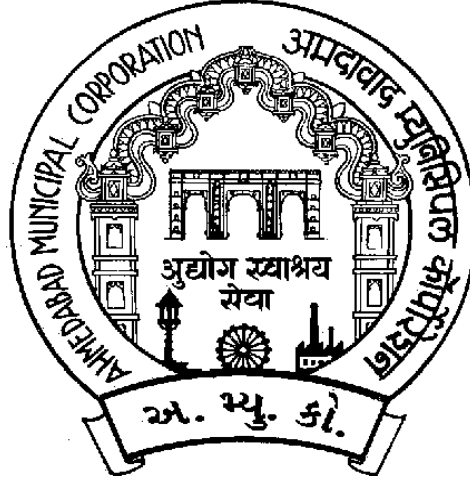


**AHMEDABAD MUNICIPAL CORPORATION**  
( ENGINEERING DEPARTMENT NORTH ZONE )



**TENDER DOCUMENT**

**CONSTRUCTION OF INDULAL YAGNIK COMMUNITY HALL AFTER  
DEMOLITION OF OLD HALL BUILDING AT F.P.NO. 192, T.P.S.NO. 12  
(ASARVA EXTENSION SOUTH) IN BAPUNAGAR WARD,  
NORTH ZONE, AHMEDABAD**

**Volume -1 Part-B\_ Technical Specification for Civil Work**

**Municipal Commissioner  
Ahmedabad Municipal Corporation  
Sardar Patel Bhavan,  
Danapith ,  
Ahmedabad**

## SPECIFICATIONS OF ITEMS OF B.O.Q.

### BIDDERS PLEASE READ CAREFULLY AND COMPULSORY SIGN. WITH SEAL:

- This section gives detail specifications for mainly used materials, for other materials refer Building Specifications.
  - For detailed specification refer R & B Dept. Booklet for General Technical Specification for building works.
  - Proper care has been taken to note down specifications of all the items, but if any item is not found hereby, it shall be executed only as per the guidelines of the consultants, no payment shall be made if the guidelines are not followed.
- a) Samples of all the materials to be used shall be got approved before placing the order and then approved sample shall be deposited with the Project Consultants / A.M.C. locker safely.
  - b) In case of non-availability of materials in metric unit, the unit shall be converted by the Project Consultants, for which neither extra cost shall be paid nor rebate shall be given/ recovered on those items / materials.
  - c) The contractor shall submit the original Testing Certificate of the material tested, if in any case, the Consultants finds the Tests to be repeated, the contractors shall do the same with no extra cost to be borne by the clients / consultants.
  - d) The contractor may also be asked for the originality of the material used, this certificate may be asked from the vendor / manufacturer from whom the materials has been procured.
  - e) For all materials stored on site, the contractors shall be sole responsible for the wastage, theft or any other kind of losses.
  - f) Wherever in the tender document, two statements or two brands conflicts/ differs, the superior material quality / brand shall be followed, and same for any construction activity such as strength of material / grade of the material / mortar / concrete mix shall be followed the superior one only, any discrepancy in this regard shall be solved by the AMC or Project Consultants and the decision of the Client shall be final and binding to the Contractors without any oppose.
- We agree and abide to follow the specifications / instructions given to us during the course of execution.

Sign. & Seal of the Bidders

## **GENERAL TECHNICAL SPECIFICATIONS FOR BUILDING WORK**

### **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 or 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.
5. The distance, which constitutes lead, shall be determined along the shortest practical route and not 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 specified, it shall mean "all leads"
7. Lift shall be measured from plinth level.
8. Upto "floor two level" means actual height of floor (Maxi. 4 M.) upto 3 Mt. above plinth level.
9. Definite particulars covered in the items of work, through not mentioned or elucidated in it, specifications shall be deemed to be included there in.
10. Reference to specifications of materials as made in the detailed specification of the items of work is in the form of a designation containing the number of the specification of the material and prefix 'M' e.g. 'M-5'.
11. Approval to the samples of various materials given by the Engineer-in-charge shall not absolve the contractor from the responsibility of replacing defective material brought on site or materials used in the work found defective at a later date.
12. The contract rate of the item of work shall be for the work completed in all respects.
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 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 shall be kept in sufficient numbers and in good working condition on the site of the work.
17. All works shall be carried out in a workmanlike manners 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

be 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 thereof 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 "Minor Minerals Act", and such other laws and rules prescribed by Government from time to time.
23. All necessary safety measures and precaution (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 unless recovery at one percent towards testing charges is separately made.
25. Approval to any of the executed items for the work does not in any way relieve the contractor of his responsibility for the correctness, soundness and strength of the structure as per the drawings and specification.

### **SPECIFICATIONS OF MATERIALS**

#### **M-1.**

#### **Water:**

- 1.1. Water shall not be salty or brackish and shall be clean, reasonably clear and free objectionable quantities of silt and traces of oil and injurious alkalis, salts, organic matter and other deleterious material which will either weaken the mortar or concrete or cause efflorescence or attack the steel in R.C.C Container for transport, storage and handling of water shall be clean. Water shall conform to the standards specified in I.S.456-1978.
- 1.2. 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 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. Portable water will be generally found suitable for curing mortar or concrete.

**M-2. Lime:**

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

**M-3. Cement :**

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

**M-4. White Cement :**

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

**M-5. Coloured Cement:**

- 5.1 Coloured cement shall be with white or gray Portland cement as specified in the item of the work.
- 5.2 The pigments used for coloured cement shall be of approved quality and shall not exceed 10% of cement used in the Mix. The mixture of pigment shall be properly grounded to have a uniform colour and shade. The pigments shall have such properties to provide for durability under exposure to sunlight and weather.
- 5.3 The pigment shall have the property such that it is neither by the cement nor detrimental to it.

**M-6. Sand:**

- 6.1. Sand shall be natural sand, clean, well graded, hard strong durable and gritty particle free from injurious amounts of dust clay, kankar nodules, soft or flaky particles shale, alkali, salts organic matter, loam, mica or another deleterious substance and shall be got approved from the Engineer-in-charge. The sand shall not contain more than 8 percent of silt as determined by field test. If necessary the sand shall be washed to make it clean.
- 6.2. Coarse Sand : The fineness modulus of coarse sand shall not be less than 2.5 and shall not exceed 3.0.  
The sieve analysis of coarse shall be as under:

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

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

I.S.Sieve	Percentage by weight	I.S.Sieve	Percentage by weight
Designation	Passing Sieve	Designation	Passing Sieve

4.75 mm.	100	600 Micron	40-85
2.36 mm.	100	300 Micron	5-50
1.18 mm.	70-100	150 Micron	0-10

**M-7. Stone Dust :**

- 7.1. This shall be obtained from crushing hard black trap or equivalent. It shall not contain more than 8% of silt as determined by field test with measuring cylinder. The method of determining silt contents by field test is given as under :
- 7.2. A sample of stone dust to be tested shall be placed without drying in 200 mm. measuring cylinder. The quantity of the sample shall be such that it fills the cylinder upto 100 mm. mark. The clean water shall be added upto 150 mm. mark. The mixture shall be stiffed vigorously and the content allowed to settle for 3 hours.
- 7.3. The height of silt visible as settled layer above the stone dust shall be expressed as percentage of the height of the stone dust below. The stone dust containing more than 8% silt shall be washed so as lowering the silt content within the allowable limit.
- 7.4. The fineness modulus of stone dust shall not be less than 1.80.

**M-8. Stone Grit:**

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

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

- 8.3. The crushing strength of grit will be such as to allow the concrete in which it is used to be built up to the specified strength of concrete.
- 8.4. The necessary tests for grit shall be carried out as per the requirements of I.S. 2386 (Parts I to VII) 1963, as per instructions of the Engineer-in-charge. The necessity of test will be decided by the Engineer-in-charge. The necessity of test will be decided by the Engineer-in-charge.

**M-9. Cinder :**

- 9.1. Cinder is well burnt furnace residue, which has been fused or sintered into lumps of varying sizes.
- 9.2. Cinder aggregates shall be well burnt furnace residue obtained from furnace using coal fuel only. It shall be sound clean free from clay, dirt ash or other deleterious matter.

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

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

**M-10. Lime Mortar :**

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

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

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

**10.3. Preparation of Mortar :**

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

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

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

**M-11. Cement Mortar:**

**11.1** Water shall conform to specification M –1. Cement : Cement shall conform to specification M- 3.

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

**11.2** Preparation of Mix :11.2.1 Cement and 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 homogenous mixture of uniform colour is obtained., Mixing platform shall be so arranged that no deleterious extraneous material shall get mixed with mortar or mortar shall be gradually added and thoroughly mixed to form a stiff plastic mass of uniform colour so that each particle of sand shall be completely covered with a film of wet cement. The water cement ratio shall be adopted as directed.

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

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

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

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

**TABLE**

I.s.sieve	percentage passing for single sized aggregates of nominal size			I.S.Sieve Designation sized	Percentage passing for single aggregates of Nominal size		
80 mm.	--	--	--	12.5 mm.	--	--	--

63 mm.	100	--	--	10 mm.	0.5	0.02	0.30
40 mm.	85-100	100	--	4.75 mm	--	0.5	0.5
20 mm.	0-20	85-100	100 mm.	2.35	--	--	--
15 mm.	--	--	85-100				

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

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

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

**13.1** Aggregate For Design Mix Concrete :Coarse aggregate shall be of machine crushed stone of black trap or equivalent hard stone and be hard strong dense, durable clean and free skin and coating likely to prevent proper adhesion of mortar.

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

**13.3** The necessary tests indicated in I.S. 383-1970 and I.S. 456-1978 shall have to be carried out to ensure the acceptability of the material.

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

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

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

**14.2** The brick bats shall be measured by volume by suitable boxes or as directed.

**M-15 Bricks :**

**15.1** The bricks shall be hand or machine moulded and made from suitable soils and kiln-burnt. They shall be free from crack and nodules of free lime. They shall have smooth rectangular faces with sharp corers 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"x4 $\frac{3}{8}$ " x 2 $\frac{3}{4}$ " )225 x 110 x 75 mm.

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

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

**M-16 Stone :**



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

**M-17. Laterite Stone :**

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

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

- 18.1** Mild steel bars reinforcement for R.C.C work shall conform to I.S. 432(Part-II) 1966 and shall be tested quality. It shall also comply with relevant part of I.S. 456-1978.
- 18.2** All the reinforcement shall be clean and free from dirt, paint, grease, mile scale or loose or thick rust at the time of placing.
- 18.3** For the purpose of payment, the bar shall be measured correct upto 100 mm. length and weight payable worked out at the rate specified below :
- |                         |                        |
|-------------------------|------------------------|
| 1. 6mm. x 0.22 Kg./Rmt  | 8. 20mm. 2.47 Kg./Rmt  |
| 2. 8mm. x 0.39 Kg./Rmt. | 9. 22mm. 2.98 Kg./Rmt  |
| 3. 10mm x 0.62 Kg./Rmt  | 10. 25mm. 3.85 Kg./Rmt |
| 4. 12mm x 0.89 Kg./Rmt  | 11. 28mm. 4.83 Kg./Rmt |
| 5. 14mm x 1.21 Kg./Rmt  | 12. 32mm. 6.31 Kg./Rmt |
| 6. 16mm x 1.58 Kg./Rmt  | 13. 36mm. 7.99 Kg./Rmt |
| 7. 18mm x 3.00 Kg./Rmt  | 14. 40mm 9.86 Kg./Rmt. |

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

- 19.1** High yield strength steel deformed bars are either cold twisted or hot rolled, shall conform to I.S. 1739-1966 and I.S.1139-1966 respectively.
- 19.2** Other provision and requirements shall conform to specification NO. M-18 for Mild steel bars.

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

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

- 20.2** The tensile strength of the high tensile steel bars shall be as specified in the item. In absence of the given strength, the minimum strength shall be taken as per para 6.1 of I.S. 1785-1962. Testing shall be done as per I.S. requirements.
- 20.3** The high tensile steel shall be free from loose mill scale, rust oil, grease, or any other harmful matter, Cleaning of steel bars may be carried out by immersion in solvent solution, wire brushing or passing through a pressure box containing carborundum.
- 20.4** The high tensile wire shall be obtained from manufactures in coil having diameter not less than 350 times the diameter of wire itself so that wire springs back straight back straight on being uncoiled.
- M-21. Mild Steel Binding Wire :**
- 21.1.** The mild steel wire shall be of 1.63 mm or 1.22 mm. (16 or 18 gauge) diameter and shall conform to I.S. 280-197.
- 21.2.** The use of black wire be permitted for binding reinforcement bars. It shall be free from rust, Oil paint, grease, looser mill scale or any other undesirable coating which may prevent adhesion of cement mortar.
- M-22. Structural Steel :**
- 22.1.** All structural steel shall conform to I.S. 226-1965. The steel shall be free from the defects mentioned in I.S. 226-1975 and shall have a smooth finish. The material shall have a smooth finish. The material shall be free from loose mill scale, rust pits or other defects affecting the strength and durability. Rivet bars shall conform to I.S. 1148-1973.
- 22.2.** When the steel is supplied by the Contractor test certificates of the manufactures shall be obtained according to I.S. 226-1975 and other relevant Indian Standards.
- M-23. Galvanised Iron Sheets :**
- 23.1** The galvanised iron sheets shall be plain or corrugated sheets of specified in item. The G.I. sheets shall conform to I.S. 217-1977. The sheets shall be undamaged in carriage and handling either by rubbing off of zinc coating or otherwise they shall have clean and bright surface and shall be as directed as per site condition.
- 23.2** The length and width of G.I. sheet shall be as directed as per site condition.
- M-23 (A) G.I Valleys gutter ridges :**
- 23.A.1.** The G.I. ridges and hips shall be of plain galvanised sheets class-3 of the thickness as specified in item. These shall be 600 mm. in width and properly bent up to shape without damage to the sheets in process of bending.
- 23.A.2.** Valleys gutters and flashings shall also be galvanised sheet of thickness as specified in item. Valleys shall be 900 mm. wide overall and flashing shall be 380 mm. wide overall. They shall be bent to the required shape without damage to the sheet in the process of bending.
- M-24. Asbestos Cement Sheets :**
- 24.1.** Asbestos cement sheets plain, corrugated or semi corrugated shall conform to I.S. 459-1970.
- 24.2. Ridges & Hips :**
- 24.2.1** Ridges and hips shall be same thickness as that of A.C. sheets. The types of ridges suitable for the type of sheets and locations.
- 24.2.2** Other accessories to be used in roof such as flashing pieces, cavity filler pieces valley gutters, north light and ventilator curves, barge boards etc. shall be standard manufacture and shall be suitable for the type of sheets and location.
- M-25. Mangalore Pattern Roof Tiles :**
- 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 wide plank of 30 mm. minimum thickness with or without steel lining roof steel plates stiffened by steel angles. The shuttering shall be supported on battens and beams and props of vertical ballies properly cross braced together so as to make the centering rigid. In places of bulky props, brick pillar of adequate section built in mud mortar may be used.
- 26.2. The form work shall be sufficiently strong and shall have camber, so that it assumes correct shape after deposition of the concrete and shall be able to resist forces caused by vibration of live load of men working over it and other incidental loads associated with it. The shuttering shall have smooth and even surface and its joints shall not permit leakage of cement grout.
- 26.3. If at any stage of work during or after placing concrete in the structure, the form work sags or bulges out beyond the required shape of the structure, the concrete shall be removed and work redone with fresh concrete and adequately rigid form work. The complete 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 and shall be placed as per design requirement. These shall rest squarely on wooden sole plates 40 mm. thick and minimum bearing area if 0-10 sq. m. laid on sufficiently hard base.
- 26.5. Double wedges shall further be provided between the sole plate and the wooden props so as to facilitate tightening and easing of shuttering without jerking the concrete.
- 26.6. The timber used in shuttering shall not be so dry as to absorb water from concrete and swell or bulge nor so green or wet as to shrink after erection. The timber shall be properly sawn and planed on the sides and surface coming in contact with concrete. Wooden 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 solutions before the concreting is done. Alternatively coat of raw linseed oil or oil of approved manufacturer may be applied in place of soap solution. In case of steel shuttering either soap solution or raw linseed oil shall be applied after thoroughly cleaning the surface. Under no circumstances black or burnt oil shall be permitted.
- 26.9. The shuttering for beams and slabs shall have camber of 4 mm. per meter (1 to 250) or as directed by the Engineer-in-charge so as to offset the subsequent deflection. For cantilevers, The camber at free end shall be 1/50 of the projected length or as directed by the Engineer-in-charge.

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

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

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

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

**M-29. Teak wood :**

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

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

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

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

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

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

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

- 30.1** The solid core type flush door shutters shall be decorative or non-decorative type as specified in the drawing. The size and thickness of the shutter shall be as specified in drawings or as directed. The timber species for core shall be used as

- per I.S. 2202- (Part-I) 1980. The timber shall be free from decay and insect attack. Knots and knot holes less than half the width of cross-section of the members in which they occur may be permitted. Pitch pockets, Pitch streaks and harmless pin holes shall be permissible except in the exposed edges of the core members. The commercial plywood, cross-bands shall conform to I.S. 303-1275.
- 30.2** The face panel of the shutters shall be formed by gluing by the hot press process on both faces of the core with either plywood or cross-bands and face veneers. The hopping rebating opening of glazing, Venetian etc. shall be provided if specified in the drawing.
- 30.3** All edges of the door shutters shall be square. The shutters shall be free twist or warp in its plane. Both faces of the shutters shall be sand papered to smooth even texture.
- 30.4** The shutters shall be tested for
- (1) End immersion test :** The test shall be carried out as per I.S. 2202 (part-I) 1980. There shall be no delamination at the end of the test.
  - (2) Knife test :** The face panel when tested in accordance with I.S. 1659-1979 shall pass the test.
  - (3) Glue adhesion Test :** The flush door shall be tested for glue adhesive test in accordance with I.S. 2202 (Part-I) 1980. The shutters shall be considered to have passed the test if no delamination occurs in the glue lines in the plywood and if no single declamination more than 80 mm. in length and more than 3 mm. in depth has occurred in the assembly glue lines between the plywood face and the style and rail. Delamination at the corner shall be measured continuously around the corner. Delamination at the knots, knots holes and other permissible wood defects shall not be considered in assessing the sample.
- 30.5** The tolerance in size of solid core type flush door shall be as under :  
In Normal thickness + 1.2 mm. In Normal height + 3 mm.
- 30.6** The thick of the shutters shall be uniform throughout with a permissible variation of not more than 0.8 mm. when measured at any two points.
- M-31.** Aluminum doors, Windows, Ventilators.
- 31.1** Aluminum alloy used in the manufacture of extruded window sections shall conform to I.S. designation HEA-WP of I.S. :733-1975 and also to I.S. Designation WVG-WP of I.S. 1285-1975. The Section shall be as specified in the drawing and design. The fabrication shall be done as directed.
- 31.2** The hinges shall be cast or extruded aluminum hinges of same type as in windows but of large size.
- 31.3** The hinges shall normal be of 50 mm. projecting type. Non-projecting type of hinges may also be used if directed. The handles of door shall be of specified in the drawing and design. The fabrication shall be done as directed.
- M-32.** **Rolling Shutters :**
- 1** The rolling shutter shall conform to I.S. 6248-1979. Rolling shutters shall be supplied of specified type with accessories. The size of the rolling shutters shall be specified in the drawings. The shutters shall be constructed with interlocking lath sections formed from cold rolled steel strips not less than 0.9 mm. thick and 80 mm. wide for shutters upto 3.5 mm., width not less than 1.25 mm. thick and 80 mm. wide for shutters 3.5 mm in width and above unless otherwise specified.
  - 2** Guide channels shall be of mild steel deep channel section and of rolled pressed or built up (fabricated) jointures construction. The thickness of sheet used shall not be less than 3.15 mm.
  - 3** Hood covers shall be made of M.S. Sheets not less that 0.92 mm. thickness For shutters having width 3.5 Meter and above the thickness of M.S. Sheet for the hood cover shall be not less than 1.25 mm.

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

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

**33.1** The collapsible steel gate shall be in one or two leaves and size as per approved drawings or as specified. The gate, shall be fabricated from best- quality mild steel channels, flats etc. Either steel pulleys or ball bearing shall be provided in every double channel. Unless otherwise specified the particulars of collapsible gate shall be as under :

- (a) Pickets : These shall be of 20 mm. M.S., channels of heavy sections unless otherwise shown on drawings. The distance center to center of pickets shall be 12 cms. with an opening of 10 Cms.
- (b) Pivoted M.S. flats shall be 20 mm x 6 mm.
- (c) Top and bottom guides shall be from tee or flat iron of approved size.
- (d) The fittings like stoppers, fixing hold fasts, locking cleats, brass handles and cast iron rollers shall be of approved design and size.

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

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

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

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

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

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

**M-37. Plywood :**

- 37.1** The plywood for general purpose shall conform I.S. 303-1975. Plywood is made by cementing together thin boards or sheets of wood into panels. There are always an odd number of layers 3,5,7,9 ply etc. The plies are placed so that grain of each layer is right angle to the grain in the adjacent layer.
- 37.2** The Chief advantages of plywood over a signal board of the same thickness is the more uniform strength of the plywood, along the length and width of the plywood and grater resistance to cracking and splitting with change in moisture content.
- 37.3** Usually synthetic resins are used for gluing, pherolic resins are usually cured in a hot press which compresses and simultaneously heats the plies between hot plates which maintain a temperature of 90 degrees C. to 140 degrees C. and a pressure of 11 to 14 kg/sq.cm. on the wood. The time of heating may be anything from 2 to 69 minutes depending upon thickness.
- 37.4** When water glue are used , the wood absorbs so much water that the finished plywood must be dried carefully. When synthetic resins are used as adhesive finished by plywood must be exposed to an atmosphere of controlled humidity until the proper amount of moisture has been absorbed.
- 37.5** According to I.S. 303-1975 the plywood for general purpose shall be of three grades **BWR, WWR** and **CWR**, depending upon the adhesives used for bonding and veneers, and it will be further classified into six types namely AA,AB,AC,BB,BC and CC based on the quality of the two faces, each face being of three kinds namely, A,B and C, After pressing, the finished plywood should be reconditioned to a moisture content not less than 8 percent and not more than 16 percent.
- 37.6** Thickness of plywood Boards :

**TABLE**

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

**M-38. Glass :**

- 38.1** All glass shall be of the best quality free from specks, bubbles, smokes, veins, air holes blisters and other defects. The kind of glass to be used shall be mentioned in the item or specification or in the special provisions or as shown in detailed drawings. Thickness of glass panes shall be uniform. The specifications or different kinds of glass shall be as under.
- 38.2 Sheet Glass :**
- 38.2.1** In absence of any specified thickness or weight in the item or detailed specifications of the item of work, sheet glass shall be weighing 7.5 Kg/Sq.m. for panes upto 600 mm x 600 mm.
- 38.2.2** For panes larger than 600 mm. x 600 mm. and upto 800 m. x 800 mm. the glass weighing not less than 8.75 Kg/Sq.m. shall be used. For bigger panes upto 900 mm. x 900 mm. glass weighing not less than 11.25 Kg/Sq.m. shall be used.
- 38.2.3** Sheet glass shall be patent flattened glass of best quality and for glazing and framing purposes shall conform to I.S. : 1761-1960. Sheet glass of the specified colours shall be used, if so shown on detailed drawings or so specified. For important buildings and for panes with any dimension over 900 mm. plate glass of specified thickness shall be used.
- 38.3. Plate Glass. 38.3.1.** When plate glass is specified it shall be 'Polished patent plate glass' of best quality. It shall have both the surface ground flat and parallel and polished to obtain clear undisturbed vision and reflection. The plate glass shall be

of the thickness mentioned in the item or as shown in the detailed drawing or as specified. In absence of any specified thickness and type of glass shall be as per details on drawings or as specified or as directed.

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

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

**M-39. Acrylic Sheets :**

**39.1.** Acrylic sheet be of thickness as specified in the item and of 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 thickness. It shall be extremely resistant to sunlight, weather and low temperatures. It shall not show any significant yellowing or change in physical properties or loss of light transmission over a longer period of use. The sheet shall be impact resistant also. Sheets should be available in complete range of standard transparent, translucent and opaque colours. Sheets shall be of such quality that they can be cut bent and jointed as desired. Solution for the joints shall be used as per the requirement of manufacturer.

**M-40. Particle board :**

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

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

**41.1** The expanded polystyrene ceiling boards and tiles shall be approved make and shall be of size, thickness, finish and colour as indicated. It shall be of high density and suitable for use as insulating material. The insulating material shall be like slab of Thermocol etc.

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

**42.1** The resin bonded fiber glass tiles, or rolls shall be of approved make and shall be of sizes, thickness and finish as indicated.

**42.2.** For test of Minerrak wool thermal insulation Blanket I.S. : 3144?1965 shall be followed.

**42.3.** Insulation wool blanket shall be with following coverings on one or both sides as indicated.

- (1) Bituminised hessain Kraft paper for keeping out dust.
- (2) Hessian cloth or Kraft paper for keeping out dust.
- (3) G.I. wire netting, suitable for surface to be plastered over.

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

**43.1. General**

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



- 43.1.2 They shall be of iron, brass, aluminum, chromium plated iron chromium plated brass, copper oxidised iron, copper oxidised brass or anodized 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 ensure ease of operation.
- 43.1.4 The samples of fixtures and fastenings shall be got approved as regards quality and shape before providing them in position.
- 43.1.5 Brass and anodised aluminum fixtures and fastenings shall be bright finished.
- 43.2. Holdfasts :**
- 43.2.1. Holdfasts shall be made from mild steel flat 30 cm. length and one of the holdfasts shall be bent at right angle and two nos. of 6 mm. diameter holes shall be made in it for fixing it to the frame with screws. At the other end. The holdfast shall be forked and bent at right angles in opposite directions.
- 43.3. Butt hinges :**
- 43.3.1. Railway standard heavy type butt hinges shall be used when so specified.
- 43.3.2. The strap hinges shall be manufactured from M. S. Sheet.
- 43.4 Siding door bolt (Aldrops):** 43 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 as shall be used and shall be got approved.
- 43.6 Door Latch:**43.7.1 The size of door latch shall be taken as the length of latch.
- 43.7 Bathroom Latch :**43.5.1 Bathroom latch shall be similar to tower bolt.
- 43.8 Handle :** The size of the handles shall be determined by the inside grip length of the handles. Handles shall have a base plate of length 50 mm more than size of the handle.
- 43.9 Door Stopper:** 43.9.1 door stoppers shall be either floor door stopper type or door catch type floor stopper shall be of overall size as specified as shall have rubber cushion.
- 43.10 Door Catch :**43.10.1 Door catch shall be fixed as height of about 900 mm from the floor level so that one part of the catch is fitted on the inside of the shutter and the other part is fixed in the wall with necessary wooden plug arrangements for appropriate fixate. The catch shall be fixed 20 mm from the face of the door for easy operation of catch.
- 43.11 Wooden Door stop with high :**
- 43.11.1 wooden door stop of size 100mm X 60 mm X 40 mm shall be fixed on the door frame with a high of 75 mm size at high of 900 mm from the floor level the wooden door stop shall be provided with 3 coats of approved oil paint.
- 43.12 Case meant window fastener :** Casement window fastener for single leaf window shutter shall be left or right handed as directed.
- 43.13 Casement stays (straight peg 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 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 length and shall be firmly riveted to the base plate in case of brass pivot.

#### **M-44.**

##### **44.1**

#### **Paints :**

##### **(A) Oil Paints :**

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

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

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

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

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

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

**M-45 French polish :**

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

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

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

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

**46.1.** The marble chips shall be of approved quality and shades. It shall be hard, sound, dense and homogenous in texture with crystalline and coarse grains. It shall be uniform in colour and free from stains, cracks decay and weathering.

**46.2.** The size of various colours of marble chips of approved quality and colours only as per grading as decided by the Engineer-in-charge shall be used for marble mosaic tiles or works.

**46.3.** The marble chips shall be machine crushed. They shall be free from foreign matter, dust etc. Except as above, the chips shall conform to I.S. : 2114-1962.

**M-47. Flooring Tiles :**

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

**47.1.1.** The plain cement tiles shall be general purpose type. These are the tiles in the manufacturer of which no pigments are used Cement used in the manufacturer of tiles shall be as per Indian Standards.

**47.1.2.** The tiles shall be manufactured from a mixture of cement and natural aggregates by pressure process. During manufacture, the tiles shall be subjected to a pressure of not less than 140 Kg/Sq. Cm. The proportion of cement to aggregate in the backing of the tiles shall be not less than 1:3 by weight. The wearing face through the tiles are of plain cement, shall be provided with stone chips of 1 to 2 mm. Size. The proportions of cement to the marble chips aggregate in the wearing layer of the tiles shall be three parts of cement to one part chips by weight. The minimum thickness Of wearing layer shall be 3 mm. The colour and texture of wearing layer shall be uniform through out its face and thickness. On removal from mould, the tiles shall be kept in moist conditions continuously at least for seven days and subsequently, if necessary, for such long period as would ensure their conformity to requirements of I.S. : 1237-1980 regarding strength resistance to wear and water absorption.

- 47.1.3.** The wearing face of the tiles shall be plain, free from projections, depressions and cracks and shall be reasonably parallel to the back face of the tile. All angles shall be right and all edges shall be sharp and true.
- 47.1.4.** The size of tiles shall generally be square shape 24.85 Cm. x 24.85 Cm. or 25 Cm. x 25 Cm. The thickness of tiles shall be 20 mm.
- 47.1.5.** Tolerance of length and breadth shall be plus or minus one millimeter, Tolerance or thickness shall be plus 5 mm.
- 47.1.6.** The tiles shall satisfy the tests as regards transverse strength, resistance to wear and water absorption as per I.S.:1237-1980.
- 47.2. (B) Plain Coloured Tiles :**
- 47.2.1.** These tiles shall have the same specification as per plain cement tiles as per (A) above except that they shall have a plain wearing surface where in pigments are used. They shall conform to I.S. 1237-1980.
- 47.2.2.** The pigment used for colouring cement shall not exceed 10 percent by weight of cement used in the mix. The pigments, synthetic or otherwise, used for colouring tiles shall have permanent colour and shall not contain materials detrimental to concrete.
- 47.2.3.** The colour of the tiles shall be specified in the item or as directed.
- 47.3. (C) Marble mosaic tiles :**
- 47.3.1.** These tiles have the same specifications as per plain cement tiles except the requirements as stated below:
- 47.3.2.** The marble mosaic tiles shall conform to I.S. 1237-1980. The wearing face of the tiles shall be mechanical ground and filled. The wearing face of tiles shall be free from projections, depressions and cracks and shall be reasonably parallel to the back face of the tiles. All angles shall be right angles and all edges shall be sharp and true.
- 47.3.3.** Chips used in the tiles be from smallest up to 20 mm. size. The minimum thickness of wearing layer of tiles shall of 6 mm. For pattern of chips to be used on the wearing face, a few samples with or without their full size photographs as directed shall be presented to the Engineer-in-charge for approval.
- 47.3.4.** Any particular samples, If found suitable shall be approved by the Engineer-in-charge, or he may ask for a few more samples to be prepared indicating roughly the particular sized chips to be more or less in the samples presented. The samples have to be made by the contractor till a suitable sample is finally approved for use in the work.
- The Contractor shall ensure that the tiles supplied for the work shall be in conformity with the approved sample only, in terms of its dimensions, thickness of backing layer and wearing surface, materials, ingredients, colour shade, chips, distribution etc. required.
- 47.3.5.** The tiles shall be prepared from cement conforming to Indian Standards or coloured Portland cement generally depending upon the colour of tiles to be used or as directed.
- 47.4. (D) Chequered Tiles:**
- 47.4.1.** Chequered tiles shall be plain cement tiles or marble mosaic tiles. The former shall have the same specification as per (A) above and the latter as per marble mosaic tiles as per (C) except as mentioned below :
- 47.4.2.** The tiles shall be of nominal size of 250 mm. x 250 mm. or as specified. The center to center distance of chequer shall not be less than 25 mm. and not more than 50 mm. The overall thickness of the tile shall be 22 mm.
- 47.4.3.** The grooves in the chequers shall be uniform and straight. The depth of the grooves shall not be less than 3 mm. The chequered shall be plain, coloured or mosaic as specified. The thickness of the upper layer measured from the top of the

cheques shall not be less than 6 mm. The tiles shall be given the first grinding with machine before delivery to site.

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

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

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

- (1) The length of a tile including nose shall be 330 mm.
- (2) The minimum thickness shall be 28 mm.
- (3) The nosing shall have also the same wearing layer as at the top.
- (4) The nosing edge shall be rounded.
- (5) The front portion of the tile for a minimum length of 75 mm. from and including the nosing shall grooves running parallel to nosing and at center 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 be green. Brown colour stones shall not be allowed for use. They shall be without any soft veins, cracks or flows.
- 48.2.** The size of the stones to be used for flooring shall be of size 600 mm x 600 mm and/or size 600 mm x 450 mm, as directed. However smaller sizes will be allowed to be used to the extent of maintaining required pattern. Thickness shall be as specified.
- 48.3.** Tolerance of minus 30 mm. on account of chisel dressing of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be + 3 mm.
- 48.4.** The edges of stones shall be truly chiselled and table rubbed with coarse sand before paving. All angles and edges of the stone shall be true, Square and free from chipping and the surface shall be true and plain.
- 48.5.** When machine cut edges are specified, the exposed edges and the edges at joints shall be machine cut. The thickness of the exposed machine cut edges shall be uniform.

**M-49. Polished Kotah Stones**

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

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

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

**M-51. Marble Slab :**

- 51.1.** Marble slab shall be white or of other colour and of best quality as approved by the Engineer-in-charge
- 51.2.** Slabs shall be hard, uniform and homogeneous in texture. They shall have even crystalline grain and free from defects and cracks. The surface shall be machine polished to an even and perfectly plane surface and edges machine cut true and square. The rear face shall be rough to provide key for the mortar.
- 51.3.** Marble slabs with natural veins, if selected shall have to be laid as per the pattern given by the Engineer-in-charge. Size of the slab shall be minimum 450mm x 450mm. and preferable 300 mm x 600 mm. However, smaller sizes will be allowed to be used to the extent of maintaining required pattern.
- 51.4.** The slab shall not be thinner than the specified thickness at its thinnest part. A few specimen of finished slab to be used shall be deposited by the Contractor in the office for reference.
- 51.5.** Except as above, the marble slabs shall conform to I.S. 1130-1969.

**M-52 Granite Stone Slab :**

- 52.1** Granite shall be of approved colour and quality. The stone shall be hard, even, sound regular in shape and generally uniform in colour. It shall be without any soft veins, cracks or flaws.
- 52.2** The thickness of the stone shall be as specified in items.
- 52.3** All exposed face shall be double polished to tender truly smooth and the even reflecting surface. The exposed edges and corners shall be rounded off as directed. The exposed edges shall be machine cut and shall have uniform thickness.

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

- 53.1** P.V.C sheets for P.V.C. floor covering shall be homogenous flexible type, conforming to I.S. 3452-1966. The P.V.C covering shall neither develop any toxic effect while put to use nor shall give off any disagreeable odor.
- 53.2** Thickness of flexible type covering tiles shall be as specified in the description of the item.
- 53.3** The flexible type shall be backed with Hussein or other woven fabric. The following tolerances shall be applicable on the nominal dimension of the sheet rolls or tiles :
- (a) Thickness + 0.15 mm
- (b) Length or Width :
- |                         |            |                        |               |
|-------------------------|------------|------------------------|---------------|
| 1. 300 mm. square tiles | + 0.20 mm. | 39.00 mm. square tiles | +0.30 mm.     |
| 2. 600 mm. square tiles | + 0.40 mm. | 4 Sheets and rolls     | +0.10 percent |

**53.4 Adhesive :**

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

**M-54. Facing tiles :**

- 54.1.** The facing tiles (burnt clay facing bricks) shall be free from cracks, flaws and nodules of free lime. They shall be thoroughly burnt and shall have plane rectangular faces with parallel sides and sharp straight right edged faces. The texture of the finished surface that will be exposed when in place, Shall conform to an approved sample consisting not less than four stretcher bricks each representing the texture desired. The facing tiles shall have a pleasing appearance, sufficient resistance to penetration by rain and greater durability than common bricks. The tiles shall conform to I.S. 2691-1972.
- 54.2.** The standard size of facing brick tiles shall be 19 x 9 x 4 cms. The facing brick tiles shall be provided with frog which shall conform to I.S. 1077-1976.
- 54.3.** The permissible tolerance in dimensions specified above shall be as follows :

**Size Tolerance for**

- |        | <b>1<sup>st</sup> class Brick</b> | <b>2<sup>nd</sup> class Brick</b> |
|--------|-----------------------------------|-----------------------------------|
| 19 cm. | + 6 mm.                           | + 10 mm.                          |
| 9 cm.  | + 3 mm.                           | + 7 mm.                           |
| 4 cm.  | +1.5 mm                           | + 3 mm.                           |
- 54.4** The tolerance for distortion or war page of face or edges of individual brick from a plane surface and from a straight line respectively shall be as follows :  
Facing dimensions Permissible tolerance  
Max. below 19 cms. Max. 2.5 mm.  
-do- above 19 cm. Max 3.0 mm.
- 54.5** The average compressive strength obtained as sample of five tiles when tested in accordance with the procedure laid as per I.S. 1077-1976 shall be not less than 175 Kg./Sq. Cm. The average compressive strength of any individual bricks shall be not less than 160 Kg/Sq.Cm.
- 54.6** The average water absorption for five bricks tiles shall not exceed 12 percent of average weight of brick before testing.  
The absorption for each individual bricks shall not exceed 25 percent.
- 54.7** The brick tiles when tested in accordance with I.S. 1077-1976, the rate of efflorescence shall not be more than 'Slightly effloresced'.
- M-55. White glazed tiles :**
- 55.1** The tiles shall be of best quality as approved by the Engineer-in-charge. They shall be flat and true to shape. They shall free from cracks , crazing, spots chipped edges and corners. The glazing shall be of uniform shade.
- 55.2** The tiles shall be nominal size of 150 mm x 150 mm. unless otherwise specified. The maximum variation from the stated sizes, other than the thickness of tile, shall be plus or minus 1.5 mm. The thickness of tile shall be 6 mm. Except as above the tiles shall conform to I.S. 777-1970.
- M-56. Galvanised iron pipes and fittings :** **56.1.** Galvanised iron pipe shall be of the medium type and of required diameter and shall comply with I.S. 1239-1979. The specified diameter of the pipes shall refer to the inside diameter of the bore, Clamps, screw and all galvanised iron fittings shall be of the standard 'R' or equivalent make.
- M-57. Bib cock and stop cock :**
- 57.1** A bib cock is a draw off tap with a horizontal inlet and free outlet. A stop cock is a valve with a suitable means of connection for insertion in a pipe line for controlling or stopping the flow.
- 57.2** They shall be of screw down type and of brass chromium plated and of diameter as specified in the description of the item. They shall conform to I.S. 781-1977 and they shall be of best Indian make. They shall be polished bright.
- 57.3** The minimum finished weight of bib cock and stop cock shall be as given below :
- | Diameter | Bib cock | Stop cock | Diameter | Bibcock  | Stop cock |
|----------|----------|-----------|----------|----------|-----------|
| 8 mm.    | 0.25 Kg. | 0.25 Kg.  | 15 mm.   | 0.40 Kg. | 0.40 Kg.  |
| 10 mm.   | 0.30 Kg. | 0.35 Kg.  | 20 mm.   | 0.75 Kg. | 0.75 Kg.  |
- M-58. Gun metal wheel valve :**
- 58.1.** The gun metal wheel valve be of approved quality. These shall be gun metal fitted with wheel and shall be of gate valve opening full way and of the size as specified. These shall conform to I.S. 778-1971.
- M-59. White glazed porcelain wash basin :**
- 59.1.** Wash basin shall be of white porcelain first quality best Indian make and it shall conform it I.S. 2556 (Part-IV) 1972 and I.S. 771-1979.  
The size of the wash basin shall be as specified in the item, Wash basin shall be of one piece construction with continued over-flow arrangements. All internal angles shall be designed so as to facilitate cleaning. Wash basin shall have single tap hole

or two holes as specified. Each basin shall have a circular waste hole which is either rebated or 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 recess which shall fully drain into the bowl.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- 65.1.** The low level flushing tank shall be of 15 liters capacity. It shall conform to I.S. 774-1971. The flushing vaster shall be of best quality and free from any defects.

The flushing tank shall have outlet 32 mm. diameter The outlet shall be connected with W.C. Pan by lean pipe or P.V.C. pipe as specified. The flushing tank shall be provided with inlet and outlet for fixing G.I. inlet pipes and over-flow pipes. The flushing tank shall be provided with chromium plated handle for flushing. The flushing tank shall be provided with brackets of cast iron so that it can be fixed on wall at specified height. The brackets shall Conform to I.S. 775-1970.

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

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

**M-67. Flush cock :**

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

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

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

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

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

**68.4. Tolerances.**

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

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

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

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

**M-69. Nahni Trap :**

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



- other flaws or any other kind of defects which affect serviceability. The size of nahn trap shall be as specified and shall be of self cleaning design.
- 69.2.** The Nahn trap shall be of quality approved by the Engineer-in-charge and shall generally conform to the relevant Indian Standards.
- 69.3.** The Nahn trap provided shall be with deep seal, minimum 50 mm, except at places where trap with deep seal can not be accommodated. The cover shall be cast iron. Performed cover shall be provided on the trap of appropriate size.
- M-70. Gully Trap :**
- 70.1** Gully Trap shall conform to I.S. 651-1980. It shall be sound, free defects such as fire cracks. The glaze of the traps shall be free from crazing. They shall give a sharp clear note when struck with light hammer. There shall be no broken blisters.
- 70.2** The size of the gully trap shall be as specified in the item.
- 70.3** Each gully trap shall have one C.I. gratings of square size corresponding to the dimensions of inlet of gully trap, It will also have a water tight. C.I. cover with frame inside dimensions 300 mm. x 300 mm., the cover with frame inside dimension, 300 mm. 300 mm., the cover weighing not less than 4:53 Kg. and the frame not less than 2.72 Kg. The grating cover and frame shall be of sound and good casting and shall have truly square machined seating faces.
- M-71. Glaze Stone Ware Pipe And Fitting :**
- 71.1.** The pipes and fittings shall be of best quality as approved by the Engineer-in-charge. The pipe shall be of best quality manufactured from stone-ware of fire clay, salt glazed thoroughly burnt through the whole thickness, of a close even texture, shall be smooth and perfectly glazed. The pipe shall be capable to withstand pressure of 1.5 mm. lead without showing sign of leakage. The thickness of the wall shall not be less than 1/12<sup>th</sup> of the internal dia. The depth of socket shall not be less than 38 mm. The socket shall be sufficiently large to allow a joint of 1 mm. around the pipe.
- 71.2.** The pipes shall generally conform to relevant I.S. 651-1980.
- M-72. Wall Peg Rail :**
- 72.1.** The aluminum wall peg rail shall have three aluminum pegs of approved quality and size. It shall be fixed on teakwood plant of size 450 mm. x 75 mm. x 20 mm. The teakwood shall be french polished or oil painted as specified.
- M-73. G.I. 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 the outside end tee and bend cut at half the length shall be provided and at other end coupling shall be provided to have better fixing. The water spout shall be provided as per detailed drawings or as directed.
- M-74. Asbestos Cement Pipe (A.C. Pipe):**
- 74.1.** The asbestos cement pipe of diameter as specified in the description of the item shall conform to I.S. 1626-1980. Specials like bends, shoes cowls, etc. shall conform to relevant Indian Standards. The interior of pipe shall have a smooth finish, regular surface and regular, internal diameter. The tolerance in all dimensions shall be as per I.S. 1626-Part-I 1980.
- M-75. Crydon Ball valve :**
- 75.1.** Ball valve of screwed type including polyethylene float and necessary lever etc. shall be of the size as mentioned in the description of item and shall conform to I.S. 1703-1977.
- M-76. Bitumen Felt For Water Proofing And Damp Proofing :**
- 76.1** Bitumen felt shall be on the fiber bases and shall be type 2, self finished grade-2 and shall conform to I.S. 1322-1970.

**M-77****Selected Earth :**

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

**M-78.****Barbed Wire :**

- 78.1.** The barbed wire shall be of galvanised steel and it shall generally conform to I.S. 278-1978. The barbed wire shall be if type-I whose nominal diameter for line wire shall be 2.5 mm. and point wire 2.24 mm. The nominal distance between two bars shall be 75 mm. Unless otherwise specified in the item. The barbed wire shall be formed by twisting together two line wires, One containing the barbs. The size of the line and point wires and barb spacings shall be as specified above. The permissible deviation form the nominal diameter of the line wore and point wire shall not exceed + 0.08 mm.
- 78.2.** The barbs shall carry four points shall be formed by twisting two point wires each two turns, lightly round one line wire, making altogether four complete turns. The barbs shall be so finished that the four points are set and locked at right angles to each other. The barbs shall have a length of not less than 13 mm. and not more than 13 mm. and not more 18 MM. The points shall be sharp and cut at an angle not greater than 35 degree of the axis of the wire forming the barbs.
- 78.3.** The lind and point wire shall be circular section free from scale and other defects and shall be uniformly galvanised. The line wire shall be in continuous length and shall not contain any weld other than those in the rod before it is drawn. The distance between two successive splices shall not be less than 15 meters.
- 78.4.** The lengths per 100 Kg. of barbed wire I.S. type I shall be as under  
Nominal 1000 meter Minimum 834 Meter Maximum 1066 Meter.

## **TECHNICAL SPECIFICATIONS FOR CIVIL ITEMS**

### **Item No. 1 a, b, c ,d ,e ,f, g**

#### **Demolition and disposal of unserviceable materials with all leads and lifts**

##### **1.0 Workmanship :**

1.1 The demolition shall consist of demolition of one or more parts of the building as specified or shown in the drawings. Demolition implies taking up or down or breaking up. This shall consist of demolishing whole or part of work including all relevant item as specified or shown in the drawings.

1.2 The demolition shall always be planned before hand and shall be done in reverse order of the one in which the structure was constructed. This scheme shall be got approved from the Engineer-in-charge before starting the work. This however will not absolve the contractor from the responsibility of proper and safe demolition.

1.3 Necessary dropping, shoring and under pinning shall be provided for the safety of the adjoining work or property, which is to be left intact, before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damages is caused to the adjoining property.

1.4 Wherever required, temporary enclosures or partitions shall also be provide 1. Necessary precautions shall be taken to keep the dust nuisance down as and where necessary.

1.5 Dismantling shall be commenced in a systematic manner. All materials which are likely to be damaged by dropping from a height or demolishing roof, masonry etc. shall be carefully dismantled first. The dismantled articles shall be properly stacked as directed.

1.6 All materials obtained from demolition shall be the property of Government unless otherwise specified and shall be kept in safe custody until handed over to the Engineer-in-charge.

1.7 Any serviceable materials, obtained during dismantling or demolition shall be separated out and stacked properly as directed, with all lead and lift. All unserviceable materials, rubbish etc. shall b stacked as directed by the Engineer-in-charge.

1.8 On completion of work, the site shall be cleared of all debris rubbish and cleaned as directed.

##### **2.0 Mode of measurements & payment :**

2.1 Measurements of all work except hidden work shall be taken before demolition dismantling and no allowance for increase in bulk shall be allowed. The demolition of lime concrete shall be measured under this item. Specification for deduction for voids, openings etc. shall be on same basis as that employed for construction of work.

2.2 All work shall be measured in decimal system as fixed in its place subject to the following limits, unless otherwise stated hereinafter: (a) Dimensions shall be measured to the nearest 0.01 mt. (b) Area shall be worked out to the nearest 0.01 sq. mt. (c) Cubical connection shall be worked out to the nearest 0.01 Cu.m.

2.3 the rate shall include cost of all labour involved and tools used in demolishing and dismantling including scaffolding. The rate shall also include the charges for separating out and stacking the serviceable materials properly and disposing the unserviceable materials with all lead and lift. The rate also includes for temporary storing for the safety of the portion not required to be pulled down or of adjoining property and providing temporary enclosures or partitions where considered necessary.

2.4 For Various items From 1- a to g, the rates and unit shall be as mentioned in B.O.Q.

**Item No. 2**  
**Excavation**

Excavation for foundation up to 1.5 M. depth including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 Meter lead. Rates are incl. shoring & strutting. All kind of soil

Excavation for foundation for depth from 1.5 M. to 3.0 M. including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 M. lead. Rates are incl. shoring & strutting. All kind of soil

Excavation for foundation for depth from 3.0 M. to 5.0 M. including sorting out and stacking of useful materials and disposing of the excavated stuff up to 50 M. lead. Rates are incl. shoring & strutting. All kind of soil

1 Excavation for foundation / pits / raft / trenches etc. for following depth, by mechanical or manual including sorting out and stacking of useful materials, dressing of the sides, ramming of bottom, disposing of the excavated stuff up to 50 m. lead including lifts, for all kind of soil, all complete as per drawing, specifications, instruction & directions of the Engineer-in-charge. For all civil, plumbing, electrical & infrastructure works. No extra payment will be made for shoring, strutting and dewatering.

- a) Upto 1.5
- b) from 1.5 to 3.0 mtrs
- c) from 3.0 to 5.0 mtrs

General:

1.1 Any soil which generally yields to the application of pickaxes and shovels, spades, rakes or any such ordinary excavating implement or organic soil, gravel, silt, sand turf loam, clay, peat etc. falls under this category. For materials and workmanship for earthwork and excavation, relevant specifications of IS 1200 (Part I) and IS: 3764 shall be followed.

1.2 The depth of the excavation shall be as per the item description.

2.0 Clearing the Site:

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

2.2 All types of trees, woods etc. which requires prior permission of Govt./Forest Authority, before cutting shall be cut after obtaining such permission from them. It shall be the Contractor's responsibility to obtain such permission from the respective authorities.

2.3 The rate of site clearance is deemed to be included in the rate of earthwork, for which no extra will be paid.

### 3.0 Setting out:

3.1 After cleaning the site, the centerlines will be given by the Architect and 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 made of MS angle iron and embedded in 1:2:4 CC. They shall maintain the same as long as required and directed.

### 4.0 Excavation:

4.1 The excavation in the foundation shall be carried out either manually or by mechanical means, in true line and level and shall have the width and depth, as shown in the drawings or as directed. The Contractor shall do the necessary shoring and strutting or shall provide necessary slopes to a safe angle or steps, as required or directed, at his own cost. No extra payment shall be made for such precautionary measures, taken. The bottom of the excavated area shall be leveled both longitudinally and transversely, as directed, by removing excess soil and watering, as required. No earth filling will be allowed for bringing it to level, if by mistake or any other reason, excavation is made deeper or wider than shown on the drawings or as directed. The extra depth or width shall be made up with concrete of the same proportion, as specified for the foundation concrete, at the cost of the Contractor.

4.2 The Contractor shall at his own expense and without extra charge make provision of supporting all utility services, lighting the trenches, separating and stacking serviceable materials neatly, shoring, timbering, strutting, bailing out water either sub-soil or rainwater, including pumping at any stage of the work.

Trenches shall be kept free of water while masonry or concrete works are in progress and till the Architect and Engineer-in-charge considers it necessary, i.e. till the concrete is sufficiently set.

### 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. complete.

5.2 The Contractor shall remove the balance of the excavated quantity from the site of work, to a place, as directed, within a lead upto 50 m. measured from the outer face of the building / work under consideration and for all lift.

5.3 The lead is the shortest practical route and not necessarily the route actually taken. The decision of Engineer-Incharge shall be final in this regard.

### 6.0 Mode of Measurement and Payment:

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

6.1 The rate shall include for clearing the site, surface dressing, making layout of the building, fixing permanent grid points with MS iron posts, embedded in C.C. 1:2:4, placed sufficiently away from the building and establishing bench marks etc.

6.2 The rates shall include for necessary shoring, timbering and strutting for protection of sides of the excavated trenches and pits, pumping out rain or surface water at any stage of construction so as to keep the trenches/pits dry, to the satisfaction of the Architect/Engineer-in-charge.

6.3 The rate shall include leveling and ramming the bottoms of excavations to receive concrete, etc. including trimming to slope wherever necessary etc. complete.

6.4 The rate shall be for a unit of one m<sup>3</sup>.

**Item No.2 d, e**

Add extra for Disposing off the excavated stuff of above items for lead of

(A) 50 m to 100 m

(B) 100 m to 200 m

Disposing of excavated materials.

All unserviceable material, which in the opinion of Engineer-in-Charge cannot be used or auctioned shall be removed from the area and disposed off as per the directions of the Engineer-in-Charge. Care shall be taken to see that unsuitable waste materials are disposed off in such a manner that there is no likelihood of these getting mixed up with the materials meant for construction.

The lead is the shortest practical route and not necessarily the route actually taken. The decision of Engineer-Incharge shall be final in this regard

Mode of measurement and payment:

The rate shall be for a unit of one cu. Meter and shall be as per joint measurement as per levels.

**Item No.2 f**

Providing and installing cast in situ single under reamed piles of specified diameter and length below pile cap, excluding the cost of Concrete, steel reinforcement but including the cost of boring with bentonite solution and the length of the pile to be embedded in pile cap etc. all complete. (Length of pile for payment shall be measured upto to the bottom of pile cap) :

1.1 450 mm dia. Piles

1.2 500 mm dia. Piles

**1.0. Workmanship :**

**1.1.** The ground shall be roughly leveled and after making the position of piles, the holes shall be bored with aspire angle to the Given depth and specified diameter using boring guide and Required Proper Machineries.

**1.2.** The bore holes shall be truly vertical and uniform bore throughout of specified diameter with using Bentonite Solution AS PER Latest IS Specification. After boring to the required depth, the bore shall be cleared off the loose soil and disposal of surplus excavated stuff as directed.

**2.0. Mode of measurement and payments:**

**2.1.** The rate for boring holes shall include: -

(a) Roughly leveling the ground in positions where piles are to be provided.

(b) Making the positions of piles by pegs and boring guide and also for shifting of boring guide.

(c) Bailing out water, if any met with during boring.

- (d) Disposal of surplus excavated stuff as directed.
- (e) All tools, plants, equipment's and labor required for satisfactory completion of work.
- 2.2. The rate shall be for a unit of One RMT.

#### **Item No.2 g**

Extra over single under ream for providing additional bulbs in under reamed piles, under specified diameter excluding the cost of Concrete, steel reinforcement (only the nos. of extra bulbs are to be paid):

- 1.1. 450 mm dia. Piles
- 1.2. 500 mm dia. Piles

**1.0. Workmanship :** The relevant specifications of item No. 2 h shall be followed except that after boring to the required depth, the bore shall be enlarged at the bottom by an under reamer 2 to 2 ½ times the diameter of the bore as directed. It shall be ensured that the bore for the pile shall be enlarged to the correct diameter.

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

- 2.1. The relevant specifications of item No. 2 h shall be followed.
  - 2.2. The rate shall be paid extra over and above the rate of item No. 2 h under reaming the piles.
- The rate shall be for a unit of one Number.

#### **Item No.3 a**

Providg. & laying cement concrete 1:5:10 (1 cement : 5 coarse sand : 10 hand broken aggregates 40 mm nominal size) and curing complete, excluding cost of form work in foundation & Plinth.

##### **Materials**

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

##### **Workmanship**

Relevant specifications of item No. 4 shall be followed except that the work is to be carried out in cement concrete 1:5:10.

##### **Mode of measurements & payments:**

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

#### **Item No.3b**

Providg. & 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 form work in Foundation and Plinth

##### **Materials**

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

##### **Workmanship**

Relevant specifications of item No. 4 shall be followed except that the work is to be carried out in cement concrete 1:3:6.

Mode of measurements & payments:

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

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

#### **Item No. 3c**

#### **Supplying of graded hand broken stone size of 90 mm to 127 mm at site (Rubble or Spoul).**

Workmanship & Material :

Rubble or Spouls of size varying from 90 mm to 127 mm shall be brought to the site and shall be dumped at the desired locations, irrespective to the lead and lift.

The item shall be measured in the unit of Cmt.

#### **Item No.3d**

Labour charges for spreading the spouls 90 mm to 127 mm thick layer good earth filling in voids correcting the grade & camber comp. with rolling, watering, incl. preparing the surface by brushing for removing all loose or dirt etc. comp..

Workmanship & Material

Spreading the rubble or Spouls of size varying from 90 mm to 127 mm as and where directed by the engineer in charge.

The item shall be measured in the unit of Smt.

#### **Item No.4**

Plain Cement Concrete 1:4:8

Provdg. & laying cement concrete 1:4:8 (1 cement : 4 coarse sand : 8 hand broken stone aggregates 40 mm nominal size) and curing complete excluding cost of form work in foundation & plinth.

Materials :

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

Stone aggregate 40 mm. nominal size shall conform to M-12.

Workmanship : General :

Before starting concrete 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, 4 parts of sand, 8 parts of stone aggregates and shall so measured by volume.

Mixing :

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 machinery's 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 cases 10% more cement than otherwise required shall have to be used without any extra cost. The mixing in mechanical mixer shall be done for a period 1 to 2 minutes. The quantity of water shall be sufficient to produce a dense concrete of required workability for the purpose.



**Transporting & Placing the concrete :**

The concrete shall be handled 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.

**Compacting :**

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.

**Mode of measurement and 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. 5**

**Filling with excavated earth**

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

**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 to a size not bigger than 50 mm.

1.2 As soon as the work in foundation has been completed and measured, the sides of foundation shall be cleared of all debris, brick bats, mortar dropping etc. and filled with earth in layers not exceeding 15 cm. Each layer shall be adequately watered, rammed well and consolidated before the succeeding layer is laid. The earth shall be rammed with mechanical rammer of different capacity as per site condition.

1.3 The plinth shall be similarly filled with earth in layers not exceeding 15 cm, adequately watered and consolidated by ramming with iron rammers/ mechanical rollers. 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 and gradient, intended to receive any floor finish.

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

1.6 The excavated stuff of the selected type only shall be allowed to be used for filling the trenches and plinths. Under no circumstances, black cotton soil shall be used for filling the plinths.

1.7 The soil used for backfilling shall have optimum moisture content (OMC).

1.8 The compaction shall be carried out to achieve Proctor density of 95%. The procedure for OMC and proctor density shall be carried out as per relevant IS codes. The samples for test shall be as per the relevant IS codes.

2.0 Mode of Measurements and Payment :

2.1 The payment shall be made for filling in plinth and sides of foundations. No deductions shall be made for shrinkage or voids, if considered as instructed above.

2.2 The rate includes the cost of mechanical compaction by compactors.

2.3 The rate shall be for an unit of one m<sup>3</sup>.

2.4 Only consolidated measurements of the fill shall be measured and paid for under this item.

2.5 Foundation filling shall be measured and paid only if the excavation item is without backfilling.

#### **Item No.6**

Conveyance charges of earth lime, murrum, building rubbish, manure, garbage, sludge, excavated rock, fly ash, aggregate of any kind etc. comp. upto 2 km lead.

**Unsuitable Material:** Unsuitable Material is that Material that determine by the Engineer In charge as unsuitable to utilize in the any backfilling works or other works.

**Surplus Material:** Surplus material means material resulting from the excavation that is not required for Backfilling or any other suitable works.

This material is the solely property of the Employer.

All the unsuitable or surplus material should be stack as per instruction of Engineer in charge within 50 m lead or outside the project boundary.

Prior written permission to be required before disposing of the material. Contractor should specify the location where it will dispose off. If employer should give the location but not bound for that.

The lead of disposing off should be upto 2 Km in any premises for all lead and Lift.

#### **Mode of Measurement and Payment**

The Measurement of disposing of excavated stuff (unsuitable or surplus) above 50 m lead and upto 2 Km in any premises for all lead and Lift. Shall be in Cum. The work should involve loading, unloading and transporting for all lead and Lift.

Rate: The Rate Shall be for a unit of one Cubic meter.

#### **Item No. 7a**

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

Filling, in foundation and plinth (under floors), with good quality coarse river sand, obtained from outside, including watering, ramming well, consolidating and dressing etc. complete all as per specification and direction of engineer-in-charge.

1.0 Materials: Sand shall conform to M-6.

2.0 Workmanship :

2.1 The relevant specification of item no. 1.09 shall be followed except that sand shall be filled in foundations and in plinth, under floors, including watering, ramming well, consolidating and dressing etc., complete.

3.0 Mode of Measurements and Payment :

3.1 The relevant specification of item no. 1.09 shall be followed.

3.2 The rate includes cost of collecting, carting good quality sand, with all lead, lift and labour for filling the same in foundations and in plinth, mechanical compaction.

3.3 The rate shall be for an unit of one m<sup>3</sup>.

3.4 Only consolidated measurements of the fill shall be measured and paid for under this item.

#### **Item No. 7b**

##### **Filling With Selected Soil**

Filling in foundation and plinth with murrum or selected soil in layers of 20 cm. thickness including watering, ramming and consolidating etc. Complete.

Materials:

1.1 Murrum or selected earth brought from outside shall be clean, of good binding quality and of approved quality obtained from approved pots/quarries of disintegrated rocks which contain silicones materials and natural mixture of clay of calcareous origin. The size of murrum shall not be more than 20 mm. and shall be approved by the Engineer-in-charge, before use. It shall conform to M-64.

1.0 Workmanship :

1.1 The relevant specifications of item filling shall be followed except that the murrum or selected soil shall be filled in foundations and plinths in 20 cm. layers, including consolidating, ramming well, watering, dressing etc., complete.

2.0 Mode of Measurements and Payment :

2.1 The relevant specifications of item no. 1.09 shall be followed.

2.2 The rate includes cost of collecting and carting murrum or selected earth of approved quality with all lead, lift and labor required for filling in foundations and plinth.

2.3 The rate shall be for a unit of one m<sup>3</sup>.

2.4 Only consolidated measurements of the fill shall be measured and paid for under this item.

## **Item No.8 & 9**

### **Brick Masonry Work**

#### **Foundation Masonry:**

Providing and laying Brick work using common burnt clay building bricks having crushing strength not less than 35 kg/Sq. cm. in foundations and plinth in cement mortar 1: 6 (1 cement : 6 fine sand). This includes pointing, curing, scaffolding, etc. complete

Materials: Water shall conform to M-1 Cement shall conform to M-3 Sand shall conform to M-6. Brick shall conform to M-15 Cement mortar shall conform to M-11.

#### **Workmanship: Proportion:**

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

#### **Wetting of bricks:**

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

#### **Laying:**

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

A layer of mortar shall be spread on full width for suitable length of the lower course. Each brick shall

first be properly bedded and set home by gently tapping with handle of trowel or wooden mallet. Its side face shall be flushed with mortar before the next brick is laid and pressed against it. On completion of course, the vertical joints shall be fully filled from the top with mortar.

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

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

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

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

#### **Joints:**

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

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

#### **Curing**

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

#### **Preparation of foundation bed:**

If the foundation is to be laid directly on the excavated bed, the bed shall be leveled, cleared of all loose materials, cleaned and wetted before starting masonry. If

masonry is to be laid on concrete footing, the top of concrete shall be cleaned and moistened. The contractor shall obtain the engineer's approval for the foundation bed, before foundation masonry is started.

When pucca flooring is to be provided flush with the top to plinth, the inside plinth offset

shall be kept lower than the outside plinth top by the thickness of the flooring.

**Mode of measurements and payment:**

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

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

(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 exceeding 1000 Sq. cm.

(3) Wall plates and bed plates, bearing of slabs, chhajjas and the like whose thickness does not exceed

10 Cms. and the bearing does not extend to the full thickness of wall.

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

(5) Iron fixtures, pipes up to 300 mm dia hold fasts and doors and windows built into masonry and

pipes etc. for concealed wiring.

(6) Forming chases of section not exceeding 350 Sq. Cm. in masonry.

Apertures for fire places shall not be deducted nor shall extra labour required to make splaying of jambs, throating and making Arches over the aperture be paid for separately.

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

### **Above Plinth Masonry:**

Providing and laying Brick work using common burnt clay building bricks having crushing strength not less than 35 kg/Sq. cm. in cement mortar 1: 6 (1 cement : 6 fine sand) for superstructure upto floor three level height. This includes pointing, curing, necessary scaffolding, tools, etc. complete.

**Materials:**

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

**Workmanship:**

The relevant specifications of item No. 13 shall be followed except that the masonry work shall be carried out above plinth level to floor two level i.e. for ground floor.

The frames of doors, windows, cupboards, etc. shall be housed into the brick work at the correct

location and level as directed. The heavy steel doors, window frames etc. shall be built in with brick work but for ordinary steel doors and windows required opening for frames, hold fasts etc. shall be left in the wall and frames embedded later on in order to avoid damage to the frames.

Necessary scaffolding shall be provided. The supports of the scaffolding shall be sound and strong tied together with horizontal pieces over which the scaffolding planks shall be fixed. Simple scaffolding shall be allowed normally. In this case scaffolding hole shall rest in hold header horizontal course only. Minimum number of holes shall be left in brick work for supporting horizontal scaffolding holes.

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

Mode of measurement:

The masonry work of G. F. i.e. above plinth level to floor two level shall be measured and paid under this item.

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

No deduction shall be made from quantity of brick work. No extra payment shall be made for embedding in masonry or making holes in respect of following items:

The rate shall be for a unit of one cubic meter

### **Half Brick Masonry:**

Providing and laying brick partition wall of 11.50 cms thick with good quality bricks of the strength not less than 35 Kg / Sq. c.m. kiln burnt bricks laid in C.M. 1:4 ( 1 Cement and 4 Coarse sand) including providing 5 cms thick cement concrete bed 1:3:6 ( 1 Cement : 3 Sand : 6 Grit size 6 mm to 10 mm) after every 8 layers of bricks including racking out the joints , scaffolding, staging curing, etc. complete as per the standard specifications in true line, level and plumb for super structure at any height and level. This includes pointing, curing, necessary scaffolding, tools etc. complete.

Materials: Brick 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.

Workmanship:

Relevant specifications of bricks, wetting and laying of bricks, joints, curing etc. shall conform to item

No 13 except the brick work of half bricks shall be carried out.

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

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 laid 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.

Mode of measurement and payment:

The half brick masonry work in foundation and plinth 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.

The relevant specifications of item No. 6.12 shall be followed. The length shall be measured nearest to one Cm.

The rate shall be for a unit of Sq. Mt.

### **Half brick thick Honey-comb brick work with common burnt clay building bricks having crushing strength not less than 35 Kg/ sq. cm in cement mortar 1:4 ( 1 cement : 4 coarse sand)**

The Brickwork shall be done as honey combing. Alternate bricks shall be laid and care shall be taken of the mortar in C.M. 1:4 only.

## **Item No.10.1 , 10.2 , 11a, 11b**

### **Reinforced Cement Concrete**

#### **Materials**

Water shall conform to M-1 Cement shall conform to M-3, Sand shall conform to M-6, Grit shall conform to M-8, Graded stone aggregate 20 mm. nominal size shall conform to M-12.

#### **General**

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

The designation ordinary M-100,M.150,M-200,M-250 specified as per I.S. Correspond approximate to 1:3:6, 1:2:4, 1:1/2:3 and 1:1:2 nominal mix of ordinary concrete by volume respectively.

The ingredients required for ordinary concrete containing one beg of cement of 50 kg. By weight (0.- 342 Cu. M.) for different proportions o mix shall be as maintained:  
The water cement ratios shall not be more than specified in the above table. The cement content of the mix specified in the table of water in mix has to be increased to overcome the difficulties of placements and compaction so that the eater-cement-ratio specified in the table is not exceeded.

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

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

For reinforced concrete work, coarse aggregate having a nominal size of 20 mm. are generally considered satisfactory.

For heavily reinforced concrete members in the case of ribs of main beams, the nominal

Maximum size of coarse aggregate should usually be restricted to 5mm. less than the minimum clear distance between the main bars or 5 mm. less than the minimum cover to the reinforcement whichever is smaller.

Where the reinforcement is widely spaced as in solid slabs, limitations of Engineer-in-charge based upon the are other minimum cover.

#### **Workmanship**

Proportioning : proportioning shall be done by volume, except cement which shall be measured in terms of bags of 50 kg weight, the volume of one such being taken as 0.0342 cu. Meter. Boxes 35x25 cms and 40 cms.deep while measuring of aggregate. The size of boxes (internal) shall be shaking ramming or hammering. The proportioning of sand shall be on the basis of its dry volume and in case of damp sand, allowances for bulkage shall be made.

Mixing :

For all work, concrete shall be mixed in a mechanical mixer which alongwith other accessories. Shall be kept in first class working condition and so maintained throughout the construction. Measured quantity of aggregate, sand and cement and so maintained throughout the construction. Drum of the mixer while it is continuously running mix shall be added gradually and mixing continued for another one a half minute. Mixing shall be continued till materials are uniformly distributed and uniform colour fi the entire mass is obtained and each individual particle of the coarse aggregate shows complete of mother containing its proportionate amount of cement. In no case shall the mixing be done for than 2 minutes all ingredients have been put into the mixer.

When hand mixing is permitted by the Engineer-in-charge for small or for certain other reasons, it shall be done on the smooth water tiger platform large enough to allow efficient turning over the ingredients of concrete before and after adding eater. Mixing platform shall be so arranged that on foreign gets mixed with neither concrete nor does the mixing water flow out. Cement in required number of bags shall be placed in a uniform layer on 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 than be mixed thoroughly by turning over to gat a miniature to uniform colour. Specified quantity of water shall than be added gradually through a rose can and the mass turned over till a mix of required consistency is obtained. In hand mixing quantity of cement shall be increased by 10 percent above that specified.

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

Consistency:

The degree of consistency which shall upon the nature of the work and methods of vibration of concrete shall be determined by regular slump tests in accordance with I.S.1199-1959. The slump of 10 mm. to 25mm. shall be adopted when vibrators are used and 80 mm. when vibrators are not used.

Inspection.

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

Centering design and its erection shall be got approved from the engineer-in-charge. One carpenter with helper shall invariably be kept present through the period of concreting. Movement of labour and other persons shall be totally prohibited for reinforcement laid in position. For access to differents parts suitable mobile platforms shall be provided so that steel reinforcement in position is not disturbed. For ensuring proper cover, mortar blocks of suitable size shall be cast and tied to the reinforcement. Timer, kapachi or metal pieces shall not be used for this purpose.



Transporting and laying:

The method of transporting and placing concrete shall be as approved. Concrete shall be so transported and placed that no contamination, segregation or loss of its constituent material takes place.

Placing of concrete:

No concrete shall be placed in any part of the structure until the approval of the Engineer-in charge has been obtained.

Concreting shall proceed continuously over the area between construction joints. Fresh concrete contraction joint is formed. Concrete shall be compacted in its final position within 30 minutes of its discharge from the mixer. Except where otherwise agreed to by the Engineer-in-charge, concrete shall be deposited in horizontal layers to a compacted depth of not more than 0.5 meter when internal vibrators are used and not exceeding 0.30 meter in all other cases.

Unless otherwise agreed to by the Engineer-in-charge, concrete shall not be dropped in to place from way as to avoid segregation. When concreting has to be resumed on a surface which has hardened, it shall be roughened, swept clean, thoroughly wetted and covered with a 13 mm. Thick layer of mortar shall be freshly mixed and placed immediately before placing of new concrete. Where concrete has not fully hardened, all laitances 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 then coated with neat cement grout. The first layer of concrete to be placed on this surface shall not exceed 150 mm. in thickness and shall be well rammed against old work, particular attention being given to corners and close spots.

All concrete shall be compacted to produce a dense homogeneous mass with the assistance of vibrators, unless otherwise permitted by the Engineer-in-charge for exceptional cases, such as concreting under water, where vibrators cannot be used. Sufficient vibrators in serviceable condition shall be kept at site so that spare equipment is always available in the event of breakdowns. Concrete shall be judged to be compacted when the mortar fills the spaces between the coarse aggregate and begins to cream up to form an even surface. Compaction shall be completed before the initial setting starts i.e. within 30 minutes of addition of water to dry mixture. During compaction, it shall be observed that needle vibrators are not applied on reinforcement which is likely to destroy the bond between concrete and reinforcement.

Curing:

Immediately after compaction, concrete shall be protected from weather, including rain, running water, shocks, vibration, traffic, rapid temperature changes, frost and drying out process. It shall be covered with wet sacking, hessian or other similar absorbent material approved, soon after the initial set, and shall be kept continuously wet for a period of not less than 14 days from the date of placement. Masonry work over foundation concrete may be started after 48 hours of its laying but curing of concrete shall be continued for a minimum period of 14 days.

Sampling and testing of concrete

Samples from fresh concrete shall be taken as per I.S. 1199-1959 and cubes shall be made, cured and tested at 7 days and 28 days as per requirements in accordance

with I.S. 516-1959. A random sampling tested i.e. the sampling should be spread over the entire period of concreting the cover all mixing units.

The minimum frequency of sampling of concrete of each grade shall be in accordance with following:

Quantity of concrete in the work	No. of Samples	Quantity of concrete in the works.	No. of samples.
1-5 cmt.	1	16-30 cmt.	3
6-15 cmt.	2	31-50 cmt.	4
51 and above	4 + one additional for each additional 50 m. or part		

NOTE: Atleast one sample shall be taken from each shift. Ten test specimens shall be made from each on each day of the concreting as per above frequency. The number of specimens may be suitably increased as seemed necessary by the engineer-in charge when procedure of tests given above reveals a poor quality of concrete and in other special cases.

The average strength of the group of cubes cast for each day shall not be less than the specified cube strength of 150 kg/Cm<sup>2</sup> at 28 days. 20 % of the cubes cast for each day may have value less than the specified strength provided the lowest value is not less 85 % of the specified strength. If the concrete made in accordance with the proportions given for a particular grade does not yield the specified strength, such concrete shall be classified as belonging to the appropriate lower grade. Concrete made in accordance with the proportions given for a particular grade shall not, however, be placed in a higher grade on the ground that the test strength are higher than the minimum specified.

Stripping:

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

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

Immediately after the removal of forms, all exposed bolts etc, passing through the cement concrete member and used for shuttering or any other purpose shall be cut inside the cement concrete member to a depth of at least 25 mm. below the surface of the concrete and the resulting holes are filled by cement mortar. All fins caused by form joints, all cavities produced by the removal of form ties and all other holes

and depressions, honeycomb spots, broken edges or corners and other defects, shall be thoroughly cleaned, saturated with water and carefully pointed and rendered true with mortar of cement and fine aggregate mixed in proportions used in the grade of concrete that is being finished and of as dry consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure thorough filling in all voids. Surfaces which are pointed shall be kept moist for a period of 24 hours. If rock pockets/honey combs in the opinion of the Engineer-in-charge are of such an extent or character as to affect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare the concrete defective.

#### Mode of measurements & payment

The consolidated cubical contents of concrete work as specified in item shall be measured. The concrete laid in excess of sections shown on drawing or as directed shall not be measured. No deduction shall be made for-

(a) Ends of dissimilar materials such as joints, beams, posts, girdes, rafters, purline trusses, corbels and steps etc. up to 500 Sq.M.cm in section.

(b) Opening up to 0.1 Sq. M.

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

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

### **FOR CONCRETE WORKS : M-200 AND M-250 GRADE CONCRETE**

Providing and laying in position machine batched and machine mixed controlled cement concrete M- 200 and curing etc. complete, excluding the cost of form work and reinforcement for reinforced concrete work in

#### 2.1 General

Except where they are varied by the requirements of this specification due provision of Indian Standard Specification IS-456-1964 for plain and reinforced concrete and any other relevant ISS applicable together with the latest amendments shall be held to be incorporated in this specification. It shall be intent of the specifications to ensure that all concrete placed at various location of the job should be durable, strong enough to carry the design loads, it should mixed well and practically be impervious to water. It should be free from such defects as shrinkage, cracking and honey combing.

#### 2.2 Proportioning of the Mix

In ordinary concrete, excluding controlled concrete, proportions of cement to fine and coarse aggregate shall be as specified in the respective items and shall be accurately measured as in Table 'A' below. These proportions are based on assumption that the aggregates are dry.

If aggregates are moist allowance shall be made for bulking in accordance with IS : 2386. Allowance shall also be made for surface water present in aggregate when computing water content. Surface water present shall be determined by one of the field methods described in IS : 2386 (Part III). In the absence of exact data, the amount of surface water may be estimated from the values given in Table 'B' below.

#### 2.3 Mixing

(a) Concrete of 1:2:4 or richer mix shall be mixed in an approved mechanical mixer. The mixer and mixing platform shall be suitably protected from wind and rain. Aggregates shall be accurately measured out in boxes and mixed dry along with cement, water shall then be added in measured quantity and mixing shall be continued until there is a uniform in colour and consistency but in no case shall the mixing be done for less than 2 minutes.

(b) When hand mixing is permitted with the approval of the Engineer-in-charge it

shall be carried out on a water tight mixing platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency.

## 2.4 Consistency

Quantity of water for making reinforced concrete shall be sufficient so as to ensure that concrete shall surround and properly grip all the reinforcement. The best consistency shall be that, which will flow sluggishly without flattening out and without separation of coarse aggregates from the mortar. The degree of plasticity shall depend on the nature of work and atmospheric temperature and whether the concrete is vibrated or hand compacted.

The slumps shown in table 'C' obtained by the standard slump test carried out in accordance with the procedure laid down in IS : 119-1959 shall be adopted for different types of work.

## 2.5 Admixtures

The use of admixtures may be allowed only if approved by the structural consultant and his decision in this regard shall be final.

## 2.6 Transporting

Concrete shall be conveyed from the place of mixing to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of any of the ingredients. If segregation does occur during transport, the concrete shall be remixed before being placed. In no case, more than 30 minutes shall elapse between mixing and consolidation in its position.

## 2.7 Placing & Compacting

(a) Concrete shall be placed in layers of suitable thickness or in strips and compacted before initial setting commences and should not be subsequently disturbed. Method of placing shall be such as to preclude segregation and as far as practicable the placing shall be continuous. Special care shall be taken in accordance with IS : 456 while laying concrete under extreme weather.

(b) Concrete shall be thoroughly compacted during the operation of placing and thoroughly worked around the reinforcement, embedded fixtures and spaded against corners of the form work and by punning, rodding, mechanically vibrating or by any other approved means. In addition form work shall be tapped lightly by using wooden mallet at the pouring head. The number and type of vibrator to be used shall be subject to the approval of Engineer-in-charge and in general immersion type vibrators shall be used. External vibrators shall also be used whenever directed.

(c) The intensity and duration of vibration shall be sufficient to cause complete settlement and compaction without any stratification of successive layers or separation of ingredients or formation of laitance. Vibrator shall be inserted vertically in the concrete at points not more than 45 cm. Apart and with drawn very slowly when air bubbles no longer come on the surface. Over vibration or vibration of very wet mixes is harmful and should be avoided. Care shall be taken to utilize the vibrator only to compact the concrete and not to spread it. Sufficient number of reserve vibrators in good working condition shall be kept on hand at all times, so as to ensure that there is no slackening or interruption in compacting.

(d) Dimension of column, beams, slab, footing shall exactly as per drawing, however, in special circumstances tolerance in dimension shall be allowable as under:

#### VARIATIONS:

(1) Variation from level or specified grades for slab

(2) Variation in cross sectional diameter of columns / beams / slabs. walls in similar.  
Minus 6 mm Plus 12 mm.

(3) Variation in sizes and location from those specified for slab and wall

opening 12 mm. (4) Footings

(i) Variation of Dimension in Plan minus 12 mm plus 50 mm. (ii) Misplacement : 2% but not more than 50 mm.

(iii) Reduction in thickness : 5% of specified thickness.

#### 2.8 Construction joints

(a) Concreting shall be carried out end to end continuously as far as possible and when construction joints are totally unavoidable, it shall be located in a predetermined position approved by the Engineer in charge. The joints shall be kept at places where the shear force is the minimum and these shall be straight and at right angles to the direction of main reinforcement. When the work has to be resumed, on a surface which has hardened, such surface shall be roughened. It shall be swept clean, thoroughly wetted and covered with a 13 mm. Thick layer of mortar composed of cement and sand in the same ratio as the cement and sand in the concrete mix. This 13 mm. Layer of mortar shall be freshly mixed and placed immediately before the placing of concrete.

(b) Where the concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes, care being taken to avoid dislodgment of particles of aggregate. The surface shall then be coated with neat cement grout. In horizontal joints the first layer of concrete to be placed on this surface shall not exceed 15 cm. Thickness and shall be well rammed against old work, particular attention being paid to corners.

#### 2.9 Expansion joint

Expansion joint shall be provided where required as shown on the drawings or as directed by the Engineer in charge / Consultant. The joints shall be filled with approved quality filler.

## 2.10 Curing

Concrete shall be carefully protected during first stage of hardening from harmful effects of excessive heat, drying winds, rain or running water. It shall be covered with a layer of sacking, sand, canvas, hesian, or similar absorbent materials and kept constantly wet for ten days from the date of placing of concrete. Alternatively, the concrete being thoroughly wetted and covered by layer of approved water proof material which should be kept in contact with it for seven days.

## 2.11 Formwork

a) The form work shall conform to the shape, lines and dimensions as shown on the plans and be so constructed as to remain sufficiently rigid during the placing and compacting of the concrete and shall be sufficiently water tight to prevent loss of cement slurry from the concrete. Form work or centering shall be constructed of steel or timber and adequately designed to support the full weight of wet concrete without deflection and retain its form during laying, ramming and setting of concrete. Timber used shall be properly seasoned so as to prevent deformation when wetted.

b) All props shall be straight and of full height and no joints shall be allowed. Props shall be braced with thin bamboos or wooden battens and where additional staging is necessary, extra care shall be taken to use bigger diameter props with bracing at 4 or 5 levels. All props shall be supported on sole plates and double wedges. At the time of removing props these wedges shall be gently eased and not knocked out.

c) All rubbish, chipping, shavings and saw dust shall be removed from the interior of the forms before the concrete is placed and the form work in contact with the concrete shall be mineral oil or any other approved material. Care shall be taken that oil or such approved material is kept put of contact with the reinforcement.

d) All formwork shall be removed without shock or vibration and shall be eased off carefully in order to allow the structure to take up its load gradually. Forms shall not be disturbed until concrete has adequately hardened to take up super-imposed load coming on it and in no circumstances shall forms be struck until the concrete reached a strength of at least twice the stress to which the concrete may be subjected at the time of striking.

e) In the normal circumstances (generally where temperatures are above 21 degrees centigrade) and where ordinary cement is used, forms may be struck after expiry of following periods :-

(a) Walls, columns and vertical sides of beam : 48 Hours as may be directed by the Engineer in Charge.

(b) Bottom of Slab Upto 4.50 Mt span : 7 Days.

(c) Bottom of Slab above 4.50 Mt. Span : 14 Days.

(d) Bottom of Beams and arch rib over 6.00 Meter Span : 21 Days.

However this period may be increased or decreased at the discretion of Engineer-in-charge. Special care shall be taken while striking the centering of cantilevered slab canopies, portal frames, folded plate construction and period of striking centering shall be as determinate by the Engineer-in-charge. If directed, forms shall be given an upward camber to ensure that the beams do not have any sag.

Surface that becomes exposed on removal of forms shall be carefully examined any fins, burrs, projections etc. That are detected shall be removed. Any honeycombing of minor nature shall be finished neatly with cement mortar 1:2.

Any work showing signs of damage through premature or careless removal of centering or shuttering or shuttering, shall be reconstructed by the Contractor at his own cost.

## 2.12 Strength

Concrete mixed in the proportion desired shall have compressive strength after curing, not less than the following:-

Sr. No.	Concrete Mix	Minimum Compressive Strength 7	Minimum Compressive Strength 28 days
1	1:1:2 (M -25)	160 kg. / sq.cm (2250 lbs. / sq	250 kg. / sq.cm (3500 lbs. / sq cm
2	1:1.5:3 (M-20)	132 kg. / sq.cm (1875 lbs. / sq	200kg. / sq.cm (2850 lbs. / sq cm
3	1:2:4 ( M-15)	106 kg. / sq.cm (1500 lbs. / sq	150 kg. / sq.cm (2100 lbs. / sq cm

(b) Tests on concrete shall be carried out in accordance with IS-456 and any other IS applicable.

The frequency of works test shall be at such intervals as ordered by the Engineer-in-charge and subject to that every 150 cu.m of concrete placed or part thereof and for a day's concrete exceeding 20 cu.m a batch of 6 cubes shall be made for every sample and 3 of them tested after 7 days and the remaining 3 cubes shall be tested after 28 days. The criteria for acceptance of concrete as conforming to the specified proportion/grade of concrete shall be in accordance with IS:456 and the contractor shall entirely re-do the rejected work at his own cost. Strength or 28 days shall alone be considered for acceptance. The Contractor shall arrange to carry out the tests in accordance with the relevant Indian standards specifications in any approved Laboratory and the test reports in Original submitted to Engineer-in-charge. The entire cost of testing shall be borne by the Contractor.

2.13 Details of aggregates and water required in different concrete Mixes, surface water in sand, and slump required is given in Table A , Table B and Table C as under:

Table A

S. N o.	Nominal Mix	Qty. of aggregates required per 50		Qty. of water required per 50 Kgs. of cement	
		FINE cu.m	Coarse cum	Vibrat	Unvibr
				(for dry aggregate)	
1	1:1:2	0.035	0.070	22 Lits.	27 Lits.
2	1:1.5:3	0.052	0.106	23 Lits.	30 Lits.
3	1:2:4	0.070	0.138	27 Lits.	32 Lits.
4	1:3:6	0.105	0.210	28 Lits.	34 Lits.
5	1:4:8	0.150	0.280		45 Lits.

Table B

S. N	Aggregates	Approximate Qty of surface
1	Very Wet sand	120 lits.
2	Moderaly Wet sand	80 Lits.
3	Moist sand	40 Lits.
4	Moist Gravels or crushed sock	20-40 Lits.
	Coarser the aggregate, lesser the water it will carry.	

Table C

S.	Type of work	Slump Required	
		For concrete when	For unvibrated
1	Mass concrete on RCC foundation, footings	2.5 Cms. ( 1")	5 Cms. ( 2")
2	Beams, Slabs, columns with simple reinforcement	2.5 to 5 Cms. ( 1"-	5 Cms – 10 Cms
3	Thin Sections with congested Reinforcement	5 Cms – 10 Cms ( 2" – 4" )	10-15 Cms. ( 4" – 6" )
Note: Should conditions governing slumps and workability changed pointing to advisability of an increased slump, this shall only be done by decreasing the amount of aggregate and not only by increasing the amount of water.			

#### 2.14 Specifications for Controlled Concrete:

The following specifications shall form part of the contract and these shall be deemed to be supplemental to the specifications in the printed tender and not in derogation thereof except to the extent specifically provided herein.

##### 2.14.1 General

2.14.2 All concrete shall comply with the requirements of IS:456. Wherever a reference is made to any Indian Standard Code of practice it shall mean the latest version of the relevant standard in use.

2.14.3 Concrete work shall be supervised by a competent concrete technologist approved by the Engineer-In-charge structural consultant whose duty will be to supervise all stages of designing the mix, preparation and placing of concrete. All cubes shall be made and site tests carried out under his direct.

Supervision in the presence of Engineer-In-Charge/Structural Consultant or his authorised representatives. In order to exercise the required degree of constant control over the concrete materials and their preparations, the Contractor shall set up and maintain at his own expense a testing laboratory at site. He shall provide all apparatus required for sensitive testing of concrete and concrete materials and in particular he must have the following equipment in the Site Laboratory, if the adequate testing laboratories are not available in the near by area of work site.

2.14.4 Before the commencement of construction work, the Contractor shall supply to the Engineer- In-Charge/Structural Consultant arrangement for concreting plant.



2.14.5 All materials which have been damaged, contaminated or have deteriorated or do not comply in any way with the requirements of this specifications be rejected and shall be removed from the site at the Contractor's own expense

2.14.6 Materials viz., cement, fine aggregate, coarse aggregates, water etc. Shall be tested, if directed, in an approved testing laboratory and test reports in original, shall be forwarded to Engineer-in-charge and all costs tests shall be borne by the Contractor.

If directed, tests shall be repeated and costs of such tests shall be borne by the Contractor.

2.14.7 The concrete mix shall be designed by any of the recognised methods. The proportions chosen should be such that the concrete is of adequate workability for the conditions prevailing on the work in question and can be properly compacted.

2.14.8 The maximum total quantity of aggregate by weight shall not exceed what is shown in the table given below in paragraph 3.3 except where otherwise specifically permitted by the Engineer-in-charge / Consultant.

2.14.9 Except where it can be shown to the satisfaction of the Engineer-in-charge/Consultant that supply of properly graded aggregate of uniform quality can be maintained over the period of work, the grading of aggregate should be controlled by obtaining the coarse aggregate in different sizes and blending them in the right proportions for various mix designs, the different sizes being stocked in separate stock piles. The materials should be stock piled preferably a day before use. The grading of coarse, and fine aggregate should be checked as frequently as possible, the frequency for a given job being determined by the Engineer-in-charge/Consultant to ensure that the supplies are maintaining the uniform grading with that of the samples used in the preliminary tests

2.14.10 In proportioning concrete, the quantity of both cement and aggregate should be determined by weight. Water should be either measured by volume in calibrated tanks or weighed. All measuring equipment shall be maintained in a clean serviceable condition and their accuracy periodically checked

## 2.15 Materials

### 2.15.1 Cement

Cement shall comply in every respect with the requirements of the IS.269 for Portland cement and shall be obtained from approved sources.

Cement shall be stored in suitable weather-proof structures on raised wooden platform and in stacks which are not higher than 10 bags. Sufficient space shall be provided for circulation and rotation of bags in order to minimize the length of storage of any of the bags. Provisions for storage shall be ample and the consignment of cement as received shall be separately stored in such a manner as to provide easy access for the identification and inspection of each consignment. Cost of providing these structures shall be borne by the contractor.

Stored cement shall meet the test requirements at any time after storage when a retest is ordered by the Engineer-in-charge/Consultant, Cement concerning which there is doubt shall not be used pending testing and satisfactory results. All

cement not conforming to specifications and rejected by the Engineer-In-Charge/Consultant shall be removed immediately from the site of work.

Cement shall be used in the sequence in which it arrives in order that no cement shall be unnecessarily stored for a long period. If cement becomes humpy due to partial hydration it shall be removed from the site immediately.

#### 2.15.2 Admixtures:

Admixtures shall be allowed to improve workability only if there is proved evidence that neither the strength nor the other requisite qualities of concrete and/or steel, accessories, grout are impaired by their use. The use of admixtures containing Calcium Chloride, Fluorides, Nitrates and Sulphates is prohibited. The Engineer-In-Charge decision on all matters relating to the use of admixtures shall be final.

Admixtures shall be stored in a suitable weather proof shed/building. Any material which has deteriorated or which has been contaminated or damaged whether during transitor at site shall be immediately removed from the site and replaced at Contractor's own expense.

#### 2.15.3 Fine Aggregates:

Shall conform with the requirements of IS:383 and relevant portion of IS: 515. It shall be chemically inert, strong, hard, durable of Limited porosity, free from adherent coatings, clay lumps, coal and coal residues, and shall not contain any organic matter or other admixtures that may cause corrosion of reinforcement or impair the strength or durability of the concrete. The maximum quantity of the deleterious materials shall not exceed the limits specified in the relevant Indian Standards Specification.

The natural sand shall have grading conforming to one of the four grading limits given in the following table:-

#### Grading Limit for fine aggregates

IS sieve Designation.	Percentage passing			
	Grading Zone 1	Grading Zone 2	Grading Zone 3	Grading Zone 4
10 mm	100	100	100	100
4.75 mm	90 -100	90 -100	95 -100	95-100
2.36 mm	60 – 95	75- 100	85-100	95 -100
1.18 mm	30-70	55 -90	75 -100	90-100
600 micron	15-34	35-59	60-79	80-100
300 micron	5-20	8-30	12-40	15-50
150 micron	0-10	0-10	0-15	0-15

(when grading falls outside the limits of any particular grading zone of Sieves, other than 600 Micron Sieve, by a total amount not exceeding 5%, it shall be regarded as falling within the grading zone.)

#### 2.15.4 Coarse Aggregates

Coarse Aggregates shall conform with the requirements of IS:383 and relevant portions of IS:515. It shall consist of hard, dense, durable, uncoated crushed

rock. Use of gravel Aggregates shall be free from soft, friable, thin or flaky pieces. It shall be free from injurious amounts of alkali or organic matter other than deleterious materials. The maximum quantity of deleterious materials shall not exceed the limits specified in the relevant Indian Standard Specifications.

Coarse aggregates shall be obtained in single sizes conforming to the grading given in the following table in respect of each nominal size. Single sized aggregates shall be blended in suitable proportions to obtain a desired grading of coarse aggregates. At the discretion of the Engineer-In-Charge/Consultant use of graded aggregates shall be allowed provided the grading conforms to the limits specified in the following table under Column B.

Sieve Designation	A Percentage Passing , for single sized Aggregate of nominal size						B Percentage passing , of graded Aggregate of			
	63	75	90	106	125	150	4.75	7.5	15	30
80 mm	100	100	100	100	100	100	100	100	100	100
63 mm	100	100	100	100	100	100	100	100	100	100
40 mm	100	100	100	100	100	100	100	100	100	100
20 mm	100	100	100	100	100	100	100	100	100	100
16 mm	100	100	100	100	100	100	100	100	100	100
12.5 mm	100	100	100	100	100	100	100	100	100	100
10 mm	100	100	100	100	100	100	100	100	100	100
4.75	100	100	100	100	100	100	100	100	100	100
2.36	100	100	100	100	100	100	100	100	100	100

- For heavily reinforced concrete members as in the case of ribs of main beams, the nominal maximum size of the aggregate shall usually be restricted to 5 mm. Less than the minimum clear distance between the main bars or 5 mm less than the minimum cover to the reinforcement whichever is smaller.
- Where reinforcement is widely spaced as in solid slabs, nominal maximum size of the aggregate shall be 20 mm.
- For reinforced concrete work, aggregates having a maximum size of 20 mm shall be used.

In selecting coarse as well as fine aggregates, the Contractor shall satisfy himself that the source is suitable and adequate for regular supply and a watch shall be maintained that the particle shape and grading remain reasonably uniform throughout the progress of work. If directed by Engineer-in-charge/Consultant, the aggregates shall be washed at Contractor's expense. For both fine and coarse aggregates, preliminary tests shall be carried out for physical characteristics, limits of deleterious substances, soundness, etc. Prior to commencement of work and also when the source of supply is changed.

#### 2.15.5 Water:

Water used for both mixing and curing shall be free from injurious amounts of deleterious materials. Potable contractor. Water containing any sugar or an excess of acid, alkali or salt, shall not be permitted for use. Water which fails to satisfy the following requirements shall not be used.

(a) To neutralise 200 ml. Sample it should not require more than 2 ml. Of 1.0 normal NaOH. (b) To neutralize 200 ml. Sample it should not require more than 10 ml. Of 1.0 normal HCL. (c) Percentage of solids should not exceed the following :

Organic	0.02 Percent
Inorganic	0.30
Sulphates	0.05
Alkalies chlorides	0.10

In case of doubt, the Engineer-In-Charge may require that concrete mixed with water proposed to be used should not have a compressive strength, lower than 9% of the strength of concrete mixed with distilled water.

#### 2.15.5 Reinforcement

All reinforcement shall conform with the requirements of relevant IS specifications for mild steel, deformed steel etc. All reinforcement when placed in position shall be clean and free from loose mild scales, dust, loose rust and coats of paints, oil or other coating while may destroy or reduce bond. Welded joints may be allowed only when tests shall be made to prove that the joints are of the full strength of the bars connected. Welding of reinforcement shall be done in accordance with the recommendations of relevant Indian Standards for welding of mild steel bars used in reinforced cement concrete.

#### 2.15.7 Concrete Mix design

Concrete mix for various specified design strengths shall be worked out by the Contractor by any of the recognized method of mix design. There shall be one or two or more mix designs for same grade of concrete for different workability as required for different structural members such as slabs, beams, columns etc.

The selected mix proportion shall ensure that workability of the fresh concrete is suitable for conditions of handling and placing, so that after compaction it surrounds all reinforcement ducts etc. And completely fills the form work. When the concrete is hardened its quality shall be such as to comply with the strength, durability and other requirements taking into account the conditions to which it will be exposed.

The preliminary mix design shall assume only fair control, unless the contractor can prove from his last experience that he is capable of achieving a high degree of control. Give due regard to the criteria of acceptance for preliminary test as stipulated in IS:456 (please see table I). 5 companion cubes shall constitute a test and the average strength of 5 companion cubes tested. shall not be less than the stipulated strength for preliminary tests. The design mix and control shall be

accepted if only one out of five cubes may give a value less than the specified strength (Ref. Cl. 5.2.2.1 and 5.4.2 of IS 456- 1964). The contractor shall prepare well in advance all calculations, tabulations, graphs pertaining to concrete mix design and preliminary test results and submit the copies to Engineer-in-charge/Consultant for their instructions. (Please see table II). Only that mix which is approved in writing by the Engineer-in-charge clearly understood that such approval shall not absolve the contractor of his responsibility for compliance of works test results.

The minimum cement content for various mixes as well as the maximum aggregate to cement ratio shall be as under:-

Max. aggregate /	Mix	Cement Content Concrete
9.0	M 150	280 Kgs. per Cmt. (800 kgs. / 100 Cft.)
7.0	M 200	320 Kgs. per Cmt. (900 kgs. / 100 Cft.)
6.0	M 250	350Kgs. per Cmt. (1000 kgs. / 100 Cft.)
5.0	M 300	390 Kgs. per Cmt. (1100 kgs. / 100 Cft.)
4.5	M 350	425 Kgs. per Cmt. (1200 kgs. / 100 Cft.)
4.0	M 400	460 Kgs. per Cmt. (1300 kgs. / 100 Cft.)
	M 450	495Kgs. per Cmt. (1400 kgs. / 100 Cft.)

## 2.16 Mixing & placing of Concrete

### Measurement of Materials :

**Cement :** In proportioning concrete, the quantity of both cement and aggregates shall be determined by weight. Where the weight of cement is determined by accepting the maker's weight per bag, a number of bags as directed by the Engineer-In- Charge shall be weighed separately to check the net weight. Where cement is weighed on the site and not in bags it shall be weighed separately from the aggregate. **Aggregate :** Aggregates shall be batched by weight in mechanical weigh batcher or batching plant unless otherwise specified in the Schedule of quantities. Where Volumetric proportions are allowed, with the consent of the Engineer-in-charge, the conversion from weight to that of volume shall be on the basis of dry bulk densities of the aggregates.

**Water:** Water shall be measured either by volume (I) calibrated tanks or weighed, water shall not

be measured using ordinary buckets, Measurement of water to control and maintain water cement ratio is of utmost importance and adequate attention shall be given by the contractor to the satisfaction of the Engineer-in-charge/Consultant.

All measuring equipment shall be of approved type and maintained in serviceable condition and their accuracy periodically checked.

**Mixing :** Concrete shall be mixed in a mechanical mixer. Through mixing of concrete is essential and mixer shall always be operated at the speed recommended by the makers. The with IS:1791, but in no case mixing shall be done for less than two minutes to ensure that the materials are uniformly

distribute and the mass is uniform in colour and consistency. When the mixing is over the entire contents of the drum shall be discharged in one operation into a hopper or a container to avoid segregation of mortar from coarse aggregates. If the concrete is allowed to be unloaded on a platform, it shall be watertight. After day's work the mixer shall be thoroughly washed and blades cleaned otherwise mixing drum will soon become callous with harden concrete which will impair the efficiency of the mixer. Inside of the drum shall be inspected regularly; any blades which are worn out or broken should be replaced.

**Transporting:** Concrete shall be handled from the place of mixing to the place of final deposit as rapidly as practicable by methods which will prevent the segregation or loss of any of the ingredients. If segregation occurs during transport the concrete shall be remixed before being placed. **Placing :** Concrete shall be placed in position and compacted before initial setting commences and when once compacted it shall not be subsequently disturbed. Method of placing shall be such as to preclude segregation.

During hot or cold weather, concrete shall be transported in deep containers to reduce loss of water by evaporation during hot weather and loss of heat during cold weather. Deep containers are specified on account of their lower ratio of surface area to mass.

Concrete shall not be dropped into position from a height greater than 2.0 meters.

Before the concrete is actually placed in position, the insides of the forms should be inspected to ensure that the shuttering is water-tight and the surface treated with approved composition. All debris, sand, dust etc., shall be removed from shuttering before concrete is placed in position.

Concrete shall be placed in suitable layers depending upon the nature of work and in no case shall be more than 30 cm. Thick, placing shall be confined as far as practicable.

When concrete is required to be placed under adverse conditions viz. Extreme weather conditions, under water, in alkali soils and in alkaline water, the requirements as stipulated in IS: 456 shall be completed.

#### 2.17 Compaction :

Concrete shall be thoroughly compacted during the operation of placing and thoroughly worked around the reinforcement, around embedded fixtures and into corners of and by light tapping the form work on the external face at the actual pouring head and this shall be followed by mechanical vibration by using approved type of vibrator.

Beams and columns shall be vibrated using immersion vibrators as per IS: 2505 and IS: 3558; thin sections like water tanks walls shall be vibrated using clamp on vibrated and shall be vibrated using surface vibrators. The contractor shall at all times have in reserve sufficient vibrators of each type to guard against shut down of the work occasioned by the failure of the equipment. No concreting shall be permitted in the event of power failure.

The intensity and duration of vibration shall be sufficient to ensure complete settlement and compaction without any stratification of successive layers or separation of ingredients or formation of lamination. Immersion vibrators shall be inserted vertically and not at any angle at regular intervals not more than 45 cm. Apart and withdrawn very slowly when air bubbles no longer come on the surface. It is better to vibrate at smaller intervals for shorter periods of time. To avoid trapping of air the thickness of layer of concrete to be vibrated shall not be less than 15 cm. And maximum advisable shall be 45 cm. The vibrator used

to push concrete laterally in the forms of and it shall never be used nearer than 10 cm. To the form surface in order to obtain a uniform appearance.

#### 2.18 Curing

Concrete shall be carefully protected during firststage of hardening from harmful effects of excessive heat, drying winds, running down of surface water and shocks. Concrete shall be prevented from drying out at least for a period of 14 Days and thereafter the surface kept moist for another 7 day. The method of curing shall be that horizontal surfaces shall be kept covered with ponded water for a continuous period of 14 days and vertical surfaces like columns, fins etc. Shall be covered with straw, hessian etc. And kept constantly wet by water spray. More sprinkling of water on vertical surfaces shall not be allowed.

#### 2.19 Testing and acceptance of concrete

Method of sampling and testing shall be carried out as per IS : 1199 and IS : 516 and evaluation of test results shall be as per IS : 456 in general and clause 5.4 hereafter ion particular Tests shall be conducted on companion cubes or specimen.

Companion specimens shall be cast from a single batch of concrete and shall be of the same age at the time of testing.. The average strength of three companion specimens shall constitute the result of that test. From each sample of concrete 6 companion cubes shall be taken. Three of these shall be tested at 7 days and the remaining 3 at 28 days.

A minimum of two such samples giving 12 cubes shall be obtained per mix per day or for every 30 cu.m. or fraction thereof for each grade whichever gives more number of cubes. All these cubes shall be tested in the site laboratory or any recognized laboratory. The Engineer-in-charge / Consultant may at his absolute discretion increase or decrease the frequency of tests.

The criteria for acceptance of a concrete shall be in accordance with the latest version of IS : 456 and the consequence of rejection shall be at the expense of contractors. Strength of 28 days shall be considered for acceptance.

Table 1

Strength requirement of concrete ( All values are in Kgs. / Cm2)

Compressive Strength of 15 .c.m. Cubes at days after mixing , conducted in accordance with IS : 516		
Grade of Concrete	Preliminary Test	Work Test Min.
M-100	135	100
M-150	200	150
M-175	230	175
M- 200	260	200
M– 250	320	250
M– 300	380	300
M– 350	440	350

Mode of measurement and payment:

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

**Item No.10.3, 10.4, 10.5****Ready Mix Concrete****M-300****M250****M200**

**1.0** (i) Ready Mixed Concrete should be from reputed manufacturers and contractors have to obtain prior approval of EIC with respect to supplier of RMC.

Rate to include the transportation with all leads from RMC plant to the place of work and pumping of concrete to any height and the rate shall be for all leads.

(ii) Cement concrete delivered at site should be workable and should satisfy all the required standard tests like cube test and slump test etc or item description as specified in code of practice. Samples taken at site only will be deciding factor.

(iii) It is the responsibility of contractor ensures proper co-ordination for the timely supply of concrete and approved quality product.

(iv) Contractor has to make arrangement for proper approach road (for which nothing extra shall be paid for) to enable the vehicle carrying concrete to move freely without any extra cost to the department before ordering the concrete. However existing approach road may be made use of for this purpose.

(v) Contractor has to ensure proper strong shuttering / centering to receive the concrete at all heights.

(vi) The design mix of RMC for the manufacturer / supplier of RMC has to be obtained well in time and approval of Engineer in Charge to be obtained prior to use. The design mix should be based on latest IS 456. This approval has to be obtained whenever the design mix is changed. The RMC should be supplied confirming to the approved design mix which shall be continuously checked during the progress of work. All the quality checks as per IS stipulations should be scrupulously followed during the concreting. The work shall be carried out at all heights.

**2.0 Workmanship**

**2.1** All Work and Material Specification as per Above Item.

**2.0 Mode of Measurement and Payment**

**3.1** The item shall be measured and paid in cum. The rate excludes the cost of reinforcement and formwork.

**Item No.10.6**

Drilling suitable holes in reinforced or plain cement concrete with power driven drill machine to a minimum depth of 80mm upto 250mm in RCC beams, lintels, columns and slabs to introduce steel bars for sunshades/balconies including fixing the steel bars in position using Hilti Chemical HY200-R but excluding the cost of reinforcement, all complete as per direction of Engineer-In-Charge.

8 mm Dia in 80 mm Deep & 12 mm Dia Drilling
10 mm Dia in 100 mm Deep & 14 mm Dia Drilling
12 mm Dia in 120 mm Deep & 16 mm Dia Drilling
16 mm Dia in 160 mm Deep & 20 mm Dia Drilling
20 mm Dia in 200 mm Deep & 25 mm Dia Drilling
25 mm Dia in 250 mm Deep & 32 mm Dia Drilling

Specifications same as item description followed as per engg. in charge / consultants guide lines.



The rate shall be for a unit of one No.

#### **Item No.11c**

##### **Tremix**

P/A Trimix with dewatering machine and floater machine on constructed R.C.C. work incl. cost of machine and labour etc. comp. as directed.

##### **TREMIX –**

scope of work includes channel fixing, surface vibration & leveling, vacuum dewatering, floating & toweling the surface. The contractor shall have at the job site sufficient equipment (vacuum Pumps, mats, filter pads and accessories) to ensure that the vacuum dewatering process continues uninterrupted to completion. Standby equipment are sometimes required.

##### **General**

The work shall be planned and executed. The concrete shall be leveled with vibrating screening running on a true surface, set at the proper elevation required to provide the specified finished elevation. The vibrating screed shall be moved forward as rapidly as proper consolidations allows. The proper surcharge of concrete must be maintained in front of the leading edge of the screed.

##### **Vacuum**

Immediately after leveling, the concrete shall be covered with filter pads and suction mats in strict accordance with the recommendation of the manufacturer to have the fully dewatered. A vacuum should be applied to the mat. The vacuum shall be maintained for at least 3 minutes per inch of concrete thickness. The suction mats and filter pads shall then be removed to the next section in leapfrog manner.

##### **Floating**

Upon removal of the suction mats and filter pads the concrete surface shall be power floated without any delays until all imprints from the vacuum process are removed. The higher speed is recommended for the floating process. Two passes with the floating disc should be made in the junction of two mats in order to avoid risk for cracking.

##### **Finishing**

The waiting time after the floating operation depends on concrete temperature and humidity and varies from 10 minutes to 2 hours. The trowelling operation cannot take place before the concrete hardened enough to carry the machine. i. e. the trowelling blades will not leave any marks on the concrete. Repeated troweling with the intervals between the passes, which are adapted to the setting of the concrete, greatly improves the surface characteristics. At least two passes are recommended. Curing

Vacuum dewatered concrete should be cured like any other quality concrete in order to achieve a good final result with ponding.

##### **Mode of Measurement and payment:**

shall be paid for a unit of 1 smt for top surface. Mode Measurement and payment : on smt basis of finished work. The contract rate shall be include carrying out all required operations to complete this item of work, including cost of labour, materials, tools & plants etc. Rate of shuttering with MS channels & cutting of grooves and joint filler are included.

## Item No.12

### Formwork :

Providing form work in ordinary timber planking so as to give a rough finish including centering, shuttering, strutting and propping etc. height of propping and centering below supporting floor to ceiling not exceeding 4 M & removal of the same for in situ reinforced or plain concrete work in

- (a) Foundation, footings, bases of columns etc. and mass concrete. (b) Columns, pillars, posts & struts.
- (c) Sides and soffits of beam, haunchings, cantilevers, girders, bressumers and lintels exceeding 1 M in depth.
- (d) Edges of slabs and breaks in floor and walls.
- (e) Staircase with-sloping or stepped soffits risers & strings excluding landing. Incl.

### PLEASE NOTE:

FOR COLUMNS, SHUTTERING PLATES WITH NUT AND BOLT SHALL BE USED AND CONVENTIONAL SHUTTERING SHALL NOT BE ALLOWED.

### Materials:

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

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

### Workmanship:

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

### Cleaning & Treatment of forms:

All rubbish particularly chippings shaving and saw dust shall be removed from the interior of the form before the concrete is placed and the form work in contact with concrete shall be cleaned and thoroughly 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 or form oil of approved manufacture may be applied in case steel shuttering is used. Soap solution or raw linseed oil shall be applied after thoroughly cleaning the surface. Care shall be taken that the coating does not get construction joint surface and reinforcement bars.

### Stripping time:

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

- (a) Sides of walls columns and vertical faces of beam □□□24 to 48 hours.
- (b) Beams soffits (props left under) □□□□□□□□□7 days.
- (c) Removal of props slabs
  - (1) Slabs spanning up to 4.5 m □□□□□□□□□□□7 days.
  - (2) Spanning over 4.5 mm □□□□□□□□□□□□□7 days.
- (d) Removal of props to beams and arches
  - (1) Spanning up to 6 m □□□□□□□□□□□□□□14 days.
  - (2) Spanning over 6 m □□□□□□□□□□□□□□14 days.

However this period may be increased or decreased at the discretion of Engineer-in-charge. Special care shall be taken while striking the centering of cantilevered slab canopies, portal frames, folded plate construction and period of striking centering shall be as determinate by the Engineer-in-charge.

#### Procedure when removing the form work:

All formwork shall be removed without such shock or vibration as would damage the reinforcement 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.

#### Centering:

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

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

The centering and form work shall be inspected and approved by the Engineer-in-charge before centering. 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 work, injury to life and language to property.

#### Scaffolding:

All scaffolding, hoisting arrangements and ladders etc required for the facilitating of concreting shall be provided and removed on completion at his own expense. The scaffolding, hoisting arrangements and ladders etc. shall be strong enough to withstand all live, dead and impact loads expected to act and shall be subject to the approval of the Engineer-in-charge. However, contractor shall be solely responsible for the safety of the hoisting arrangements and ladders shall allow easy approach etc.

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

The rate is applicable to all conditions 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, nailing, easing, striking and removal.
- (b) Filleting to from 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.

#### Re-use:

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

Mode of measurements & payment:

From work shall be measured as the area in square meters of shuttering in contract with concrete except in the case of inclined member and portion of curved profile and upper side in which case only area of underside shall be measured for payment.

Form work to secondary beams shall be measured up to the side of main beams but no deduction shall be made from the work of the main beam at the inter section point.

No, deduction shall be made from the formwork of a column a inter section of beams. The rate is for the completed item.

The rate shall be for a unit of one Sq. meter or as per the B.O.Q.

### **Item No.13**

**Providing T.M.T Fe 500D bar reinforcement for R.C.C. work including bending, binding and placing in position complete up to any floor level.**

#### **1.0. GENERAL**

This work shall consist of furnishing and placing TMT Fe-500 Conforming to IS 1786 2008 reinforcement Providing and applying anticorrosive treatment with polymer base materials to the steel reinforcement including descaling the dust and applying the preventive coating of approved make etc. complete, 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 may be either TMT Fe-500 tensile steel, high strength deformed bars. They may be uncoated or coated with epoxy or with approved protective coatings.

2.2. T.M.T. bars reinforcement for R C C work shall conform IS 432 (Part II) 1966 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, all 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 bending 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 T.M.T. 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 spilling 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 non-corrodible material wooden and metal supports shall not extend 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 blocks 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 from corrosion, concrete cover shall be provided as indicated on drawings. All bars protruding from concrete and to which other bars are to be lapped 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. 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 shear nor 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 jointed by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than the normal cross section of the bar. Threads shall be standard threads. Steel for coupling shall conform to IS 226.

10.9. When permitted or specified on the drawings joints of reinforcement bars shall be butt-welded

so as to transmit their full stresses. Welded joints shall preferably be located at points where 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 arc welding using a process which excludes air from 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, paint and other foreign matter before welding. Only competent welders shall be employed on the work. The M S electrodes used for welding shall conform to IS 814. Welded pieces of reinforcement shall be tested. Specimen shall be taken from the actual site and their number and frequency to test shall be as directed by the Engineer in charge.

#### 11.0 MODE OF MEASUREMENTS and PAYMENT

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

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

Reinforcement shall be measured in length including hooks, if any, separately for different diameters as actually used in work, excluding overlaps. From the length so measured, the weight of reinforcement shall be calculated in tonnes on the basis of IS 1732. Wastage, overlaps, couplings, welded joints, spacer bars, chairs, stays, hangers and annealed steel wire or other methods for binding and placing shall not be measured and cost of these items shall be deemed to be included in the rates for reinforcement..

The contract unit rate for coated/uncoated reinforcement shall cover the cost of material, fabricating, transporting, storing, bending, placing, binding and fixing in position as shown on the drawings as per these specifications and as directed by the Engineer, including all labour, equipment, supplies, incidentals, sampling, testing and supervision.



The unit Rate for coated reinforcement shall be deemed to also include cost of all material, labour, tools and plant, royalty, transportation and expertise required to carry out the work. The rate shall also cover sampling, testing and supervision required for the work. **No Payment shall be given for Lap.**

The rate shall be for a unit of One Kg.

#### **Item No.14 x, 14b & 15**

**Polished Kotah Stone:**

Providing and laying polished Kota stone slab (Polished / River Finish, Green colour ) flooring over 20 mm. (average) thick base of cement mortar 1:6 (1 cement : 6 coarse sand) or lime mortar 1:1.5 laid over and joined with grey cement slurry including rubbing and polishing complete. 25 mm th.

Providing and laying rough chiseled dressed stone flooring over 20mm average thick base of cement mortar 1:5 (1-Cement : 5-coarse sand) or L.M. 1:1.5 (1-Lime putty : 1.5 - coarse sand) including pointing with cement mortar 1:2 (1 cement : 2-stone dust) etc. complete. (A) 25mm thick

Providing and laying polished Kota stone slab 25 mm. thick in Platform ,Riser of Stair , Skirting, Tread , dado and pillars laid on 10 mm. thick cement mortar 1:3 (1 cement : 3 coarse sand) jointed with grey cement slurry including rubbing and polishing and MAKING groove where it is Required etc. compl

#### **Materials :**

Water shall conform M-1. Lime mortar shall conform to M-10. Cement mortar shall conform to M-11 polished kota stone shall conform to M-49.

#### **Workmanship :**

Each slab shall be cut to the required size and shape and fine chisel dressed at all the edges. The sides thus dressed shall have a full contact if a straight edge is laid along. The sides shall be table rubbed with coarse sand before paving. All angles and edges of the slabs shall be true square and free from chippings and giving plain surface. The thickness shall be 35 mm. (Average) as specified in the item but not less than 30 mm. at any place of the slab.

Bedding for the kota stone slabs shall be cement mortar 1:6 (1 cement : 6 coarse sand) of average thickness 20 mm. as given in the description of the item. Sub grade shall be cleaned, wetted and mopped. Mortar of the specified mix and thickness shall be then be spread on an area sufficient to receive one kota stone slab. The slab shall be washed clean before laying. It shall be laid on top pressed, tapped gently to bring it in level with the other slabs. It shall be lifted and laid aside. 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 place in position and tapped with wooden mallet till it is properly pedded in level with and close to the adjoining slab. The joint shall be as fine as possible. The slabs fixed in the floor adjoining the wall shall enter not less then 10 mm. under the plaster skirting or dado. The junction between the wall floor shall be finished neatly. The finished surface shall be true to levels and slopes as directed.

The floor shall be kept wet for a minimum period of 7 days. So that bedding and joints set properly. Polishing shall be normally commenced after 14 days of laying the stone slab. First polishing shall be done with ear borundum stones of 120 grade

grit fitted in the heavy machine and then second polishing shall be done with carborundum stone of 220 of 350 grade grit fitted in heavy machine. Water shall be properly used during polishing. The stone shall then be washed clean with water. When directed by the Engineer-in-charge wax polish of approved quality shall be applied on the surface with the help of soft cloth over a clean and dry surface. Then the polish machine fitted with bobs shall be run over it.

The holes required for Nahni traps, pipes any other fittings shall be made without any extra cost.

**Mode of measurements & payment :**

The rate shall include the cost of all materials and labour involved in all the operations described above. The Kota stone flooring shall be measured in square metres correct to two places of decimal, length and breadth shall be measured correct to a centimeter and between the finished face of skirting dado or wall plaster and no deduction shall be made nor extra paid for any opening in floor of area upto 0.1 sq. mt.

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

#### **Item No.16 & 17**

Providing and laying white/Colour glazed tiles 6 mm thick in flooring treads of steps and landing laid on a bed of 12 mm thick cement mortar 1:3 (1 cement : 3 coarse sand) finished with flush pointing in white cement.

. Providing and laying White / Colour glazed tiles of size 600 mmx300mm x 8 mm / 300 mmx 450mm x 8 mm in skirting, risers of steps, Floor and dado on 10 mm. thick cement plaster 1:3 (1 cement : 3 coarse sand) and jointed with white cement slurry.etc. complete in all respects etc. complete as direction by E.I.C.

#### **Materials :**

Water shall conform to M-1. Cement mortar shall conform to M-11. White or any colour glazed tiles shall conform to M-55.

#### **Workmanship :**

**Preparation of surface :** In case of brick masonry wall, the joints shall be raked out to a depth of atleast

15 mm. while the masonry is being laid. In case of concrete wall, the surface shall be chiselled and roughened with wire brushes. The surface shall be cleaned and wetted thoroughly before commencing the laying work.

#### **Laying :**

The wall surface shall be covered 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 and edges with white cement slurry set in bedding mortar. The tiles shall be gently tapped in position one after the other keeping the joints as this as possible. Top of skirting or dado shall be truly horizontal and the joints vertical or as per required pattern.

Risers of steps, skirting and dado shall rest on top of treads or flooring. Where full size tiles cannot be fixed, they shall be cut the surface shall be washed clean.

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.

#### **Mode of measurement & payment :**

The rate shall include the cost of all materials and labour required for various operations described above. Risers of steps, skirting and dado shall be measured in square metres.

Length and height shall be measured along the finished face of the skirting or dado including curves, where special such as covers, internal and external angles, etc. used. The length and height shall be measured correct to the centimeter except in case of riser and skirting where height shall be measured correct to 3 mm.

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

**Item No.18****Marble Sills and Jambs:**

Providing and laying marble stone slab flooring over 20 mm. (Average) base of cement mortar 1:6 (1 cement: 6 coarse sand) or L.M. 1:1.5 laid and jointed with grey cement slurry including rubbing and polishing complete: (A) Marble slab 25 mm. thick.

**Materials:**

19 mm to 22 mm thick pre-polished Marble stone / Jaisalmer stone shall be used. The fixing of marble shall be done on plastered (wired finish) wall sides so as to be fixed in proper line, level and plumb. The edges of the stone shall be moulded as per instructions of the consultants.

**Workmanship: Dressing of slab :**

Every stone shall be cut to required size and fine chisel dressed to give a smooth and even surface on all sides to the full depth. A straight edge laid along the sides of the stone shall be fully in contact with it. Chisel dressing shall also be done on top surface to remove any waviness. The sides and top surface to marble slabs shall be machine rubbed or table rubbed with coarse sand before using. All angles and edges of slabs shall be true square and free from chippings.

The thickness of stone shall be 25 mm. The allowable tolerance shall be 2 mm. allowable. The tolerance shall be 15 mm. in length and breadth.

**Bedding :**

Bedding of marble slabs shall be made with cement mortar 1:6 (1 cement : 6 coarse sand) of average thickness 50 mm. thick as given in description of item. Minimum thickness at any place shall not be less than 25 mm.

**Laying :**

The surface of sub grade shall be cleared, wetted and mopped. Mortar of specified mix and thickness shall then be spread on an area sufficient to receive one marble slab. The slab shall be washed clean before laying. It shall be laid on top, pressed and tapped gently to bring it in level with other slabs. It shall then be lifted and laid aside. The top surface of the mortar shall then be corrected by adding fresh mortar at hollows, or depressions. The mortar shall then be allowed to harden over this surface. A cement slurry of honey like consistency at 4.4 Kg. Of cement per sq. metre. The edges of slabs already paved shall be buttered with grey cement. The slab shall then be gently placed in position and tapped with wooden mallet till it is properly bedded in level with and close to the adjoining slab. The joints shall be as fine as possible : Surplus cement on the surface of the slabs shall be removed. The slab fixed in the floor adjoining the walls shall enter not less 10 mm. under the plaster skirting or dado. The junction between the walls and floors shall be finished neatly. The finished surface shall be true to level and slopes as directed.

**Curing :**

The floor shall be cured for minimum period of seven days. Polishing and finishing: Unevenness at the meeting edges of slab shall be removed by fine chiseling. Finishing etc. shall be done as per relevant specifications of item no. 14.21 (A) of terrazzo tiles flooring except that cement slurry with/or without pigments shall not be applied on the surface before each polishing.

**Mode measurements & payment :**

Marble stone flooring / dado with various kinds of marble shall be measured in sq. metre. The length and breadth shall be measured between the finished face of skirting or dado or wall plaster. No deduction shall be made. Not extra shall be paid for any openings in the floor or area upto 0.05 sq. mt. Nothing extra shall be paid for laying stone at different levels in the same room. Treads and steps of stairs paved with marble stone slabs shall also be measured under flooring.

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

**Item No.19a, 19b**

**Vitrified Tiles:**

Providing and laying Vitrified tiles 8 to 10 mm thick , 24" x 24" 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.

Providing and laying Vitrified tiles 8 to 10 mm thick , 24" x 24" in skirting risers of steps and dedo on 10mm thick cement plaster 1:3 (1cement : 3-coarse sand) and jointed with white cement slurry

Tile shall conform to manufacture or supplier as per approved by EIC or by architect

Workman Ship shall be followed as per Item No. 16.

The measurement shall be done in Smt.

**Item No.20**

**Ceramic Tiles:**

Providing and laying Ceramics tiles 6 to 8 mm thick in flooring, treads of steps, landing and dedo on 12 mm. thick cement plaster 1:3 (1 cement : 3 coarse sand) and jointed with white cement slurry etc. complete in all respects etc. complete as direction by E.I.C.

Approved Ceramic tiles shall be laid on hard rough IPS or waterproof treated sub base ready to receive eramic tiles with a bedding of cement sand mortar. Tiles shall be laid in accordance to IS specifications and nstructions of manufacturer. Tiles shall be laid in cement sand mortar in ratio 1:5 (1 cement : 5 sand) on a bed of minimum 50 mm thickness.

Floor to receive tiles shall be wire brushed cleaned, wetted and mopped. Cement mortar of about 50 mm hickness shall be spread over the area uniformly and compacted with 2-3 meter straight edge to achieve dead niform levels. Surface shall be allowed to harden but in plastic state a thick cement paste by using cement @ 0.5 kg/sq m shall be worked into the bedding. Cement paste or approved tile adhesive shall be applied to the ready only where immediate laying of tiles is carried out. Wetted tiles shall be cleaned and fixed in the thick cement pasted bedding. Tiles shall be positioned by tapping with wooden hammer and level checked with straight edge 2-3 meter long. Joints shall be as specified or as thin as possible. Points to be noted prior to start are as under -

- 1) Layout of the tiles is checked and approved by the EIC.
- 2) End cut tiles are more than half.
- 3) Floor and wall tiles are in the same line.
- 4) Change of tiles is below the door shutter.
- 5) Dividing strip is provided if shown in drawing.
- 6) Cutouts of floor drains are in line with the tiles. Tiles around cutouts are greater than 50 mm or half the tile whichever is greater.
- 7) Joints shall be cleaned thoroughly and grouted with approved unsanded readymade grout or as directed by the EIC. Grout shall be a thick paste and tooled into joints and area of the tile cleaned with a damp cloth. Grouting shall be cured by wet curing for 7 days.

- 8) After 24 hours of grouting, tiles shall be cleaned with water and after 7 to 10 days or prior to handing over, tiles shall be washed with mild acid. Care shall be taken that grout does not develop any stain mark.
- 9) All expansion joints shall be carried out right through and finished by sealing with silicon sealant.

**Mode of Measurement & Payment**

Shall be measured and paid Per square Meter ( Smt.)

**Item No.21**

Providing & Laying 18 mm thick Mirror polish granite For flooring , counter , stair-riser , tread , skirting , dedo , Jambs etc. machine cut or chiselled on bed of cement mortar 1:1 pointing with neat cement slurry incl. moulding, Making grooves where it is required etc. comp. as per instruction of engineer in charge.

The relevant specification shall be followed as per It.No.18 , read machine Polished granite stone 18mm thick instead of Kota Stone

The bedding shall be of cement mortar 1:1 as the slope of the floor demands. The granite shall be laid in any pattern as per the design given.

The measurement shall be done in Smt.

**Item No.22a, 22b**

15 or 20 mm Thick Plaster

Providg. 15 to 20 mm. thick Finish / Mala cement plaster in single coat on fair side of brick / concrete walls for interior plastering upto floor four level and finished even and smooth in C.M.1:4.

**Materials:**

Water M-1 The cement mortar of proportion 1:4 shall conform to M-13.

**Workmanship: Scaffolding:**

Wooden ballies, bamboos planks, treatles 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.

**Preparation of back-ground:**

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 roughened by wire brushing if it is not hard and by racking if it is hard. In case of concrete surface, if a chemical retarder has been applied to the form work, The surface shall be roughened by wire brushing and all the resulting dust and loose particles cleaned off and care shall be taken that none of the retarder is left on the surface. Trimming of projections on brick/concrete surface where necessary shall be carried out to get an even surface. Raking of joints in case of masonry where necessary shall be allowed to dry out for sufficient period before carrying out the plaster work.

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.

For external plaster, the plastering operation shall be started from top floor and carried Downwards. For internal plaster, the plastering operations may be

started whenever the building frame and cladding work are ready and the temporary supporting ceiling resting on the wall of the floor have been removed, Ceiling plaster shall be completed before starting plaster to walls.

#### Application of plaster:

The application about 15×15 cms. Shall be first applied horizontally and vertically at not more than 2 metre intervals over the entire surface to serve as gauge. The surface of these gauges shall be truly inplane 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 movement at a time. Finally, the surface shall be finished off true with a trowel or wooden float according as a smooth or a sandy granular texture is required. Excessive trowelling or overworking the float shall be avoided. All corners, arrises, angles and junctions be truly vertical or horizontal as the case may be and shall be carefully finished. Rounding or vertical or horizontal as the case may be and shall be carefully finished. Rounding or chamfering corners, arrises junction etc. shall be carried out with proper templates to the size required. Cement plaster shall be used within half an hour after addition of water. Any mortar or plaster which is partially set shall be rejected and removed forthwith from the site:

In suspending the work at the end of the day, the plaster shall be left out clean to the line both horizontally and vertically. When recommencing the plaster, the edges of the old work shall be scraped clean and wetted with cement putty before plaster is applied to the adjacent area to enable the two to properly joint together. Plastering work shall be closed at the end of the day on the body of the wall and nearer than 15 cm. To any corners or arrises. Horizontal joints in plasterwork shall not also occur on parapet tops and copping as these invariably lead to leakage. No portion of the surface shall be left out initially to be packed up later on.

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

#### Mode of measurement & payment:

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

All plastering shall be measured in square metres unless, otherwise specified length, breadth or height shall be measured correct to a centimeter.

Thickness of the plaster shall be exclusive of the thickness of 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.

This item includes plastering upto floor two level.

The measurement of wall plastering shall be taken between the walls or partition for length and from the top of floor or skirting to ceiling for height. Depth of cover of cornices if any shall be deducted. Soffits of stairs shall be measured as plastering on ceilings, flowing soffits shall be measured separately. For jambs, soffits, sills etc. for openings not exceeding 0.5 sq. mt. Each in area for ends of joints, beams, posts, girders, steps etc. not exceeding 0.5 sq. mt. Each in area and for opening beams exceeding 0.5 sq.mt. and not exceeding 3.0 sq. mt. In each area deductions and additions shall be made in the following manner:

(a) No deductions shall be made for ends joints, beams posts etc. and opening not exceeding 0.5 sq. mt.

Each and no addition shall be made for reveals, jambs, soffits, sills etc. of these opening for finish to plaster around ends of joints, beams, posts etc.

(b) Deduction for opening exceeding 0.5 sq. mt. But not exceeding 3 sq. mt. Each shall be made as follows and no addition shall be made for reveals, jambs, soffits etc. sills etc. of these openings.

(1) When both face of all wall are plastered with same plaster, deduction shall be made for one face only.

(2) When two faces of wall are plastered with different types of plasters or if one faces 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 or reveals is less than that on the other side but no deductions shall be made on the other side. Where width of face shall be made from area of all are equal, deductions of 50% of area of opening on each for shall be made from area of plaster and/or pointing as the case may be.

For opening having doorframes equal to projecting beyond the thickness of wall, full deduction for opening shall be made from each plastered face of the wall.

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

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

#### **Item No.22c**

Providing & fixing 23 cm wide chicken mesh jali with nails & then application of 15 mm plaster on R.C.C. & masonry joints as per dir. of engg. In charge.

In general the work shall be carried out as per the standard specifications of P.W.D. / C.P.W.D. / GWSSB relevant drawings and as per the instructions of Engineer in Charge. The work shall be carried out as per item description.

Material, Workmanship and Fixtures & Fastening etc. :

The chicken wire mesh shall be provided to prevent cracks appearing between junctions of column / beams and walls, 230 mm wide chicken wire mesh fixed with U nails, 150 mm centre to centre before plastering the junction. The plastering of walls and beam/column in one vertical plane should be carried out in one go.

Mode of measurement & payment:

The rates include all materials, labour, tools and plants in satisfactory completion of work as specified above.

The rates shall be for unit of one Sq.mt. for actual work done.

#### **Item No.22d**

Providing and mixing water proofing materials in cement mortar in proportion recommended by the manufacturer. etc. comp. as per instruction of engineer in charge.

#### **Workmanship**

The proportion of materials for the cement concrete shall be mentioned with the specification of that item.

The quantity of water proofing materials to be added and the method of addition shall be as specified by manufacturers .

**Mixing**

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

**Mode of measurement and payment**

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

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

**Item No.23**

Providing 20 mm th. Double coat Sand face / Mala Cement Plaster on Walls upto any Height Above Ground level consisting of 12 mm th. Backing coat of C.M. 1:3 ( 1 cement : 3 Sand ) & 8 mm th. Finishing coat of C.M. 1:1 ( 1 cement : 1 sand ) etc. Complete.

**Materials:**

Water shall conform to M-12 cement mortar shall conform to M-11.

**Workmanship:**

The work shall be carried out in the coats. The backing coat (base coat) shall be 12 mm. Thick in C.M.

1:3 except that the thickness of back shall be 12 mm. Average. Before the first coat hardens it shall be beaten up by edges of wooden tappers and close dents shall be made on the surface.

The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days depending upto the weather conditions. The surface shall not be allowed to dry during this period.

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 work shall be carried out uniformly as per sample approved.

**Curing:**

The curing shall be started overnight after finishing of plaster. The plaster shall be kept for a period of

7 days. During this period, it shall be protected from all damages.

**Mode of measurement and payments:**

The relevant specification of item no. 49 shall be followed except that the sand face plaster on outside above ground level shall be measured under this item.

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

**Item No.24a, 24b, 24c, 25a, 25b, 25c**

**COLOUR AND PAINTING WORKS PUTTY**

Providing and laying water resistant putty on the plastered surface to give a smooth and even finish.

The rate includes scrapping the existing surface and laying 3 coats as per the consultant's instructions. Preferred Brand " Birla White Putty" or equivalent but approved.



This includes necessary scrapping of the wall / ceiling, then applying 1 coat of putty, then giving enough time to dry the putty, the next cycle of the second coat shall only start after proper drying of the first coat is done. Then the levelling shall be checked and the third and final coat shall be done after proper inspection from the client / consultants. If any undulation found after 3<sup>rd</sup> coat of the putty, the consultants may suggest for the another coat , for which no extra payment shall be made to the contractors.

Materials: Water shall conform to M-1 and Asian acrylic Putty and Primer or as equivalent make approved by Engineer In charge.

#### Workmanship

##### Preparation of surface:

The surface shall be thoroughly cleaned of all dust, dirt, mortar dropping and other foreign matter before white wash is to be applied.

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

Oil or grease spots shall be removed by suitable chemical. Smooth surfaces shall be rubbed with wire brushes. All unsound portion of the surface plaster shall be removed to full depth of plaster in rectangular patches and plastered again after raking the masonry joints properly. Such portions shall be wetted and allowed to dry. Any crevices, at any level shall be cleaned and filled with the plaster mortar and cured as above. They shall then be given one coat of white wash.

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

##### Scaffolding:

Wherever scaffolding is necessary, it shall be erected in such a way that as far as possible no part of scaffolding shall rest against the surface to be white or colour washed. A properly secured, strong and well tied suspended platform (Zoola) may be used for white washing. Where ladders are used, pieces of old gunny bags shall be tied at top and bottom to prevent scratches to the floors and walls. For white washing of ceilings, proper stage scaffolding shall be erected where necessary. Also, while painting the ceiling, the floor area shall be covered properly with plastic so that the flooring is not spoiled.

##### Application :

The primer shall be applied with a brush on the clean, dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks. A coat of putty (lapi) shall be applied to the entire surface. Putty shall be used of readymade or brought of the company like Asian as directed by the Engineer-in-charge and Architect. The second coat of primer and putty shall then be applied and it shall thereafter be allowed to dry for at least 48 hours before oil bound distemper or paint is applied.

##### Mode of Measurements and Payment:

The item shall be measured in the unit of Square Meter for Payment.

## DISTEMPER

Distempering (Three Coats) with oil bound washable distemper of approved brand and shade on undecorated wall surfaces to give an even shade, and also includes a priming coat after thoroughly brushing the surface to make the surface free from mortar dropping and other foreign matter. Rates also include preparing the surface even and sand papered smooth.

### Materials:

Oil bound washable distemper and primer shall be of approved brand and manufacture. The distemper shall be of required colour and shade and the same shall conform to I.S. 428-1969.

### Workmanship :

Scaffolding : Where scaffolding is required, it shall be erected in such a way that as far as possible no part of scaffolding shall rest against the surface to be distempered. A properly secured strong and well tied suspended platform (Jools) may be used for distempering. Where ladders are used, pieces of old gunny bags shall be tied at top and bottom to prevent scratches to the walls and floors. For distempering to ceiling, proper stage scaffolding shall be erected where necessary.

### Preparation of surface :

The undecorated surface to be distempered shall be thoroughly brushed off from dust, dirt, grease, mortar dropping and other foreign matter and sand papered smooth. New plaster surface shall be allowed to dry for atleast 2 months before applications of distemper.

All unnecessary nails shall be removed. pitting in plaster shall be made good with plaster of paris mixed

with dry distemper of colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of distemper shall be applied over the patches. The surface shall be allowed to dry thoroughly before the regular coat of distemper is allowed. The surface affected by moulds, moss, fungi algae lichens, efflorescence etc. shall be treated in accordance with I. S. 2395 (Part- I) 1966. Before applying distempering, any unevenness shall be made good by applying putty made of plaster of paris mixed with water on entire surface including filling up the undulation and then sand papering the same after it is dry.

### Priming coat :

A priming coat or distemper prime of approved manufacture and shade shall be applied over the papered surface in case of new work on undecorated surface. If the distemper priming is done after the wall surface dries completely, the distemper primer shall be applied.

Application of Primer shall be done as under :

The primer shall be applied with a brush on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks. It shall be allowed to dry for atleast 48 hours before oil bound distemper or Paint is applied. Oil bound distemper is not recommended to be applied within six months of the completion of wall plaster.

### Preparation of oil bound distemper :

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

### Application of Distemper coat :

For undecorated surfaces, after the primer coat is dried for atleast 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the

distemper, taking care not to rub out the priming coat. All loose particles shall be dusted off after rubbing. Minimum two coats of distemper shall be applied with brushes in horizontal strokes followed immediately by vertical strokes which together shall constitute one coat. The subsequent coats shall be applied after a time interval of at least 24 hours between consecutive coats to permit proper drying of the preceding coat. The finished surface shall be even and uniform without patches, brush marks, distemper drops etc. sufficient quantity of distemper shall be mixed to finish one room at a time. The application of a coat in each room shall be finished in one operation and no work shall be started in any room which cannot be completed on the same day.

15 cm. double bristled distemper brush shall be used. After day's work brushes shall be thoroughly washed in hot water soap solution and hung down to dry. Old brushes which are dirty and caked with distemper shall not be used on the work. Protective measurements : The surfaces of doors, windows, floors, articles of furniture etc. and such other parts of the buildings as are not to be distempered shall be protected from being splashed upon. Such surfaces shall be cleaned of distemper splashes if any.

Mode of measurements & payment :

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

All the work shall be measured net in the decimal system as in place subject to the following limits

unless otherwise stated hereinafter :

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

Area in individual items shall be worked out to the nearest 0.01 sq. m. all work shall be measured in sq. metre. No deductions shall be made for ends of joints, beams, posts etc., and openings, not exceeding

0.5 sq.m. each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings nor for finish around ends of joints, beams, posts etc

## ENAMEL PAINT

Painting Three coats (after priming coat) on new steel & other Metal surfaces with enamel paint of approved brand and shade, brushing, interior to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.

Materials :

The enamel paint shall conform to I.S. 133-1975.

Workmanship :

The surface shall be first scrapped with sand paper and then the foreign matter shall be removed thoroughly. Then a primer coat shall be applied, which shall be allowed to dry for 24 hours. The next day approved shade and quality paint shall be applied. Proper care shall be taken that no foreign matter and brush marks are left on the surface. No air bubbles shall be allowed on the surface.

Mode of measurements & payment :

The relevant specifications of item shall be followed, for mode of measurements and payments. The rate excludes cost of priming coat.

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

## PLASTIC PAINT

Providing & applying three coats (first two coats are with brush and final coat is with roller) of plastic emulsion paint of desired shade, of approved make, brand

and manufacture, on any surfaces, at all heights, to give an even shade, including thoroughly brushing the surface free from mortar droppings and other foreign matter and sand papered smooth. The paint shall be applied after applying a coat of primer and putty.

**Materials :**

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

**Workmanship :**

Scaffolding : The relevant specifications of item shall be followed.

Preparation of Surface : The relevant specifications of item No. 86 shall be followed.

Preparation of Mix : This shall be done as per manufacturers 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.

**Applications :**

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

The paint shall be laid on evenly and smoothly by means of crossing and laying off the crossing and laying off 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 a 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.

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 preceding coat has become sufficiently hard to resist marking by brush being used. 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.

**Precautions :**

(a) Old brushes if they are to be used with emulsion paints, shall be completely dried of turpentine 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 putties 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.

**Mode of measurements & payment :**

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

## WHITE WASHING

White washing with lime on any surfaces (3 coats with brush) to give an even shade, including thoroughly brooming the surface to remove all dirt, dust, mortar drops and other foreign matter etc. complete.

### Materials :

The calcarcole shall be made from glue and boiling water by mixing 1 kg. Mixture shall be suitably tinted where required for use under coloured distemper if required.

Glue shall conform to I.S. 852-1969 (Specifications for animal glue).

Lime used shall be freshly burnt class 'C' Lime (fat lime) and white in colour conforming to I.S. 712-

1973. Water shall conform to M-1 Best quality of gum shall be used in the preparation of white wash. Ultramarine blue or Indigo: This shall conform to I.S. 55-1970 for points and shall be used for preparation of white wash. Pigments: mineral colours, not affected by lime shall be used in preparing colour wash.

### Workmanship :

#### Preparation of white wash solution :

Surface already white or colour. The fat lime shall be slaked at site and shall be mixed and stirred with about five litres of water for 1 kg. of unslaked lime to make a thin cream. This shall be allowed to stand for a period of 24 hours and then shall be screened through a clean coarse cloth, 4 kg. of gum dissolved in hot water shall be added to each cubic metre of lime cream. Small quantity of ultramarine blue (Upto 3 gms. Per kg. of lime) shall also be added to the last two coats of white wash solution and the whole solution shall be stirred thoroughly before use.

#### Preparation of surface :

The surface shall be thoroughly cleaned of all dust, dirt, mortar cropping and other foreign matters before white wash is to be applied.

The surface spoiled by smoke soot shall be scraped with steel wire brushes or steel scrappers or shall be rubbed with over burnt surkhi or brick bats. The surface shall be then broomed to remove all dust, dirt and shall be washed with clean water. Oil or grease spots shall be removed by suitable chemical and smooth surface shall be rubbed wire brushes.

All unsound portion of the surface plaster shall be removed to full depth of plaster in rectangular

patches and plastered again after raking the masonry joints properly. Such portion shall be wetted and allowed to dry. They shall then be given one coat of white wash.

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

#### Scaffolding :

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

#### Application of white wash :

On the surface so prepared the white wash shall be applied with 'Moon' brush. The first stroke of the brush shall be from top downwards, another from bottom upwards over the first stroke and similarly one stroke from the right another from the left, over the first stroke brush before the it dries. This will form one coat. Each coat shall be allowed to dry before next coat is applied. Number coats as specified in item shall be applied. It shall present smooth and uniform finish free from brush marks and it should not come off easily when rubbed finger.

Splashing and dropping if any on the doors and windows, ventilators etc. shall be removed and the surface cleaned.

Priming and Alkali resistant treatments, scrapping of surface washing etc. surface spoiled by smoke

soot removed of oil and grease spots treatment for infection with effloresces moulds moss, funji and kitchen and patch repairs to plaster wherever done shall not be paid extra.

Mode of measurements & payment :

All the work shall be measured in the decimal system as under : (a) Dimensions shall be measured to the nearest 0.01 M.

(b) Area in individual items shall be worked out to the nearest 0.01 Sq. M.

All the work shall be measured in sq. mt. Deductions for jambs, soffits, stills etc. for opening not exceeding 0.5 sq. mt. each in area for ends of joints, posts, beams, girders, steps etc. not exceeding 0.5 sq. mt. each in area and for opening exceeding 0.3 sq. mt. and not exceeding 3.0 sq. mt. each in area deductions and additions shall be made as under :

No deductions shall be made for ends of joints beams, posts etc. and openings not exceeding 0.5 sq. mt. each. No addition shall be made for reveals, jambs, soffits, sills etc. of these openings nor for finish around ends of joints, beams, posts etc. Deductions for openings exceeding 0.5 sq. mt. but not exceeding 3 sq. mt. each shall be made as follows and no addition shall be made for reveals, jambs, soffits etc. of these openings :

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

(b) When each face of wall is provided with different finish deduction shall be made for that side of frame for door, windows etc. on which width of reveals is less than that of the other side, where width of reveals on both faces of wall are equal, deduction of 50% of area of opening on each face shall be made from total area of finish.

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

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

No deduction shall be made for attachment such as casing, conducts, pipe, electric wiring and the like. Corrugated surfaces shall be measured flat as fixed and not girth. The quantities so measured shall be increased by the following percentage and the resultant shall be included with the general areas.

(a) Corrugated steel sheets 4% (b) Corrugated A. C. Sheets 20%

(c) Semi corrugated A. C. Sheets 10%

(d) Nainital pattern roof (Plain sheeting with rolls) 10% (e) Nainital pattern roof (with corrugated sheets) 25%

Cornices and other wall features, when they are not picked out in a different finish/colour shall be girthed and included in the general area.

The rate shall include the cost of all materials, labour, scaffolding, protective measures etc. involved in all the operations described above.

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

## TEXTURE PAINT

### Material

Acrylic based Exterior Texture in approved finish and quality laid of 2 mm. thick texture material in swirl / rainfall / vertical scratch / horizontal scratch finish of approved brand, quality and manufacturer

Primer: The primer to be used for the painting with acrylic emulsion on cement concrete surfaces,

Plastered surfaces, A.C. sheets, timber and metal surfaces, if necessary, shall be of approved base and as per Recommendations of the manufacturers.

### Workmanship

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

All materials not in actual use shall be kept properly protected, lids of 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.

The surface shall be thoroughly cleaned and dusted. All rust, dirt and grease shall be thoroughly removed before textured work started. First coat of Exterior wall primer to be applied after thoroughly cleaning the plastered wall surface and it should be free from any loose paint, dust or grease etc. And growth of fungus, algae or moss should be removed by wire brushing and water. And should also fill cracks with Standard Crack Filler Paste. No texture work on exterior or other exposed part to the work shall be carried out in wet, damp or otherwise unfavorable weather and all the surfaces shall be thoroughly dry before textured work is started.

### Scaffolding:

All scaffolding, hoisting arrangements and ladders, etc. required for facilitating of texture work shall be provided and removed on completion work by Contractor, at his own expense. The scaffolding, hoisting arrangement, ladders etc. shall be strong enough to withstand all live, dead and impact loads expected to act and shall be subject to the approval of the Architect and Engineer-in-charge. However, Contractor shall be solely responsible for the safety of the scaffolding, hoisting arrangement, ladders, work and workmen, etc.

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

### Application of Textured work:

First coat of Exterior wall primer to be applied after thoroughly cleaning the plastered wall surface and it should be free from any loose paint, dust or grease etc. And growth of fungus, algae or moss should be removed by wire brushing and water. And should also fill cracks with Standard Crack Filler Paste.

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 lying 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 lying off will constitute one coat.

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

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.

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

The texture material 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 enplane 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 movement at a time. Finally, the surface shall be finished off true with a trowel or wooden float according as a smooth or a sandy granular texture is required. Excessive toweling or overworking the float shall be avoided. All corners, arises, angles and junctions etc. shall be carried out with proper templates to the size required.

The Texture 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 mark. The lamps shall be brushed out. Texture white cement paint shall not be applied on-surface already treated with white wash, color wash, distemper dry or oil bound varnishes, paint etc.

#### 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. Preparation of background: The surface shall be cleaned of all mortar dropping, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface shall be roughened by wire brushing. It is not hard and by racking if it is hard. In case of concrete surface, if chemical retarder has been applied to the form work.

#### Mode of Measurement & Payment

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



## ACRYLIC PAINT

Providing and applying 3 coats of water based 100 % acrylic emulsion paint, waterproof and weatherproof, external quality paint Apex or equivalent but approved of desired shade , after thoroughly brushing the surface to remove all dirt and dust and all foreign matter and mortar droppings and sand papered smooth as directed upto the utmost satisfaction of the consultants.

The surface on which the painting works is to be done shall be scrapped with sand paper and all the foreign matter and dust etc. shall be removed thoroughly so as to give a smooth finish. Then a coat of primer shall be applied and kept for 24 hours for drying.

Paint of any approved pattern and shade shall be selected and shall be executed.

### Mode of Measurement& Payment

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

### Item No.24d

#### P./L. METALIC HERITAGE SURFACE TEXTURE

Providing and fixing of HERITAGE textured homogeneous wall finishing system from BAKELITE HYLAM LTD or equivalent make consisting of a two component system of (25 kgs per Pack) made of 92% silica particles coated with fade resistant pigments, 100% acrylic polymer bonding agent (5kgs per pack) with the applied thickness of the coating being between 0.8mm-1.2mm to be applied on acured, smooth level plaster without keying, as per the shades/combinations approved, as per the manufacturer directions, for usages, to be applied by an approved applicator of the manufacturer, as per the directions / supervision of the engineers in charge, all complete.

### Workmanship

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

All materials not in actual use shall be kept properly protected, lids of 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.

The surface shall be thoroughly cleaned and dusted. All rust, dirt and grease shall be thoroughly removed before textured work started. First coat of Exterior wall primer to be applied after thoroughly cleaning the plastered wall surface and it should be free from any loose paint, dust or grease etc. And growth of fungus, algae or moss should be removed by wire brushing and water. And should also fill cracks with Standard Crack Filler Paste. No texture work on exterior or other exposed part to the work shall be carried out in wet, damp or otherwise unfavorable weather and all the surfaces shall be thoroughly dry before textured work is started.

### Scaffolding:

All scaffolding, hoisting arrangements and ladders, etc. required for facilitating of texture work shall be provided and removed on completion work by Contractor, at

his own expense. The scaffolding, hoisting arrangement, ladders etc. shall be strong enough to withstand all live, dead and impact loads expected to act and shall be subject to the approval of the Architect and Engineer-in-charge. However, Contractor shall be solely responsible for the safety of the scaffolding, hoisting arrangement, ladders, work and workmen, etc.

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

#### Mode of Measurement & Payment

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

#### Item No.26a, 26b , 26c

Providing & Laying & Jointing glazed stoneware pipes incl. excavation up to 2.0 mt.,refilling, trasporting the pipe to work site, unloading, lowering in trenches, laying and jointing the pipes in c.m. 1:1 incl. all jointing materials such as cement, sand, hemp, bitumen as dire. testing the pipe line to a head of 1.5 mt. and hydraulic test as dire incl. watering trenches, spreading , and carting away of surplus earth within 100 mt.lead as dire. etc. comp.

100 mm. dia., 150mm Dia, 230 mm Dia

#### Materials :

(1) Water shall conform to M-1, (2) Cement mortar of proportion 1 : 1 shall conform to M-11 (3) 100 mm. dia. glazed stoneware pipe shall conform to M-71.

#### Workmanship :

The trenches for stoneware pipe drains shall be carried out as per relevant specifications for stoneware pipes of 100 mm. dia.

#### Laying :

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

#### Jointing :

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

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

The mortar shall be mixed as necessary for immediate use.

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

The mortar shall be cured to 10 days.

Testing of Joints : The pipe line shall be tested as directed.

If any leakage is visible, the defective part of the work shall be made good at no extra cost.

A slight amount of sweating which is uniform may be overlooked, but excessive sweating from a particular pipe or joints shall be watched for and taken as indicating a defect to be made good.

Mode of measurements & payment :

Pounding or bottaning of the trenches bed to fit the lower part of the pipe and 'Grips' left to take socket, collars etc. are included in the rate of laying the pipes.

The measurements shall be net without any allowance for cutting and waste. The length of bends, junctions and other connections shall be included in the total length of the drain pipes. Nothing extra shall be paid for the same. The rate includes necessary excavation refilling trenches etc. complete.

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

#### **Item No.27**

Constructing brick masonry chamber for under ground C.I. Inspection chamber and bends with bricks having crushing strength not less than 35 Kg. Cm<sup>2</sup> in C.M. 1:5 C.I. cover with frame (Light duty) 455mm x 610 mm internal dimensions total weight of cover with frame to be not less than 38 Kg. (Wt. of cover 23Kg.) 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 15 mm thick with cement mortar 1:3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete.(i) Inside dimensions 455 mm x 610 mm and up to 850 mm deep

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 shaft shall conform to M-14. M.S. bar shall conform to M-18.

Workmanship :

C.I. inspection chamber with provision of C.I. bends of specified size with bolts, nuts and left washers for underground drain shall be enclosed in masonry chamber which shall be constructed as under :

The excavation shall be done true to dimensions and levels shown on the plans or as directed.

Bed concrete shall be of 15 cms. thick C.C. 1 : 5 : 10 (1 cement : 5 coarse sand : 10 graded brick bat aggregates). The projection of bed concrete beyond the masonry walls shall be 7.5 cms.

Mode of measurements & payment :

The earth work in excavation providing and laying C.I. inspection chamber and bends shall be measured and paid for separately.

The rate shall be for a unit of one number.

#### **Item No.28**

Constructing Manhole with R.C.C. top slab in 1:2:4 mix (1-cement: 2-coarse sand:4-graded stone aggregate 20 mm nominal size) foundation concrete 1:3:6 mix (1-cement:3-coarse sand:6-Brick bats 40+50mm size) inside plastering 15mm thick with Cement Mortar 1:5 (1-Cement:5-coarse sand) finished with a floating coat of neat cement and making channels in cement concrete 1:2:4 mix (1-Cement:2 -Coarse sand:4-stone aggregate 20 mm nominal size) finished smooth complete including curing and festing (i) Inside size 900mm x 1200mm and up to 1.5M. deep including C.I. cover with frame size 560 mm diameter total weight of cover and frame to be not less than 128kgs. (Wt. of cover 64Kg. and Wt. of frame 64Kg.) (A) With 230 mm thick walls of brick masonry using brick having crushing strength not less than 35Kg./Sq.cm. in Cement Mortar 1:5 (1-Cement: 5-Coarse sand) (2)B type depth up to 1.50 Metre

1. A type depth 0.90 metre
2. B type depth 150 metre
3. C type depth 2.25 metre
4. D type depth 315 metre

Materials :

Water shall conform to M-1. Cement shall conform to M-6. Burnt bricks shall conform to M-15. Brick bats of 40 to 50 mm. size shall conform to M-14. Stone coarse aggregate of 20 mm. nominal size shall conform to M-12. Grit shall conform to M-8. Cement mortar of specified proportion shall conform to M-

11. The cast iron manhole cover of 560 mm. dia. with frame shall conform to I.S.

1726-1966. Workmanship :

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

Bed concrete :

The manhole shall be built on a bed of cement concrete 1 : 3 : 6 (1 cement : 3 coarse sand : 6 brick bats) (40 to 20 mm. nominal size) to the thickness of the bed concrete shall be 15 cms. for manhole upto 1 M. depth and 20 cms. for manholes over metre and upto 2 metres. depth and 30 cms. for manholes of greater depth.

Projection of bed concrete beyond the masonry wall shall be 15 cms.

Walls :

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

Plaster :

The inside of walls shall be plastered 15 mm. thick with C.M. 1 : 5 (1 cement : 5 coarse sand) and finished with floating coat of neat cement. All angles shall be rounded to 7.50 cms. radius and all rendered internal surfaces shall have impervious finish obtained by using a steel trowel. The external joints of masonry shall be finished smooth.

Channels & Benching :

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

The channel and benching shall be done C.C. 1 : 2 : 4 (1 cement : 2 coarse sand : 4 graded stone aggregate

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

The cover slab of R.C.C. 1 : 2 : 4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal

size) 15 cms. thick reinforced with 10 mm. bars at 15 cms. C/C bothways, surface and edges finished fair. Full bearing equal to the width of wall shall be given to the slab on all sides. The frame of manhole cover shall be embedded firmly in R.C.C. Slab so that the top of the frame remains flush with the top of R.C.C. slab.

Testing :

Manhole shall be tested by filling with water to a depth not exceeding 1.2 M. as directed. After completion of work, manhole covers shall be sealed by means of thick grease. Mode of measurements & payments :

The depth of manhole shall be distance between the top of the manhole cover and the invert level of

the main drain. The rate includes all labour, materials, tools and plant etc. required for satisfactory completion of this item as directed above.

The rate shall be for a unit of one number.

**Item No.29**

Providing and fixing white vitreous china flat back or wall corner type lipped front urinal basin of 340x280x470 mm sizes respectively with standard flush pipe, Waster Pipe, Waste Coupling, PVC Connection and G.I clamps complete, including painting of fittings and brackets, cutting and making good the walls and floors wherever required : Cera Model No. S4020103 or Equivalent

**1.0 Materials :**

The squatting plate pattern, white glazed earthenware urinal shall confirm to I.S. 771(Part-1)-1979 (Reaffirmed 2017) or its relevant & latest edition. It shall be of best Indian Make. The urinal must be of first quality, free from any defects, cracks etc .

Urinal basins shall be of flat back or corner wall type lipped in front. These shall be of white vitreous china conforming to IS 2556(Part-6)-1995 (Reaffirmed 2018). The urinals shall of one-piece construction. Each urinal shall be provided with not less than two fixing holes of minimum dia.

6.5 mm on each side . Each urinal shall have an integral flushing rim of suitable type and inlet or supply horn for connecting the flush pipe. The flushing rim and inlet shall be of the self- draining type. It shall have a weep hole at the flushing inlet of the urinals.

**2.1 Workmanship:**

2.2 The squatting plate urinal shall be fixed as directed.

2.3 The top edge of the squatting plate shall be fixed by using S.S. screw. It shall be at a height of 65cm from the standing level to the top of the leaf of the urinal unless otherwise directed by engineer in charge. Each urinal shall be connected to 32mm dia . waste pipe which shall discharge into the channel or a floor trap. The connection between the urinal and flush or waste pipe shall be made by means of putty or white lead mixed with chopped hemp. The C.P. brass trap and union shall be connected to 32mm dia. solid UPVC waste pipe which shall be suitably laid towards the wall and which shall discharge into concerned NT as shown in drawings or as directed by EIC.

**3.0 Mode of measurements and payment :**

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

The rate also includes waste pipe upto NT, 32mm dia. brass coupling & connection pipe etc.

The rate shall be for a unit of one number

**Item No.29b. 29c**

Providing and Fixing of C.P. Brass BIB Cock of 15 mm Dia of Jaquar make florentine series model no. 5047n or equivalent make with all necessary fittings. as approved by Engineer - in - charge.,

Providing and fixing brass screw down Angle stop tap.(A) 15mm dia. Of Jaquar make florentine series modelno. 5053n or equivalent make with all necessary fittings. as approved by Engineer - in - charge.,

**1.1 Materials**

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

**2.1 Workmanship**

2.2 The screw down bib tap 15 mm. dia. as specified above shall be fixed as directed. The threaded portion shall be smeared with white or red lead and around with as few

turns of Teflon tape round the screwed end of the pipe. The bib cock shall be then screwed and fixed to water tight position.

3.1 Mode of measurements and payment

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

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

#### **Item No.29d**

Providing and fixing 100 mm. dia. C. P. brass shower rose with 15 mm. or 20 mm. inlet.

Materials :

100 mm. dia. C. P. brass shower rose shall conform to I.S. : 2556-1972 part XI and of best quality and make as approved by the Engineer-in-charge. The inlet of shower rose shall be 15 mm. dia. or 20 mm. dia. as directed.

Workmanship :

The C. P. brass shower rose shall be fixed as directed 15 mm. dia. or 20 mm. dia. G. I. inlet pipe as the case may be. It shall be having an openable screen for maintenance purpose.

Mode of measurements & payment :

The rate includes 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.30**

Providg. & laying S.W. Gully trap with C.I. girting brick masonry chamber & water tight C.I. cover with frame of 300 mm x 300 mm size ( inside) with standard weight. square mouth trap size 150 x100 mm P trap

Materials :

(1) Water shall conform to M-1. (2) Cement mortar of proportion 1 : 5 shall conform to to M-11. (3) Burnt brick shall conform to M-15. (4) The S.W. Gully trap of 100 mm. x 100 mm. size shall conform to M-70.

Workmanship :

Excavation for gully trap shall be done true to dimensions and levels as indicated on plans or as directed. The excavation work shall generally be done as per relevant specification of item 4.0.0 of earth work.

Fixing :

The gully trap shall be fixed over cement concrete 1 : 5 : 10 (1 cement : 5 sand : 10 graded brick bats aggregate 40 mm. nominal size) foundation, 650 mm. square and 100 mm. thick.

The depth of top of concrete below the ground level shall be 675 mm. The jointing of gully outlet to the branch drain shall be done similar to jointing of S. W. pipe.

Brick masonry chamber :

After fixing and testing gully and branch drain, a brick masonry 300 x 300 mm. inside with bricks in C. M. 1 : 5 (1 cement : 5 sand) shall be built with a 100 mm. brick work round the gully trap from the top of bed concrete upto ground

level. The space between the chamber walls and the trap shall be filled with cement concrete 1 : 5 : 10. The upper portion of the chamber i.e. above the top level of the trap shall be plastered inside with cement mortar 1 : 3 (1 cement : 3 sand) finished with floating coat of neat cement. The corners and bottom of the chamber shall be rounded off so as to slope towards the grating.

C.I. cover with frame 300 mm. x 300 mm. (inside) size shall than be fixed on the top of the brick masonry with C. C. 1 : 2 : 4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) 40 mm. thick and rendered smooth. The finished top of the cover shall be left about 40 mm. above the adjoining ground level so as to exclude the surface water from entering the gully trap.

Mode of measurements & payment :

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

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

### **Item No.31**

Providing erecting and fixing double coated ISI water tank of required capacity each with all necessary fittings and connection etc. complete on terrace

#### **1.0 MATERIAL**

##### **1.1.PVC Water tank**

PVC double coated Water tank of specified capacity and of approved in liters of approved make and quality Net capacity shall be net volume of water stored between the lowest level of overflow and lowest specified level.

##### **1.2. Nipple**

Galvanize pipe nipple shall be of approved make and of best quality

##### **1.3. Ball valve**

Ball valve shall be of approved make and of best quality

##### **1.4. Connections**

Connections shall be of approved make and of best quality

#### **2.0 WORKMAN SHIP**

2.1. Tank shall be approved quality and standard make. 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 odour. It does not have any toxic effect and it does not contaminate the water. Thereby making it unpotable.

2.2. 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.

#### **3.0 MODE OF MEASUREMENT and PAYMENT**

3.1. The unit rate PVC tank shall include the cost of all materials, tools and plant required for lifting to required height with all lead and lift, placing and fixing in position, all required specials and jointing adhesive compound, finishing as per direction of the Engineer-in-charge, and all other incidental expenses for producing PVC water tank work of specified diameter 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.

3.2. The PVC water tank work shall be measured for its number limiting to specified capacity to those specified on plan or as directed. The rate shall be for a unit of one number.

3.3. The payment will be made on litter basis of the finished work.

### **Item No.32**

Extra rate over item of excavation of earth for excavation of asphalt pavement/RCC of thickness up to 0.20 meter including demolishing the asphalt carpet, metal, soiling / cutting Reinforcement etc.comp. with stacking the material as directed.-up to 0.20 meter thickness.

1. This work shall consist of excavation, removal and satisfactory disposal of all materials necessary for the construction of widening carriageway in accordance with requirements of these specifications and the lines, grades and cross sections shown in the drawings or as indicated by the Engineer.
2. After the site has been cleared the limits of excavation box cutting the road surface shall be set out true to lines, curves, slopes, grades and sections as shown on the drawings or as directed by the Engineer.
3. Box cutting shall be carried out in conformity with the directions laid here in under and in a manner approved by the Engineer. The work shall be so done that the suitable materials available from box cutting excavation are satisfactorily utilized as directed.
4. The contractor shall not excavate outside the limits of box cutting. Subject to the permitted tolerances, any excess depth width excavated beyond the specified levels dimensions on the drawings shall be made good at the cost of the contractor with suitable material of characteristics similar to that removed and compacted as directed.
5. Cutting shall be done in proper grade and camber as per measurements given. Care must be taken that all slopes are evenly and truly dressed. Cutting shall be done to the exact depth required and shall be as per formation level in proper grade and the camber. If extra depth of cutting is done due to negligence of contractor the same shall be refilled with approved quality of materials duly consolidated to the satisfaction of the Engineer-in-charge (without extra cost).
6. The bottom level of box cutting i.e. sub grade shall be watered and well compacted with vibratory roller at OMC to the desired density as directed by the Engineer in charge. Rolling and compaction shall be deemed to be incidental to the work and no extra cost shall be paid for compaction of box cutting base surface.
7. The stuff received from the cutting shall be used for filling and correcting side slopes of bank and earthwork for embankment as directed by the Engineer in charge with all lead and lift.
8. The measurement of box cutting shall be taken on level basis and level shall be taken at 30 mt. interval. Volume shall be computed in cubic meters by average area method.
9. The payment shall be made on Sq.mt. basis.
10. The rate includes cost of all labour, machineries required, cost of carting and spreading the cutting stuff with all lead and lift and leveling the dumping ground embankment, rolling and consolidation of subgrade level etc. complete.

### **Item No.33**

P/F PVC / C.I. (span) nahni trap and all of the following nominal dia of self cleaning design with C.I.Screw down or hinged greeting inclusive cost of cutting and making good the walls and floors for drain 75 mm dia. etc. comp..

Materials :

The PVC Nahni trap shall be conform to M-69. The C.I. hinged of screwed down cover shall be of best quality.

Workmanship :



The Nahni trap with 100 mm. dia. inlet and 50 mm. dia. outlet shall be fixed as per drawings or as directed.

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.

Mode of measurements & payment :

The rate includes cost of all labour, materials, tools and plants etc. required for satisfactory completion of this item including lead jointing and testing.

The payment of seat and cover shall be made separately. The rate shall be for a unit of one number.

#### **Item No.34a, 34b**

Providing laying and jointing in true line and level 15mm dia. U.P.V.C. Pipe ( SCH- 40) for cold water including fittings 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 concealed as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.

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 ) 15 mm dia.
- ( b ) 20 mm dia.
- ( c ) 25 mm dia.
- ( c ) 32 mm dia.
- ( d ) 40 mm dia.
- ( e ) 50 mm dia.

#### **1.0 Materials :**

1.1 The UPVC & CPVC Pipe of specified dia. of Astral, Prince or equivalent make shall be of tested quality.

#### **2.0 Workmanship :**

2.1 The Pipe shall be fully cleared of all foreign matter before fixing. The jointing shall be done leak proof.

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

3.1 The rate includes all labor, materials, tools and plant etc. required for satisfactory completion of this item.

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

#### **Item No.35**

Providg. And fixing to wall ,ceiling and floor 10.00 kg. F/Sq.Cm2 working pressure polythelene pipes of the following outside diameter, low, density, complete with special flange compression type fittings, wall clips etc. making good wall ceiling and floor.

75 & 110 mm diameter

Materials : P.V.C. pipe of 75 & 110 mm. diameter. Workmanship :

The G.I. pipe of 30 cms. fixed as rain water pipe as directed. The pipe shall be fixed about ¼ dia. below

the floor level so as to make approach of water easy. The inlet of pipe shall be rounded off for easy entry of rain water pipe. The pipe shall be fixed in C.M. 1 : 3.

Mode of measurements & payment :

The rate includes of all labour and materials required for satisfactory completion of this item. The rate shall be for a unit of one Rmt.

**Item No.36**

Providing and fixing water closet squatting Pan ( Indian type W.C. Pan) size 580mm (A)VitreousChina. (I)Long pattern = White colour with Trap and Pair of Foot Rest

Materials : The 100 mm. size 'P' or 'S' trap for water closet shall conform to M.62  
Cement mortar shall conform to M.11

Workmanship : Workmanship 'P' or 'S' trap shall be fixed with pan and cast iron pipe with C.M. 1 : 1.

The pan shall be provided with a 100 mm. 'P' or 'S' trap as specified in the item with an approximately 50 mm. Seal. The joint between the pan and the trap shall be made peak-proof with cement 1 : 1 (1 cement : 1 fine sand).

Mode of measurements & payment :

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

The rate shall be for a unit of one number.

**Item No.37a**

Providing and fixing white vitreous china extended wall mounting water closet of Cera Make S1043101 Carat Model Or Equivalent Model With EWC Soft Close Seat Cover, Chair Bracket, nuts, bolts and gasket etc complete..

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

Workmanship

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

The flushing rim and the inlet shall be of the self-draining type and weep hole shall be provided at the flushing inlet of the wall mounted water closet.

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

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

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

Each WC set shall be provided with approved quality of seat , rubber buffers and chromium-plated hinges .

Seat shall be so fixed that it remains absolutely stationary in vertical position without falling down on the WC .

Approved PVC Flush Tank Shall Be Fixing and Jointing with Proper Connection to WC Pan with all Necessary Fittings as approved by engineer in charge.

Plastic Seat and Covers for Water Closet The seat and cover shall be of thermosetting or thermoplastic conforming to IS 2548 (Part- 1)-1996 (Reaffirmed 2017) or of thermoplastic confirming to IS 2548 (Part-2)-1996 (Reaffirmed 2017) as specified .

Unless otherwise specified these shall be of closed pattern.

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

Thermo plastic materials used may be of Polystyrene conforming to type 2 or 3 of IS 2267-1995 (Reaffirmed 2020) or of polypropylene , Appendix A of IS 2548-1996 (Reaffirmed 2017) . In public buildings where rough and heavy use of seats and covers are common , plastic seats shall be moulded out of thermosetting materials, phenolic or urea formaldehyde only and the underside of the seat shall be flat with solid moulding .

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

The cover shall be fitted with the same number of buffers as provided for the seat.

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

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

**Mode of measurements and payment:-**

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

The rate includes cost of all labour for fixing pans and seat and cover, inlet outlet connection for flushing etc.

Complete including testing the same of a completely commissioned w .c.

The rate shall be for a unit of one number.

**Item No.37b**  
**FLUSH COCK**

Providing and fixing chromium plated brass half turn flush cock of approved quality including fixing in pipe line etc. complete. (I) 20 mm. dia. (II) 25 mm. dia. (III) 32 mm. dia.

Materials :

Chromium plated brass half turn flush cock shall conform to M-67.

Workmanship : The half turn flush cock of specified diameter shall be fixed as directed. The flush cock shall be fixed in G. I. pipe line with necessary fittings. The joints shall be made leak proof by using spun yarn and white zink.

Mode of measurements & payment :

The rate includes cost of all materials and labour required for satisfactory completion of this item including fittings.

The rate shall be for a unit of one number.

**Item No.37c**

Providing and fixing Health Faucet of Jaquar make model no. 573 or equivalent make as approved by engg. In charge with flexible tube upto 1 metre long etc. complete.

**Materials :**

As Approved by EIC or Architect

**Workmanship :** The Health Faucet with flexible tube upto 1 metre long with S shall be fixed as directed.

**Mode of measurements & payment :**

The rate includes cost of all materials and labour required for satisfactory completion of this item including fittings.

The rate shall be for a unit of one number.

**Item No.38a**

Providing and fixing 24"x18"x8" Carylil Elegance or Equivalent Make of Single Bowl Sink S.S. Matt Finish With Waste Coupling, Waste Pipe, etc. cutting and making good the walls wherever required.

Stainless steel (304 grade) fixing shall be as per I.S. code 13983-1994 (Reaffirmed 2019) or its relevant & latest editions.

2 Sink shall be made of one piece and joints less and of matt finish.

3 The size of sink shall be 24"x18"x8" .

4 Stainless steel coupling of standard make and design shall be fixed to sink. The minimum internal dimension when measured on the bowl centre lines across the top of the bowl.

5 Steel sink shall be fixed as per instruction in C.M. 1 :3

6 The rate shall be for a unit of one number of completed item, which includes cost of labour, material tools and plant and other equipment required for satisfactory completion of item. The rates are also inclusive of P&F 32mm dia. C. P. brass waste coupling and 32mm dia. Rigid PVC waste pipe up to N.T.

7 It shall be maintained free of any spots/scratches when completely handed over to the beneficiaries -if need be they shall be replaced at no extra cost if directed for.

8 The rate shall be of unit of one number basis.

**Item No.38b**

Providing and fixing Under counter Wash basine including 15 mm C.P. Brass Pillar tap, 32 mm C.P. Brass Waste of Standard make, Cutting & Making good the wall / granite Wherever Required in White Color : Model S2030101 of Cera Clair Series or Equivalent make Wash basine of size : 520x450 mm.

**Materials :**

The white glazed earthenware wash basin shall be 520 cm. x 450 mm of 1st quality and make as approved by the Engineer-in-charge. The wash basin shall conform to M-59.

**Workmanship :**

The wash basin shall be fixed on the wall as and where directed. The wash basin shall be Fixed in Granite Counter after Making Hole where it is required.

**Mode of measurements & payment :**

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

The rate shall be for a unit of one number.

**Item No.39****MIRROR**

Providg. & fixing 600mm x 450 mm Bevelled edge mirror of superior glass mounted of .6 mm th. A.C. sheet or plywood sheet and fixed to wooden pluge with C.P. brass screws and washers

Providing and fixing mirror of superior glass (of approved quality) and of required shape and size with plastic moulded frame of approved make and shade with 6 mm thick hard board backing : Rectangular shape 1500x450 mm

**Materials :**

The 600 x 450 mm. size mirror shall be of superior glass with edge rounded off or bevelled 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 plywood sheet shall be of commercial grade. Workmanship : The mirror of 500 mm. x 450 mm. size mounted 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.

**Mode of measurements & payment :**

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.40**

Providg. & fixing C.P..Brass towel rail complete with C.P. brass brackets fixed to wooden plugs with C.P. Brass screws.(600 mmx 20 mm size)

**1.1 Materials**

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

**2.1 Workmanship**

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

**3.1 Mode of measurement and payment**

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

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

**Item No.41, 42**

Providing and fixing ball valve (brass) of approved quality, High or low pressure, with plastic floats complete :

(A) 15 mm dia
(B) 20 mm dia
(C) 25 mm dia
40 mm dia
50 mm dia

Providing and fixing Full Way valve (HEX) with wheel of approved quality : :

15 mm dia
20 mm dia
25 mm dia
32 mm dia
40 mm dia
50 mm dia

Materials :

The Ball Valve and full way wheel valve of specified dia. shall conform best quality

Workmanship :

The Ball Valve and full way wheel valve shall be fully cleared of all foreign matter before fixing. The fixing of valve shall be done by means of bolts nuts and 3 mm. rubber insertions with flanges of spigot and socketed tail pieces, drilled to the same specification as in case of socket and spigot and with flanges in case of flanged pipes. The jointing shall be done leak proof.

Mode of measurements & payment :

The rate includes all labour, materials, tools and plant etc. required for satisfactory Completion of this item.

The rate shall be for a unit of one number.

#### **Item No.43**

##### **PILLAR TAP**

Providing and Fixing of C.P.Brass Pillar Cock of 15 mm Dia of Jaquar make model no. 5011n or equivalent make with all necessary fittings. as approved by Engineer - in - charge.,

Workmanship :

The C.P. Brass pillar tap of specified dia. shall be fixed as directed with required washer of selected leather or rubber asbestos composition or of plastic as directed. The cock shall fixed with pipe line with white zink end spun yarn to make joint water right. the work shall be carried out in best workman like manner.

Mode of measurements & payment :

The rate includes cost of all labour, materials tolls and plant etc. required for satisfactory completion of this item.

The rate shall be for a unit of one number.

#### **Item No.44a**

Providing and laying integral cement based water proofing treatment including preparation of surface as required for treatment of roofs, balconies, terraces etc consisting of following operations:

- (a) Applying a slurry coat of neat cement using 2.75 kg/sqm of cement admixed with water proofing compound conforming to IS. 2645 and approved by Engineer-in-charge over the RCC slab including adjoining walls upto 300 mm height including cleaning the surface before treatment.
- (b) Laying brick bats with mortar using broken bricks/brick bats 25 mm to 115 mm size with 50% of cement mortar 1:5 (1 cement : 5 coarse sand) admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge over 20 mm thick layer of cement mortar of mix 1:5 (1 cement :5 coarse sand ) admixed with water

proofing compound conforming to IS : 2645 and approved by Engineer-in-charge to required slope and treating similarly the adjoining walls upto 300 mm height including rounding of junctions of walls and slabs.

- (c) After two days of proper curing applying a second coat of cement slurry using 2.75 kg/sqm of cement admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge.
- (d) Finishing the surface with 20 mm thick jointless cement mortar of mix 1:4 (1 cement :4 coarse sand) admixed with water proofing compound conforming to IS : 2645 and approved by Engineer-in-charge
- (e) The whole terrace so finished shall be flooded with water for a minimum period of two weeks for curing and for final test. "All above operations to be done in order and as directed and specified by the Engineer-in-Charge :and shall be guaranteed for minimum period of 10 years after handing over the completed building by the main contractor to be finished as directed. Stamp paper guarantee 10 years to be furnished before receiving any payment from the client.

With average thickness of 120 mm and minimum thickness at khurra as 65 mm.

#### Materials:

Sand M-6 Cement M-3 White cement M-4 Cement Mortar M -11, Brick bats confirming to M-14. China Mosaic of best quality and uniform in colour .

#### WORKMANSHIP :

**Preparing the Surface** The surface of the slab should be roughened by scrapping when the slab concrete is still green , however, the surface need not be hacked . In case the slab is already cast and surface fairly finished,the same shall be cleaned neatly of all mortar droppings, loose materials etc with brooms/cloth.

**Providing and Laying of Slurry under Base Coat** The quantity of water required to prepare the slurry with 2.75 kg. of blended cement to be painted over an area of 1 sq.m. Shall be calculated exactly as described below.

The consistency of the slurry should be such as to cover the desired area by using 0.488 kg of blended cement per sqm of area .

On deciding the correct quantity of water required per sqm . area the required quantity of slurry should be prepared which can be applied over the desired surface within half an hour of mixing with 0.488 kg. of grey cement+ 0.253 kg. water proofing compound as per manufacturer specifications+ x litres of water per sqm . area and the required quantity of slurry thus prepared should only be used for first application.

The first layer shall be applied with painting brushes over the specified and dampened area carefully including the corners, holes on the surfaces and joints of pipes in concrete etc. and the application should continue at least upto 150 mm height of fixtures of pipes from the surface. The surface on application shall be air cured for 4 hours.

Depending upon the area of surface that has to be covered , the required quantity of slurry should be prepared using 2 .75 kg. blended cement+ water per sq .m. area to be covered, taking particular care to see that only that much quantity of slurry shall be prepared which can be used within half an hour of preparation i.e. before the initial setting time of cement.

The prepared slurry shall be applied over the dampened surface with brushes very carefully, including the joints between the floor slab and the parapet wall, holes on the surfaces, joints of pipes, masonry/concrete etc.

The application of the slurry should continue up to a height of 300 mm on the parapet wall. The slurry should also be applied up to a height of 150mm over pipe projections etc .

**Laying Base Coat** 10mm thick Immediately after the application of slurry and when the application is still green, 10 mm thick waterproofing cement plaster as base coat with cement mortar 1:3 (1 cement: 3 coarse sand) shall be evenly applied over the concrete surface taking particular care to see that all the corners and joints are

properly packed and the application of the base coat shall be continued up to a height of 300mm over the parapet wall.

Laying Brick Bat Coba Brick bat of size 25 mm to 40 mm out of well burnt bricks shall be used for the purpose of brickbat coba.

The brick bats shall be properly dampened for six hours before laying .

Brick bats shall be laid to required slope/gradient over the base coat of mortar leaving 15-25 mm gap between two bats. Cement mortar 1:4 (1 blended cement: 4 coarse sand) admixed with proprietary waterproofing compound confirming to IS 2645-2003 (Reaffirmed 2017) shall be poured over the brick bats and joints filled properly. Under no circumstances dry brick bats should be laid over the base coat. The haunches/gala at the junction of parapet wall and the roof shall be formed only with brick bat coba .

In case the brick bat coba is laid on the base coat immediately on initial set there will be nonecessity of applying cement slurry over the base coat before laying the brick bat coba. However, if the brick bat coba is to be laid on the subsequent day , cement slurry prepared as described in above shall be applied over the top surface of the base coat, then only the brick bat coba shall be laid. Application of Slurry over Brick Bat Coba After three days of curing, cement slurry prepared as per above shall be applied on the surface of brick bat coba. The application of slurry shall be the same as described above which should cover the haunches/gala, and the remaining small portion of parapet wall and also inside the groove. Then after 10mm thick waterproofing cement plaster in C.M. 1:3 (1 cement: 3 coarse sand) shall be evenly applied over the brick bat coba surface taking particular care to see that all the corners and joints are properly packed and the application of the second coat shall be continued up to a height of 230mm over the parapet wall. After three days of curing , fix waterproof glazed tiles of maximum size 25x25mm over cement mortar 1:1 and finally finishing the surface with towel with white cement slurry.

The whole terrace so finished shall be flooded with water for a minimum period of two weeks of curing and for ponding test. All above operations to be done in order and as directed and specified by the Engineer in charge.

#### MODE OF MEASUREMENT AND PAYMENT:

The flooring shall be measured in Sq.mt, for visible area of work done. It inclusive the rounding of junction and corner of walls.

The rate shall include the cost of all materials and labour involved in all operations described above, hire charges of all machinery, scaffolding , curing for complete above items.

The rate shall be for a Unit of one Sq.mt

#### **Item No.44b**

China Mosaic:

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.

#### Please Note:

The china mosaic shall be done at any height, level, on walls / slabs etc. The china mosaic shall be done as murals, graffiti, pattern etc.  
No extra rates shall be paid for any such kind of designs.

All the cracks other than hair cracks shall be cut to V section cleaned & filled with rich cement sandmortar. The surface shall have aluminum slope of 1 in



120, grading shall be carried out with cement mortar 1:5 if proper slope is not available in concrete Indian patent stone flooring having average thickness equivalent to 30 mm shall be laid in panels top surface of Indian patent stone flooring shall be roughed for proper bonding. Glazed tiles pattern / design shall be got approved Architect / Consultant before laying. All the joints shall be filled with white cement. Glazed tile shall be laid on cement mortar bedding approved water proofing compound shall be added in mix of Indian patent stone flooring dose of water proofing compound shall be as per manufacturer's specifications.

Total thickness of their treatment shall be minimum 50 mm thick, surface to be water tested by keeping are submerged continuously for twenty four hours.

Measurement shall paid for net area including wata if any and measured on plan in sqm.

#### **Item No.44c**

Providing and applying fibre reinforced elastomeric liquid water proofing membrane with resilient acrylic polymers having Sun Reflectivity Index (SRI) of 105 on top of concrete roof in three coats @10.76 litre/ 10 sqm. One coat of self-priming of elastomeric waterproofing liquid (dilution with water in the ratio of 3:1) and two coats of undiluted elastomeric waterproofing liquid (dry film thickness of complete application/system not less than 500 microns). The operation shall be carried out after scrapping and properly cleaning the surface to remove loose particles with wire brushes, complete in all respect as per the direction of Engineer-in-Charge.

#### **MATERIALS:**

Sand M- 6, Cement M- 3, White Cement M- 4, China Mosaic quality and uniform in colour. fibre reinforced elastomeric liquid composite for waterproof coating. Cement shall conform to M.3 Water proofing material shall be used of CICO, Fairmate, Perma, Sika, Pidilite (Dr.fixit) as per manufacturer's specifications.

#### **WORKMANSHIP:**

Workmanship shall be as per manufacturer's specifications and recommendations. How ever, following steps shall be followed for workmanship.

Cleaning the roof surface by means of wire brush to make the roof surface free from all loose particles, dust etc prior to application of 1st coat.

Application of 1st coat of resilient acrylic polymers having Sun Reflectivity Index (SRI) of 105 on top of concrete roof in three coats @10.76 litre/ 10 sqm. One coat of self-priming of elastomeric waterproofing liquid (dilution with water in the ratio of 3:1) and two coats of undiluted elastomeric waterproofing liquid (dry film thickness of complete application/system not less than 500 microns).

The whole terrace so finishing shall be flooded with water for a minimum period of two weeks of curing and for final test. All above operations to be done in order and as directed and specified by the Engineer -In- Charge.

#### **MODEOFMEASUREMENTANDPAYMENT:**

The flooring shall be measured in Sq.mt, for visible area of work done. It inclusive the rounding of junction and corner of walls.

The rate shall include the cost of all materials and labour involved in all the operation described above , hire charges of all machinery, scaffolding, curing for complete above items . The rate shall be for a Unit of One Sq.mt.

#### **Item No.44d**

Filling in Sunken Portion with good Quality Aerated light weight concrete block having crushing strength not less than 35 kg/sqcm and where directed by the Architect / Engineer-in-charge, in sunk in layer. including watering, ramming where it is required etc. complete, as directed by the Architect / Engineer-in-charge .

. Materials :

The Aerated light weight concrete block should be good quality or check by directed engineer in charge .

In general the work shall be carried out as per the standard specifications of P.W.D. / C.P.W.D. /

GWSSB relevant drawings and as per the instructions of Engineer in Charge. The work shall be carried out as per item description.

#### Mode of Measurement and Payment

The payment will be made on Cubic Meter 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 rate shall be for a unit of one cubic meter

#### **Item No.45d**

##### **Indian Pattern Stone(I.P.S.)**

Providing and laying Cement concrete flooring for I.P.S. 1:2:4 (for Indian Patent Stones) (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm. nominal size) lain in layer finished with a floating coat of net cement- 50 mm th by addition of waterproof chemical etc. complete.

#### Materials:

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Stone aggregate

20 mm. nominal size shall conform to M-12. Cement concrete 1:2:4 proportion measured by volume shall conform to relevant specification or ordinary grade 1:2:4 concrete.

#### Workmanship :

The cement concrete flooring of 50 mm. thick (average) is to be laid as per the site condition. The concrete shall be mixed in a mechanical mixer at the work. Hand mixer may however be allowed for smaller quantities of work and in case of failure of machines or as permitted by the engineer-in-charge. It shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. However in such cases 10% more cement than otherwise required shall have to be used without any cost. The mechanical mixing shall be done for a period of  $1\frac{1}{2}$  to 2 minutes. The quantity of water shall be thus sufficient to produce a dense concrete required workability for the purpose. Flooring of specified thickness shall be laid in accordance with approved pattern or as directed. Finishing operation shall start shortly after the cessation of beating and shall be spread over a period of one to six hours depending upon the temperature and atmospheric conditions. The surface shall be left for some time till moisture disappears from it. Fresh quantity of cement shall be mixed with water to form a thick slurry and spread over the surface while the concrete is still green. Use of dry cement or cement and sand mixture sprinkled on this surface to stiffen the concrete or absorb excessive moisture shall not be permitted. The cement slurry shall then be properly paste twice by means of iron flats, once, when the slurry is applied and the second time when cement starts setting and finished smooth. The surface shall be marked with string or B.R.C. fabric jali to make the surface non slippery as and when directed. The junction of floors with wall plaster dado or skirting shall be rounded where so required upto 25 mm. radius. Flooring in lavatories and bath rooms shall be laid after fixing of water closet and squatting pans and floor traps, which shall be plugged while laying the floors and opened after the floors, are completed. Any damage, done to water supply sanitary fittings during the execution of work shall be made good.

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

1.2 The form work shall be provided if necessary as directed by the engineer in charge. Concreting shall be done as per alternate bay method with necessary centering wither by mastic or cement mortar as directed.

Mode of measurement & payment :

The rate shall include the cost of all material and labour involved in all the operations described above. No deduction shall be made or extra paid for any opening upto 0.1 sq. metre in area in the floor, nothing extra shall be paid for laying the floor at different levels in the same room or the court yard.

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

#### **Item No.46a, 46b, 46c**

**Steel Work:**

Providing and fixing M.S.grill, gate, stair / balcony railing , elevation element of required pattern in frames of windows etc. with M.S. flats, square or round bars etc. including priming coat with approved steel primer all complete.

Applying priming coat over new steel and other metal surface after and including preparing the surface by thoroughly cleaning, oil, grease, dirt and other foreign matter and scoured with brushes fine steel wood, scrapers and sand paper with ready mixed priming paint brushing red lead.

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.

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All structural steel work shall conform to code of practice for use of structural steel in General Building construction I. S. 800 – 1962

Materials: The structural steel work shall conform to M-22. Red lead paint primer shall conform to I. S. : 102-1962.

**Workmanship:**

The steel sections as specified or required shall be cut, square and to correct lengths, as per drawings and design. The cut ends exposed to view shall be finished smooth. No two pieces shall be welded or other wise jointed to make up the required length of member, except as indicated in the drawings or as directed. All straightening and shaping to form shall be done by application of pressure and not by hammering. Any bending or cutting shall be carried out in such a manner as not to impair the strength of the metal. All operations shall be done in cold state unless otherwise directed/permitted. Steel riveted or bolted in built up sections, frame work.

The steel structure as shown in the drawings or as per direction of the Engineer-in-charge shall be laid out one level platform to full scale and to full size or in parts. A steel tape shall be used for measurements to ensure maximum accuracy.

Wooden templates 12 mm to 19 mm thick or metal sheet template shall be made to correspond to each

connecting gussets plate and rivet holes shall be accurately marked on them and drilled. The template shall be laid on the steel members, and holes of the steel members shall also be marked for cutting. The base of steel columns and the position of Anchor bolts shall be carefully set out.

All stiffeners shall be formed by pressure and where practicable, the metal shall not be cut and welded in making these. In major works or where so specified shop drawings giving complete details and information for the fabrication of the component parts of the structure, including location type size, length and details of rivets, bolts, or weld shall be prepared in advance of the actual fabrication and as approved. The drawings shall indicate the shop and field rivets and bolts. The steel member shall be distinctly marked or stenciled with paint with the identification mark as given in the shop drawings. The bars shall be thickened at the ends, so as to provide for screwed threads and gradually tapered off to meet their normal section. Great accuracy shall be observed in fabrication of various member, so that these can be assembled without being unduly packed, strained or forced into position and when built up, shall be true and free from twist, bniks, buckles, or open joints.

Before making holes individual members for fabrication, the steel work intended to be riveted or bolted together shall be assembled or clamped properly and tightly so as to ensure close abutting or lapping of the different members. All stiffeners shall bear tightly both at top and bottom without being drawn or caulked. The abutting joints shall be cut or dressed true and straight and fitted close together.

Web splice plates and filters under stiffeners shall be cut to fit within 3 mm or flange angles, web plates of girders shall have not cover plates, shall have their ends flush with the top of angles forming the flanges unless otherwise required. The web plates when spiced shall have clearance of more than 6 mm.

The erection, clearance for cleared ends of members connecting steel to steel shall preferably be not greater than 1.5 mm. The erection clearance at the ends of beams without web cleats shall to be more that 3 mm at each end but where for a practical reason greater clearance is necessary, suitably designed seating shall be provided. Pins and rollers shall be accurately turned to gauge. These shall be straight and smooth and free from flows. The roller bearing shall be provided with adequate arrangement for holding the girders or truss resting on it. In columns caps and bases, the ends of shafts together with the attached gussets angles, channels etc., after riveting together shall be accurately mechanized so that the parts connected butt against each other over the entire surfaces of contract connecting angles or channels shall be fabricated and placed in position with greater accuracy so that they are not unduly reduced in thickness by machining.

The ends of bearing stiffeners shall be machanised or ground to fit tightly both at the top and bottom. All holes shall generally be drilled to the required size and at the required size and at required position. Sub punching shall be permitted, provided it is done 3 mm or less in diameter and remade thereafter to the required size. The holes for rivets and bolts shall be larger by 0.4 to 6 mm than the nominal diameter of rivets or black bolts depending up on the diameter of rivets.

Holes shall have their axis perpendicular to the surface bored through. The drilling or reamering shall be free form butts, and the holes should be clean and accurate. Holes for counter shunk bolts shall be made in such a manner that their heads fit flush with the surface after fixing.

The fabrication work shall be completed in workshop as far as it is practicable to do so. Site joints shall be done with rivets and fitted bolts or black bolts, as shown in the drawings or as directed. Generally the following principles shall govern the use of rivets turned and fitted bolts, and black bolts.

- (i) Rivets and turned and fitted bolts shall be used where the connection is such that slip under load has to be avoided.
- (ii) Black bolts may be used very sparingly where a force is carried through a connection without impact, vibration or reversal of stresses.

**Riveting:** The parts assembled for riveting shall be in close contact with each other and the bearing stiffeners shall bear tightly both at top and bottom without being drawn or caulked. Members to be riveted shall be properly pinned or bolted and rigidly held together while riveting. Drifting of holes shall not be permitted except to draw the parts together and the drifting tools so used shall have maximum diameter not exceeding the nominal diameter of rivets or bolts. Drifting done during assembling shall not distort the metal or enlarge the holes. The shanks of rivets shall project beyond the plate surface sufficiently so as to fill the

Hole thoroughly and from the required head after riveting.

The riveting shall be done by hydraulic or pneumatic process. However where such facilities are not available, hand riveting may be permitted. The rivet shall be heated red-hot, care being taken to control the temperature of heating so as not to burn the steel. Riveting of diameter less than 10 mm may be fitted cold. Rivets shall be of heat finish with heads full and of equal size. All loose, burnt or badly formed rivets with concentric or deficient heads shall be cut out and replaced. The heads of rivets shall be central to shanks and shall grip the assembled members firmly. In cutting out rivets, care shall be taken so as not to injure the assembled members, caulking or recouping shall not be permitted.

For testing rivets, hammer weighing approximately 0.25 kg. shall be used of the rivets shall be tapped, slack rivets will give a hollow sound and a jar.

All rivet heads shall be painted with red lead paint within a week of their fixing.

Bolting all bolt heads and nuts shall be hexagonal and of equal size unless specified otherwise. The screwed heads shall conform to I.S. : 1363:1960 and the threaded surface shall not be tapered.

The bolts shall be of such length so as to project two clear threads the nuts, when fixed in position and

these shall fit in the holes without any shakes. The nut shall be fit in the threaded ends of bolts properly. Where turned and fitted bolts are required to be used in place of rivets they shall be provided with washers not less than 6 mm thick so that the nut when tightened shall not bear on the unthreaded body of the bolt. Tapered washers shall be provided for all heads and nuts bearing on leveled surfaces. The threaded portion of the bolts shall not be within the thickness of the parts bolted together.

The faces of the bolt and nuts abutting against steel members shall be machine finished. Where there is a risk of the nut being removed or becoming loose due to vibrations or reversal of stresses, these shall be secured from slackening by the use of locknuts, spring washers, cross cutting or hammering down of threads as directed.

Bolts, nuts and washers shall be thoroughly cleaned and dipped in double boiled linseed oil before use. The whole steelwork shall be painted with a coat of priming coat of red lead, as per relevant specifications of painting.

**Mode of measurement and payment:**

The steelwork shall be measured in general as under.

- (a) All work shall be measured on the basis of finished dimensions as fixed at site and measured net unless specified otherwise.
- (b) The weight of steel sections, steel strips in finished work shall be calculated from standard weight on the same basis on which steel is supplied to the contractor by department or those given in relevant I. S. if steel is arranged by the contractor.
- (c) The weight of steel plates and strips shall be taken from relevant I. S. based on 7.85 kg/sq. meter for every millimeter sheet thickness if steel is supplied by the contractor, otherwise the weight shall be calculated on the basis on which steel is supplied to the contractor by department.
- (d) Unless otherwise specified weight of clearest, brackets, packing pieces, bolts, nuts, washers,

distance pieces, separators, diaphragm gusset (taking over all square dimensions) fish plates etc. shall be added to the weight of respective items.

(e) In riveted work allowance to be made of weight of rivet hands. No deductions shall be made for rivet or bolt holes excluding holes for anchor or holding down bolts.

(f) For forged steel and steel casting weight shall be calculated on the basis of 850 kg/cum.

(g) Unless otherwise specified an additional of 2.5 percent of the weight of structure shall be made for shop and site rivet heads in riveted steel structure.

(h) Unless otherwise specified no allowance shall be made for the weld metal in case of welded steel structure.

(i) Dimensions other than cross sections and thickness of plates shall be measured to nearest 0.001 m

(j) Mill tolerance shall be ignored when weight is determined by calculation.

The rate includes cost of all material, labour, erection, hoisting, scaffolding protective measure, required for proper completion of the item of work. This shall also included conveyance and delivery handling, loading, unloading and storing etc. required for completing the item described above including necessary wastage involved.

Mode of Measurement & Payment : The item shall be paid in Kilograms

The actual piece (unpainted) shall be taken for weighing and the same piece theoretical weight shall be done. Whichever is lesser, shall be paid.

#### **Item No. 46d**

**Providing & Fixing 1 mm Thick S.S.-304 Grade 90 cm High S.S. Railing having Hand Rail Member of 50 mm Dia., 3 No. of Horizontal Pipe of 16 mm Dia. & Baluster Supprrt of 40 mm Dia. At Every Third Step as per Detail Given. Rate Includes All Work Complete as per Description & as per Direction of Engg. in Charge.**

#### **Material**

anticorrosive 304 grade S S pipe of 50 mm dia (16Gauge) as hand rail

S S 304 grade Baluster of 38 mm dia for vertical and horizontal support

And including accessories as per detailed drawing as directed etc. complete.

The material shall be free from loose miles scale rust piles or other affective strength and durability.

#### **Workmanship**

Fixing 90 cm Height Stainless Steel Railing made from anticorrosive 304 grade S S pipe of 50 mm dia (16 Gauge) as hand rail with S S 304 grade Baluster of 40 mm dia (16 Gauge) as a vertical support fixed in RCC slab at 1.2m c/c including three horizontal S S pipes of 16 mm dia (16 Gauge) at equal distance fixed by 18.75 mm dia (16 Gauge) S S pipe with baluster including accessories and shall be fixing by welding in true line and level and slope the railing shall be powder coats lines as per standards.

If stainless tell wall brackets of required size fixed in wall including providing and fixing the same with stainless steel wall brackets of approved type design and quality as directed by engineering in- charged

#### **Mode of measurement and payment**

The item shall be measured for its length limiting dimensions to those specified on place of directed.

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

**Item No.47a**

**Collapsible Gate:**

Providing and fixing in position collapsible steel shutters with vertical channels 20x10x2 mm braced with flat iron diagonals 20x5 mm size with top & bottom rails of T-iron 40x40x6 mm with 38 mm dia. Steel pulleys complete with bolts , nuts , locking arrangement , stoppers , handles including applying a priming coat of red lead paint & two coats of enamel paint of selected shade & approved make.

**Materials:** The collapsible steel gate shall conform to M-33.

**Workmanship:** T-rails shall be fixed to the floor and to the lintel at top by means of anchor bolts, embedded in cement concrete on floor and lintel. The anchor bolts shall be placed approximately at 45 mm centers alternatively in the two flanges of the T iron. In the bottom runner (T-iron) shall be embedded in the floor and proper groove shall be formed along the runner for the purpose. The collapsible gate shall be fixed at the sites by fixing the end double channels in the T-Iron rail and also by hold fasts bolted to the end double channel and fixed in the masonry of the side walls or the otherwise.

In case where the collapsible gate is not required to the lintel beams or slop above, a tee iron suitably designed may be fixed at the top embedded in masonry and provided with necessary clamps and roller arrangement at the top.

All the adjoining work damaged while fixing of gate shall be made good to match the existing work without any extra payment.

All the members of the collapsible gate including T-Iron shall be thoroughly cleaned of rust, scales, dust etc. and given a priming coat of red lead before fixing them in position.

**Mode of measurements and payment:**

The collapsible gate shall be measured in sq. meter. The height of the gate shall be measured as the length of double channels and breadth from outside to outside of the end fixed double channels in open position of the gate. The rate includes providing handles, locking arrangements, stoppers etc.

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

**Item No. 47b**

**Providing corrugated 0.80 mm (22 gauge) thick G.I. sheets roofing fixed with galvanized iron 'J' or 'L' hook bolts, and nuts 8 mm. dia with bitumen and G.I. limpet washers filled with white lead complete excluding the cost of purlines, rafters and trusses.**

**1.0 Materials:** Corrugated G.I. sheets shall conform to M-24.

**2.0 Workmanship :**

**2.1** Spacing of purlines: One purlin shall be provided at the ridge and one at the eaves. The spacing of other purlines for 0.8 mm. thick G.I. sheet not exceed 1.80 metres. The purlin shall coincide with the centre line of the end lap. The ridge purlin shall be placed in such a way that the ridges can be fixed properly.

The portion overhanging the wall support shall not be more than one fourth of the spacing of purlins.

- 2.2** The top surface of the purlins shall be painted before the sheets are fixed over them. Embedded portions of purlins shall be finished with two coats of coat-tar.
- 2.3 Laying of Sheets :**
- 2.3.1** The sheets shall be laid in purlins to a true plane with the line of corrugations truly parallel or normal to the sides of area to be covered. The sheets shall not generally be built into gable parapets. They shall be bent up along their side edges close to the wall, and the junction shall be protected by suitable flushing or by projecting drip course.
- 2.3.2** The laps at end shall be provided 150 mm. minimum for roof slopes 1 in 2 (1 vertical: 2 horizontal) and steeper but 200 mm. shall be provided for flatter slopes than those shall above. The side lap shall be provided two ridges of corrugations at each side.
- 2.3.3** The sheets shall be cut to the dimensions of the shape of the roof either along their lengths or their width or in slant across the line of corrugations at hips and valleys. The sheets shall be cut carefully with a straight edge and chisel to give a straight finish. The sheets shall be laid such that the laps are turned away from the usual direction of local heavy rain.
- 2.3.4 Fixing of Sheets :**
- 2.3.4.1** Sheets shall be fixed to the purlins or other roof members such as hips of valley rafter etc. with 'J' or 'L' galvanized hook bolts, and galvanized nuts 8 mm. dia, with bitumen impet washers and G.I. washers. Limpet washers with white lead shall be used. Length of hook bolt shall be varried to suit the site requirement. Bolts shall be sufficiently long so that after fixing the project above the top of their nuts by not less than 12 mm. the grip of 'J' or 'L' hook bolts on the side of purlins shall not be less than 25 mm. There shall be minimum of three hooks bolts places at the ridge of corrugations in each sheets in every purlin, and their spacing shall not exceed 300 mm. coach screw shall not be used for fixing the sheets to purlins, where the slopes of roof are not less than  $2\frac{1}{2}$  horizontal). (1 vertical:  $2\frac{1}{2}$  horizontal).
- Sheets shall be jointed together at the side laps by galvanized iron bolts and nuts 25 mm. x 6 mm. size, each bolt with a bitumen and G.I. limpet washer filled with white lead. Where the overlaps at the sides extend to two corrugations these bolts shall be places zigzag over the two over lapping corrugations, so that the end of the overlapping sheets are drawn tightly towards each other. The spacing of same bolts shall not exceed 600 mm. along each of the staggered rows.
- 2.3.5** Holes for all bolts shall be drilled and not punched in the ridges of the corrugations from the under side, while the sheets are on the ground. The holes in the sheets shall be atleast 50 mm. from the edge. Sheets drilled wrongly shall be rejected. The holes in the washers shall be of the exact diameter of hook, bolts or the scam bolts. The nuts shall be tightened from above to give a leak proof roof.
- 2.3.6** The roof when complete shall be trues to lines and slopes and shall be lead-proof.
- 3.0 Mode of measurements & payment :**
- 3.1** The measurements of the C.G.I. sheet roof shall be taken for finished work in superficial area in general plane (not girthed on the roof). The laps between the C.G.I. sheets both at their ends and along the side edges shall not be measured. The overlaps of C.G.I. sheets over the valley piece



- underlap under the ridge, hip and flashing piece shall be included in the measurements.
- 3.2 No deductions in measurements shall be made for openings for chimney stacks, sky light etc., of area upto 0.40 sq. mt. Nor extra be paid for extra labour in cutting and for wastage etc., in forming such openings.
  - 3.3 The rate of roof shall include the cost of all materials and labour involved in all operations described above. The rate also includes the cost of provision, erection and removal of the scaffolding, benching, ladders, templates and tools required for the proper erection and completion of the work. The rate includes the cost of purlines, rafters and trusses.
  - 3.4 The rate shall be for a unit of one sq. metre.

#### **Item No.47c**

**Providing valleys 900 mm. overall in plain 1.6 mm. thick G.I. sheet Class – 3 fixed with ‘J’ or ‘L’ hook bolts and nuts galvanized from ‘J’ or ‘L’ hook bolts and bitumen washers complete.**

- 1.1 The G.I. valleys 900 mm. overall in galvanized plain sheet of 1.6 mm. thickness shall be of class-3. The valleys shall be 900 mm. wide overall and flashing shall be 380 mm. wide overall. These shall be bent to the required shape without damage to the sheets in process of bending.
- 2.0 **Workmanship :**
- 2.1 The relevant specifications of item no. 15.1 shall be followed except that the work shall be carried out for G.I. Valleys 900 mm. overall with G.I. sheets 1.6 mm. thickness.
- 2.2 Wherever the edge of a roof sheeting or valley gutter is turned up against a wall, the edge shall be weather proofed with a flashing. Flashing shall be bent to shape and fixed, Lap over the sheet shall be not less than 150 mm. over the roofing sheets. The end laps between the flashing sheets not be less than 225 mm.
- 2.3 The flashing shall be inserted into brick work or masonry joints to a depth of 50 mm. These joints shall be filled with cement plaster (1:3). The flashing shall be well secured to the masonry whenever flashing has to be laid at a slope; it shall be stepped at each course of masonry, the step being out back at angle of not less than 30 degrees to the vertical.
- 2.4 Valley shall be bent to shape and shall have end lap and projection on either side under C.G.I. sheet not less than 225 mm. Valley shall be fixed to the roof members below, with same 8 mm. dia. G.I. hook bolts and nuts and bitumen and G.I. limpet washer which fixes the sheets to these members. Atleast one of the fixing bolts shall pass through the end laps of the valley piece. If necessary extra bolts shall be provided for this purpose.
- 3.0 **Mode of measurements & payment :**
- 3.1 The measurement for valley shall be taken for finished work in length along their centre lines.
- 3.2 No laps shall be measured.
- 3.3 The rate excludes the cost of boarding underneath which shall be paid separately.
- 3.4 The rate of flashing includes the cost of mortar for fixing in wall and other labour and materials required for it.  
The rate shall be for a unit of one running metre.

**Item No.48**

Providing and fixing rolling shutters of approved make made of 80 mm wide M.S. laths inter-locked together through their entire length and jointed together at the ends by end locks mounted on specially designed pipe shaft with bracket plates, guide channels and arrangements for inside and outside locking with push-pull operation including the cost of hood cover and spring etc. complete.(A) Shutters having width below 3.5 M.

**General**

The work shall be consist of furnishing and placing Providing and fixing rolling shutters of approved make of the shape and dimension Shown in figure and conforming to these specification of as approved by engineer in charge.

**Material & Workmanship**

Rolling shutter shall conform to i.s 6248-1979 Rolling shutters shall be supplied of specified type with accessories. The size of rolling shutter shall be specified in drawing. The shutter shall be constructed with inter locking lathe section formed from cold rolled steel strip not less than 0.9 mm. wide for shutter up to 3.5m. width not less than 1.25mm. thick and 80mm wide for shutters 3.5m in width and above unless otherwise specified

Guide channel shall be mild steel deep channel section and rolled pressed or build up (fabricated ) joint less construction the thickness of sheet used shall not be less than 3.15mm.

Hood covers shall be made of m.s sheet not less than 0.90mm thick for shutter having width 3.5 meter and above the thickness of M.S sheet for the hood cover shall be not less than 1.25mm.

The spring shall be of best quality and shall be manufactured from tested high tensile steel wire of strip of adequate strength to balance the shutter 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 plunge and screw bolt etc. The rolling shutter shall be self rolling up to 8 sq. m. clear area without ball bearing and up to 12 Sq.m clear with ball bearing. If the rolling shutter area of larger , then gear operated type shutters shall be used.

The locking arrangement shall be provided at the bottom of shutter at both ends the shutter shall be open from outside.

The shutter shall be completed with door suspension shaft locking arrangement , pulling hooks , handles and other accessories.

**Mode of Measurement & Payment**

The payment shall be made on SQMT basis of the finished work The necessities labour material Equipments tools and plant conveyance including loading And unloading etc shall be provided by the contractor as directed by engineer in charge. The item shall be measured for its length & width limiting damnation in this specified on this plan or as directed .

The rate shall be for a unit of one SQMT.

**Item No.49a, 49b, 50a, 50b**

Providing and fixing window having extruded aluminum Colour anodized section frame main outer size 63.50x 38.10x 1.95mm ( Section no:4605, @ Wt 1.094 Kg/Rmt), horizontal two track member size 61.85 mmx 31.75 mmx 1.20mm ( Section no:8687 @ wt.of 0.695 Kg/mt), vertical member of size 61.85 mmx 31.75mm x 1.30mm ( Section no: 8758 @ wt. of 0.659 Kg/mt) with sliding shutters of horizontal member

size 40mmx 18mmx 1.29mm ( Section no:8949 @ wt. of 0.456 Kg/mt), vertical member of size 40mmx 18mmx 1.29mm ( Section no:8947 @ wt.of 0.456Kg/mt / Section 8948,@ Wt.0.457Kg/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 complete for window.

## MATERIAL

Aluminium standard section

Specification no M-31 from specification booklet for Building works

The size of the bottom member shall be as mentioned in description of the item

Outer frame sections shall be of three track

Transparent bronze colour tinted float glass

Specification no M-38 from specification booklet for Building works for Glass shall be applied for this item except the glass shall be transparent bronze colour tinted float glass of approved brand and colour and thickness

The glass shall be of approved make having thickness of 5 mm the glass shall be transparent bronze colour tinted and free from scratches and cracks the glass shall be provided on the top

Glazing clips

Glazing clips shall be of specified size and shall be Free from any scratches or holes or any damages on surface. All section shall have finished luster surface on all sides

Rubber Gasket

Rubber gasket shall be of approved make. Shall be Free from any scratches or holes or any damages on surface. And shall have finished luster surface on all sides

Fixtures

Specification no M-43 from specification booklet for Building works for fixture and fastening shall be applied for this item

Handles

Handles shall be of approved make. Shall be Free from any scratches or holes or any damages on surface. And shall have finished luster surface on all sides Bolts All bolts shall be of approved make. Shall be Free from any scratches or holes or any damages on surface. And shall have finished luster surface on all sides

## WORKMANSHIP

The Work of aluminium Window shall be done with extreme finishing. The Glass shall be fixed in shutters as directed by Engineer in charge using glazing clips and rubber gaskets as required all the fixtures and fastenings shall be fitted at right place and as directed by Engineer in charge

**Mode of Measurement and Payment** The payment will be made on square Meter 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 length and width limiting dimensions to those specified on plan or as directed.

The rate shall be for a unit of one square meter

## Item No.49b

Providing and fixing window having extruded aluminum Colour anodized section frame main outer size 95mm x 24mm x 1.17 mm ( Section no:2459 @ wt. of 0.738 Kg/mt), horizontal Three track member size 92mm x 31.75mm x 1.30mm ( Section no:8688, @ Wt.1.07 Kg/mt), vertical member of size 92mm x 31.75mm x 1.50mm ( Section no:8933, @ Wt.1.06 Kg/mt) with sliding shutters of horizontal member size 40mm x 18mm x 1.29mm ( Section no:8947 @ wt. of 0.456 Kg/mt), vertical member of size 40mm x 18mm x 1.29mm ( Section no:8949 @ wt. of 0.456 Kg/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

## MATERIAL

Aluminium standard section

Specification no M-31 from specification booklet for Building works

The size of the bottom member shall be as mentioned in description of the item

Outer frame sections shall be of three track

Transparent bronze colour tinted float glass

Specification no M-38 from specification booklet for Building works for Glass shall be applied for this item except the glass shall be transparent bronze colour tinted float glass of approved brand and colour and thickness

The glass shall be of approved make having thickness of 5 mm the glass shall be transparent bronze colour tinted and free from scratches and cracks the glass shall be provided on the top

Glazing clips

Glazing clips shall be of specified size and shall be Free from any scratches or holes or any damages on surface. All section shall have finished luster surface on all sides

Rubber Gasket

Rubber gasket shall be of approved make. Shall be Free from any scratches or holes or any damages on surface. And shall have finished luster surface on all sides

Fixtures

Specification no M-43 from specification booklet for Building works for fixture and fastening shall be applied for this item

Handles

Handles shall be of approved make. Shall be Free from any scratches or holes or any damages on surface. And shall have finished luster surface on all sides Bolts All bolts shall be of approved make. Shall be Free from any scratches or holes or any damages on surface. And shall have finished luster surface on all sides

## WORKMANSHIP

The Work of aluminium Window shall be done with extreme finishing. The Glass shall be fixed in shutters as directed by Engineer in charge using glazing clips and rubber gaskets as required all the fixtures and fastenings shall be fitted at right place and as directed by Engineer in charge

**Mode of Measurement and Payment** The payment will be made on square Meter 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 length and width limiting dimensions to those specified on plan or as directed.

The rate shall be for a unit of one square meter

## Item No.50

### ALUMINIUM DOOR WORK

Providing and fixing Aluminium Door work (Single Shutter OR Double Shutter with or without fix glass) made from Jindal or equivalent make Powder Coated (50 micron pure polyester coating) ,aluminium section frame built up standard tubular and other section of approved make confirming to IS 733 and IS 1285 , member size with shutters of horizontal member , vertical member Confirming to IS733 and IS 1285 fixed with rawl plug abd screws or fixing clips or with expansion hold fasteners including necessary filling up of gaps at junctions at top bottom and sides with required PVC/ Neoprene felt, 8/12 mm toughened glass of approved make etc. Aluminum sections shall be smooth, rust free, straight.mitred and jointed mechanically wherever required including Door Hardware such as cleat angles aluminum snap beading for glazing /paneling, CP Brass/ Stainless steel screws, Stoppers, heavy duty floor hing, S.S. Hinges, aldrop , Locking system, heavy duty Floor Springs, Pivot and fixtures and transparent silicon sealant glass fixing to frame as per

details all complete as per architectural drawings and the direction of Engineer in Charge.  
rate incl. all type of aluminium sections for doors as per the detail Architectural dwg.

#### MATERIAL

Aluminium standard section

Specification no M-31 from specification booklet for Building works

The size of the bottom member shall be as mentioned in description of the item

Outer frame sections shall be of three track

Transparent bronze colour tinted float glass

Specification no M-38 from specification booklet for Building works for Glass shall be applied for this item except the glass shall be transparent bronze colour tinted float glass of approved brand and colour and thickness

The glass shall be of approved make having thickness of 5 mm the glass shall be transparent bronze colour tinted and free from scratches and cracks the glass shall be provided on the top

Glazing clips

Glazing clips shall be of specified size and shall be Free from any scratches or holes or any damages on surface. All section shall have finished luster surface on all sides

Rubber Gasket

Rubber gasket shall be of approved make. Shall be Free from any scratches or holes or any damages on surface. And shall have finished luster surface on all sides

Fixtures

Specification no M-43 from specification booklet for Building works for fixture and fastening shall be applied for this item

Handles

Handles shall be of approved make. Shall be Free from any scratches or holes or any damages on surface. And shall have finished luster surface on all sides Bolts All bolts shall be of approved make. Shall be Free from any scratches or holes or any damages on surface. And shall have finished luster surface on all sides

#### WORKMANSHIP

The Work of aluminium Window shall be done with extreme finishing. The Glass shall be fixed in shutters as directed by Engineer in charge using glazing clips and rubber gaskets as required all the fixtures and fastenings shall be fitted at right place and as directed by Engineer in charge

Mode of Measurement and Payment The payment will be made on square Meter 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 length and width limiting dimensions to those specified on plan or as directed.

The rate shall be for a unit of one square meter

#### Item No.51a

Providing and fixing standard extruded of aluminium section of size 63 mm x 38.10 mm x 1.2mm (Section:2434, @ Wt.0.643Kg/mt ) with colour anodized aluminium frame for ventilation with 5 mm thick frosted glass as details etc complete for Ventilation

#### MATERIAL

Aluminium standard section

Specification no M-31 from specification booklet for Building works.

The size of the bottom member shall be as mentioned in description of the item.

The frosted louvers glass should be 4mm thick louvers & 5 mm thick transparent bronze colour tinted float fixed glass fixed to aluminium strip blade it should be confirm with m-38 from specification booklet for building work.

The 5 mm thick frosted lovers glass and transparent bronze colour tinted float glass should be free from scratches and cracks All section should be of good quality of brand and manufacture. It should be of size described in item description as directed by Engineer in charge. All sections should be colour anodized.

Fixtures

Specification no M-43 from specification booklet for Building works for fixture and fastening shall be applied for this item.

Bolts

All bolts shall be of approved make. Shall be Free from any scratches or holes or any damages on surface. And shall have finished luster surface on all sides.

**WORKMANSHIP**

Aluminium section of size 65 x 25 x 1.50 mm weight @ 0.833 Kg.mt. with colour shall be fitted at right place and as directed by Engineer in charge.

The Work of ventilation shall be done with extreme finishing. The Glass shall be fixed in frame for ventilation as directed by Engineer in charge. Required all the fixtures and fastenings shall be fitted at right place and as directed by Engineer in charge.

**Mode of Measurement and Payment**

The payment will be made on square Meter 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 consolidated item shall be measured for its length and width limiting dimensions to opening of window.

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

#### **Item No.51b**

Providing and fixing standard extruded of aluminium section of size 63.50 x 38.10 x 1.95 mm ( Section no: 4605, @Wt 1.094 Kg / Rmt with colour anodized aluminium frame with 5 mm thick transparent bronze colour tinted float glass as details etc complete for Fix window.

**MATERIAL**

Aluminium standard section

Specification no M-31 from specification booklet for Building works.

The size of the bottom member shall be as mentioned in description of the item.

The frosted lovers glass should be 4mm thick louvers & 5 mm thick transparent bronze colour tinted float fixed glass fixed to aluminium strip blade it should be confirm with m-38 from specification booklet for building work.

The 5 mm thick frosted lovers glass and transparent bronze colour tinted float glass should be free from scratches and cracks All section should be of good quality of brand and manufacture. It should be of size described in item description as directed by Engineer in charge. All sections should be colour anodized.

Fixtures

Specification no M-43 from specification booklet for Building works for fixture and fastening shall be applied for this item.

Bolts

All bolts shall be of approved make. Shall be Free from any scratches or holes or any damages on surface. And shall have finished luster surface on all sides.

**WORKMANSHIP**

Aluminium section of size 65 x 25 x 1.50 mm weight @ 0.833 Kg.mt. with colour shall be fitted at right place and as directed by Engineer in charge.

The Work of ventilation shall be done with extreme finishing. The Glass shall be fixed in frame for ventilation as directed by Engineer in charge. Required all the fixtures and fastenings shall be fitted at right place and as directed by Engineer in charge.

#### Mode of Measurement and Payment

The payment will be made on square Meter 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 consolidated item shall be measured for its length and width limiting dimensions to opening of window.

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

### **Item No.51**

#### Flush Doors

Providing and fixing ISI marked 32 mm thick flush door shutters conforming to IS : 2202 (Part I) decorative type, core of block board construction with frame of 1st class hard wood and well matched teak 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters with 1.00 mm thick Decorative Laminated Sheet on both faces of shutters including ISI marked Stainless Steel butt hinges, bright /matt finished 125 mm Stainless Steel handles of approved quality & make, ISI marked oxidised M.S. door latches of Size 300x20x6 mm conforming to IS:5930 with necessary screws etc. complete as per direction of Engg. incharge.

#### Flush door shutter

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.10.30 P.No.72 except that using Double shutter pivoted with required Teak wood batten having 1mm thick lamination on both side, Durable Grip shall be providing with 15cm long stainless steel handle and necessary Locking system of Godrej instead of SS hinges with necessary screws etc.

Necessary S.S. fixtures and fastening like Screw, Khili, SS hinges, SS handle, magnet, stoppers etc. Shall be provided as directed by engineer in charge.

For colour The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.19.71 P.No.142

Aluminium shall be confirm with Specification no M-31 from specification booklet for Building works

#### Fixtures

Specification no M-43 from specification booklet for Building works for fixture and fastening shall be applied for this item.

#### Bolts

All bolts shall be of approved make. Shall be Free from any scratches or holes or any damages on surface. And shall have finished lustre surface on all sides.

#### Workmanship

The non-teak wood frame inserted into the hollow aluminium section frame

The Work shall be done with extreme finishing, required all the fixtures and fastenings shall be fitted at right place and as directed by Engineer in charge.

#### Mode of measurement

The consolidated Item shall be measured and paid on its breadth and height limiting dimensions to those specified in estimate plan or as directed.

The payment will be made on square meter basis of the finished work.

Consolidation of all Item shall be measured and paid based on Sqmt

#### Item No.52

Providing wood work in frames of Doors, windows cleare story windows and othersimilar works wrought, framede and fixed in position. (A) Indian Teak Wood

**1.0 Materials:** Wood in frames shall conform to M-29

**2.0 Workmanship:**

**2.1** The item covers the requirement of frames for doors, windows, clerestory windows their supply and fixing.

**2.2 Frames:**

**2.2.1** All members of the frames shall be exactly at right angles. The right angle shall be checked from inside surface of the respective members.

**2.2.2** All member of frames shall straight without any warp or bow and shall have smooth surface well planed on the three sides exposed at right angles to each other. The surface touching the wall may not be planed unless it is required in order to straighten up the member or to obtain the overall size within the tolerances specified.

**2.2.3** Frame shall have dovetail joints. When clerestory windows are included, it shall be provided by having full length one piece post for door or windows and clerestory window extending the frame on top at the head to the required extent. Horns shall not be provided in the head of the frame. When No. still are provided the vertical posts of the frame in the ground floor shall be embedded in the sill masonry for 10 cm in upper floors, their vertical posts shall be fixed in the floor or masonry by forming notches 10 mm deep. Slight adjustment spacing as necessary shall be done to have the hold fasts in the joints of masonry course. The frame shall be created in position and held plumb with strong support from both sides and built in masonry as it is being built. The transom shall be through tenoned in to the mortices of the jamb post to the full width of the jamb post and the thickness of the tenon shall be not less than 15 mm.

**2.3 Tolerance:** Unless specially mentioned otherwise tolerance of  $\pm 1.5\text{mm}$  shall be allowed for each wrought face.

**2.4** The tenons shall be closely fitting into the mortices and suitably pinned with wood dowels not less that 10mm. dia meter. The depth of rebates for housing the shutter shall be as shown in the detailed drawing or as directed.

**2.5** The contact surface of tenon and mortice shall be treated before putting together with an adhesive of approved make.

**2.6** Minimum number of three hold fasts shall be fixed on each side of door and windows frames, one at the center point and the other two at 30 cm from the top and the bottom of the frames. In case of windows and ventilators frames whose height is less 1 M two hold fasts on each side shall be fixed at quarter points of the frames. The size of each hold fast shall be 300 x 25 x 6 mm and of mild steel with split end. The hold fast shall be fixed with screws to frames.

**2.7** Mild steel hold fasts shall be protected with a coating of coal asphalt tar. The surface of frame abutting the masnory or concrete faces shall be properly treated by applying a coat of approved coating.

**3.0 Mode of measurements & payments:**

**3.1** The linear dimensions shall be measured correct up to 1 cm. The quantity shall be worked out correct to 2 places of decimals of a Cu. m.  
The rate shall be for a unit of 10 cu dia.

#### Item No.53

*(I) Providing and fixing 35mm thick fully panelled shutters for doors, windows, and clerestory windows including anodised aluminium butt hinges with necessary screws, Indian teak wood.*

**1.0 Materials:**

(1) Wood for shutter shall conform to M-29 (2) Anodised aluminium butt hinges shall conform to M-43.



- 2.0 Workmanship:** The item covers the requirement of preparation of shutters for doors, windows, clerestory windows, their supply and fixing.
- 2.2 Shutters:**
- 2.2.1** Panelled shutters shall be constructed in the form of timber frame work of styles and rails with panel, inserted of type as specified in the detailed drawings. Panel shall be fixed by providing grooves in the style and rails. The styles and rails shall be joined to each other by mortise and tenon joints at right angles.
- 2.2.2** All members of the shutters shall be straight without any warp or how and shall have smooth, well planed faces at right angles to angles to each other.
- 2.2.3** The size of styles and rails shall be as per drawing or as directed. Styles and rails of shutters shall be made of one piece only.
- 2.3.1 Timber paneling:**
- 2.3.1** Thickness of the panel shall be as specified in the item as shown in the drawing or as directed. If the panel is made from more than one piece, the pieces shall be finished as shown in the detailed drawings and shall be joined with continuous groove with specified size. The end pieces of the panel and the top and bottom of the panel shall be provided with continuous tongue to frame into groove of the frame shutter. An air space of 1.5 mm shall be left in the groove of frame shutter while fixing the panels in it.
- 2.3.2** The faces of the panel as well as various pieces of the panel shall be closely fitted to the size of the grooves.
- 2.3.3** Finishing of the corners of raised panel edges shall be done as shown in drawings or as directed.
- 2.4 Fixtures & Fastenings:**
- 2.4.1** The rate shall include anodised aluminium butt hinges including fixing with iron screws. The size and number of hinges shall be as per table given in annexure-1.
- 3.0 Mode of measurements and payment:**
- 3.1** The rate for shutter includes cost of providing block and clear for keeping the shutter in open position as directed.
- 3.2** The dimension of the shutter shall be measured clear size of the shutter in close position between the grooves of the frame.
- 3.3** The rate shall be for a unit of one sq. meter.

***(II) Providing and fixing 35 mm thick fully glazed shutters for doors, windows and clerestory windows including anodised aluminium butt hinges with necessary streces, Indian Teak Wood.***

- 1.0 Materials:** Teak wood shall conform to M-29. Glass shall conform to M-38. Anodised aluminium butt hinges shall conform to M-43.
- 2.0 Workmanship:**
- 2.1** The relevant specifications of item No. 53(i) I shall be followed except that the 35 mm thick shutters fully glazed for doors, windows and clerestory windows including aluminium butt hinges with necessary screws.
- 2.2 Glazing:**
- 2.2.1** The glass panels shall be embodied in putty and secured to the rebate by wooden beds or mouldings shape and size as approved with counter sunk screws of suitable size.
- 2.2.2** The glass panel shall be properly cut to fit the rebates of the frames and sashes fully with a light minus margin of about 1.5 mm on all sides. Before glazing the frame shall be primed and prepared for painting so that wood may not draw oil out of putty. The rebate shall be putted to an extent to provide bedding all round the glass.
- 2.2.3** The glass shall then be bedded in putty and fitted to frames with wooden beads or mouldings as directed and secured with counter sunk screw. The screw shall be spaced not more than 10 mm from each corner and not more than 200 mm apart.
- 2.2.4** The size of the rebate in the frame and size and shape of beads or moulding shall be as per detailed drawings or as directed. The beds or mouldings shall have mitred corners.
- 3.0 Mode of measurement and payment:**
- 3.1** The relevant specifications of item No. 53(i) I shall be followed.
- 3.2** The rate shall be for a unit of one sq. meter.

***(III) Providing and fixing 35 mm thick partly panelled and partly glazed shutters, or doors, windows including anodized aluminium butt hinges with necessary screws, Indian teak wood.***

- 1.0 Materials:** Teak wood shall conform to M-29. Glass shall conform to M-38. Anodised aluminium butt hinges shall conform to M-43.
- 2.0 Workmanship:** The relevant specifications of item No. 53 (I) and 53(II) shall be followed except that the 35 mm thick shutters shall be partly panelled and partly glazed for door windows, clerestory windows etc., as per drawings.
- 3.0 Mode of measurement and payment:**
- 3.1** The relevant specifications of item No. 53(I) shall be followed.
- 3.2** The rate shall be for a unit one sq. meter.

#### **Item No.54**

Providing and fixing FRP frame size 125x65 mm and 35mm thick FRP shutter with wood grain raised paneled design finish shutter having extra reinforcement on sides & edges in Gel coat finish. The core of the shutter & frame is to be filled up with injected polyurethane foam done in situ alongwith embedded wooden pieces for stiffening & also taking hinges & finiturs. 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 fastener sleeve & alluminium fixtures & fastenings.

### **1.0 MATERIAL**

#### **1.1. FRP Frame size 125x50**

1.5 to 2.0 mm thick fire retardant grade FRP skin in depressed panel shall be of approved make as approved by Engineer in charge

FRP skin depressed panel shall be of water proof weather proof termite proof mild acid and alkali proof, sound proof and fire resistance FRP frame size as per required and 38mm shutter shall be in standard factory made members fabricated in factory including necessary stainless steel fixtures and fastenings of approved brand and make as approved by Engineer in Charge

Whole section shall be of water proof weather proof termite proof mild acid and alkali proof, sound proof and fire resistance The frame shall be of best quality and free from any defect

#### **1.2. FRP flush single shutter 35mm thick**

FRP Shutters of 38 mm thick in standard design of FRP and 3.12 mm hide and dandified molded wood primer coated skin on both side of shutter skin is to be confirmed to ASTM D - 1037 pressed under hot process over wood style 65 x 27 mm top and bottom rail and lock rail 125 mm x 27 mm including stainless steel hinges with necessary aluminum fixture and fastening remaining hole of portion is to be filled up with PUF and shutters is to be finished in gel coat Whole section shall be of water proof weather proof termite proof mild acid and alkali proof, sound proof and fire resistance The shutters shall be of best quality and free from any defect

### **2.0. S. S. FIXTURES AND FASTNINGS**

#### **2.1 Hinges,**

Hinges shall be of approved make. shall be Free from any scratches or holes or any damages on surface. and shall have finished luster surface on all sides

The hinges shall be of best quality and free from any defect

#### **2.2 Handles,**

Handles shall be of approved make. shall be Free from any scratches or holes or any damages on surface. and shall have finished luster surface on all sides

The handles shall be of best quality and free from any defect

#### **2.3 Bolts,**

All bolts shall be of approved make. shall be Free from any scratches or holes or any damages on surface. and shall have finished luster surface on all sides

The bolts shall be of best quality and free from any defect

### **3.0 WORKMANSHIP**

3.1. The Work of FRP door shall be done with extreme finishing. The FRP Shutters and granite frame shall be fixed in position in true line and level and shall be fitted as directed by Engineer in charge with all required fixtures and fastenings shall be fitted at right place as shown in the drawing and as directed by Engineer in charge.

3.2. The back of each Stone slab to be fixed shall be smeared with cement paste of matching colour and the Stone slab shall then be gently tapped against the surface, with a wooden mallet. The skirting shall be done only after the fixing is completed. Any pipes coming out of the wall through the dado or skirting shall only be at the intersection of the horizontal and vertical joints. The Stone slab shall not have staggered joints. The joints shall be true to entire line both ways and vertical joints shall be in line with joints or flooring. Stone slab shall be fixed as close as possible to the adjoining tiles and any difference in the thickness of the Stone slab shall be evened out in the cement paste so that all the tiles faces are set in conformity with one another. The skirting shall project uniformly and not more than 6 mm, thickness beyond the finished surface above.

Top of skirting or dado shall be truly horizontal. The risers of steps, skirting or dado shall rest on top of treads of flooring. Wherever required the Stone slab shall be cut (saw n) and thin edges smoothened before use.

#### 4.0 Mode of Measurement and Payment

4.1. The unit rate of FRP door shall include the cost of all materials, cost of all necessary fixtures and fastenings, labour charges for fixing frames, doors and fixing the FRP door in wall at the place shown in drawing and as instructed by Engineer in charge, all tools and plant required for assembling and fixing in position, finishing as per direction of the Engineer-in-charge, and all other incidental expenses for preparing door frame and shutter of specified size to complete the door structure or its components as shown on the drawings and according to these specifications. They shall also include the cost of making, fixing and making walls good by plaster patch colour etc as required

4.2. The FRP door shall be measured for its length or width and height, limiting dimensions to those specified on plan or as directed.

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

#### Item No.55a, 55b, 56

Making connection of drain or sewer line with existing manhole including breaking into and making good the walls, floors with cement concrete 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) cement plastered on both sides with cement mortar 1:3 (1 cement : 3 coarse sand), finished with a floating coat of neat cement and making necessary channels for the drain etc. complete :

For Pipe 100 mm to 250 mm diameter
For Pipe 250 mm to 300 mm diameter
For pipes 350 to 450 mm diameter

Making connection of G.I. distribution branch with G.I. main of following sizes by providing and fixing tee, including cutting and threading the pipe etc. complete :

upto 80 mm nominal bore
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Mode of measurements and payment

The rate shall be for unit of one Number

#### Item No.57a

**Providing throating or plaster drip, grooves and moulding to Wall , R.C.C. chajja and slab.**

Materials

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

### **Workmanship**

The work shall be carried out as directed . The proportion of mix for finishing shall be as per concerned plaster.

Curing shall be done for not less than 7 days. The work shall be carried out in best workman like manner. The throating, plaster drip and moulding shall be one centimeter in thickness and 4 centimeter wide .

### **Mode of measurements and payment**

The rate shall be for unit of one Rmt.

### **Item No.57b**

Providing & Laying cement vatta 10 cm x 10 cm in size quarter round in c.m. 1:1 ( 1 cement, 1 coarse sand) laid in one layers finishing with a floating of neat cement watering etc complete as dire.

### **Materials**

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

### **Workmanship**

The work of cement vata of 10 ems x 10 ems size shall be carried out at junctions of parapets, chhajjas, bathroom, toilets, sunk slabs and terraces as directed. The vata shall be finished in quarter round shape. The work shall be carried out in the best workman like manner. The inner portion of rain water pipe shall be rounded off properly during construction the vata. The work shall be cured for 7 days.

### **Mode of measurements and payment**

The work shall be measured for finished item in running meter.

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

### **Item No.58**

#### **Anti Termite Treatment**

Carring out plinth treat ment to post construction/ existing structure by spraying chemical solution for termite control treatment including labour and material consist ment with I.S.I specification. Using Chlordene and Chiorpur files 20EC. As Per 6131 \_paret- II  
Concentration Weight one percent is recommended i.e one litre 20EC chemical emulsion with 19 liter give 1% concentration inclusive of one litre chemical emulsion appication at the rate of 5 Litre chemical/ Sqm of surface is recommended as per I.S

#### **1.0 Material**

The material shall be same as item no. 9

#### **2.0 Workmanship**

2.1 The chemical barrier shall be complete and continuous under whole of the structure to be protected.

2.2 The treatment shall be done as per the PCI specifications.

2.3 Treatment for building shall start after the excavation is complete and before layingsoling and PCC. The treatment shall be carried out in the following stages:

2.4 Treatment to soil below raft: The soil in the raft shall be compacted and leveled with mechanical rollers. The procedure of the same is covered in the relevant item no. The surface of earth shall be treated with emulsion at the rate of 5 liters per sqm. The treatment shall be done before lying rubble soling and PCC.

2.5 Treatment to soil along the retaining wall: The soil along the retaining wall shall be treated at the rate of 5 liter per sq. The treatment shall follow the backfilling

which shall be done in layers of 30 Cms. Rodding shall be carried out to facilitate the absorption of the chemical emulsion.

2.6 Treatment of soil along the external perimeter of the building: The specification shall be same as item no.15 Para. 2.3.2.

2.7 Treatment of soil surrounding pipes, wastes and conduits: The specification shall be same as item no. 15 Para. 2.3.4.

2.8 The chemical treatment shall be carried out when the surface is quite dry. Chemical treatment shall not be carried out when it is raining or when the soil is wet with rainwater or sub soil water.

2.9 Once formed, treated soil barriers shall be not disturbed. If disturbed, immediate steps shall be taken to restore the continuity and compactness of the barrier system.

2.10 Reconciliation of chemicals brought on site and used for treatment shall be submitted on completion of job.

2.11 The treatment against termite infection shall remain effective for a period not less than 10 years, from date of issue of the final certificate of completion of work. If at any time during this period, any defects in treatment are revealed or any evidence of infection in any part of the building or structure is noticed, the Contractor shall rectify the concerned defects within 15 days on receipt of notice from Engineer-in-charge. On Contractor's failure to do so, the Engineer-in-charge may get the same rectified through any other agency at the Contractor's risk and cost, and the decision of Architect or Engineer-in-charge as to the cost payable by the Contractor for the same shall be final and binding to the Contractor.

2.12 A guarantee bond on Twenty Rupee stamp paper shall be given by the Contractor to the Government, in the manner form described below :

#### FORM OF GUARANTEE BOND

"I/We .....(Contractor) hereby guarantee that work will remain unaffected and will not be in any way damaged by termite or any other germs of similar types, for a period of 10 years after completion of the work of anti-termite, as per the terms and conditions of the contract and the Contractor hereby indemnifies and agrees to save the Government from any loss and or damage that might be caused on account of termite and or other similar type of germs and hereby guarantees to make good any loss or damages suffered by the Government and further guarantees to redo the affected work without claiming any extra cost." This guarantee shall remain force for the period of 10 years, from the completion of the work under the contract and it shall remain binding to the Contractor for period of 10 years.

2.13 The deposit at the rate of 50% of the cost of this item from the running and final bills shall be recovered and retained for the first one year after virtual completion of the work.

### 3 Mode of Measurements and Payment :

3.1 The plan area at ground floor shall be measured and paid. No deduction shall be made nor extra paid for any opening for pipes, etc., upto 0.1 m<sup>2</sup>. The rate shall include the cost of all labour and materials required for the operation involved for satisfactory completion of this item.

3.2 The rate shall be for a unit of one m<sup>2</sup>.

**Item No.59**

**Carring out timber treatment to all wood work including drilling holes and spraying oil based chemical solution on surface of timber work for termite control including labour and material etc. complete. Using Chlordene 20EC. As Per 6113 part III Consentration Weight 1.00 percent is recommended one litre chemical emulsion dillute with 9 liter of kerosene precent concentration. Total dillute concentration will be 10 litre inclusive of the litre chemical emulsion application 0.75/Litre chemical per one Sqmt printed two coat wood surface.**

- 1.0 Materials :
  - 1.1 The relevant specifications of item No. 22.00.7 shall be followed.
- 2.0 Workmanship :
  - 2.1 The wood work effected by Ants shall be cleaned of all live formly hidding inside. The whole wood surface shall be then treated with oil or kerosene based chemical emulsion shall be poured into holes by means of funnels specifically prepared for the same and allowed to seep. After funels become empty, another does of chemical shall be pured in them. This process shall be done repeatedly till the whole wood work fully become saturated with chemical.
  - 2.2 The holes drilled in wood work shall be filled in with party and other similar materials as directed and the whole wooden surface shall be made good s before.
- 3.0 Mode of measurements and payment :
  - 3.1 The work shall be measured for the finished work in sq. meter including frame.
  - 3.2 The out to out of frame shall be measured as width and from top flooring to top of frame shall be as height. This area includes for treating frame and shutters both.
  - 3.3 The rate includes cost of all labours and materials, required for satisfacotry completion of this item.
  - 3.4 The rate includes drilling holes plugging the same after treatment completed and making good as before.
  - 3.5 The rate shall be for a unit of one sq. meter.

**Item No.60a, 60b****Paver Blocks**

Providing and fixing pre-cast Rubber Dye / steel Dye inter locking concrete block 60mm thick with grade of concrete M300 pnumatic 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 guidlines of IRC : SP 63-2018 etc. Complete.

**Material :**

Rubber dye inter locking concrete Block 60 / 80 mm thick

- (1) Water shall confirm to toM-1,
- (2) (2) Cement shall conform to M-3, (3) (3) Sand shall conform to M-6,
- (4) (4) Mortar shall conform to M-11,
- (5) (5) Aggregates shall conform to M-12, (6) (6) Shuttering shall conform to M-26.

**Workmanship**

Laying should be done on 75 mm Thick Sand completed Bed.

This work shall be carried out in the central median and/or along the footpaths in conformity with the lines, levels and dimensions as specified in the drawings.

### Paver Block :

The paving Blocks shall be precast 15 cm thick in M 35 / 30 C.C. of shape and size and colour as directed by Engineer in Charge. The paver blocks should be Rubble mold in appropriate plant having facility for applying high pressure and controlled vibration. For normal paving work, the length of a paving block should ordinarily be not greater than twice the mean width; the thickness is a minimum 15 cm; the maximum length generally not exceeding 280mm; the width generally in the range of 75 to 140mm with a maximum chamfer of 10mm (preferably chamfer should be in the range of 3-5mm). The sides of the block should be perpendicular to the top and bottom faces except that the top edge may be chamfered. The blocks should have the following dimensional tolerances: Plan dimensions  $\pm 2$ mm Thickness  $\pm 3$ mm. The Cement used shall be any one of the following:

- (a) 43 grade ordinary Portland Cement conforming to IS 269 (b) 53 grade ordinary Portland Cement conforming to IS 8112.

Coarse aggregates shall comply with the requirements of IS 383. As far as possible crushed / semi crushed aggregates shall be used. For ensuring adequate durability, the aggregate used for production of blocks shall be sound and free of soft or honeycombed particles. The nominal maximum size of coarse aggregate used in production of paver blocks shall be 12 mm. Fine aggregates shall conform to the requirements of IS 383. Both river/quarry sand and stone dust meeting the requirements can be used.

### Pigments:

Synthetic or natural pigments may be used in concrete mix to obtain paver blocks with desired shades of colors. The pigment used should result in durable colors of paver blocks. It shall not contain matters detrimental to concrete. Pigments, either singly or in combination, conforming to the following I.S may preferably be used.

- (a) Black or Red or Brown pigment IS: 44 (b) Green pigment IS: 54  
(c) Blue pigment IS: 55/56 (d) White pigment IS: 411 (e) Yellow pigment IS: 50

The pigment should be finer than the cement. The pigment shall not contain zinc compounds or organic dyes.

The paver blocks shall be of M-35 / 30 grade having compressive strength at 28 days of 35 / 30 N/mm<sup>2</sup> and necessary testing shall be carried out to maintain the required compressive strength.

To ensure durability, the average water absorption in a block should not exceed 5% . In situations, where parts of blocks are to be used e.g. around manholes, the block should be purpose cut at site.

### Bedding Sand

The Bedding sand should be free of deleterious materials. The thickness of the bedding layer should be as shown in the drawing and should be of uniform thickness. The grading of the bedding sand should be as under:

IS Sieve Size	Percent Passing
9.52 mm	100

4.75 mm	95-100
2.36 mm	80-100
1.18 mm	50-95
600 micron	25-60
300 micron	10-30
150 micron	0-15
75 micron	0-10

#### Joint Filling Sand

The gaps in between two paving blocks (not more than 3mm) shall be filled relatively finer than the bedding sand. The joint filling sand should be as dry as possible. The gradation for the joint filling sand is as under.

IS Sieve Size	Percent Passing
2.36 mm	100
1.18 mm	90-100
600 micron	60-90
300 micron	30-60
150 micron	15-30
75 micron	0-10

#### Construction

##### General

The construction of block pavement involves preparation of subgrade, sub base and base course layers, bedding sand and finally the laying of blocks.

**Preparation of Sub grade** This is the foundation layer on which the block pavement is constructed. The water table should be at a minimum depth of 600mm below the sub-grade. Sub-grade should be compacted in layers of 150 or 100 mm thickness as per IRC: 36-1970. The prepared sub grade should be graded and trimmed to a tolerance of  $\pm 20$  mm of the design levels, and its surface evenness should have a tolerance of within 15 mm under a 3 m straight edge. Base and Sub base Course  
Base and Sub base courses are constructed in accordance with standard procedure contained in the relevant IRC specifications like IRC: 37-2001. The material shall be evenly laid in required thickness as specified in drawing and shall be watered, and consolidated to provide proper level and grade.

##### Placing and Screening of Bedding Sand

The thickness of the sand bed after compaction should not be more than 75 mm. Bedding sand should not be used to fill up local depressions on the surface of a base or sub base. The depressions should be repaired in advance before placing sand. Sand to be used should have uniform moisture content of 6 to 8%. The processed sand is spread with the help of screed boards to the required thickness. The Screed boards are provided with nails at 2-3m apart which when dragged gives the desired thickness. The sand is subsequently compacted with plate vibrators weighing 0.6 tons or more. Level checks shall be carried out on a grid pattern to establish that the desired level is achieved. Local correction can be done either by removing or adding extra sand followed by leveling and compacting the layer.

##### Laying of Blocks

Blocks should be laid commencing from the edge strip and proceed towards the inner side. The blocks can be placed to different bonds or patterns as directed by Engineer in Charge. With the help of gauges, the joint width specification (2 to 4mm) should be checked in the first few square meters, where it should be ensured that the block alignment is correct. To start with, full blocks should be used; only subsequently, cutting and in filling at edges be permitted. Under no Circumstances should the blocks be forced or hammered into the bedding at this



stage of lying. For cutting paving blocks, hydraulic or mechanical block cutters, or power saws are used. Cut units less than 50mm minimum dimension should not be used. Where space does not permit use of a larger segment, use premixed concrete or sand –cement mortar instead. The blocks shall be laid in line and level and to required camber. Compaction

For compaction of the bedding sand and the blocks laid over it, vibratory plate compactors are used over the laid paving units; at least two passes of the vibratory plate compactor are needed. Such vibratory compaction should be continued till the top of each paving blocks is level with its adjacent blocks.

Joints filling

The joints should be completely filled with dry sand. The operation of joint filling comprises of spreading a thin layer of the joint filling sand on the block surface and working the sand into each joint by brooming. Following this, passes of heavy plate compactor are applied to facilitate fine sand to fill the joints. The sand should be broomed or spread over the surface with a small surcharge.

Opening for use Until all the joints are completely filled, no usage should be permitted over the block pavement. The block pavement should be inspected frequently, to ensure that any incompletely filled joints, exposed by usage and/or weather are promptly filled. Such frequent inspection should be continued till dust and detritus from the roadway tightens the surface of the joints.

Measurements for payments

The work of Paver block shall be measured as finished work in Square Meter. Fixing paver blocks in required shape and pattern and filling joints and compacting using all tools, equipment materials and labour.

The contract rate shall include carrying out all required operations to complete this item of work, including cost of labour, materials, tools & plants etc.

#### **Item No.61**

Kerbing:

Providing and fixing pre-cast concrete kerb stone of gray cement based concrete block 30cm length, 30cm height and 15cm thick of M250 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.

Materials:

Precast C.C. Block: (1) Water shall conform to M-1, (2) Cement shall conform to M-3, (3) Sand shall conform to M-6, (4) Mortar shall conform to M-11, (5) Aggregates shall conform to M-12, (6) Shuttering shall conform to M-26.

Construction of Precast C.C. Block:

Precast C.C blocks shall be made from M-25 grade of cement concrete. The concrete shall conform to relevant IS code and the size shall be as specified in drawing and the surface shall have fair finish.

The strength of the C.C. Block shall have compressive strength of 25N/mm<sup>2</sup> after 28 days. It shall fix on road surface/on ground with necessary excavation and shall be joined in C.M.1:3 to required line and level. The shape of blocks shall be of any shape / shapes approved by Engineer-in-charge. Cement concrete block of approved design of size 300 x 300 x 150 mm of the make approved by engineer-in-charge.

Excavation:

Clearing the site : The site on which the structure is to be built, shall be cleared and all obstructions, loose stone, materials and rubbish of all kind, bush, wood and trees shall be removed as directed. The materials so obtained shall be property of the Government and be conveyed and stacked as directed within 50 M. lead. The roots of the trees coming in the sides shall be cut and coated with hot asphalt. The rate of site clearance is damaged be included in the rate of earthwork for which no extra will be paid. Setting out:

After clearing the site, the center 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 tractor shall assume full responsibility for alignment elevation and dimension of each and all parts of the work. Contractor shall supply laborer's, materials., etc. required for setting out the reference marks and bench marks and shall maintain them as long as required and directed.

Excavation:

The excavation, in foundation shall be carried out in true line and level and shall have the width and depth as shown in the drawings or as directed. The contractor shall do the necessary shoring and strutting 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 levelled 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 other reason excavation is made deeper or wider than 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 1.5 m. depth shall be measured under this item.

Disposal of the excavated stuff

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.

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.

Fixing of Blocks:

Cement concrete blocks of approved shape shall be fixed in line & level. The alignment of C.C blocks shall be got approved before fixing at site of work. Blocks should be laid commencing from one end of the edge strip and proceed towards the other end. The blocks can be placed to different bonds or patterns as directed by Engineer in Charge. With the help of gauges, the joint width specification (2 to 4mm) should be checked in the first few meters, where it should be ensured that the block alignment is correct. To start with, full blocks should be used; only subsequently, cutting and in filling at edges be permitted. Under no Circumstances should the blocks be forced or hammered into the bedding at this stage of lying. For cutting paving blocks, hydraulic or mechanical block cutters, or power saws are used. Cut units less than 50mm minimum dimension should not be used. Where space does not permit use of a larger segment, use premixed concrete or sand – cement mortar instead. The blocks shall be laid in line and level and to required gradient. The block shall be jointed with cement mortar 1:1 (1 cement : 1 coarse sand) as directed by Engineer-in-charge.

Mode of measurements and payment:

Measurement should be in Running Meter (Rmt) up to two decimal.

The rate should be including all above activity and incidental activity to be carried out to complete the work in all respect. No extra payment for transportation, loading, unloading from stock yard should be paid.

**Item No.62a**

Providing and fixing double action hydraulic floor spring of approved brand and manufacture conforming to IS : 6315, having brand logo embossed on the body / plate with double spring mechanism and door weight upto 125 kg, for doors, including cost of cutting floors, embedding in floors as required and making good the same matching to the existing floor finishing and cover plates with brass pivot and single piece M.S. sheet outer box with slide plate etc. complete as per the direction of Engineer-in-charge. With stainless steel cover plate minimum 1.25 mm thickness

**Hydraulic Floor Spring**

The hydraulic floor spring shall be heavy duty double action floor spring of make approved by the Engineer -in-Charge suitable for door leaf of weight minimum 125 kg. The top cover plate shall be of stainless steel, flushing with floor finish level. The contractor shall cut the floor properly with stone cutting machine to exact size & shape. The spindle of suitable length to accommodate the floor finish shall be used. The contractor shall give the guarantee duly supported by the company for proper functioning of floor spring at least for 10 years .

The rate shall be for a unit of one no.

**Item No.62b**

Providing and fixing aluminium extruded section body tubular type universal hydraulic door closer (having brand logo with ISI, IS : 3564, embossed on the body, door weight upto 36 kg to 80 kg and door width from 701 mm to 1200 mm), with double speed adjustment with necessary accessories and screws etc. complete.

**Materials:**

These shall be made of cast iron/aluminium alloy/zinc alloy and of shape and pattern as approved by Engineer-in-Charge . Make shall be as specified in tender item or as directed.

These shall generally conform to IS Specifications for door closers (Hydraulically regulated) IS 3564-1995 (Reaffirmed 2018) .

The door closers may be polished or painted and finished with lacquer to desired colour . Aluminium alloy door closer shall be anodized and the anodic coating shall not be less than grade AC15 of IS 1868-1996 (Reaffirmed 2021). All dents, burrs and sharp edges shall be removed from various components and they shall be pickled, scrubbed and rinsed to remove grease , rust, scale or any other foreign elements . Afterpickling, all the M.S. parts shall be given phosphating treatment in accordance

with IS 3618-1966 (Reaffirmed 2021).

The nominal size of door closers in relation to the weight and the width of the door size to which it is intended to be fitted shall be given in Table.

TABLE

Type and Designation of Door Closers

Designed of Closers	Mass of the Mass (KG)	Width of the Door (MM)	Remarks
1.	Upto 35	Upto 700	For light doors such as double leaved and toilet doors .
2.	36 to 60	701 to 850	Interior doors , such as of bed rooms, kitchen and store

3.	61 to 80	851 to 1000	Main doors in a building, such as entrance doors
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#### Workmanship:

After being fitted in its position when the door is opened through 90°, the same should swing back to angle of  $20^\circ \pm 5^\circ$  with nominal speed but thereafter, the speed should get automatically retarded and in case of doors with latches, it should be so regulated that in its final position the door smoothly negotiates with the latch.

Mode of measurement and payment:

Rate are inclusive of all material and labour etc .

The rate shall be for a unit of Number basis. .

#### Item No.95

##### Aluminum Composite Panel

Designing, fabricating, testing, installing and fixing in position Curtain Wall with Aluminium Composite Panel Cladding, with open grooves for linear as well as curvilinear portions of the building, for all heights and all levels etc. including::

- (a) Structural analysis & design and preparation of shop drawings for pressure equalisation or rain screen principle as required, proper drainage of water to make it watertight including checking of all the structural and functional design..
- (b) Providing, fabricating and supplying and fixing panels of aluminium composite panel cladding in pan shape in metallic colour of approved shades made out of 4 mm thick aluminium composite panel material consisting of 3mm thick FR grade mineral core sandwiched between two Aluminium sheets (each 0.5mm thick). The aluminium composite panel cladding sheet shall be coil coated, with Kynar 500 based PVDF / Lumiflon based fluoropolymer resin coating of approved colour and shade on face # 1 and polymer (Service) coating on face # 2 as specified using stainless steel screws, nuts, bolts, washers, cleats, weather silicone sealant, backer rods etc.
- (c) The fastening brackets of Aluminium alloy 6005 T5 / MS with Hot Dip Galvanised with serrations and serrated washers to arrest the wind load movement, fasteners, SS 316 Pins and anchor bolts of approved make in SS 316, Nylon separators to prevent bi-metallic contacts all complete required to perform as per specification and drawing The item includes cost of all material & labour component, the cost of all mock ups at site, cost of all samples of the individual components for testing in an approved laboratory, field tests on the assembled working curtain wall with aluminium composite panel cladding, cleaning and protection of the curtain wall with aluminium composite panel cladding till the handing over of the building for occupation. Base frame work cost for ACP cladding is included in this item rate. The Contractor shall provide curtain wall with aluminium composite panel cladding, having all the performance characteristics all complete, as per the Architectural drawings, as per item description, as specified, as per the approved shop drawings and as directed by the Engineer-in-Charge. However, for the purpose of payment, only the actual area on the external face of the curtain wall with Aluminum Composite Panel Cladding (including width of groove) shall be measured in sqm. up to two decimal places.

#### Material

4mm thick PVDF coated aluminum foil composite section in three layers top layer of the PVDF coated metallic coloured aluminum foils shall not less than 0.30mm thick and bottom layer of the aluminum foils shall not less than 0.30mm thick and middle layer of polyethylene. 50mm x 25mm aluminum box pipe with 20mm x 20mm. Aluminum clamping G.E. (Winsil- 20) weather silicone sealant.

## 1.0 WORKMANSHIP:

### 1.1 Finishing the surface by aluminum section cladding.

The aluminum box pipe of 50mm x 25mm size shall be fixed on existing wall at all required

distance with screwing to correct length as per drawings and design. In case of different shapes other than structural parts, aluminium framing to be done as per drawing and instructions of consultants as a base for glass framing.

The cut and exposed to view shall be finished smooth. Two pieces shall not be allowed or

otherwise jointed to make up the required length of member. Powdered coated M.S. clamp

shall be used in R.C.C. work where ever necessary. Roll plugs shall be used while drilling in wall for screwing.

The aluminum PVDF coated foil composite section of selected and approved metallic colour finishing and of leading company having 4mm thick. PVDF coated aluminum foil composite section in three layers, top layer of the PVDF coated metallic coloured aluminum foils shall not less than 0.30mm thick and bottom layer of the aluminum foils shall not less than 0.30mm thick and middle layer of polyethylene. It shall be fold from surrounding edge to fix with 20 x 20mm aluminum angle screwing using tray system and panels sites as per detailed design supplied by Architect or Engineer in charge.

Tray shall be formed of aluminum PVDF coated foil in required size as per design and suggested by Engineer in charge.

The aluminum PVDF coated tray shall be fixed to the 50mm x 25mm box pipe on exterior

face of building wall with the help of screw. Roll plugs to correct line length and width.

The Horizontal and vertical joints between tray shall be sealing with structural sealant GE

(Winsil - 20) weather silicon sealant to cover the expose surface with matching colour.

The detail design for the entire framing work shall be made by the contractor at his own cost and get approved from Engineer in charge before executing the work. The aluminum PVDF coated composite section, tray size shall be as approved by Engineer in charge.

## 2.0 MODE OF MEASUREMENT AND PAYMENT:

The rate shall be included the cost of all materials, all labour and scaffolding etc. involve to

complete and finished the said items.

All the finished visible surface of aluminum cladding shall be measured in Square meter correct to a two decimal.

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

### Item No.64

Providing and Fixing Box type metal letters forming composite box made from 1mm thick stainless steel plate of grade 304 having brush finish of following font size to be fixed at Main Gate in english and or Gujarati and including fixing charges. etc. complete as per direction of Engg. incharge. for Payment Purpose Height of Letter will be measured.

#### Materials:

The stainless steel letter shall be confirm to IS 6911- 2017 and shall be of 304 grade.

#### Workmanship :

The letter shall be fixed in true line and level and at any height as per the drawing or as directed by engineer in charge. Work shall be carried out with all the required tools, plants, materials, labour and chemicals required for fixing of letter.

Mode of measurement and payments

Rates are inclusive of all labour, materials, tools, plants, scaffolding etc. to complete the work.

The rate shall be paid per unit of One Running Inch.

**Item No.65a**

Providing and Fixing MURAL made out of 2mm thick s.s. plate grade 304, including making necessary design as per Architect dwg. Through laser cutting including connection to the R.C.C./Masonry with necessary frame, anchor fastnuts, M.S. Plate etc. complete as per direction of Engg. incharge.

Material:

S.S. sheet shall confirm to IS 5522-2014 (Reaffirmed 2019) & S.S. sheet shall be 304 grade .

Workmanship

S.S. Mural Sheet board shall be made from Stainless steel sheet 304 grade in required size.

Carving Design Made as per Direction of EIC / Architect.

S.S. signage board shall be fixed on wall with s.s. screw with cap as per detail drawing or as directed by Engineer-In-Charge .

Mode of Measurements and Payment Measurement:

The rate includes the cost of materials and labour etc. complete.

The rate shall be for a unit of Sq.mtr.

**Item No.65b**

Providing and Fixing Sinage - internal and external signage boards with Vinyl Text on ACP sheet / 2 mm th. S.S. Plate etc. complete as per direction of Engg. incharge.

Material:

S.S. sheet shall confirm to IS 5522-2014 (Reaffirmed 2019) & S.S. sheet shall be 304 grade .

Plywood shall confirm to M-26.

Laminate shall confirm to IS 2046-1995 (Reaffirmed 2020) and thickness shall be 1.0mm.

Workmanship

S.S. signage board shall be made from Stainless steel sheet 304 grade in required size and fixed on 12mm thick laminated plywood finished . S.S. signage board shall be fixed on wall with s.s. screw with cap as per detail drawing or as directed by Engineer-In-Charge .

Mode of Measurements and Payment Measurement:

The rate includes the cost of materials and labour etc. complete.

The rate shall be for a unit of Sq.Inch.

**Item No.65c**

Providing and fixing retro Reflective Hi Intensity Micro Prismatic Grade Board using 2mm Aluminum / 4mm ACP, angle iron 75 x 75 x 6mm. Descaling and degreasing the board as per requirement using epoxy reflective process by screen painting as directed etc. complete including transporting and fixing in C.C. 1:2:4 with necessary excavation curing etc. complete as per I.R.C. 67-2012 design. A warranty for 7 years for the Retro reflective sheeting from original manufacturer & a certified copy of 3 year outdoor exposure test report from third party test lab for

the product offered shall be submitted by contractor. (B)Class B Type-4(MDR/ODR) retro reflective sheeting.

The sign board shall conform to IRC-67-1977 and ninth schedule of the motor vehicle Act. It shall be providing and fixed as directed by the Engineer in charge.

#### 1.2 Traffic Signs having retro-reflective sheeting :

1.2.1 General Requirements : The retro-reflective sheetings used on the sign shall consist of white or coloured sheeting having a smooth outer surface which has the property of retro-reflection over its entire surface. It shall be weather resistant and show lifting or curling and shall have negligible shrinkage or expansion. A certificate of having tested the sheeting for these properties in an unprotected outdoor exposure facing the sun for two years and its having passed these tests shall be obtained from a reputed laboratory by the manufacturer of the sheeting. The reflective sheeting shall be either of engineering grade material with enclosed lens or of high intensity grade with encapsulated lens/ micro prismatic type. The type of sheeting to be used would depend upon the type, functional hierarchy and importance of the road.

#### 1.2.2 High Intensity Grade Sheetting :

1.2.2.1 Encapsulated Lens Type : This sheeting shall be of encapsulated lens type consisting of spherical glass lens elements, adhered to a synthetic resin and encapsulated by a flexible, transparent water proof plastic having a smooth surface. The retro reflective surface after cleaning with soap and water and in dry condition shall have the minimum co-efficient of retro-reflection (determined in accordance with ASTM Standard E:810) as indicated in Table 800-1.

TABLE 800-1  
ACCEPTABLE MINIMUM CO-EFFICIENT OF RETRO REFLECTIVE FOR  
HIGH INTENSITY GRADE SHEETING (CANDELAS PER LUX SQUARE  
METRE).

Observation angle (in degrees)	Entrance Angle (in degrees)	White	Yellow	Orange	Green / Red	Blue
0.2	-4	250	170	100	45	20
0.2	+30	150	100	60	25	11
0.5	-4	95	62	30	15	7.5
0.5	+30	65	65	25	10	5

When totally wet, the sheeting shall not show less than 90% of the values of retro reflectance indicated in Table 800-1. At the end of 7 years, the sheeting shall retain at least 75% of its original retro-reflectance.

#### 1.3.2 Engineering Grade Sheetting

This sheeting shall be of enclosed lens type consisting of microscopic lens elements embedded beneath the surface of a smooth, flexible, transparent, water-proof plastic, resulting in a non-exposed lens optical, resulting in a non-exposed lens optical reflecting systems. The retro-reflective surface after cleaning with soap and water and in dry condition shall have the minimum coefficient of retro-reflection (determined in accordance with ASTM Standard E-810) as indicated in Table 800-2.

**TABLE 800-2**  
**ACCEPTABLE MINIMUM CO-EFFICIENT OF RETRO REFLECTIVE FOR**  
**ENGINEERING GRADE SHEETING (CANDELAS PER LUX SQUARE**  
**METRE)**

Observation angle (in degrees)	Entrance Angle (in degrees)	White	Yellow	Orange	Green	Red	Blue
0.2	-4	70	50	25	9.0	14.5	4.0
0.2	+30	30	22	7.0	3.5	6.0	1.7
0.5	-4	30	25	13.5	14.5	7.5	2.0
0.5	+30	15	13	4.0	4.0	3.0	0.8

1.1.2.3 When totally wet, the sheeting shall not show less than 90% of the values of retro-reflectance indicated in Table 800-2. At the end of 5 years, the sheeting shall retain at least 50% of its original retro reflectance.

1.1.3 Messages/Boarders : The messages (legends, letters, numerals etc.) and borders shall either be screen-printed or of cut-outs. Screen-printing shall be processed and finished with materials and in a manner specified by the sheeting manufacturer. Cut outs shall be of materials as specified by the sheeting manufacturer and shall be bonded with the sheeting in the manner specified by the manufacturer.

1.1.4 For screen-printed transparent coloured areas on white sheeting, the co-efficient of retro-reflection shall not be less than 50% of the values of corresponding colour in Tables 800-1(a), 800-1(b) and 800-2 as applicable.

1.1.5 Cut out messages and borders, wherever used, shall be made out of retro-reflective sheeting (as per Clause 1.1.2) except those in black which shall be of non-reflective sheeting.

1.1.6 Colour : Unless otherwise specified, the general colour scheme shall be as stipulated in IS:5 "Colour for Ready Mixed Paints".

Blue	IS	Colour No.166 : French Blue
Red	IS	Colour No.537 : Signal Red
Green	IS	Colour No.284 : India Green
Orange	IS	Colour No.591 : Deep Orange

The colours shall be durable and uniform in acceptable but when viewed in day light or under normal headlights at night.

1.1.7 Adhesives : The sheeting shall either have a pressure sensitive adhesive of the aggressive-tack type requiring no heat, solvent or other preparation for adhesion to a smooth clean surface, or a tack adhesive activated by heat, applied in a heat-vacuum applicator, in a manner recommended by the sheeting manufacturer. The adhesive shall be protected by an easily removable liner (removable by peeling without soaking in water or other solvent) and shall be suitable for the type of material of the base plate used for the sign. The adhesive shall form a durable bond to smooth, corrosion and weather resistant surface of the base plate such that it shall not be possible to remove the sheeting from the sign base in one piece by use of sharp instrument. In case of pressure-sensitive adhesive sheeting, the sheeting shall be applied in accordance with the manufacturer's specifications. Sheeting with adhesives requiring use of solvents or other preparation for adhesive shall be applied strictly in accordance with the manufacturer's instructions.

1.1.8 Refurbishment: Where existing signs are specified for refurbishment, the sheeting shall have a semi-rigid aluminium backing pre-coated with aggressive-tack type pressure sensitive adhesive. The adhesive shall be suitable for type of material used for the sign and should thoroughly bond with that material.



#### 1.1.9 Fabrication :

1.1.9.1 Surface to be reflectorised shall be prepared to receive the retro-reflective sheeting. The smooth plain surface before the application of retro-reflective sheeting. If the surface is rough, approved surface primer may be used. After cleaning, metal shall not be handled, except by suitable device or clean canvas gloves between all cleaning and preparation operation and application of reflective sheeting/primer. There shall be no opportunity for metal to come in contact with grease, oil or other contaminants prior to the application of retro-reflective sheeting.

1.1.9.2 Complete sheets of the material shall be used on the signs except where it is unavoidable. At splices, sheeting with pressure sensitive adhesive shall be overlapped not less than 5 mm. Sheeting with heat-activated adhesives may be spliced with an overlap not less than 5 mm or butted with a gap not exceeding 0.75 mm. Where screen printing with transparent colours is proposed, only but jointing shall be used. The material shall cover the sign surface evenly and shall be free from twists, cracks and folds. Cut outs to produce legends and borders shall be bonded with the sheeting in the manner specified by the manufacturer.

1.1.10 Warranty Durability : For each lot of sheetings procured, the contractor shall obtain from the manufacturer a 7 years warranty for satisfactory field performance including stipulated retro reflectance of the sheetings of high intensity grade and a 5 years warranty for the engineering grade and submit the same to the Engineer. In addition, a 7 years and a five years warranty for satisfactory in-field performance of the finished sign with retro-reflective sheeting of high intensity grade and engineering grade respectively, inclusive of the screen printed or cut-out letters/legends and their bonding to the retro reflective sheeting shall be obtained from the contractor/supplier and passed on to the Engineer. The contractor/supplier shall also furnish a certification that the signs and materials supplied against the assigned work meet all the stipulated requirements and carry the stipulated warranty. Processed and applied in accordance with recommended procedures, the reflective material shall be weather resistant and following cleaning shall show no appreciable discolouration, cracking, blistering or dimensional change and shall not have less than 50 percent of the specified minimum reflective intensity values (Tables 800-1 and 800-2) when subjected to accelerated weathering for 1000 hours, using type E or EH weatherometer AASHTO Designation M 268).

#### 1.2 Installation :

1.2.1 Sign posts, their foundations and sign mountings shall be so constructed as to hold these in a proper and permanent position against the normal storm wind loads or displacement by vandalism. Normally signs with an area upto 0.9 sq.m. shall be mounted on a single post, and for greater area two or more supports shall be provided. Sign supports may be of mild steel, reinforced concrete or galvanised iron (G.I.). Post end(s) shall be firmly fixed to the ground by means of properly designed foundation. The work of foundation shall conform to relevant specifications as specified.

1.2.2 All components of signs and supports, other than the reflective portion and G.I. Posts shall be thoroughly descaled, cleaned, primed and painted with two coats of epoxy paint. Any part of mild steel (M.S.) post below ground shall be painted with three coats of red lead paint.

1.2.3 The signs shall be fixed to the posts by welding in the case of steel posts and by bolts and washers of suitable size in the case of reinforced concrete or G.I. Posts. After the nuts have been tightened, the tails of the bolts shall be furred over with a hammer to prevent removal.

1.3 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.

1.4 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.65d**

Road marking with hot applied thermoplastic paints with reflectorising glass beads on bitumin surface providing and laying a hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads @ 250gms per sqm area, thickness of

2.5mm is excluding of surface applied glass beds as per IRC:35. The finished surface to be level, uniform and free from streaks and holes.zebra patta /bump patta lane/center line/ edge line/cut patta.

### 1.1. General

The colour, width and layout of road markings shall be in accordance with the code of practice of Road Markings with paints, IRC: 35 and specified in the drawings or as directed by the Engineer.

### 1.2. Materials

Road marking shall be of hot applied thermoplastic compound and reflectorised paint specified in the item and the material shall meet the requirements as specified below.

### 1.3 Hot Applied Thermoplastic Road Marking

#### 1.3.1 General:

- (i) The work under this section consists of marking traffic stripes using a thermoplastic compound meeting the requirements specified herein.
- (ii) The Thermoplastic compound shall be screeded /extruded or to the pavement surface in a molten state by suitable machine capable of controlled preparation and laying with surface application of glass beads at a specific rate. Upon cooling to ambient pavement temperature, it shall be produce an adherent pavement marking of specified thickness and width and capable of resisting deformation by traffic.
- (iii) The colour of the compound shall be white or yellow (IS colour no. 356) as specified in the drawings or as directed by the engineer.

#### 1.3.2 Thermoplastic materials

##### 1.3.2.1 General:

The thermoplastic material shall be homogeneously composed of aggregate, pigment, resins and glass reflectorizing beads.

##### 1.3.2.2 Requirement:

I composition the pigment, beads and aggregate shall be uniformly dispersed in the resin. The material shall be free from all skins, dirt and foreign objects and shall comply with requirements indicated in Table 800:- 3.

**Table 800-3 PROPORTIONS OF CONSTITUTENTS OF MARKING MATERIAL (Percentage by weight)**

Component	White	Yellow
Binder	18.0 min.	18.0 min.
Glass Beads	30 - 40	30 - 40
Titanium dioxide	10.0 min.	—
Calcium Carbonate and Inert Fillers	42.0max.	See
Yellow pigments	—	Note

Note: Amount of yellow pigment, calcium carbonate and inert fillers shall be at the option of the manufacturer, provided all other requirements of this specification are

## **II Properties :**

The properties of thermoplastic material, when tested in accordance with ASTM 036/IS-3262 (Part-I) shall be as below:

A) Luminance:

White: Daylight luminance at 45 degree 65 percent min. as per AASHTO M 249.

B) Drying time:

When applied at a temperature specification by the manufacturer and to the required thickness, the material shall set to bear traffic in not more than 15 minutes.

C) Skid resistance: not less than 45 as per BS 6044

Cracking resistance at low temperature : The material shall show no cracks on application to concrete blocks.

E) Softening point:  $102.5 \pm 9.5$  C as per ASTM 0 36.

F) Flow resistance: Not more than 25 percent as per AASHTO M 249.

Yellowness index (for white thermoplastic paint) : not more than 0.12 as per AASHTO M 249

**III Storage Life :** The materials shall meet the requirement of these specifications for period of one year. The thermoplastic material must also melt uniformly with no evidence of skins or un-melted particles for the one year storage period. Any material not meeting the above requirements shall be replaced by the manufacturer / supplier / contractor.

**IV Reflectorisation :** shall be achieved by incorporation of beads the grading and other properties of the beads shall be as specified in clause 803.4.3 of MORT&H specification.

**V Marking:** Each container of the thermoplastic material shall be clearly and indelibly marked with the following information.

The name, trademark or other means of identification of manufacturer.

Batch number. Date of manufacture.(Colour (white or yellow)).

Maximum application temperature and maximum safe heating temperature.

**VI Sampling and testing :** The thermoplastic material shall be sampled and tested in accordance

with the appropriate ASTM/BS method. The contractor shall furnish to the employer a copy of certified test reports from the manufacturer of the thermoplastic material showing results of all tests specified therein and shall certify that the materials meet all requirements of this specification

### **1.3.3 Reflectorizing glass beads:**

**1.3.3.1 General :** The specification covers types of glass beads to be used for to production of reflectorised pavement markings.

Type 1 beads are those which are a constituent of the basic thermoplastic compound vide Table

800-3 and type-2 beads are those which are to be sprayed on the surface vide clause 803.6.3

1.3.3.2 The glass beads shall be transparent, colourless and free from miliness, dark particles and excessive air inclusions. This shall conform to the requirements spelt out in clause 803.4.3.3.

### 1.3.3.3 Specific requirements

**Gradation :** The glass beads shall meet the gradation requirements for the two types as given in Table 800-4.

**TABLE 800-4 GRADATION REQUIREMENT FOR GLASS BEADS**

Sieve size	Percent Retained	
	Type 1	Type 2
1.18 mm	0 to 3	-
850 micron	5 to 20	0 to 5
600 micron	-	5 to 20
425 micron	65 to 95	-
300 micron	-	30 to 75
180 micron	0 to 10	10 to 30
Below 180 Micron		00 to 15

**Roundness :** The glass beads shall have a minimum of 70 percent true spires.

**Refractive index:** The glass beads shall have a minimum refractive index of 1.50.

**Free flowing properties:** The glass beads shall be free of hard lumps and clusters and shall dispense readily under any conditions suitable for paints stripping. They shall pass the free flow test.

**1.3.3.4 Test methods :** The specific requirement shall be tested with the following methods.

**Free flow test:** Spread 100 grams of beads evenly in a 100 mm diameter glass dish. Place the dish in a 250 mm inside diameter desiccators which is filled within 25 mm of the top of a desiccators plate with sulphuric acid water solution (specific gravity 1.10) cover the desiccators and let it stand for 4 hours at 20 to 29 degree C. Remove sample from desiccators, transfer beads to a pan and inspect for lumps or clusters. Then pour beads into a clean dry glass funnel having a 100 mm stem and 6 mm orifice. If necessary, initiate flow by lightly tapping the funnel. The glass spheres shall be essentially free of lumps and clusters and shall flow freely through the funnel.

II. The requirements of gradation, roundness and refractive index of glass beads and the amount of glass beads obtained from a reputed laboratory showing results of all tests specified therein and shall certify that material meets all requirements of this specification. However, if so required, these tests may be carried out as directed by the engineer.

### 1.3.4 Application properties of thermoplastic material.

1.3.4.1 The thermoplastic materials shall readily get screed/extruded at temperatures specified by the manufacturers for respective method of

application to produce a line of specified thickness which shall be continuous and uniform in shape having clear and sharp edges.

1.3.4.2 The materials upon heating to application temperatures shall not exude fumes, which are toxic, obnoxious or injurious to persons property.

1.3.5 Preparation :

The materials shall be melted in accordance with the manufacturer's instruction in a heater fitted with a mechanical stirrer to give a smooth consistency to the thermoplastic materials to avoid local overheating. The temperature of the mass shall be within the range specified by the manufacturer and shall on no account be allowed to exceed the maximum temperature started by the manufacturer. The molten material should be used as expeditiously as possible and for thermoplastic materials which has natural binders or is otherwise sensitive to prolonged heating the materials shall be maintained in a molten condition for more than 4 hours.

ii) After transfer to the laying equipment the material shall be maintained within the temperature range specified by the manufacturer for achieving the desired consistency for laying.

1.3.6

Properties of finished road marking:

The stripe shall not be slippery when wet.

The marking shall not lift from the pavement in freezing weather.

After application and proper drying the stripe shall show no appreciable deformation or discoloration under traffic and under road temperatures up to 60 °C.

The marking shall not deteriorate by contact with sodium chloride calcium chloride or oil drippings from traffic.

The stripe of marking shall maintain its original dimension and position.

Cold ductility of the material shall be such as to permit normal movement with the road surface without chipping or cracking.

The colour of yellow marking shall conform to IS colour no. 356 as given in IS : 164.

**Reflectorised Paint:** Reflectorised paint, if used, shall conform to the specification by the manufacturers and approved by the engineer. Reflectorising glass beads for reflectorising paints where used shall conform to the requirements of clause 803.4.3.

## Application

1.3.7 Marking shall be done by machine. For locations where painting cannot be done by machine, approved manual methods shall be used with prior approval of the engineer. The contractor shall maintain control over traffic while painting operations are in progress so as to cause minimum inconvenience to traffic compatible with protecting the workmen.

1.3.8 The thermoplastic materials shall be applied hot either by screeding or extrusion process. After transfer to the laying apparatus, the material shall be laid at a temperature within the range specified by the manufacturer for the particular method of laying being used. The paint shall be applied using a screed or extrusion machine.

1.3.9 The pavement temperature shall not be less than 10 °C during application. All surfaces to be marked shall be thoroughly cleaned of all dust, dirt, grease, oil and all other foreign matter before application of the paint. The material, when formed into traffic stripes, must be readily renewable by placing on overlay of

new material directly over an old line of compatible material. Such new material shall so bond itself to the old line that no splitting or separation takes place.

Thermoplastic paint shall be applied in intermittent or continuous lines of uniform thickness of at

least 2.5 mm unless specified otherwise. Where arrows or letters are to be provided, thermoplastic compound may be hand-sprayed. In addition to the beads included in the material, a further quantity of glass beads of type-2, conforming to the above noted specification shall be sprayed uniformly into a monolayer on to the hot paint line in quick succession of the paint spraying operation. The glass beads shall be applied at the rate of 250 grams per square meter area.

1.4.4 The minimum thickness specified is exclusive of surface applied glass beads. The method of thickness measurement shall be in accordance with appendices B and C of BS - 3262 (Part-3)

1.4.5 The finished lines shall be free from ruggedness on sides and ends and be parallel to the general alignment of the carriageway. The: upper surface of the lines shall be level, uniform and free Steaks.

### **1.5 Measurement for Payment:**

1.5.1 The painted marking shall be measured in sq. meters of actual area marked (excluding the gaps, if any).

1.5.2 In respect of markings line directional arrows and lettering, etc. the measurement shall be by numbers.

**1.6 Rate:** The contractor unit rate for road markings shall be payment in full compensation of furnishing all labour, materials, tools, equipment, including all incidental costs necessary for carrying out the work at the site confirming to these specification complete as per the approved drawing(s) or as directed by the engineer and other incidental cost necessary' to complete the work to these Specification.

### **1.7 SPECIAL TERMS AND CONDITIONS FOR THERMOPLAST PAINT WORK:**

(1) Agency should carry out the such type of work by only of thermoplastic paint laying machine (power driven only) with temperature controller and automatic mixing arrangement of glass beads in required proportion.

(2) After completion of the laying of thermoplastic paint work, two years guarantee for durability and reflectivity as per M.O.R.T.H. specification for road and bridge works clause 803 should be given by the bidder in the writing.

(3) Guarantee security deposit shall be retained @ 10% of the cost of the item of thermoplast paint from the R.A. bills, which will be released after expiry of guarantee period.

(4) Agency who carry out the such type of work shall have an experience of carrying out similar type of work.

(5) Test certificates as per M.O.R.T.H. specification for road and bridge works clause 803.3.2.2 (vi)

should be furnished of reputed laboratory before

**Item No.65e**

CAT EYE/Pavement Marker(MNC two nail) made out of acrylic StreneAcrylonitrile or hi-impact poly Steren fitted with moulded of metheacrylate(MNC)reflector cube corner reflector design,filled with tightly adhering pooting compound as per ASTMD-788 size 11.5x7x1.60 cms or 10x10x1.75 cms provided with bituminous adhesive in sufficient quantity with each unit fixing with two shrank .Reflector on both side.Co efficient of lamination as per specification and compressive strenth 13 tones at 23 degree centigrade etc.B) Double side lenses..

## **1.0 General**

The colour, configuration, size and location of cat-eye for highways other than Expressways shall be in accordance with the code of Practice for Road Signs, IRC:67 or as shown on the drawings or as directed by the Engineer.

The cat eye shall be reflectorised as shown on the drawings or as directed by the Engineer. It shall be of retro-reflectorised type and made of encapsulated lens type reflective sheeting vide Clause 801.3, fixed over aluminium sheeting as per these specifications.

In general, cautionary and mandatory signs shall be fabricated through process of screen printing. In regard to informatory signs with inscriptions, either the message could be printed over the reflective sheeting, or cut letters of non-reflective black sheeting used for the purpose which must be bonded well on the base sheeting as directed by the Engineer.

## **1.2 Materials :**

The various materials and fabrication of the cat eye shall conform to the following requirements. The adhesive materials shall be of standard quality and it shall be high resistance quality against heavy moving vehicles.

The materials shall be used for the body of the cat-eye is of high density PVC materials.

The dimensions and size of the cat-eye shall be as per IS standard. The retro-reflective sheeting used on the cat-eye shall consist of the white or coloured sheeting having a smooth outer surface which has the property of retro reflection over its entire surface. It shall be weather resistant and show colour fastness. It shall be new and unused and shall show no evidence of cracking, scaling, pitting, blistering, edge lifting or curling and shall have negligible shrinkage or expansion. A certificate of having tested the sheeting for these properties in an unprotected outdoor exposure facing the sun for two years and its having passed these tests shall be obtained from a reputed laboratory, by the manufacturer of the sheeting. The reflective sheeting shall be either of Engineering Grade material with enclosed lens or of High Intensity Grade with encapsulated lens. The type of the sheeting to

be used would depend upon the type, functional hierarchy and importance of the Road.

**High intensity grade sheetings :** This sheeting shall be of encapsulated lens type consisting of spherical glass lens, elements adhered to a synthetic resin and encapsulated by a flexible, transparent water-proof plastic having a smooth surface. The retro-reflective surface after cleaning with soap and water and in. dry condition shall have the minimum co-efficient of retro-reflection determined in accordance with ASTM Standard E:810 )

**TABLE 800.1**  
**ACCEPTABLE MINIMUM CO-EFFICIENT OF RETRO-REFLECTION FOR**  
**HIGH INTENSITY GRADE SHEETING**  
 [CANDEL AS PER LUX PER SQUARE METRE]

Observa- tion (in degree)	Entrance angle (in degree)	White	Yellow	Orange	Green/ Red	Blue
0.2	-4	250	170	100	45	20
0.2	+ 30	150	100	60	25	1.1
0.5	- 4	95	62	30	15	7.5
0.5	+ 30	65	45	25	10	5.0

When totally wet, the sheeting shall not show less than 90 percent of the values of retro reflective indicated in Table 800-1. At the end of 7 years, the sheeting shall retain at least 75 percent of its original retro- reflectance.

**Engineer grade sheetings :** This sheeting shall be of enclosed lens type consisting of microscopic lens elements embedded beneath the surface of a smooth, flexible, transparent, water proof plastic, resulting in a non-exposed lens optical reflecting system. The retro-reflective surface after cleaning with soap and water and in dry condition shall have the minimum co-efficient of retro-reflection determined in accordance with ASTM Standard E:810) as indicated in Table 800.2.



**TABLE 800.2**  
**ACCEPTABLE**  
**MINIMUM CO-**  
**EFFICIENT OF**  
**RETRO-REFLECTION FOR HIGH**  
**INTENSITY GRADE SHEETING**  
 [CANDEL AS PER LUX PER SQUARE METRE]

Observation (in degree)	Entrance angle (in degree)	White	Yellow	Orange	Green	Red	Blue
0.2	-4	70	50	25	9.0	14.5	4.0
0.2	+ 30	30	22	7.0	3.5	6.0	1.7
0.5	-4	30	25	13.5	4.5	7.5	2.0
0.5	+ 30	15	13	4.0	2.2	3.0	0.8

When totally wet, the sheeting shall not show less than 90 percent of the values of retro reflective indicated in Table 800-2. At the end of 5 years, the sheeting shall retain at least 50 percent of its original retro- reflectance.

1.3 Processed and applied in accordance with recommended procedures, the reflective material shall be weather resistant and, following cleaning, show no appreciable discolouration, cracking, blistering or dimensional change and shall not have less than 50 percent of the specified minimum reflective intensity values (Table 800-1 and 800-2) when subjected to accelerated weathering for 1000 hours, using type E or EH Weatherometer (AASHTO Designation M 268).

#### **1.4 INSTALLATION:**

The Cat-Eye shall be installed directly on road surface, after cleaning completely by removing all dust and other foreign materials from the surface of the road.

#### **1.5 MEASUREMENT FOR PAYMENT :**

The measurement of Cat-Eye shall be in numbers, these shall be measured in No.

#### **1.6 RATE:**

The Contract unit rate shall be payment in full for the cost of making Cat-Eye, including all materials, installing it at the site and incidentals to complete the work in accordance with the Specifications.

**Item No.66a**

Providing and fixing eco-friendly light weight calcium silicate false ceiling tiles having T egular edge & 15mm Thick Densified edges on the Tile Periphery for Extra Strength The Light weight calcium silicate ceiling tiles shall have, light reflection 85% non-combustible as per B.S.476 part IV, 100% humidity resistance and also having thermal conductivity 0.043° w/m KC. for the best thermal Insulation.

The Light weight calcium Silicate tile shall be of approved texture Fine fissured/ Spintone/ Cosmos having NRC value of 0.5 & Globe having NRC value of 0.75 NRC or equivalent of size 595X595 mm to be laid on true horizontal level suspended inter locking metal grid of hot dipped galvanized steel sections (galvanizing @ 120 grams per sqm including bothside) consisting of main 'T' runner suitably spaced at joints to get required length and size of 24X38 mm made from 0.30 mm thick (minimum) sheet, 1200 mm centre to centre, and cross 'T' of size 24X28 mm made out of 0.33 mm (Minimum) sheet spaced 1200 mm along spaced between main 'T' at 600 mm centre to centre to form a grid of 1200X600mm and secondary cross 'T' of length 600mm and size 24x28mm made of 0.30 mm thick (Minimum) sheet to be interlocked at middle of the 1200X600mm panel to form grid of size 600X600mm resting on periphery walls / partitions on a perimeter wall angle pre-coated steel of size (24X24X3000mm made of 0.40mm thick (minimum) sheet with the help of rawl plugs at 450mm centre to centre with 25mm long dry wall screws @ 230mm interval and laying 15mm thick Densified edges light weight calcium silicate ceiling tiles of approved texture (Fine Fissured/ Cosmos/Spintone) in the grid including, cutting /making opening for services like diffusers, grills, light fittings, fixtures, smoke detectors etc., wherever required, Main 'T' runners to be suspended from ceiling using G.I. slotted cleats of size 25X35X1.6mm fixed to ceiling with 12.5mm dia and 50mm long dash fasteners, 4mm G.I. adjustable rods with galvanized steel level clips of size 85X30X0.8mm, spaced at 1200mm centre to centre long main 'T' bottom exposed with 24mm of all T-sections shall be pre-painted with polyester baked paint, for all heights, , as per specifications, drawings and as directed by engineer-incharge. Note:- Only calcium silicate false ceiling area will be measured from wall to wall. No deduction shall be made for exposed frames/ opening (cut outs) having area less than 0.30 sqm. The calcium silicate ceiling tiles shall have NRC. Value of 0.50 (Minimum) for Fine fissured/ Spintone/ Cosmos and 0.75 NRC for Globe, light reflection 85% noncombustible as per B.S. 476 part IV, 100% humidity resistance and also having thermal conductivity. 0.043° w/m KC.for the best thermal Insulation

**Materials:-**

- 1.1 Calcium silicate tiles for false ceiling confirming to relavant IS standard.
- 1.2 Grid channels of G.I. hot dipped galvanised steel section and Misc. fixtures and fastening shall be confirming to relavant IS/as approved by Engineer-in-charge.
- 1.3 Workmanship:-
- 1.4 The item covers the requirement of fixing of Calcium silicate tiles and grid framing of G.I. sections with approved fixtures & fasteners such as bolts, screws etc., as per details, drawings and as directed by the Engineer-in charge.
- 1.5 G.I. channels confirming M-23 shall only be used.
- 1.5.1 Wall angle fixed to the perimeter at the wall at the ceiling level which decided.
- 1.5.2 Main sections are suspended from the soffit with the help of plugs, soffit cleat, 4 mm rod and levelling deep.
- 1.5.3 Cross sections are locked with the main section.
- 1.5.4 Completed frame work with section ready for laying ceiling panels.
- 1.5.5 The light weight calcium silicate tile shall be of approved texture fine fissured/Spin tone/Cosmos having NRC value of 0.5 & Globe having NRC value of 0.75 NRC or equivalent of size 595 x 595 mm to be laid on true horizontal level.

1.6 Mode of measurement and payment:-

1.7 The rate includes cost of materials ,all labours, tools tackles etc. required for satisfactory completion of item.

1.8 The necessary vouchers bill of purchase of materials shall be produced if demanded by the Engineer-in-charge.

1.9 Rate shall be in unit of on sq.mt basis.

#### **Item No.66b**

Providing and fixing single layer water proof gypsum board 12.5 mm thick of the make New good Group Co.Ltd. or equivalent & New good Group Co.Ltd. company sections using water proof board of size 1220 mm x 1830 mm x 8.0 mm suspended by G.I suspender of size 25 mm x 3 mm with intermediate channel of size 18mm x40mm x0.80mm at 1220 mm center to center ceiling section of size 40mmx 35mmx 0.55mm at 457 mm center to center and perimetre channel A of size 20mm x 27mm x 30mm x 0.50mm at edges & drops including paper taps and soffit cleat, anchor fastener, scotch bolt connecting cleat joining compound top coat on ceiling including making necessary opening for light fitting, diffuser etc. complete as per detail drawing as directed.

#### **Materials:**

Gypsum plaster board shall be confirm to IS 2095(Part-1)-2011 (Reaffirmed 2021),

Thickness of the gypsum plaster board shall be as specified in tender item.

Make of Suspended G.I. section shall be as specified in tender item.

Plastic emulsion paint shall confirm to M-30.

#### **Workmanship:**

Suspended ceiling which include G.I. periphery channels of size 0.55 mm thick heaving one flange of 20mm and other flange of 30mm and a web of 28mm along with perimeter of ceiling screw fixed to the wall/ partition with help of nylon sleeves and screw at 610mm Centre, then suspending G.I. intermediate channels to size 45mm x 0.9mm thick with two flange of 15mm each from the slab at 1.220 center to soffits with G.I. cleat and steel expansion fasteners ceiling section of 0.55 mm thickness having knurled web of 40mm and two flanges

of 35mm each with lips of 10.5 mm are then fixed to the intermediate channel at 457mm centers. 12mm thick gypsum calcium silicate tapered edge board is than screw fixing is done mechanically either with screw driver of drilling machine with suitable attachment. The boarding is to be done keeping a gap/groove of 2mm to 3mm shall be maintain from all sides of the boards and making a 3mm tapered edge on the two sides of the boards.

Jointing and finishing method : finally the boards are to be jointed and finished so as to have a flush which includes filling and finishing the square edges of the boards with lime and PVA based materials with fiber tape .

Necessary gape for light diffuser fans and cut out shall have to be made.

Two coats of Iapi, One coat of primer and two coats of plastic emulsion paint shall be apply to Gyp-board.

Application of Lapi, primer and plastic emulsion paint shall be followed as per 18.21 of Section-8.

#### **Mode of Measurements and Payment**

The rate includes the cost of materials , labour and tools & plants etc . complete

Measurement shall be taken for finished visible work .

Rate shall be for a unit of one Sq. m.

**Item No.67a**

Providing and Fixing 6 mm thick Lexan Polycarbonate multi wall roofing sheet fixed with hilti screw and rubber silicon sealer and alluminium strip of size 50 x 3 mm etc complete as directed by Engineer in charge

**SCOPE OF ITEMS**

Item covers providing and fixing 10 mm thick multiwall Polycarbonate sheet of as suggested by Architect / Consultant. Item covers installation with necessary making frame structure, fabrication, Adjusting and cleaning. Necessary scaffolding, Labour, all an item & safety measures for satisfactory completion of item.

**1.0 Material**

Polycarbonate sheet shall confirm IS 14443: 1997

Structural steel shall confirm M 22 from General Technical Specifications for Building Works

**2.0 Workmanship**

As per Item No. 15.1 of 2 from General Technical Specifications for Building Works considering 10 mm thick multi wall Polycarbonate sheet instead of corrugate GI Sheet. Sheet shall be firmly fixed, true to the alignment by mentioned in drawing to the satisfaction

of Architect or Engineering Incharge

**4.0 Mode of Measurement**

Measurement shall be in sq. m correct to two places of decimal for the work completed as specified as para.3 above.

Rate quoted shall be for the works including vibrators or any other materials as specified described in the respective items of work.

**5.0 Payment:**

Payment shall be made for quantity recorded in the Measurement Book as per para 4.0 above at the rate quoted by the bidder.

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

**Item No.67b**

Providing Making & Fixing Glow sign Board of suitable size as per approved color-Designed Back Light Material fixed on G.I. sheet Box of suitable size with concealed Light Fittings, Necessary Scaffolding etc. complete as per direction of Officer in charge.

Specifications same as item description

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

**Item No.68a, 68b,**

Manufacturing, testing ,supplying loading, transporting to work site, loading unloading lowering in trenches, laying and jointing RCC NP3 class pipes in C:M 1:1 including all jointing materials such as cement, sand, hemp bitumen as directed testing the pipe line to a head of 1.5 mt and hydraulic test as directed etc comp.

300 mm Dia., 450 mm Dia., 600 mm Dia.

The RCC pipes shall be procured as per ISS for B Class type specifications using best materials, first class workmanship as per IS 458/1971 of NP2 / NP3 class as per specified in the tender item. The proportion of concrete shall be one part of cement to 2 parts sand and 4 parts of black trap agg. mix. of suitable size to as to produce uniform concrete through out thickness of the pipes. Reinforcement in form of bars straight and class wise shall be provided as per IS458 class specifications. RCC spun pipe collars for the pipes shall be

made in the same manner. The internal diameter of the collar shall be sufficiently large to allow a perfect joint around the outside of the pipes with cement mortar and other plastic materials. Pipes shall be laid fully into trenches and shall be made to rest evenly on specially prepared formation or on concrete bed and for the purpose to extra rate shall be given making extra excavation for bed and in the sides of the trenches. All joints shall be thoroughly fitted using spun yarn of approved quality for the groove in the length. For each joint yarn shall be dipped in hot asphalt. The joint shall be properly cleaned and moisture and the collar shall be kept in position by means of wedges. Semi dry cement mortar of prop. 1:1 shall be forced into joints and chaucked completely by means of special cutting tools until the whole space is full. The mortar shall be sprayed around the collar joints so as to completely encase the joint. After the joints have thoroughly set, the Engineer or his Assistant may inspect the joints, and if he has any doubt as to their soundness he may required the contractors to cut open and clear away the cement of any joint that he may select and to make good the same at their expenses provided that, unless some defect be found, they shall be required to open more than one joints in 18mt (60') of pipe, though if defect be found the Engineer direct them to open as many joints as he may deem necessary, the joints made one day will not as a rule, be inspected until the following day and the cement may has sufficient time to set well before being covered up. Trenches shall not be filled until alignment and levels are examined by the Engineer or his sub ordinates and the permission for refilling is granted. The RCC pipes shall be manufacturers as per IS for B class pipes specifications using best materials first class workmanship as per IS 458/1971. and latest IS code for R.C.C. pipe line of NP3 class.

The proportion of concrete shall be one part of cement to 2 parts of sand and 2 parts of black trapagg. Mix of suitable size so as to producing firm concrete thought thickness of the pipes.

Reinforcement on form of bars straight & cross wise shall be provided as per IS 458/ class specifications. RCC spun pipes collars for the pipes shall be made in same manner the internal diameter of the collar shall be sufficiently large to allow a perfect joint around the outside of the pipes with cement mortar and other plastic materials. Any damaged or cracked carefully into trenches and shall be made to rest evenly on specially prepared formation and for the purpose no extra rate shall be given for claming such hollows in bends and in the sides of the trenches. All joints shall be thoroughly fitted using spun yarn of approved quality for the groove in

the length for each joint dipped in hot asphalt after the joint has been properly cleaned & moisture and collar kept in position by means of wedges, semi-dry cement mortar prop. 1:1 shall be forced into it and caulked completely by means of special caulking tools until the whole space in full. The mortar shall be sprayed off in the form of filler around the pipes. The R.C.C. NP3 pipe line shall run in perfect straight lines from manhole and shall be exactly to gradient. M/S shall be in RMT. Trenches shall not be filled in until the line has been tested and alignment and levels

are examined by the Engineer or his subordinates and the permission for refilling is granted.

Contractor shall be held responsible for any damage or defect to the pipe line in satisfactory working of the same for 12 months after it is put into commission, contractor must satisfy IS 458/1971 and IS 783/1959 with reference to RCC pipe.

#### **Item No.69**

Constructing Bombay Pattern Type Catch Pit of size 0.60 x 0.60 depth up to 1 mt including excavation, B.B.C.C. (1:5:10), 23 cms thick brick maso. wall in the prop. of CM (1:6) with 40 mm thick IPS flooring in the prop M15 at bottom and 15 mm thick cement plaster inside the catch pit in the proportion of CM (1:3) with out jali etc. comp. as directed.

Catchpit shall be provided at every change of alignment, gradient or diameter of storm water drains, Bends and junctions in the sewer / drain shall be grouped together in chamber as far as possible. The maximum distance between inspection chambers shall be about 25 meters. Where the diameter of sewer/ drain is increased, the soffit of the pipe shall be fixed at the same level and necessary slope given to the channel of manhole/inspection chamber. The minimum internal sizes of manhole/inspection chamber shall be as per the respective item of work. The manhole/inspection chambers shall be constructed as per the detailed drawings and as directed by Engineer. The bed concrete and the brick masonry shall be constructed of such thickness as

shown on drawing. The brick masonry shall be constructed in C.M. (1:5), plastered on both faces with 15 mm cement plaster in C.M. (1:3). The channel shall be semicircular in the bottom half and of diameter equal to the sewer/drain. Above the horizontal diameter, the sides shall be extended vertically to the same level as the crown of the outgoing pipe and the top edge shall be suitable rounded off. The branch channels shall also be similarly constructed with respect to the benching out at their junction with the main channel as appropriate fall suitable rounded off in the direction of flow in the main channel shall be given. The channel at the bottom of manhole/inspection chamber shall be plastered with C.M. (1:3) and finished smooth. Rungs shall be provided in all manholes/inspection chambers over 0.6 mtr in depth and shall be of cast iron conforming to IS:5455. These rungs shall be fixed staggered in two vertical runs, 300 mm apart horizontally and 300 mm c/c vertically. The top rung shall be 450 mm below the manhole/inspection chamber cover and the lowest not more than 300 mm above the benching. The manhole/inspection chamber framing and cover shall be of cast iron of specified weight and shall conform to the requirements given in IS:1726. The covers and frames shall be cleanly cast and they shall be free from air and sand holes and from clod shuts. They shall be neatly dressed and carefully trimmed. All castings shall be free from voids whether due to shrinkage, gas inclusion or other causes. Covers shall have a raised chequered design on the top surface to provide an adequate nonslip grip. Cover shall be capable of easy opening and closing and it shall be fitted in the frame in workmanship like manner. The cover shall be gas tight and watertight. The size of covers specified shall be considered as the clear internal dimensions of the frame. Covers and frames shall be coated with a black bituminous composition. The coating shall be smooth and tenacious. The frame of manhole/inspection chamber cover shall be firmly embeded to correct alignment and level in cement concrete on the top of the masonry. The item shall be executed as per the detailed drawing and as directed by Engineer

Mode of measurements & payment: The rate shall be for a unit of Nos

#### **Item No.70**

CatchPit Jali Fixing P/F FRC catch pit jali with frame 600mm x 600mm clear opening etc. comp.. As directed by engineer in charge.

Carting and Fixing M.H., Chamber or Catch pit Seat and Cover in line and level to match existing road level in C.C. 1:2:4 and finishing smooth, watering and protecting for 7 days etc. complete as directed.

Mode of measurement:- The rate shall be for a unit of one number basis

**Note:- I HAVE ALSO GONE THROUGH TECHNICAL SPECIFICATIONS FOR THE ITEMS AND UNIT (AS PER STANDARD P.W.D. TECHNICAL SPECIFICATION FOR THE ITEMS & UNIT AND ALSO I HAVE THE BOOK OF THE SAME) AND AGREE TO ABIDE BY THEM. IN CASE OF WHERE THERE IS NO TECHNICAL SPECIFICATION FOR THE ANY ITEMS AVAILABLE, SPECIFICATION GIVEN BY THE ENGINEER-IN -CHARGE / MANUFACTURER'S STANDARD SPECIFICATION SHALL BE FOLLOWED AND FOR THE SAME I AGREE TO ABIDE BY THEM.**

**Contractor Sign:**

**Date:**