidental expenses.
- Complete installation and commissioning in all respects as directed by the Engineer-in-Charge.

**No extra payment shall be made** for wall mounting brackets, fasteners, power cable, remote control, HDMI cable, testing, commissioning, cable management, labour, transportation, warranty obligations or any incidental work necessary for the satisfactory completion of the item.

**Item No. 111: - "Supplying & erecting 5 stage single reverse osmosis water purification system with M.S. powder coated frame, prefilter housing with 'O' ring presediment filter GAC filter, carbon filter suitable buster DC pump capacity 80 psi, mention with 40 psi inline type post carbon filter auto low & high pressure switches with following size of storage tank & LPH capacity & erected as directed [A] 10 Ltr / Hr with 7 Ltr Storage Tank "**

**Supplying, Installing, Testing and Commissioning Reverse Osmosis (RO) Water Purification System (10 LPH Capacity with 7 Litre Storage Tank)**

### **1. Scope of Work**

The work shall consist of **providing, supplying, installing, testing and commissioning a 5-stage Reverse Osmosis (RO) Water Purification System** having a **minimum purification capacity of 10 litres per hour (LPH)** with **7-litre food-grade storage tank**, complete with M.S. powder-coated mounting frame, pre-filtration unit, booster pump, RO membrane, carbon filters, storage tank, electrical accessories, inlet and outlet piping, drain connection, fittings, commissioning, demonstration and all labour, materials, tools, transportation and incidental works complete in accordance with the approved specifications and directions of the Engineer-in-Charge.

The system shall be suitable for purification of potable water and shall provide safe drinking water conforming to BIS drinking water quality requirements.

### **2. Applicable Standards**

The equipment shall conform to the latest editions of the following standards:

- **IS 16240** – Reverse Osmosis (RO) Based Point-of-Use Water Treatment Systems
- **IS 10500** – Drinking Water Specification
- **IS 3025** – Methods of Sampling and Testing of Water
- **IS 14724** – General Requirements for Drinking Water Treatment Equipment (where applicable)
- BIS Certification Requirements
- National Building Code (NBC)
- Manufacturer's Standard Specifications

The RO system shall be manufactured by an **ISO 9001 certified manufacturer** and shall comply with applicable BIS requirements.

### **3. General Requirements**

The RO unit shall be:

- Brand new.
- Factory assembled.
- Wall-mounted or frame-mounted.
- Suitable for continuous operation.
- Designed for indoor installation.
- Complete with all accessories necessary for proper functioning.

Only approved makes such as **Kent, Aquaguard (Eureka Forbes), AO Smith, Livpure, Blue Star, Pureit, V-Guard, Luminous** or equivalent approved brands shall be accepted.

#### 4. System Capacity

The RO purification system shall have:

- Purification Capacity : **Minimum 10 Litres Per Hour (LPH)**
- Storage Capacity : **Minimum 7 Litres**
- Recovery : As per manufacturer's standard.
- Operating Pressure : Suitable for municipal water supply with booster pump.
- Maximum TDS Reduction : As per IS 16240.

#### 5. Purification Process

The purifier shall consist of a **minimum five-stage purification process**, comprising:

##### Stage 1 – Pre-Sediment Filter

- Polypropylene sediment cartridge.
- Nominal filtration up to 5 microns.
- Removal of suspended particles, sand, dust and rust.

##### Stage 2 – Granular Activated Carbon (GAC) Filter

The activated carbon filter shall remove:

- Chlorine.
- Odour.
- Organic impurities.
- Taste-causing contaminants.

##### Stage 3 – Carbon Block Filter

The carbon block filter shall provide:

- Fine filtration.
- Protection of RO membrane.
- Removal of residual chlorine and organics.

##### Stage 4 – Reverse Osmosis Membrane

The RO membrane shall:

- Be Thin Film Composite (TFC) type.
- Remove dissolved salts.
- Reduce Total Dissolved Solids (TDS).
- Remove bacteria and viruses.
- Remove heavy metals.
- Remove fluoride, arsenic and other dissolved contaminants within the manufacturer's performance limits.

##### Stage 5 – Post Carbon Filter

The purifier shall be provided with:

- Inline activated carbon post filter.
- Taste enhancement.
- Odour removal.
- Final polishing of purified water.

## 6. Booster Pump

The purifier shall be fitted with:

- Heavy-duty DC Booster Pump.
- Minimum Pressure : **80 PSI**
- Low noise operation.
- Continuous duty rating.
- Suitable vibration isolation.

The pump shall automatically start and stop as required.

## 7. Pressure Switches

The system shall include:

### Low Pressure Switch

To protect the pump during low inlet water pressure.

### High Pressure Switch

To automatically stop the system after the storage tank is full.

Both switches shall be factory installed and fully functional.

## 8. Storage Tank

The purifier shall be provided with:

- Capacity : **7 Litres**
- Food-grade ABS plastic.
- Non-toxic.
- Corrosion resistant.
- Easy to clean.
- Airtight construction.

The storage tank shall maintain hygienic storage conditions.

## 9. Housing

The filter housings shall be manufactured from food-grade polypropylene.

Each housing shall be:

- Leak-proof.
- Pressure resistant.
- Provided with 'O' ring sealing arrangement.
- Easy to dismantle for maintenance.

## 10. Mounting Frame

The purifier shall be mounted on a rigid **Mild Steel powder-coated frame**.

The frame shall be:

- Rust resistant.
- Powder coated.
- Rigidly fabricated.
- Suitable for wall mounting.

Necessary anchor fasteners shall be provided.

**11. Electrical System**

The purifier shall operate on:

- 230 Volts AC
- Single Phase
- 50 Hz

The electrical system shall include:

- SMPS power supply.
- Suitable wiring.
- On/Off switch.
- Safety fuse.
- Necessary connectors.

The equipment shall be electrically safe and properly insulated.

**12. Accessories**

The RO system shall be supplied complete with:

- Inlet Ball Valve.
- Feed Water Tubing.
- Purified Water Tubing.
- Drain Tubing.
- Wall Mounting Hardware.
- All Connectors.
- Fittings.
- Flow Restrictor.
- Check Valve.
- Float Valve.
- Installation Kit.
- User Manual.
- Warranty Card.

**13. Installation**

Installation shall include:

- Fixing the mounting frame.
- Mounting the purifier.
- Connecting inlet water.
- Drain connection.
- Storage tank connection.
- Electrical connection.
- Leak testing.
- Flushing of cartridges.
- Final commissioning.

The entire installation shall be neat and aesthetically finished.

#### **14. Testing and Commissioning**

After installation, the contractor shall carry out:

- Leakage Test.
- Pressure Test.
- Pump Operation Test.
- Automatic Cut-off Test.
- Low Pressure Switch Test.
- High Pressure Switch Test.
- Water Purification Test.
- Storage Tank Operation.
- Demonstration of operation and maintenance.

The system shall deliver clear, odour-free drinking water.

#### **15. Workmanship**

The complete installation shall be:

- Securely mounted.
- Properly aligned.
- Leak-proof.
- Electrically safe.
- Ready for continuous operation.

All piping shall be neatly routed and properly supported.

#### **16. Quality Control**

The Engineer-in-Charge shall inspect:

- Manufacturer's Certificate.
- BIS Certification.
- Purification Capacity.
- Storage Capacity.
- RO Membrane.
- Booster Pump.
- Pressure Switches.
- Filter Housings.
- Powder Coated Frame.
- Installation Quality.
- Functional Performance.

Any defective equipment shall be replaced without additional cost.

#### **17. Warranty**

The complete RO system shall be supplied with a **minimum 1-year comprehensive onsite warranty** covering:

- Booster Pump.
- Electrical Components.

- Storage Tank.
- Filter Housing.
- RO Membrane (as per manufacturer's warranty policy).
- Manufacturing Defects.

The contractor shall provide:

- Warranty Card.
- User Manual.
- Installation Report.
- Test Certificate.

### **18. Measurement**

The item shall be **measured in Number (Each)** of complete **10 LPH Reverse Osmosis Water Purification System with 7 Litre Storage Tank**, installed, tested, commissioned and accepted by the Engineer-in-Charge.

No separate measurement shall be made for:

- Mounting Frame.
- Booster Pump.
- Filters.
- Storage Tank.
- Tubing.
- Fittings.
- Electrical Connections.
- Testing.
- Commissioning.
- Demonstration.

### **19. Rate**

The quoted **rate per Number (Each)** shall include:

- Supply of **5-stage RO Water Purifier (10 LPH)**.
- **7 Litre food-grade storage tank**.
- M.S. powder-coated mounting frame.
- Sediment filter.
- Granular Activated Carbon (GAC) filter.
- Carbon Block filter.
- Thin Film Composite (TFC) RO membrane.
- Post Carbon inline filter.
- 80 PSI DC booster pump.
- Low- and high-pressure switches.
- SMPS power supply and electrical accessories.
- Inlet/outlet piping, drain pipe and all fittings.
- Ball valve, connectors and installation kit.

- Transportation, loading and unloading.
- Installation, testing and commissioning.
- Demonstration to the user.
- Labour, tools, tackles and scaffolding.
- Manufacturer's warranty.
- All taxes, duties, royalties, GST, insurance, handling and incidental expenses.
- Complete installation in all respects as directed by the Engineer-in-Charge.

**No extra payment shall be made** for mounting frame, booster pump, RO membrane, storage tank, filters, tubing, electrical connections, fittings, testing, commissioning, demonstration, transportation, labour or any incidental work necessary for the satisfactory completion and operation of the RO Water Purification System.

**Executive Engineer**  
Panchayat (R & B) Division  
Vadodara