



Gujarat University

TECHNICAL SPECIFICATIONS

CIVIL AND ALLIED WORKS

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**Tender Document
For**

**Extension of IAS Training center and other
department
at Gujarat University.**

SPECIFICATIONS OF MATERIALS

M-1. Water

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

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.

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

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

Hard and bitter water shall not be used for curing

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

M-2. Lime

Lime shall be hydraulic lime as per I.S. 712-1973 Necessary tests shall be carried out as per I.S. 6932 (Parts I to X) 1973

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

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

Storage shall comply with J.S. 712-1973 The slaked lime, if stored, shall be kept in a weather proof and damp- proof shed with impervious floor and sides to protect it against rain, moisture, weather and extraneous materials mixing with it. All lime that has been damaged" in any way shall be rejected and all rejected materials shall be removed from site of work.

Field testing shall be done according to IS 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 IS. 455-1976

M-4. White Cement

- 4.1. The white cement shall conform to I S. 8042-E-1978.,

M-5. Coloured Cement

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

The pigments used for coloured cement shall be of approved quality and shall not exceed 10% of cement used in the mix. The mixture of pigment add cement shall be properly ground to have a uniform colour and shade.

The pigments shall have such properties to provide for durability underexposure to sunlight and weather.

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

M-6 Sand

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

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

| I.S. Designation | Sieve passing sieve | Percentage by weight Designation | I.S. Sieve Percentage by weight passing Sieve |
|--|------------------------------------|----------------------------------|---|
| 4.75 mm | 100 | 600 micron | 30-100 |
| 2.36 mm | 90 to 100 | 300 micron | 50-70 |
| 1.18 mm | 70 to 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. Designation | Percentage by weight Sieve passing | I.S. Designation | Percentage by weight Sieve passing |
| 4.75 mm | 100 | 600 micron | 40-85 |
| 2.36 mm | 100 | 300 micron | 5-50 |
| 1.18 mm | 75 to 100 | 150 micron | 0-10 |

M-7. Stone Dust

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

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

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

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

M-8. Stone Grit

Grit shall consist of crushed or broken stone and be hard, strong, dense, durable, clean of proper gradation and free from skin or coating likely to prevent proper adhesion of mortar Grit shall generally be cubical in shape and as far as possible flakey elongated pieces shall be avoided. It shall generally comply with the provisions of I.S. 383-1970.

Unless special stone of particular quarries is mentioned grit shall be obtained from the best black trap or equivalent hard stone as approved by the Engineer-in-charge. The grit shall have no deleterious with cement.

The grit shall conform to the following gradation as per sieve analysis :

| IS sieve designation | Percentage by weight | I.S. Sieve designation | Percentage by weight |
|----------------------|----------------------|------------------------|----------------------|
| 12.50 mm | 100% | 4.75 mm | 0-20% |
| 10 mm | 85-100% | 2.36 mm | 0-25% |

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

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

M-9. Cinder

Cinder is will burnt furnace residue which has been fused or sintered into lumps of varying sizes
Cinder aggregates shall be well burnt furnace residue obtained from furnace using coal fuel only It shall be sound clean and Free from clay Dirt ash or other deleterious matter as mentioned below

| | | |
|------------------|--|------------------|
| | The average grading for cinder aggregates shall be | |
| I.S. Designation | Percentage by weight Sieve passing | I.S. Designation |
| 20 mm 10 | 100 86 | 4.75 mm 2.36 mm |

M-10. Lime Mortar

Lime : Lime shall conform to specification M-2, Water: Water shall conform to specification M-1 and Sand: Sand shall conform to specification M-6

Proportion of Mix:

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

10.3. Preparation of mortar;

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

10.4. Storage:

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

10.5. Use:

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

M-11. Cement Mortar

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

11.2. Proportion of Mix

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

11.3. Proportion of Mortar :

In hand mixed mortar, cement and sand in the specified proportions shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3 times or more till a homogeneous mixture of uniform colour is obtained.

Mixing platform shall be so arranged that no deleterious extraneous material shall get mixed with mortar or mortar shall flow out. While mixing, the water shall be gradually added and thoroughly mixed to form a stiff plastic mass of uniform colour so that each particle of sand shall be completely covered with a film of wet cement. The water cement ratio shall be adopted as directed

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

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

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

However, in case of reinforced cement concrete the maximum limit may be restricted to 6 mm. less than the minimum lateral clear distance between bars or 6- mm. less than the cover whichever is smaller.

| IS Sieve Designation | Percentage passing for Single sized of aggregate of nominal size | | |
|----------------------|--|--------|--------|
| | 40mm | 20mm | 16mm |
| 80mm | - | - | - |
| 63mm | 100 | - | - |
| 40mm | 85-100 | 100 | - |
| 20 mm | 0-20 | 85-100 | 100 |
| 16mm | - | - | 85-100 |
| 12.5mm | - | - | - |
| 10 mm | 0.5 | .02 | 0.3 |
| 4.75 mm | - | 0.5 | 0.5 |
| 2.35 mm | - | - | - |

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

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

M-13. Black Trap or Equivalent Hard Stone Coarse

Aggregate For Design Mix Concrete .

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

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

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.

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

M-14. Brick Bats Aggregate

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

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

M-15. Bricks

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

The bricks shall be- moulded with a frog of 100 mm. x 40 mm. and 10 mm. to 20 mm. deep on one of its flat sides. The bricks shall not break when thrown on the ground from a height of 600 mm.

- 15.2. The size of modular bricks shall be 190 mm.x 90 mm.x 90 mm.

- 15.3. The size of the conventional bricks shall be as under:

(9" x 4.3/8" x 2.3/4") 225 x 110 x 75 mm.

- 15.4. Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the conventional size adopted in a particular work.

Length + 1/8" (3.0 mm.) Width \pm 1/16" (1.50 mm.) Height + 1/16" (1.50 mm.)

- 15.5. The crushing strength of the bricks shall not be less than 35 Kg/Sq. Cm. The average water absorption shall not be more than 20 percent by weight Necessary tests for crushing strength and water absorption etc. shall be carried out as per I.S. 3495 (Part-I to IV) -1976

M-16. Stone

The stone shall be of the specified variety such as Granite/Trap Stone/ Quartzite or any other type of good hard stones. The stones shall be only from the approved quarry and shall be hard sound, durable and free from defects like cavities, cracks, sand holes, flaws injurious veins, patches of loose or soft materials etc., and weathered portions and other structural defects Or imperfections tending to affect their soundness and strength. The stone with round surface shall not be used. The percentage of water absorption shall not be more than 5% of dry weight. When tested in accordance with I.S. 1124-1974. The minimum crushing strength of stone shall be 200 Kg/.Sq. Cm. unless otherwise, specified

The samples of the stone to be used shall be got approved before the work is started

The Khanki facing stone shall be dressed by chisel as specified in the item for khanki facing in required

shape and size. The face of the stone shall be-so dressed that the bushing on the exposed face shall not project by more than 40 mm. from the general wall surface and on face to be plastered it shall not project by more than 19 mm. nor shall it have depressions more than 10 mm. from the average wall surface

M-17. Laterite Stone

Laterite stone shall be obtained from the approved quarry it shall be compacted in texture sound, durable and free from soft patch. It shall have minimum crushing strength of 100 Kg/Sq. Cm. in its dry condition. It shall not absorb water more than 20% of its own weight, when immersed for 24 hours in water. After quarrying, the stone shall be allowed to weather for some time before using in work.

The stone shall be dressed into regular rectangular blocks so that all faces are free from waviness and unevenness, and the edges true and square

Those types of stone in which white clay occurs should not be used

Special corner stones shall be provided where so directed.

M-18. Mild Steel Bars

Mild steel bars reinforcement for R.C C. work shall conform to I.S. 432 (Part -II) 1966 and shall be of tested quality. It shall also comply with relevant part of I.S. 456-1978.

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

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

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

M-19. High Yield Strength Steel Deformed Bars

19.1. High yield strength steel deformed bars shall be either cold twisted other rolled and shall conform to I.S. 1786- 1966 and I.S. 1139-1966 respectively.

19.2. Other provisions and requirements shall conform to specification No. M-18 for Mild Steel Bars.

M-20. High Tensile Steel Wires

20.1. The high tensile wires for use in pre stressed concrete work shall conform to I.S,2090-1962.

20.2. The tensile strength of the high tensile steel bars shall be as specified in the item. In absence of the given strength the minimum strength shall be taken as per Para 6-1 of the I.S. 1785-1962. Testing shall be done as per I.S. requirements.

20.3. The high tensile steel shall be free from loose mill scale, rust, oil, grease, or any other harmful matter.

Cleaning of steel bars may be carried out by immersion in solvent solution, wire brushing or passing through a pressure box containing Carborundum

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

M-21. Mild Steel Binding Wire

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

M-22. Structural Steel

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

M-23. Galvanised Iron Sheets

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

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

- 23.A.1. The G.I. ridges and hips shall be of plain galvanised sheets Class - 3 of the thickness as specified in item. These shall be 600 mm. in width and properly bent up to shape without damage to the sheets in process of bending.
- 23.A.2. Valleys gutters and flashings shall also be of galvanised sheet of thickness as specified in item Valleys Shall be 900 mm. wide overall and flashing shall be 380 mm. wide overall They shall be bent to the required shape without damage to the sheet in the process of bending.

M-24. Asbestos Cement Sheets

- 24.1. Asbestos cement sheets plain, corrugated of semi-corrugated shall conform to I.S.459-1970. The thickness of the sheets shall be as specified in the item. The sheets shall be free from all defects such as cracks, holes, deformities chipped edges or otherwise damaged.
- 24.2. **Ridges & Hips :**
 - 24.2.1. Ridges and hips shall be of same thickness as that of A.C. sheets. The types, of ridges shall be suitable for the type of sheets and location.
 - 24.2.2. Other accessories to be used in roof such as flashing pieces eaves filler pieces, valley gutters, north light, and ventilator curves, barge boards etc, shall be of standard manufacture and shall be suitable for the type of sheets and location.

M-25. Manglore 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 samples of the tiles to be provided shall be got approved from the Engineer-in-charge. Necessary tests shall be carried out as directed.

M-26. Shuttering

- 26.1. The shuttering shall be either of wooden planking of 30 mm. minimum thickness with or without steel lining or of steel plates stiffened by steel angles The shuttering shall be supported on battens and beams and props of vertical bullies properly cross braced together so as to make the centering rigid. In places of bullies props, brick pillar of adequate section built in mud mortar may be used
- 26.2. The form work shall be sufficiently strong and shall 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 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 bulbies having 100 mm minimum diameter measured at mid length and 80 mm. at thin end shall be placed as per design requirement. These shall rest squarely on wooden sole plates 40 mm. thick and minimum bearing area of 0-10 sq m laid on sufficiently hard base.
- 26.5. Double wedges shall further be provided between the sole plate and the wooden props so as to facilitate tightening and easing of shuttering without jerking the concrete.
- 26.6. The timber used in shuttering shall not be so dry as to absorb water from concrete and swell or bulge nor so green or wet as to shrink after erection. The timber shall be properly sawn and planed on the sides and the surface coming in contact with concrete. Wooden form work with metal sheet lining or steel plates stiffened by steel angles shall be permitted.
- 26.7. As far as practicable, clamps shall be used to hold the forms together and use of nails and spikes avoided.
- 26.8. The surface of timber shuttering that would come in contact with concrete shall be well wetted and coated with soap solution before the concreting is done. Alternatively coat of raw linseed oil or oil of approved manufacture may be applied in place of soap solution. In case of steel shuttering either soap solution or raw linseed oil shall be applied after thoroughly cleaning the surface. Under no circumstances black or burnt oil shall be permitted.
- 26.9. The shuttering for beams and slabs shall have camber of 4 mm per meter (1 in 250) or as directed by the Engineer-in-charge so as to offset the subsequent deflection. For cantilevers, the camber at free end shall be 1 /50 of the projected length or as directed by the Engineer-in-charge.

M- 27. Expansion Joints - Premoulded filler

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

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

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

M-29. Teak wood

- 29.1. The teak wood shall be of good quality as required for the item to be executed. When the kind of wood is not specifically mentioned, good Indian teak wood as approved shall be used.
- 29.2. Teak wood shall generally be free from large, loose dead or cluster knots, flaws, shakes, warps, twists, bends or any other defects. It shall generally be uniform in substance and of straight fibers as far as possible. It shall be free from rot decay, harmful fungi and other defects of harmful nature which will affect the strength, durability or its usefulness for the purpose for which it is required. The colour shall be uniform as far as possible. Any effort like painting using any adhesive materials made to hide the defects

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

M-29.7 A Non-teak wood:

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

For this purpose wood of Bio, Kalai, Sires. Saded, Behda, Jamun, Sisoo will be used for door where as only Kalai. Sires, Halda. Kalam etc. will be permitted for shutters after proper seasoning and chemical treatment.

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

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

- 30.1. The solid core type flush door shutters shall be of decorative or non-decorative type as specified in the drawing. The size and thickness of the shutter shall be as specified in drawings or as directed. The timber species for core shall be used as per I.S.2202 (part -I) 1980. The timber shall be free from decay and insect attack Knots and knot holes less than half the width of cross-section of the members in which they occur may be permitted. Pitch pockets, pitch streaks and harmless pin holes shall be permissible except in the exposed edges of the core members. The commercial plywood, cross-bands shall conform to I.S. 303-1275
- 30.2. The face-pane! 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. The¹ hopping, rebating, opening of glazing, venation etc., shall be provided if specified in the drawing.
- 30.3. All edges of the door shutters shall be square. The shutters shall be free from twist or warp in its plane. Both faces of the shutters shall be sand papered to smooth even texture.
- 30.4. The shutters shall be tested for-

- (1) **End immersion test:** The test shall be carried out as per I.S.2202 (part-1) 1980. There shall be no delamination at the end of the test.
- (2) **Knife Test:** The face panel when tested in accordance with I.S 1659-1979 shall pass the test.
- (3) **Glue adhesion test :** The flush door shall be tested for glue adhesive test in accordance with I S 2202 (part -I) 1980. The shutters shall be considered to have passed the test, if no delamination occurs in the glue lines in the plywood and if no single determination more than 80 mm in length and more than 3 mm in depth has occurred in the assembly glue lines between the plywood face and the style and rail.

- Delamination at the corner shall be measured continuously around the corner Delamination at the knots, knot hole and other permissible wood defectects shall not be considered in assessing the sample.
- 30.5. The tolerance in size of scud core type flush door shall-be as under:
In Nominal thickness ± 1.2 mm. In Nominal height ± 3 mm
- 30.6. The thickness of the shutter shall be uniform throughout with a permissible variation of not more than 0.8 mm when measured at any points.

M-31. Aluminum doors, windows, ventilators

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

M-32. Rolling Shutters

- 32.1. The rolling shutters shall conform to I.S.6248-1979 Rolling shutters shall be supplied of specified type with accessories. The size of the rolling shutters shall be specified in the drawings. The shutters shall be specified in the drawings. The shutters shall be constructed with interlocking lath sections formed from cold rolled steel strips not less than 0.9 mm. thick and 80 mm. wide for shutters up to 3.5 m .width not less than 1.25 mm. thick and 80 mm wide for shutters 3.5 m. in width and above unless otherwise specified.
- 32.2. Guide channels shall be of mild steel deep channel section and of rolled pressed or built up (fabricated) joint less construction The thickness of sheet used shall not be less than 3 15 mm.
- 32.3. Hood covers shall be made of M S. Sheets not less than 0.90 mm. thick. For shutters having width 3.5 Meter and above, the thickness of M.S. sheet for the hood cover shall be not less than 1 25 mm.
- 32.4. The spring shall be of best quality and shall be manufactured from tested high tensile spring steel wire of strip of adequate strength to balance the shutters in all position. The spring pipe shaft etc. shall be supported on strong M S of malleable C I. brackets. The brackets shall be fixed on or under the lintel as specified with-raw plugs and screws bolts etc.
- 32.5. The rolling shutters shall be of self rolling up to 8 Sq. m. clear area without ball bearing and up to 12 Sq.m. clear area with ball bearing. If the rolling shutters are of larger, then gear operated type shutters shall be used.
- 32.6. The locking arrangement shall be provided at the bottom of shutter at both ends. The shutters shall be opened from outside.
- 32.7. The Shutters shall be completed with door suspension shafts, looking arrangements, pulling hooks, handles and other accessories.

M-33. Collapsible Steel Gate

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

M-34. Welded Steel Wire Fabric

- 34.1 Welded steel wire fabric for general purpose shall be manufactured from cold drawn steel wire "as drawn" or galvanized steel conforming to I.S. 226-1975 with longitudinal and transverse wire securely connected at every intersection by a process of electrical resistance welding and conforming to I.S. 4948-1974. It shall be fabricated and finished in workmanlike manner and shall be free from injurious defects and shall be rust proof. The type of mesh shall be oblong or square as directed. The mesh sizes and sizes of wire for square mesh 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 sizes permit.

M-35 Expanded Metal Sheets

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

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

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

M-37. Plywood

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

| Board | Thickness | Board | Thickness | Board | Thickness | Board | Thickness | Board | Thickness |
|-------|-----------|-------|-----------|-------|-----------|-------|-----------|--------|-----------|
| 3 Ply | 3 mm | 5 Ply | 5 mm | 7Ply | 9 mm | 9 Ply | 13mm | 11 Ply | 19 mm |
| | 4 mm | | 6 mm | | 13 mm | | 16 mm | | 22 mm |
| | 5 mm | | 8 mm | | 16 mm | | 19 mm | | 25 mm |
| | 6 mm | | 9 mm | | | | | | |

M-38. Glass

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

38.2. Sheet Glass

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

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

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

38.3. Plate Glass:

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

38.4. Obscured Glass:

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

38.5. Wired Glass:

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

M-39. Acrylic Sheets

39.1. Acrylic sheets shall be of thickness as specified in the item and of an specified shape and size as the case may be panels may be flat or curved It should be light in weight it shall be colour less or coloured or opaque as specified in the item. Colour less sheet shall be as transparent as the finest optical glass. Its light transmission rate shall be about 95% Transparency shall not be affected for the sheets of larger thickens, it shall be extremely resistant to sunlight weather and low temperatures.

It shall not 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 of such quality

that they can be cut, bent jointed as desired. Solution for the joints shall be used as per the requirement of manufacturer.

M-40. Particle board

- 40.1. The particle boards used for face panels shall be of best quality free from any defects. "The particle boards shall be made with phenolmaldehyde adhesive. The particle boards shall conform I S 3087-1905" Specification for wood particle board for general purpose" The size and the thickness shall be as indicated.

M-41. Expanded polystyrene or framed styrofoam slabs

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

M-42. 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 Mineral wool thermal insulation [Blanket I S 3144-1965 shall be followed
- 42.3. Insulation wool blanks shall be with the following coverings on one or both sides as indicated
- (1) Bituminous Hessian Kraft paper suitable for use in position where moisture has to be excluded.
 - (2) Hessian cloth or Kraft paper for keeping out dust
 - (3) G.I wire netting, suitable for surfaces to be plaster over

M-43. Fixtures and fastenings

43.1. General:

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

43.2. Holdfasts:

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

43.3. Butt hinges:

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

43.4. Sliding door bolts (Aldrops):

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

43.5. Tower bolts (Barrel Type):

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

43.6. Door Latch:

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

43.7. Bathroom Latch:

43.7.1. Bathroom latch shall be similar to tower bolt.

43.8. Handle:

The size of the handles shall be determined by the inside grip length of the handles. Handles shall have a base plate of length 50 mm. more than the size" of the handle.

43.9. Door Catch:

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

43.10. Door Stoppers:

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

43.11. Wooden Door Stop with hinges:

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

43.12. Casement Window Fastener:

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

43.13. Casement stays (Straight Red Stay):

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

43.14. Ventilator Catch:

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

43.15. Pivot:

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

M-44. Paints:

44.1. (A) Oil paints:

44.1.1. Oil paints shall be of the specified colour and as approved The ready mixed paints shall only be used.

However, if ready mixed paint of specified shade or tint is not available white ready mixed paint with approved stainer will be allowed. In such a case the contractor shall ensure that the shade of the paint so allowed shall be uniform.

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

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

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

44.2. (B) Enamel paints:

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

M-45. French Polish

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

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

45.2. The French polish so prepared shall conform to IS: 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 homogeneous in texture with crystalline and coarse grains. It shall be uniform in colour and free from stains, cracks, decay and weathering.

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

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

M-47. Flooring Tiles

47.1. (A) Plain Cement tiles;

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

47.1.2. The tiles shall be manufactured from a mixture of cement and natural aggregates by pressure process. During manufacture the tiles shall be subjected to pressure of not less than 140 Kg/Sq. Cm. The proportion of cement to aggregate in the backing of the tiles shall be not less than 1 : 3 by weight. The wearing face, through the tiles are of plain cement, shall be provided with stone chips

of 1 to 2 mm. size. The proportions of cement to aggregate in the wearing layer of the tiles shall be three parts of cement to one parts chips by weight. The minimum thickness of wearing layer shall be 3 mm. The colour and texture of wearing layer shall be uniform throughout its face and thickness. On removal from mould, the tiles shall be kept in moist condition continuously at least for seven days and subsequently, if necessary, for such long period as would ensure their conformity to requirements of I.S.1237-1980 regarding strength resistance to wear and water absorption.

- 47.1.3** The wearing face of the tiles shall be plane, free from projections, depressions and cracks and shall be reasonably parallel to the back face of the tile. All angles shall be right angle and all edges shall be sharp and true.
- 47.1.4.** The size of tiles generally be square shapes 24.85 Cm x24.85 Cm. or 25 Cm x 25 Cm The thickness of tiles shall be 20 mm.
- 47.1.5.** Tolerance of length and breadth shall be plus or minus one millimeter Tolerance on thickness shall be plus 5mm.
- 47.1.6.** The tiles shall satisfy the tests as regards transverse strength, resistance to wear and water absorption as per I.S 1237-1980.

47.2. (B) Plain Coloured Tiles:

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

47.3. (C) Marble mosaic tiles:

- 47.3.1.** These tiles have same specification as per plain cement tiles except the requirements as stated below
- 47.3.2.** The marble mosaic tiles shall conform to I.S 1237-1980. The wearing face of the tiles shall be mechanically ground and filled. The wearing face of tiles shall be free from projections depressions and cracks and shall be reasonably parallel to the back face of the tiles. All angles shall be right angles and all edges shall be sharp and true.
- 47.3.3.** Chips used in the tiles be from smallest up to 20 mm. size. The minimum thickness of wearing layer of tiles shall be 6 mm. For pattern of chips to be had on the wearing face a few samples with or without their full size photographs as directed shall be approved by the Engineer-in-charge, for approval.
- 47.3.4.** Any particular samples if found suitable shall be approved by the Engineer-in-charge, or he may ask for a few more samples to be presented The samples shall have to be made by the contractor till a suitable sample is finally approved for use in the work. The Contractor shall ensure that the tiles supplied for, the work shall be in conformity with the approved sample only, in terms of its dimensions, thickness of backing layer and wearing surface, materials, ingredients, colour, shade, chips, distribution etc. required.
- 47.3.5.** The tiles shall be prepared from cement conforming to Indian Standards or coloured port land cement generally depending upon the colour of tiles to be used or as directed.

47.4. (D) Chequered Tiles:

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

- 47.4.2.** The tiles shall be of nominal size of 250 mm. x 250 mm. or as specified. The centre to centre distance of chequer shall not be less than 25 mm. and not more than 50 mm. The overall thickness of the tile shall be 22 mm
- 47.4.3.** The grooves in the chequers shall be uniform and straight. The depth of the grooves shall not be less than 3 mm. The chequered tiles shall be plain coloured or mosaic as specified The thickness of the upper layer measured from the top of the chequers shall not be less than 6 mm. The tiles shall be given the first grinding with machine before delivery to site
- 47.4.4.** Tiles shall conform or relevant I.S 1237-1980.47.5.

47.5 Chequered Tiles For Stair Cases :

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

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

M48 Rough Kotah Stone

- 48.1. The Kotah stones shall be hard even, sound, and regular in shape and generally uniform in colour. The colour of the stone shall generally be green Brown coloured shall not be allowed for use They shall be without any soft veins, cracks or flaws.
- 48.2. The size of the stones to be used for flooring shall be of size 600 mm x 600 mm and/or size 600 mm. x 450 mm as directed However smaller sizes will be allowed to be used to the extent of maintaining required pattern. Thickness shall be as specified
- 48.3. The edges of stones shall be 30 mm on accounts of chisel dressing of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be + 3 mm
- 48.4. The edges of stones shall be truly chiseled and table rubbed with coarse sand before paving. All angles and edges of the stones shall be true, square and free from chipping and surface shall be true and plain
- 48.5. When machine cut edges are specified, the exposed 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 Stone

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

M-50. Dholpur Stone Slab

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

M-51. Marble Slab

- 51.1. Marble slab shall be white or of other and of best quality as approved by the Engineer-in-charge.
- 51.2. Slabs shall be hard, close, uniform and homogeneous in texture. They shall have even crystalline grain and be free from defects and cracks. The surface shall be machine polished to an even and perfect plane surface and edges machine cut true and square. The rear face shall be rough to provide key for the mortar.
- 51.3. Marble slabs with natural veins, if selected, shall have to be laid as per the pattern given by the Engineer-in-charge. Size of the slab shall be minimum 460 mm x 450 mm and preferably 600 mm x 600 mm. However, smaller sizes will be allowed to be used to the extent of maintaining required pattern.
- 51.4. The slab shall not be thinner than the specified thickness at its thinnest part. A few specimens of finished slab to be used shall be deposited by the Contractor in the office for reference.
- 51.5. Except as above, the marble slabs shall conform to I.S. 1130-1969.

M-52. Granite Stone slab

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

M-53. P.V.C. Flooring

- 53.1. P.V.C. sheets for P.V.C. floor covering shall be of homogeneous flexible type conforming to I.S. 3462-1966. The P.V.C. covering shall neither develop any toxic effect while put to use nor shall give off any disagreeable odour.
- 53.2. Thickness of flexible type covering tiles shall be as specified in the description of the item.
- 53.3. The flexible type shall be backed with Hessian or other woven fabric. The following tolerances shall be applicable on the nominal dimensions of the rolls or tiles :
 - (a) Thickness + 0.15 mm.
 - (b) Length or Width

- | | | | | | |
|-----|----------------------|------------|-----|---------------------|----------------|
| (1) | 300 mm. Square tiles | +0.20 mm. | (3) | 900 mm Square tiles | +0.60 mm. |
| (2) | 600 mm. Square tiles | + 0.40 mm. | (4) | Sheets and roll | +0.10 percent. |

53.4. Adhesive:

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

M-54. Facing Tiles

- 54.1. The facing tiles (burnt clay facing bricks) shall be free from cracks, and nodules of free lime. They shall be thoroughly burnt and shall have plane rectangular faces with parallel sides and sharp straight right angled faces. The texture of the finished surface that will be exposed when in place shall conform to an approved sample consisting not less than for stretcher bricks each representing the texture desired. The facing tiles shall have a pleasing appearance, sufficient resistance to penetration by ram and greater durability than common bricks. The tiles shall conform to I.S. 2691-1972.
- 54.2. The standard size of facing brick tiles shall be 19 x 9 x 4 cms. The facing brick tiles shall be provided with frog which shall conform to I.S. 11077-1976.

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

| Size | Tolerance for | |
|-------|-----------------------------|-----------------------------|
| | 1 st Class Brick | 2 nd Class Brick |
| 19 cm | + 6 mm | + 10 mm |
| 9 cm | + 3 mm | + 7 mm |
| 4 cm | + 1.5 mm | + 3 mm |

| The tolerance for distortion or warpage respectively shall be as | of face or edges of individual brick from a plane surface and from a straight line |
|--|--|
| Facing dimensions | Permissible tolerance |
| Max. below 19 cms. - do- above 19 cms. | Max. 2.5 mm. Max. 3.0 mm. |

- 54.5. The average compressive strength obtained as a sample of five tiles when tested in accordance with the procedure laid as per I S 1077-1976 shall be not less than 175 Kg/Sq Cm. The average compressive strength of any individual bricks shall be not less than 160 Kg / Sq.Cm.
- 54.6. The average water absorption for five bricks tiles shall not exceed 12 percent of average weight of brick before testing. The absorption for each individual bricks shall not exceed 25 percent.
- 54.7. The brick tiles when tested in accordance with I.S. 1077-1976, the rate of efflorescence shall not be more than "Slightly effloresced"

M-55. White glazed tiles

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

shall be of uniform shade.

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

M-56. Galvanised iron pipes and fittings

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

M-57. Bib cock and stop cock

- 57.1. A bib cock is a draw off tap with a horizontal inlet and free outlet A stop cock is a valve with suitable means of connection for insertion in a pipe line for controlling or stopping the flow
- 57.2. They shall be of screw down type and of brass chromium plated and of diameter as specified in the description of the item. They shall conform to I.S. 781-1977 and they shall be of best Indian make. They shall be polished bright.

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

| Diameter | Bib cock | Stop cock | Diameter | Bib cock | Stop cock |
|----------|----------|-----------|----------|----------|-----------|
| 8 mm | 0.25 kg. | 0.25 kg. | 15 mm | 0.40 kg. | 0.40 kg. |
| 10 mm | 0.30 kg. | 0.35 kg. | 20 mm | 0.75 kg. | 0.75 kg. |

M-58. Gun metal wheel valve

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

M-59. White glazed porcelain wash basin

- 59.1. Wash basin shall be of white porcelain first quality best Indian make and it shall conform to I.S. 2556 (Part -IV) -1972 and I.S. 771-1979. The size of the wash basin shall be as specified in item. Wash basin shall be of one piece construction with continued over flow arrangements All internal angles shall be designed so as to facilitate cleaning. Wash basin shall have single tap hole as specified. Each basin shall have a circular waste hole which is either riveted or beveled internally with 65 mm diameter at top and 10 mm. depth to suit the waste fitting. The necessary stud slot to receive the bracket on the underside of the basin shall be provided Basin shall have an internal soap holder which shall fully drain into the bowl.
- 59.2. White glazed pedestal of the quality and colour as that the basin shall be provided where specified in the item. It shall be completely recessed at the back for reception of supply and wash pipe. It shall be capable of supporting the basin rigidly and adequately and shall be so designed as to make the height from the floor the floor to top of the rim of basin 750 mm to 800 mm. as directed.

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

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

M-61. Orissa type water closet

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

M-62. Indian type water closet

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

M-62. A. Foot Rests

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

M-63. Glazed Earthen Ware Sink

- 63.1. The glazed earthen-ware sink shall be of specified size, colour and quality. They sink shall conform, to I.S. 771 part - II - 1979. The brackets for sinks shall conform to I.S 775-1970
- 63.2. The pipes shall conform to I.S. 1239-part-I 1973 and I.S. 404-1962 for steel and lead pipes respectively. 32 mm. brass waste coupling of standard pattern with brass chain and rubble plug shall be provided with sink.

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

- 64.1. The lipped type urinal shall be 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 of corner type urinal must be of 1st quality free from any defects, cracks etc.

M-65. Low level Enamel flushing tank

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

M-66. Cast iron flushing cistern.

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

M-67. Flush cock.

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

M-68. Cast iron pipes and fittings.

- 68.1. All soil water, vent and anti syphonage pipes and fitting shall conform to I S.1729-1964. The pipes shall have spigot and socket ends with head on spigot end. The pipes and fitting shall be true to shape smooth, cylindrical, their inner and outer surfaces being as nearly as practicable concentric. They shall be sound and nicely cast and shall be free from cracks, laps, pinholes or there imperfection and shall be neatly dressed and carefully fettled.
- 68.2. The end of pipes and fittings shall be reasonable square to their axis.
- 68.3. The sand of cast iron pipes shall be of the diameter as specified in the description and shall be in lengths of 1.5 M., 1.8 M. including socket ends of the pipe unless shorter lengths are either specified or required at junctions etc. The pipes and fittings shall be supplied without ears unless specified or directed otherwise.

68.4 Tolerances :

- 68.4.1. The Standard weights and thickness of pipes shall be as shown in the following table

A tolerance up to minus 10 per cent may however be -allowed against these standard weights

| Sr. No. | Nominal dia of Bore | Thickness of Pipe | Over all weight of Pipe excluding ears | | |
|---------|------------------------|----------------------|--|------------|----------|
| | | | 1.5 M Long | 1.8 m Long | 2M Long |
| 1 | 75mm | 5.0 mm | 12.83 Kg | 16.52 Kg | 18.37 Kg |
| 2 | 100mm | 5.0 mm | 18.14 Kg | 21.67 Kg | 24.15 Kg |

- 68.4.2. A tolerance up to minus 15 percent in thickness and 20 mm. length will be allowed for fittings tolerance in lengths shall be plus 25 mm. and minus 10 mm.
- 68.4.3. The thickness of fittings and their socket and spigot dimensions shall conform to the thickness and dimensions specified for the corresponding sizes of straight pipes. The tolerance in weights and thickness shall be the same as for straight pipes.

M-69. Nahani Trap

- 69.1. Nahani trap shall be of cast iron and shall be sound and free from porosity or other defects which affect serviceability The thickness of the base metal shall not be less than 6.5 mm The surface shall be smooth and free .form craze, chips and other flaws or any other kind of defects which affect serviceability The size of nahani trap shall be specified and shall be of self cleaning design.
- 69.2. The Nahani trap shall be of-quality approved by the Engineer-in-charge and shall generally conform to the relevant Indian Standards.
- 69.3. The Nahani trap provided shall be with deep seal, minimum 50 mm. except at places where trap with deep seal cannot be accommodated. The cover shall be cast iron perforated cover shall be provided on the trap of appropriate size.

M-70. Gully Trap

- 70.1. Gully trap shall conform to I.S. 651-1980. It shall be free from defects such as fire-cracks or hair cracks. The glaze of the traps shall be free from crazing. They shall give a sharp clear note when struck with light hammer. There shall be no broken blisters.
- 70.2. The size of the gully trap shall be as specified in the item.
- 70.3. Each gully trap shall have one C.I. grating of square size corresponding to the dimensions, of inlet of gully trap. It will also have a water tight C.I. cover with frame inside dimensions 300 mm. x 300 mm. the cover with frame inside dimensions 300 mm. x 300 mm. the cover and weighing not less than 4.53 Kg. and the frame not less than 2.72 Kg.
- The grating cover and frame shall be of sound and good casting and shall have truly square machined seating faces.

M 71. Glazed Stone Ware pipe and Fittings

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

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

M-72. Wall Peg Rail

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

M-73. G.I. Water Spot

- 73.1. The G.I. pipes of 40 mm dia shall be of medium quality and specials shall be of 'R' brand or equivalent brand of best approved quality
- 73.2. The pipe shall have length as required for the thickness of wall in which it is fixed and at outside end tee bend cut at half the length shall be provided and at other end coupling shall be provided to have better fixing. The water spout shall be provided as per detailed drawing or as directed

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

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

M-75. Crydon Ball valve

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

M-76. Bitumen Felt For Water proofing and Damp Proofing

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

M-77. Selected Earth

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

M-78. Barbed Wire

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

Item No. 01

Excavation for foundation in loose or soft soil upto 1.5 m. depth including sorting out and stacking of useful materials and disposing of the excavated stuff upto any lead. The rates shall be inclusive of any/all shoring, supporting of loose soil that may be needed as per codal requirements or site conditions or as per the Engineer-in-Charge's instructions. No additional amount shall be paid for dewatering.

EXCAVATION IN ALL KINDS OF SOILS

- 1 All excavation operations manually or by mechanical means shall include excavation and 'getting out' the excavated materials. In case of excavation for trenches, basements, water tanks etc. 'getting out' shall include throwing the excavated materials at a distance of at least one metre or half the depth of excavation, whichever is more, clear off the edge of excavation. In all other cases 'getting out' shall include depositing the excavated materials as specified. The subsequent disposal of the excavated material shall be either stated as a separate item or included with the items of excavation stating lead.
- 2 During the excavation the natural drainage of the area shall be maintained. Excavation shall be done from top to bottom. Undermining or undercutting shall not be done.
- 3 In firm soils, the sides of the trenches shall be kept vertical up to a depth of 2 metres from the bottom. For greater depths, the excavation profiles shall be widened by allowing steps of 50 cms on either side after every 2 metres from the bottom. Alternatively, the excavation can be done so as to give slope of 1:4 (1 horizontal : 4 vertical). Where the soil is soft, loose or slushy, the width of steps shall be suitably increased or sides sloped or the soil shored up as directed by the Engineer-in-Charge. It shall be the responsibility of the contractor to take complete instructions in writing from the Engineer-in-Charge regarding the stepping, sloping or shoring to be done for excavation deeper than 2 metres.
- 4 The excavation shall be done true to levels, slope, shape and pattern indicated by the Engineer-in-Charge. Only the excavation shown on the drawings with additional allowances for centering and shuttering or as required by the Engineer-in-Charge shall be measured and recorded for payment.
- 5 In case of excavation for foundation in trenches or over areas, the bed of excavation shall be to the correct level or slope and consolidated by watering and ramming. If the excavation for foundation is done to a depth greater than that shown in the drawings or as required by the Engineer-in-Charge, the excess depth shall be made good by the contractor at his own cost with the concrete of the mix used for levelling/ bed concrete for foundations. Soft/defective spots at the bed of the foundations shall be dug out and filled with concrete (to be paid separately) as directed by the Engineer-in-Charge.
- 6 While carrying out the excavation for drain work care shall be taken to cut the side and bottom to the required shape, slope and gradient. The surface shall then be properly dressed. If the excavation is done to a depth greater than that shown on the drawing or as required by the Engineer-in-Charge, the excess depth shall be made good by the contractor at his own cost with stiff clay puddle at places where the drains are required to be pitched and with ordinary earth, properly watered and rammed, where the drains are not required to be pitched. In case the drain is required to be pitched, the back filling with clay puddle, if required, shall be done simultaneously as the pitching work proceeds. The brick pitched storm water drains should be avoided as far as possible in filled-up areas and loose soils.
- 7 In all other cases where the excavation is taken deeper by the contractor, it shall be brought to the required level by the contractor at his own cost by filling in with earth duly watered, consolidated and rammed.
- 8 In case the excavation is done wider than that shown on the drawings or as required by the Engineer-in-Charge, additional filling wherever required on the account shall be done by the contractor at his own cost.
- 9 The excavation shall be done manually or by mechanical means as directed by Engineer-in-charge

considering feasibility, urgency of work, availability of labour /mechanical equipments and other factors involved. Contractor shall ensure every safety measures for the workers. Neither any deduction will be made nor will any extra payment be made on this account.

10 Mode of measurements & Payment

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

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

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

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

The rate shall be measured and paid for a unit of one cubic meter

Item No. 02

Excavation for foundation in loose or soft soil from 1.5 mt.to 3.0 mt. depth including sorting out and stacking of useful materials and disposing of the excavated stuff upto any lead. The rates shall be inclusive of any/all shoring, supporting of loose soil that may be needed as per codal requirements or site conditions or as per the Engineer-in-Charge's instructions. No additional amount shall be paid for dewatering.

- 1 The relevant specifications or item No.1 shall be followed except that the excavation work shall be carried out for Depth from 1.5 M. to 3.0 M.

2 Mode of Measurement & Payment

The relevant specifications of item No. 1 shall be followed.

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

The rate shall be for a unit of one cubic meter

Item No. 03

Excavation for foundation in loose or soft soil from 3.0 mt.to 5.0 mt. depth including sorting out and stacking of useful materials and disposing of the excavated stuff upto any lead. The rates shall be inclusive of any/all shoring, supporting of loose soil that may be needed as per codal requirements or site conditions or as per the Engineer-in-Charge's instructions. No additional amount shall be paid for dewatering.

- 1 The relevant specifications or item No.1 shall be followed except that the excavation work shall be carried out for Depth from 3.0 M. to 5.0 M.

2 Mode of Measurement & Payment

The relevant specifications of item No. 1 shall be followed.

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

The rate shall be for a unit of one cubic meter

Item No. 04

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

Workmanship

- (i) The earth to be used for filling shall be free from salts, organic or other foreign matter. All clods of earth shall be broken.
- (ii). As soon as the work in foundation has been completed and measured the site of foundation shall be cleared of all debris, brick bats: mortar dropping etc., and filled with earth in layers not exceeding 20 cms. Each layer shall be adequately watered, rammed and consolidated before the succeeding layer is laid The earth shall be rammed with iron rammers where feasible and with the but ends of crow-bars, where rammer cannot be used.
- (iii) The plinth shall be similarly filled with earth in layers not exceeding 20 cms adequately watered and consolidated by ramming with iron or wooden rammers. When filling reaches finished level the surface shall be flooded with water for at least 24 hours and allowed to dry and then rammed and consolidated.
- (iv) The finished level of filling shall be kept to shape intended to be given to floor.
- (V) In case off large heavy duty flooring like factory flooring, the consolidation may be done by power rollers, where so specified. The extent of consolidation required, shall also be as specified.
- (vi) The excavated stuff of the selected type shall be allowed to be used in filling the trenches and plinth. Under no circumstances black cotton soil be used for filling the plinth.

Mode of Measurements & Payment

The payment shall be made for filling in plinth and trenches. No deduction shall be made for shrinkage or voids, if consolidated as instructed above.
The rate shall be for a unit of one cubic meter.

Item No. 05

FILLING in plinth with SAND under floors including watering, ramming consolidating and dressing etc. complete.

Materials

Sand shall conform to M 6.

Workmanship

The relevant specifications of item No. 3 shall be followed except that sand shall be filled in under floors, including watering, ramming, consolidating and dressing etc , complete.

Mode of Measurements & Payment

The relevant specifications of item No. 3 shall be followed.
The rate includes cost of collecting, carting sand with all lead and labour for filling the same in plinth under floors. The rate shall be for a unit of one cubic meter.

Item No.06

Filling in foundation and plinth with murrum or selected soil brought from out side in layer of 20 cm. the. including watering ramming and consolidating etc. complete.

Materials

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

Workmanship

The relevant specifications of item No. 2 shall be followed except that the murrum or selected soil

shall be filled in foundations and plinth in 20 cms layer including consolidating, ramming, watering, dressing etc. complete

Mode of Measurements & Payment

The relevant specifications of item No. 3 shall be followed-

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

Rate shall be for a unit of one cubic met

Item No.07

Providing and applying general insecticide Pest Control treatment to floors, doors, cupboards, including labours, materials etc. complete as directed by EIC.

Sub-terranean termites are responsible for most of the termite damage in buildings. Typically, they form nests or colonies underground. In the soil near ground level in a stump or other suitable piece of timber in a conical or dome shaped mound. The termites find access to the super-structure of the building either through the timber buried in the ground or by means of mud shelter tubes constructed over unprotected foundations.

Termite control in existing as well as new building structures is very important as the damage likely to be caused by the termites to wooden members of building and other household article like furniture, clothing, stationery etc. is considerable. Anti-termite treatment can be either during the time of construction i.e. pre-constructional chemical treatment or after the building has been constructed i.e. treatment for existing building.

Prevention of the termite from reaching the super-structure of the building and its contents can be achieved by creating a chemical barrier between the ground, from where the termites come and other contents of the building which may form food for the termites. This is achieved by treating the soil beneath the building and around the foundation with a suitable insecticide.

Materials

Chemicals: Any one of the following chemicals in water emulsion to achieve the percentage concentration specified against each chemical shall be used:

- (i) Chlorphriphos emulsifiable concentrate of 20%
- (ii) Lindane emulsifiable concentrate of 20%

Anti-termite treatment chemical is available in concentrated form in the market and concentration is indicated on the sealed containers. To achieve the specified percentage of concentration, Chemical should be diluted with water in required quantity before it is used. Graduated containers shall be used for dilution of chemical with water in the required proportion to achieve the desired percentage of concentration. For example, to dilute chemical of 20% concentration. 19 parts of water shall be added to one part of chemical for achieving 1% concentration.

Safety Precautions

Chemical used for anti-termite treatment are insecticides with a persistent action and are highly poisonous. This chemical can have an adverse effect upon health when absorbed through the skin, inhaled as vapours or spray mists or swallowed.

The containers having emulsifiable concentrates shall be clearly labelled and kept securely closed in stores so that children or pet cannot get at them. Storage and mixing of concentrates shall not be done near any fire source or flame. Persons using these chemical shall be warned that absorption through skin is the most likely source of accidental poisoning. Particular care shall be taken to prevent skin contact with concentrates and prolonged exposure to dilute emulsion shall also be avoided. After handling the concentrates or dilute emulsion. Workers shall wash themselves with soap and water and wear clean clothing, especially before eating. In the event of severe contamination, clothing shall be removed at once and the skin washed with soap and water. If chemical has splashed into the eyes, they

shall be flushed with plenty of soap and water and immediate medical attention shall be sought. Care should be taken in the application of chemicals to see that they are not allowed to contaminate wells or springs which serve as source of drinking water.

Treatment

(i) Once the termites have an ingress into the building, they keep on multiplying and destroy the wooden and cellulosic materials, and as such it becomes essential to take measures for protection against termites. Anti termite measures described below are necessary for the eradication and control of termites in existing building. To facilitate proper penetrations of chemical in to the surface to be treated, hand operated pressure pump shall be used. To have proper check for uniform penetration of chemical, graduated containers shall be used. Proper check should be kept so that the specified quantity of chemical is used for the required area during the operation. Chemical treatment for the eradication and control of sub-terranean termites in existing building shall be done as per IS 6313 (Part III). Treatment shall be got done only from the approved specialized agencies using the chemical procured directly by the Engineer-in-Charge from reputed and authorized dealers.

(ii) Treatment along outside of foundations:

The soil in contact with the external wall of the building shall be treated with chemical emulsion at the rate of 7.5 litres per square metre of vertical surface of the sub-structure to a depth of 300 mm. To facilitate this treatment, a shallow channel shall be excavated along and close to the wall face. The chemical emulsion shall be directed towards the wall at 1.75 litres per running metre of the channel. Rodding with 12 mm diameter mild steel rods at 150 mm apart shall be done in the channel. If necessary for uniform dispersal of the chemical to 300 mm depth from the ground level. The balance chemical of 0.5 litre per running metre shall then be used to treat the backfill earth as it is returned to the channel directing the spray towards the wall surface.

If there is a concrete or masonry apron around the building, approximately 12 mm diameter holes shall be drilled as close as possible to the plinth wall about 300 mm apart, deep enough to reach the soil below and the chemical emulsion pumped into these holes to soak the soil below at the rate of 2.25 litres per linear metre.

In soils which do not allow percolation of chemicals to desired depth, the uniform disposal of the chemical to a depth of 300 mm shall be obtained by suitably modifying the mode of treatment depending on site condition.

In case of RCC foundations the soil (backfill) in contact with the column sides and plinth beams along with external perimeter of the building shall be treated with chemical emulsion at the rate of 7.5 litres/sqm of the vertical surface of the structure. To facilitate this treatment, trenches shall be excavated equal to the width of the shovel exposing the sides of the column and plinth beams up to a depth of 300 mm or up to the bottom of the plinth beams, if this level is less than 300 mm.

The chemical emulsion shall be sprayed on the backfill earth as it is returned into the trench directing the spray against the concrete surface of the beam or column as the case may be.

(iii) **Treatment of Soil under Floors :** The points where the termites are likely to seek entry through the floor are the cracks at the following locations:

- (a) At the junction of the floor and walls as result of shrinkage of the concrete;
- (b) On the floor surface owing to construction defects;
- (c) At construction joints in a concrete floor, cracks in sections; and
- (d) Expansion joints in the floor.

Chemical treatment shall be provided in the plinth area of ground floor of the structure, wherever such cracks are noticed by drilling 12 mm holes at the junction of floor and walls along the cracks on the floor and along the construction and expansion joints at the interval of 300 mm to reach the soil below. Chemical emulsion shall be squirted into these holes using a hand operated pressure pump to soak the soil below until refusal or up to a maximum of one

litre per hole. The holes shall then be sealed properly with cement mortar 1:2 (1 cement: 2 coarse sand) finished to match the existing floors. The cement mortar applied shall be cured for at least 10 days as per instruction of Engineer-in-charge.

(iv) **Treatment of Voids in Masonry :** The movement of termites through the masonry wall may be arrested by drilling holes in masonry wall at plinth level and squirting chemical emulsions into the holes to soak the masonry. The holes shall be drilled at an angle of 45 degree from both sides of the plinth wall at 300 mm intervals and emulsion squirted through these holes to soak the masonry using a hand operated pump. This treatment shall also be extended to internal walls having foundations in the soil. Holes shall also be drilled at wall corners and where door and window frames are embedded in the masonry or floor at ground. Emulsion shall be squirted through the holes till refusal or to a maximum of one litre per hole. Care shall be taken to seal the holes after the treatment.

(v) **Treatment at Points of Contact of Wood Work :** The wood work which has already been damaged beyond repairs by termites shall be replaced. The new timber shall be dipped or liberally brushed at least twice with chemical in oil or kerosene. All existing wood work in the building which is in contact with the floor or walls and which is infested by termites, shall be treated by spraying at the points of contacts with the adjoining masonry with the chemical emulsion by drilling 6 mm holes at a down ward angle of about 45 degree at junction of wood work and masonry and squirting chemical emulsion into these holes till refusal or to a maximum of half a litre per hole. The treated holes shall then be sealed. Infested wood work in chauhats, shelves, joints, purlins etc., in contact with the floor or the walls shall be provided with protective treatment by drilling holes of about 3 mm diameter with a downward slant to the core of the wood work on the inconspicuous surface of the frame. These holes should be at least 150 mm centre to centre and should cover in entire frame work. Chemicals shall be liberally infused in these holes. If the wood is not protected by paint or varnish two coats of the chemicals shall be given on all the surfaces and crevices adjoining the masonry.

118.4 Measurements: All dimensions shall be measured in Sqmt correct to a cm. The measurements shall be made of the surface actually provided with anti termite treatment in Sqmt.

118.5 Rates

The rate shall include the cost of labour and all other inputs (except concentrated chemical) involved in all the operations described above including drilling, refilling and making good the holes and paid in sqmt along with furnishing Guarantee Bond as mentioned below.

A guarantee bond on appropriately stamped paper shall be given by the contractor to the Client in the manner and form prescribed below:

FORM OF GUARANTEE BOND

“I/We..... (Contractor) hereby guarantee that work will remain uninfected and will not be in any way damaged by termite or any other germs of similar types, for a period of 10 years after completion of the work of anti-termite as per the terms and conditions of the contract and contractor hereby indemnifies and agrees to save harmless the Government of Gujarat from any loss and or damage that might be caused on account of termite and or oilier similar type of germs and hereby Guarantees to make good any loss or damages suffered by the Government of Gujarat and further guarantee to redo the effective 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 contactor for period of 10 years.

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 completion of, the work and 10% shall be

retained for the balance of guarantee period and shall be refunded only after the completion of the guarantee period.

For Concrete Work

Item No.08

Providing and laying cement concrete 1:3:6 (1 Cement : 3 coarse sand : 6 Machine Crushed stone aggregates 40m.m. nominal size) and curing complete including cost of formwork for sub base of foundation, plinth, trenches etc complete at all levels.

Materials

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

Workmanship

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

Proportion of Mix:

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

Mixing:

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

Transporting & Placing the Concrete:

- a. The concrete shall be handed from the place, of mixing to the final position in not more than 15 minutes by the method as directed and shall be placed into its final-position, compacted and finished within 30 minutes of mixing with water i.e. before the setting commences.
- b. The concrete shall be laid in layers of 15 cms to 20 cms.

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

Curing:

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

Mode of Measurement & Payment

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

Item No.09

Providing and laying cement concrete 1:4:8 (1 Cement : 4 coarse sand : 8 Machine Crushed stone aggregates 40m.m. nominal size) and curing complete including cost of formwork for sub base of foundation, plinth, trenches etc complete at all levels.

Materials

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

Workmanship

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

Proportion of Mix:

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

Mixing:

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

Transporting & Placing the Concrete:

- a. The concrete shall be handed from the place, of mixing to the final position in not more than 15 minutes by the method as directed and shall be placed into its final-position, compacted and finished within 30 minutes of mixing with water i.e. before the setting commences.
- b. The concrete shall be laid in layers of 15 cms to 20 cms.

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

Curing:

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

Mode of Measurement & Payment

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

Item N0. 10 / 11 / 12

Providing and laying in position Ready Mixed M200 / M250 Grade concrete for all depths, heights and shapes including finishing smooth with curing complete including the cost of centering, shuttering and form work but excluding the cost of reinforcement for foundation, pedestal, ground-beams, plinth beams for exposed R.C.C. work. for reinforced cement concrete work, using cement content as per approved design mix manufactured in fully automatic batching plant and transported to site of work in transit mixer for a lead up to any distance having continuous agitated mixer, manufactured as per mixed design of specified grade for reinforcement cement concrete work including pumping of R.M.C. from transit mixer to site of laying, including the cost of admixtures in recommended properties as per IS:9103 to accelerate/retard setting of concrete, improve workability without impairing strength and durability as per direction of the engineer-in-charge without fly ash (minimum cement level as per latest IS:456 shall be maintained.

Providing and fixing (also removing) RCC Centering and ply shuttering for building elements of all depth, height, shape & required size including keeping the same in position during concreting and up to the removal of the same after a specified period. Rate shall include cost of all materials, labour and scaffolding required with Accro shuttering system to execute and complete the job as directed and specified by EIC. Rate shall also include for providing dowels, pipe flanges, notches, grooves, insert plates, drip moulds etc. as directed and specified by EIC.

1 Scope of work

- (a) The section covers specifications for Item of M-250 grade concrete.
- (b) The specification cover the requirements of plain and reinforced concrete for use in various components of the structures. The work covered under this section consists of furnishing all materials including formwork, equipment, labors for the manufacturer, transport, placing, vibrating, finishing and curing of the concrete for the structure and performing all the operations necessary and ancillary thereto including dewatering as required.
- (c) all RMC work shall confirm IS 4925:2004 at site.

2 Description of Items:

Providing and lying reinforced controlled cement concrete of M-250 grade with cement, sand & kapachi and grit including centering, shuttering scaffolding, tamping, vibrating, finishing, curing etc. complete in R.C.C. slab, R.C.C. barrels, approach slab, etc. with all leads & lifts.

3.1 Indian Standards for reference.

| | | |
|-----|--|--|
| 1) | IS : 269 - 1976 (Third revision) | Ordinary and Low heat Portland cement. |
| 2) | Is : 303 - 1975 | Plywood of general purpose. |
| 3) | IS : 383 - 1970 (Reaffirmed -1980) | Coarse and fine aggregate from natural sources for concrete. |
| 4) | IS : 482 Part I - 1966 | Mild steel and medium tensile steel bars. |
| 5) | IS : 456 -1978 | Code of practice for plain and reinforced concrete. |
| 6) | IS : 460 - 1978 | Test sieves. |
| 7) | IS : 455 - 1976 | Portland slag cement. |
| 8) | IS : 516 - 1959 | Method of tests for strength of concrete. |
| 9) | IS : 650 - 1966 (Reaffirmed - 1980) | Standard sand for testing of cement. |
| 10) | IS : 1199 - 1959 | Methods of sampling and analysis of concrete. |
| 11) | IS : 1489 - 1976 | Portland pozzolona Cement. |
| 12) | IS : 1791 - 1968 | Batch type concrete mixers. |
| 13) | IS : 2386 - 1963 | Methods of tests for aggregate concrete |

| | | |
|-----|---|---|
| | (Part I to VIII) | |
| 14) | IS : 2430 - 1969 | Methods for sampling of aggregate concrete. |
| 15) | IS : 2505 - 1980 | Concrete vibrators, immersion type. |
| 16) | IS : 2506 - 1964 | Screed board concrete vibrators. |
| 17) | IS : 2580 - 1965 | Jute bags for packing cement. |
| 18) | IS : 2722 - 1964 | Portland swing weight batchers for concrete (single and double bucket type) |
| 19) | IS : 3085 - 1965 | Methods of test for permeability of cement mortar and concrete. |
| 20) | IS : 3370 1965-1967 (all parts) | Code of practice for concrete structure for the storage of liquids. |
| 21) | Is L 3558 - 1983 | Code of practice for the use of immersion vibrators for consolidating concrete. |
| 22) | Is : 4031 -1938 | Methods of physical tests for hydraulic cement. |
| 23) | Is : 4032 - 1968 (Reaffirmed - 1980) | Method of chemical analysis of hydraulic cement. |
| 24) | Is : 4656 - 1968 | Form vibrators for concrete. |
| 25) | IS : 4845 - 1968 | Definitions and terminology relating to hydraulic cement. |
| 26) | IS : 4925 - 1968 | Concrete batching; mixing plant |
| 27) | IS : 4926 -1976 | Ready mix concrete. |
| 28) | IS : 4990 - 1981 | Plywood for concrete shuttering works. |
| 29) | IS : 5242 - 1979 | Method of test for determining shear strength of mild steel. |
| 30) | IS : 5512 - 1983 | Flow table for use in tests of hydraulic cement and pozzolonic material. |
| 31) | IS : 5513 - 1976 | Vicat apparatus. |

| | | |
|-----|--|---|
| 32) | IS : 5515 - 1983 | Compaction factor apparatus. |
| 33) | IS : 5529 | Code for practice for in situ permeability test. |
| 34) | IS : 5640- 1970 | Methods of test for determining aggregates impact value of soft coarse aggregates. |
| 35) | IS : 5816 - 1970 | Methods of test for splitting tensile strength of concrete cylinders. |
| 36) | IS : 5889 - 1970 | Vibratory plate compactor. |
| 37) | IS : 5892 - 1970 | Concrete transit mixers and agitators. |
| 38) | IS : 6461 (all Parts) - 1972 | Glossary on terms relating to aggregates materials etc. |
| 39) | Is : 6923- 1973 | Method of test for performance of screed boars concrete vibrators. |
| 40) | Is : 6925 - 1973 | Method of test for determination of water soluble chlorides in concrete admixtures. |
| 41) | Is : 7245 - 1974 | Concrete pavers |
| 42) | Is : 7320 - 1974 | Concrete slump test apparatus. |
| 43) | Is: 7861 | Code of practice for stream weather concreting |
| 44) | Is : 7861 (Part - I-1971) (Part II - 1981) | Recommended practice of weather Recommended practice for cold weather concreting) |
| 45) | Is : 8041 - 1978 | Rapid hardening Portland cement. |
| 46) | Is : 8043 - 1970 | Hydrophobic Portland cement. |
| 47) | IS : 8112 - 1976 | High strength ordinary Portland cement. |
| 48) | Is : 8142 - 1976 | Method of test for determining setting time of concrete by penetration resistance, |
| 49) | Is : 8989 - 1978 | Safely code for erection of concrete framed structures. |
| 50) | Is : 9013 - 1978 | Method of making curing and determining compressive strength of accelerated cured concrete test specimen. |
| 51) | Is : 9077 - 1979 | Code of practice for corrosion protection of steel |

| | | |
|-----|------------------|--|
| | | reinforcement in R.B. and R.C.C. construction |
| 52) | Is : 9103 - 1979 | Admixtures for concrete. |
| 53) | Is : 9284 - 1979 | Methods of test abrasion resistance of concrete. |

3.2 Other Publications:

| | | |
|----|---|--|
| 1) | USBR | Concrete manual (Eighth edition revised print 1981) |
| 2) | ASTM | C-156-80 Water retention test |
| 3) | ASTM | C-491-80 Water reducing agent. |
| 4) | ASTM | C-494- type D water deducing agent and set retarder. |
| 5) | ASTM | E- 97 Light reflectance test. |
| 6) | Indian Road Congress Standard Specifications and code of practice of Road Bridges. | Section-I Section-II Section-III |
| 7) | Concrete Manual | U.S.B.R |
| 8) | ASTM | C-494-80 |
| 9) | Design aids for reinforced concrete to IS 456 - 1978 | SP-16 (S & T) 1980 |

IMPORTANT NOTE:

Proper test reports/papers for concreting materials and design mix Lab tests shall be performed and submitted to approval before using of RMC at site and any kind of change in design mix and/or materials of concreting shall follow the above procedure before use of RMC at site.

4 Batching of Concrete ingredients :

For all structural concreting, only Ready Mixed Concrete (RMC) manufactured at site is mandatory, weigh batching plant or obtained from approved R.M.C. supplying agencies or produced at site using mechanical mixers and weigh batchers as per item description, will be used. The R.M.C. supplying agency will supply mix design details in advance before start of delivery,

For Plant At site: The maximum capacity of the plant shall be calculated using the minimum

cycle time of the mixer after the materials to be mixed are fed into the mixer. The capacity of the plant, as calculated above, shall be for concrete with 80 mm slump. The plant shall be capable of accurate (see 6.1.1 and 6.3.1) batching and mixing of aggregates, sand, cement, additives, ice flakes, etc. It is necessary for the contractor to specify details as an aid for manufacturer to select/design the appropriate batch mixing plant as per IS 4925:2004.

5 Materials:

5.1 Cement:

(a) Only ordinary Portland cement (O.P.C) Shall be used for R.M.C. and other R.C.C. constructions. Pozzolona Portland Cement (P.P.C) shall not be allowed.

(b) Immediately, upon receipt at the site of the work, cement shall be stored separately in dry, watertight and properly ventilated structures. All storage facilities shall be subject to approval and shall be such as to permit easy access for inspection and identification. Sufficient cement shall be kept in stock for completion of concreting undertaken, Cement shall be used in order of receipt and cement older than 90 days shall not be used, unless the test results. Cement shall for its physical and chemical requirement, conform to IS : 269 - 1976 where ordinary portland cement is used. Sampling and testing will be done by and at the expense of the contractor. No cement shall be used until notice has been given that the test results are satisfactory.

(c) The Contractor shall create a suitable and adequate infrastructure for procuring handling, storing and conveying bulk cement to batching plant at site, with advance planning of work to be done during next seven days as approved by the Engineer-in-charge.

(d) Day to day consumption of cement shall be maintained in cement account book which shall be binding to the contractor or his authorized representative in token of acceptance. Any dispute in this regard shall be decided by the Engineer-in-charge & shall be final.

5.2 Fine aggregates:

(i) General

(a) All the aggregates shall conform to IS : 383 - 1970 or its latest edition and as directed by the Engineer-in-charge. Sand to be used shall be natural and brought from the river bed. Fine aggregates will be tested for their gradation, specific gravity, water absorption fineness modulus, soundness, petrography analysis, deleterious constituents and alkali aggregate reactivity.

(ii) Quality.

(a) Sand shall consist of hard, dense, durable and uncoated siliceous gritty materials. It shall be free from injurious amount of dust, lumps, soft and flaky particles, shale, alkali, organic matter, loam and other deleterious substances. The maximum percentage of each of the deleterious substances in sand as delivered to the mixer shall not exceed the following values

Material passing B.S.S.

| | |
|-----------------------|-----------------|
| No. 200 (Sieve No- 8) | 3 % by weight |
| Clay lumps. | 1 % by weight |
| Clinders & Clinkers | 0.5 % by weight |

Mica 2 % by weight

Total of all deleterious

substances including alkali, mica coated grains, soft and flaky particles loams etc. 5 % by weight

(b) Sand shall be free from injurious amount of organic impurities and sand producing a colour darker than the standard in the colorimetric test for organic impurities shall be rejected.

(iii) Grading:

(a) Sand shall be graded so as to impart good workability and good finishing. Sieve analysis of natural sand shall conform to the following limits of gradation (IS : 383 - 1970, Table -4)/ Grading zone II

| I.S. sieve designation | Cumulative Percentage of weight passing through sieve. |
|------------------------|--|
| 10 mm | 100 |
| 4.75 mm | 90-100 |
| 2.36 mm | 75-100 |
| 1.18 mm | 55-90 |
| 600 Micron | 35-59 |
| 300 Micron | 8-30 |
| 150 Micron | 0-10 |

(b) The deviations from the prescribed limits of cumulative percentage passing through sieve 10 mm, 4.75 mm, 2.36 mm, 1.18 mm, 600 Micron 300 micron and 150 micron IS sieves shall be permitted provided total of such deviations do not exceed 5 percent. No deviation from the prescribed limit shall be permitted for cumulative percentage passing through 600 micron IS sieve.

(iv) Fineness Modulus.

(a) Sand shall have a fineness modulus between 2.4 to 3.0 subject to the gradation specified in the preceding paragraph.

(b) The modulus shall be computed by adding commutative percentage of sand retained on the standard screens 4.75 mm, 2.36 mm, 1.18 mm, 600 micron, 300 micron, 150 micron IS sieves and dividing the sum by 100. Gradation of sand shall be so controlled that the fineness modulus of at least 9 out of 10 consecutive test samples of finished sand shall not vary by more than 0.10 from the average of 10 test samples. Sand having any deviation from the specified range of gradation and fineness modulus shall not be permitted to be used in work without the written permission of the Engineer-in-charge.

(v) Storage:

All sand shall be stored on the site of work in such a manner as to prevent intrusion of foreign matter.

5.3 Coarse Aggregate:

(i) General:

(a) Coarse aggregates for concrete shall consist of clean, hard dense and durable crushed metal and free from vegetable matter predominantly flaky aggregates shall not be used. All coarse aggregates shall be washed and / or screened by the contractor, if required. The cost of washing and screening shall be borne by the contractor. The percentage of deleterious substance in coarse aggregate shall not exceed the following values.

Material passing 150 micron

| | |
|------------------------------|---------------------|
| I.S. sieve screen | 1 Percent by weight |
| Shale | 1 Percent by weight |
| Coal | 1 Percent by weight |
| Soft fragments | 3 Percent by weight |
| Other deleterious substances | 1 Percent by weight |
| Clay lumps | 1 Percent by weight |

Coarse aggregates shall be tested for their gradation, specific gravity, water absorption, impact and abrasion values, soundness, petrography analysis, deleterious constituents, flakiness and elongation indices and alkali aggregate reactivity. coarse aggregates shall conform to IS : 383 - 1970 and IS : 515 - 1959.

(b) The sum of the percentage of all the deleterious substances shall, however, not exceed 5 percent by weight. the coarse aggregate shall conform to the requirements laid down in IS : 383 - 1970 and other relevant Indian Standard Specifications.

(ii) Grading

(a) The Maximum size of coarse aggregate shall be governed by the type of work as outlined in the table given under the sub para (iv) of this clause.

(b) The gradation shall give a dense concrete of the specified strength and consistency that will work readily into position without segregation and without the use of an excessive water content.

(c) The grading of coarse aggregate shall be in the nominal sizes as mentioned in Table-II of IS : 383 - 1970 as reproduced below:

| I.S. Sieve designation | Percentage passing for graded aggregate of nominal size. | | | |
|------------------------|--|--------|--------|---------|
| | 40 mm | 20 mm | 16 mm | 12.5 mm |
| 40 mm | 95 -10 | 100 | - | - |
| 20 mm | 30 - 70 | 95-100 | 100 | 100 |
| 16 mm | - | - | 90-100 | - |
| 12.5 mm | - | - | - | 90-100 |
| 10 mm | 10 - 35 | 25-55 | 30-70 | 40-85 |
| 4.75 mm | 0 - 5 | 0-10 | 0-10 | 0-10 |
| 2.36 mm | - | - | - | - |

However, the exact gradation required to produce a dense concrete of specified strength and desired workability shall be decided by the Engineer-in-charge.

(d) The materials passing through the screen shall be in the grades ranging from 20 mm (3/4") to 4.75 mm (3/16"). Each grade of material shall be stacked separately.

(iii) Storage:

(a) Aggregate shall be stacked in such a way as to prevent the admixture of foreign materials such as soil, vegetable matter, etc. Heaps of fine and coarse aggregates shall be kept separate. When different sizes of fine or coarse aggregate are procured separately, they shall be stored in separate stock piles sufficiently away from each other to prevent the materials at the edge of the piles from getting intermixed.

(b) The aggregates shall be stock-piled adjacent to the mixer site so as to require minimum rehandling and labour when conveyed to the mixer.

(c) The aggregates shall be placed on a dry hard patch of ground, if available otherwise a platform of planks or plain galvanized iron sheets or alternatively on a floor of dry bricks or a thin layer of lean concrete.

(d) The aggregate shall be kept free from getting dirty by people through rubbish like papers, vegetable materials and bidi etc. on the stock-piles.

(e) To minimize moisture variations the stock piles shall be as large in area as possible but low and fairly uniform in height, preferably 1.25 to 1.50 meter and the lowest layer of about 30 cm. shall be allowed to act as drainage layer and not used till the end.

(iv) Following be the maximum size of coarse aggregate for the different items of work.

| Sr. | Item of Work | Maximum nominal size of |
|-----|--------------|-------------------------|
|-----|--------------|-------------------------|

| No. | | coarse aggregate (MSA) |
|-------|--|---|
| (i) | Foundation floor and gravity retaining walls (mass concrete) | 40 mm |
| (ii) | R.C.C. Rafts, piers, Abutments, Barrels, Cut off walls, Breast walls staunching ring etc. | 40 mm |
| (iii) | R.C.C. work in Main and cross Girders, Deck slab, wearing coat kerb, parapet walls, Approach slab, pier caps, Diaphragm wall and other thin walled members and in zones of congestion. | 20 mm |
| (iv) | For any other items of construction not covered by item (i) to (iii) | As specified in the drawing or as directed by the Engineer - in-charge on case it is not specified in drawing |

(d) For heavily reinforced concrete members, as in the case of ribs of main beams, maximum size of aggregate shall usually be restricted to 5 mm less than the minimum lateral clear distance between the main bars, or 5 mm less than the minimum cover to the reinforcement, whichever is smaller. However, if required under special circumstances, the Engineer may permit an aggregate of maximum size 25 % more than this critical spacing / cover. provided that proper vibration is ensured.

5.4 Reinforcing steel

The provisions of respective section shall apply.

5.5 Water

(a) water used for mixing of concrete and mortar shall be free from injurious amounts of deleterious materials. potable water is generally considered satisfactory for mixing and curing.

(b) Where water is found to contain any sugar or and excess of acid, alkali or salt, the Engineer-in-charge will refuse to permit its use. As a guide the following table represents the maximum permissible values.

| | Percent. |
|------------------|----------|
| Organic matter | 0.02 |
| Inorganic matter | 0.30 |
| Sulphates | 0.05 |
| Alkali chlorides | 0.10 |

5.6 Admixtures :

(i)General:

The Air Entraining Agent (AEA) as an admixture shall be added to the concrete batch in a solution form. It shall be batched by means of mechanical batches capable of correct measurement and in such a manner of correct measurement and in such a manner as will ensure uniform distribution of the agent throughout the batch during the specified mixing period. The amount of AEA used shall be such as to effect air entrainment from 4 to 6 percent by volume in that portion of the concrete containing aggregate smaller than the 40 mm square mesh sieve after its placement and vibration in the forms. The actual percentage of air shall be as fixed by the Engineer-in-charge and will be changed whenever necessary to meet the varying conditions encountered during construction.. The AEA shall be brought by the contractor at his cost at the worksite for the purpose of the concrete or mortar as the case may be. The resulting modification, if any, to the content or proportion for cement as a consequence thereof, shall be borne by the contractor and no extra rate for payment will be paid according to general, technical, special, specifications for concrete. The contractor will be allowed, to use any other admixture, only after prior approval of the Engineer-in-charge. Cost of such admixture shall be borne by the contractor and shall be deemed to have been included in the unit rates quoted by the contractor for relevant items.

No material other than the essential ingredients, i.e. cement aggregates and water shall ordinarily be used in the manufactured of concrete or mortar, but the Engineer-in-charge may permit the use of approved admixture for improving special characteristics of the concrete, on satisfactory evidence that its use does not in any way adversely affect the properties of concrete particularly its strength, volume changes, durability and has no deleterious effect on the reinforcement. Admixtures here allowed will generally be conforming to the relevant ASTM standards and IS : 9103 - 1979.

(ii) Tests

The contractor shall provide satisfactory facilities for easy and quick collection of adequate samples. All tests for the evaluation and approval of an admixture shall be made by and at the expense of the Contractor. The suitability of an air entraining admixture shall be determined as per the requirement of IS : 9103 - 1979.

Cost of the admixture shall be borne by the contractor.

5.7. Epoxy

Use of Epoxy for bonding fresh concrete for repairs may be permitted on written approval of the Engineer- in-Charge. Epoxy shall be applied in accordance with the instruction of the manufacturers. The cost of such repair shall be borne by the Contractor.

5.8 Concrete for Structures

Ready mix concrete shall be used for the structures designated as M-25. The mix shall be designed using respective samples of available coarse and fine aggregates as well as cement and water to achieve the required workability and strength at minimum level of placement. Mix design studies and test will be made in Government authorized laboratory or as directed by the Engineer-in-charge. The cost of these studies and test shall be borne by the contractor. Concrete Mix design approved by the Engineer-in-charge shall be used for the work, any change in design mix and/or change in material shall be approved before using at site.

5.9 Strength Requirement of Concrete

Ordinary Portland Cement (OPC) conforming to IS : 269 -1976 shall be used. The compressive strength requirements for the various grades of controlled concrete shall be as given in Table given below:

| Grade of concrete | Compressive test strength in N/mm ² on 150 mm cube after mixing conducted in accordance with IS : 516 - 1959 | |
|-------------------|---|----------------|
| | Min at 7 days | Min at 28 days |
| M-10 | 7 | 10 |
| M-15 | 10 | 15 |
| M-20 | 13.5 | 20 |
| M-25 | 17.0 | 25 |

Note: In all cases, the 28 days compressive strength specified in the Table shall alone be the criteria for acceptance or rejection of the concrete.

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

5.10 Proportioning Concrete:

(a) Concrete mix shall be designed on the basis of preliminary tests. The proportion of ingredients shall be such that the concrete has adequate workability for conditions prevailing on the work in question, and can be properly compacted with the means available.

(b) Except when it can be shown to the satisfaction of the Engineer-in-charge that supply of properly graded aggregates of uniform quality can be maintained till the completion of the work, grading of aggregate shall be controlled by obtaining the coarse aggregates in different sizes and blending them in the right proportions as required. Different sizes, however, shall be stacked in separate stock-piles required quantity of material shall be stock-piled several hours, preferably a day, before use. Grading of coarse and fine aggregate shall be checked as frequently as possible, frequently for a given job being determined by the Engineer-in-charge to ensure that the suppliers are maintaining the uniform grading as approved for samples used in the preliminary tests. In proportioning concrete, the quantity of both of cement and aggregate shall be determined by weight. Water shall either be measured by volume in calibrated tank or weighed. All measuring

equipment shall be maintained on a clean and serviceable condition. Their accuracy shall be periodically checked.

(c) It is not important to keep the specified water cement ratio constant. To this end, moisture concrete in both fine and coarse aggregate shall be determined by the Engineer-in-charge. the amount of mixing water shall then be adjusted to compensate for any variations needed in the moisture content. For determination of moisture content in the aggregate. IS : 2386 : 2963 (Part III) shall be referred to. suitable adjustments shall also be made in the weight of aggregates to allow for variations in weight of aggregates due to variations in their moisture content.

(d) The cement level for various grades of controlled concrete shall be considered as column (B) of table shown under for the purpose of working out the rates to be quoted in the Schedule-B. If cement level of mix design for this work is less than whatever mentioned in col(A) , contractor has to utilize the cement level as per col (A) as minimum cement level.

| Sr. No. | Grade of concrete | Minimum Cement level required in kg cubic meter of concrete (A) as per I.S.456-2000. | Cement level Considered in kg/cum of concrete in Plans & Estimate (B) | As per Mix design cement level/ required in kg/cum of concrete as per gov. leter no. P, R, C, H - 2010-67 Dt. 15 th march 2011. |
|---------|-------------------|--|---|---|
| 1 | M-15, MSA-40 | 210 | 320 | 280 |
| | M-15, MSA-20 | 240 | | 300 |
| 2 | M-20, MSA-40 | 300 | 400 | 330 |
| | M-20, MSA-20 | | | 360 |
| 3 | M-25, MSA-40 | 300 | 450 | 370 |
| | M-25, MSA-20 | | | 400 |

(e) Actual cement level required for the aggregates to be used shall have been determined by laboratory tests & same has been mentioned in column (C) in above table as per gov. leter no. P, R, C, H -2010-67 Dt. 15 th march 2011. . The mix proportions shall be selected to ensure that the workability of the fresh concrete is suitable for the conditions of handling and placing, so that after compaction it surrounds all reinforcements and completely fills the formwork. When concrete is hardened, it shall have the required strength, durability and surface finish.

(f) A mix shall be designed to produce the grade of concrete having the required workability and characteristic strength not less than that stipulated in the table under the Para 7.7 above. However due to change in design mix as per this site condition, it becomes obligatory to use less or more cement per cubic meter of concrete, the contractor shall do the same without claiming any extra cost for getting higher cement level than whatever mentioned in col.(C). However actual use being less than the cement level specified in the table herein above column (B), the department

will deduct the cost of cement from the bill at the star rate of cement as provided in contract clause 59-A for the less consumption of cement level mentioned in column (B) of the above table.

As per latest guideline of department, concrete mix design for Gandhinagar District has been carried out and the results of various mix received is shown in column (C).

(g) The quantity of water shall be just sufficient to produce a dense concrete of required workability and strength for the job. An accurate and strict control shall be kept on the quantity of water.

(h) In the case of reinforced concrete work, workability shall be such that the concrete surrounds and properly grips all reinforcement, The degree of consistency, which shall depend upon the nature of work and methods of vibration of concrete, shall be determined by regular slump tests. The following slumps shall be adopted for different type of works.

| | Type of work | Slumps allowed |
|------|---|----------------|
| i) | Mass concrete for footings and retaining walls | 10 mm to 25mm |
| ii) | Beams, slabs and columns | 25 mm to 40 mm |
| iii) | Thin R.C.C. section with congested steel | 40 mm to 50 mm |
| iv) | Canal lining | 70 mm to 80 mm |

6 Production of concrete:

6.1 Aggregates

Washed Aggregates must be used. The water used for washing aggregates shall be clean and free from alkali, salts and other impurities. After washing fine aggregates must be stored in stock piles with a free draining base for at least 3 days to ensure that sand delivered to the batching plant will have a reasonable uniform moisture content. The storage and handling shall be in such a manner as to prevent intermingling of various sizes of aggregates required separately for grading purposes. No foreign matter shall be allowed to be mixed up with the aggregates.

6.2 Batching:

(a) The prescribed amount of the various materials of concrete, including water, cement admixtures, the groupings of fine aggregates and each individual size of coarse aggregate shall be measured and controlled within the specified limits of accuracy. The amount of water, cement and aggregate shall be determined by weighing. In the case of fine aggregates, the surface moisture shall be determined in accordance with the method prescribed in Appendix-D of IS :

456 - 1978 and its subsequent amendment or publications. In the case of coarse aggregate, percentage of free water shall be determined by weighing a representative sample, then surface drying each particle individually with a cleaned piece of cloth and re-weighing.

(b) The proportion of various materials shall be changed as directed/approval in order to maintain the desired quantity of the concrete. The batching equipment shall be constructed and operated so that the combined inaccuracies in feeding and measuring the materials shall not exceed 1.5 percent for water and cement and 2 percent for each size of aggregate.

(c) The operation performance of each scale or other measuring device shall be checked by test weight, and the tests shall cover the ranges of measurements involved in the batching operations. Tests of equipment in operation shall be made at least once every fortnight and adjustments, repairs or replacement, be made as necessary to meet with the specified requirement for accuracy of measurement.

(d) Aggregates shall not be batched for concrete or mortar when free water is dripping from the aggregate.

6.3 Placing :

The concrete produced in RMC plant/batching plant, when discharged from transit mixer in pump hopper shall be kept continuously agitated and pumped to destination placing point. Site made concrete shall be placed by approved method of placing. The height of any single lift of concrete shall not exceed 1.5 m for walls and 2.0 m for columns. For columns where the height of pour is more than 2.0 m, suitable arrangement in formwork should be made so that the vertical drop of concrete is restricted to less than 2.0 m. Any such arrangement should be approved from the engineer in advance before execution. High velocity discharge of concrete causing segregation of mix shall be avoided. The concrete shall be placed in the forms gently and not dropped from the height exceeding 1.5 m except in columns where the maximum allowed will be 2.0 m. Each batch of concrete will be placed in layer. Each layer of concrete shall be compacted fully before the succeeding layer is placed and separate batches shall be placed and fully compacted before the layer immediately below has taken initial set. The layers should be sufficiently shallow, to permit stitching of two layers together by vibration. Concreting of any portion or section of the work shall be carried out in one continuous operation and no interruption of concreting work will be allowed without approval of the Engineer. Plain concrete in foundations shall be placed, in direct contact, with the bottom of excavation, the concrete being deposited in such a manner, as not to get mixed with the earth. The concrete placed below the ground level shall be protected from falling earth during and after placing. Concrete placed in ground containing deleterious substances, shall be kept free from contact, with such ground and with water draining there from during placing and for a period of 7 days or otherwise instructed there after. Approved means shall be taken to protect immature concrete from damage by debris, excessive loading, abrasion, vibrations, deleterious ground water, mixing with earth and other materials and other influences, that may impair strength and durability of concrete. Before starting of work contractor will get the concrete pouring programme and its sequence approved by Engineer to avoid cold joints.

6.4 Compaction :

External, Internal (needle) and surface (screed board) vibrators of approved make shall be used for compaction of concrete

a) External/internal vibrators shall be used for compaction of concrete in foundations, columns etc. For sections such as slabs, the concrete shall be compacted by external, internal and surface type vibrators, depending on the thickness of layer to be compacted. 25mm, 40mm and 60mm dia internal vibrators may be used. The concrete shall be compacted by use of appropriate diameter vibrator by holding the vibrator in position until :

i) Air bubbles cease to come to surface

ii) Resumption of steady frequency of vibrator after short period of dropping the frequency, when the vibrator is first inserted.

iii) The tone of the vibrator becomes uniform

iv) Flattened, glistening surface, with coarse aggregates particles blended into it, appears on the surface.

After the compaction is completed, the vibrator should be withdrawn slowly from concrete so that concrete can flow in to the space previously occupied by the vibrator. To avoid segregation during vibration, the vibrator shall not be dragged through the concrete nor used to spread the concrete. The vibrator shall be made to penetrate into layer of fresh concrete below if any, for a depth about 150mm. The vibrator shall be made to operate at regular pattern of spacing. The effective radii of action will overlap, approximately half a radius to ensure complete compaction.

v) To secure even and dense surfaces free from aggregate pockets, vibration shall be supplemented by tamping or rodding by hand in the corners of forms and along the form surfaces while the concrete is plastic.

vi) A sufficient number of spare vibrators shall be kept readily accessible to the place of deposition of concrete to assure adequate vibration in case of breakdown of those in use. 25mm diameter immersion vibrators shall be used in thin sections upto 125mm, 40mm diameter immersion vibrators in fairly wide sections like beams, slabs, columns etc. and 60mm diameter vibrators in foundations, pilecaps or such large section members. Screed vibrators shall also be used for slab concreting.

vii) Plain concrete also shall be vibrated whenever and wherever directed by EIC to achieve full compaction, using needle and screed vibrators as necessary.

6.5 Curing :

Curing shall be started at the earliest by spreading wet jute cloth (hessian) and cover top with impervious sheet and subsequently cured with spraying water. In inaccessible area to start with, curing be started by spraying curing compound before starting membrane curing.

6.6 Placing temperatures :

During extreme hot weather, the concreting shall be done as per procedures set out in IS:7861, Parts I & II. Fine and coarse aggregates for concreting shall be kept shaded and the concrete aggregates sprinkled with water for a sufficient time before concreting, in order to ensure that the temperature of these ingredients is as low as possible prior to batching. The mixer and batching equipment shall be also shaded and if necessary painted white in order to keep their temperatures as low as possible. The placing temperature of concrete shall be as low as possible in warm weather and care shall be taken to protect freshly placed concrete from overheating by sunlight in the first few hours of its laying. The time of day selected for concreting shall also be chosen so as to minimize placing temperatures. In case of concreting in exceptionally hot weather the Engineer may in his discretion specify the use of ice either flaked and used directly in the mix, or blockssed for chilling the mixing water. In either case no extra payment shall be made to the contractor on this account.

6.7 Transporting Concrete

(a) Concrete shall be transported from the mixing plant to the placing position rapidly as practicable by method that will prevent segregation or loss of ingredients or slump loss in excess of 25 mm and or a loss in air concrete or more than one percent before the concrete is placed in the works. whenever the length of haul, from the mixing plant to the place of deposit is such that the concrete unduly compacts or segregates, suitable agitators or transit mixers shall be used for conveying concrete.

(b) Where the time of haul exceeds 20 minutes, mixed concrete shall be transported in suitable agitators or transit mixers as stated hereinabove.

(c) If buckets are used for conveying low-sump concrete, they shall be capable of promoting discharge in controlled quantities without splashing or segregation and shall be of such capacity that there is no splitting of batches.

7 Inspection

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

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

7.3 Sampling and testing of concrete.

7.3.1 Sample from fresh concrete shall be taken as per I.S.1199-1959 and cube shall be made, cured and tested at 7 days and 28 days as per requirements in accordance with I.S.526-1959. A random sampling procedure shall be adopted to ensure that each concrete batch shall have a reasonable chance of being tested i.e. the sampling should be spread over the entire period of concreting and cover all mixing units. The minimum frequency of sampling of concrete of each grade shall be in accordance with following:

| Quantity of concrete in the work | Nos. of samples | Quantity of concrete in the work | Nos. of samples. |
|----------------------------------|---|----------------------------------|------------------|
| 1-5 cmt. | 1 | 16-30 cmt. | 3 |
| 6-15 cmt. | 2 | 31-50 cmt | 4 |
| 51 and above cmt. | 4 + one additional for each 50 cu. Meter or part thereof. | | |

Note: At least one sample shall be taken from each shift. Six test specimens shall be made from each sample. Three for testing at 7 days and remaining three at 28 days the samples of concrete shall be taken on each day of concreting as per above frequency. The number of specimens may be suitable increase as deemed necessary by the engineer-in-charge when procedure of test given above reveals a poor quality of concrete and in other special cases.

7.3.2 The average of the group of the cube test for each day shall not be less than the specified cubes strength of 200 kg/cm² at 28 days 20% of the cube cast for each dry may have value less than specified strength provided the lowest value is not less than 85 % of the specific strength. If

the concrete made in accordance with the proportions give for particular grade does not yield the specified strength, such concrete shall be classified as belonging to the appropriate lower grade. Concrete made accordance with the proportions give for a particular grade shall not however be placed a higher grade on the ground that the test strength are higher than the minimum specified.

8 Stripping

8.1 The engineer-in-charge shall be informed in advance by the contractor of his intention to start the removal of form work. While fixing the time of removal of form work due consideration shall be given to local conditions character of structure, the weather and other conditions that influences the setting of concrete and of the materials used in the mixture. In normal circumstances (generally where temperature are above 20 c) and where ordinarily concrete used forms may be struck after expire on period specified.

8.2 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 tiles 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 reuse the form work, it shall be cleaned and made good to the satisfaction of the engineer-in-charge. After removal of form work and shuttering, the Executive Engineer shall inspect the work and satisfy by random checks that concrete procedure is of good quality.

8.3 Immediately after the removal of forms, all exposed bolts etc passing though the cement concrete member and used for shuttering or any other purpose shall be cut inside the cement concrete member to a depth of at least 25 mm below the surface of the concrete and the resulting holes be filled by cement mortar all fins caused by form joints, all cavities produced by the removal of form tiles and all other holes and depressions, honeycomb spots, broken edge or corners and other defects shall be thoroughly cleaned saturated with water and carefully pointed an rendered true with mortar of cement and fine aggregate mixed in proportion used in grade of concrete that is being furnished and of as dry consistency as is possible to use. Considerable pressure shall be applied in filling pointing to ensure through filling in all voids. Surface which are pointed shall be kept moist for a period of 24 hours if rock pockets / honey comb in the opinion of the engineer-in-charge are of a such an extent or character as to effect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement if the portions of structure affected.

9 Payment shall be made on cubic meter of work done as per approved drawing.

10 FORM WORK:

Form Work

Ply Form work shall include all temporary or permanent forms or moulds required for forming the concrete which is cast-in-situ, together with all temporary construction required for their support.

General Requirement

It shall be strong enough to withstand the dead and live loads and forces caused by ramming and vibrations of concrete and other incidental loads, imposed upon it during and after casting of concrete. It shall be made sufficiently rigid by using adequate number of ties and braces, screw jacks or hard board wedges where required shall be provided to make up any settlement in the form work either before or during the placing of concrete.

Form shall be so constructed as to be removable in sections in the desired sequence, without damaging the surface of concrete or disturbing other sections, care shall be taken to see that no piece is keyed into the concrete.

Material for Form Work

(a) Propping and Centering :

All propping and centering should be either of steel tubes with extension pieces or built up sections of rolled steel.

(a) Centering/Staging :

Staging should be as designed with required extension pieces as approved by Engineer-in-Charge to ensure proper slopes, as per design for slabs/ beams etc. and as per levels as shown in drawing. All the staging to be either of Tubular steel structure with adequate bracings as approved or made of built up structural sections made from rolled structural steel sections.

(b) In case of structures with two or more floors, the weight of concrete, centering and shuttering of any upper floor being cast shall be suitably supported on one floor below the top most floor already cast.

(c) Form work and concreting of upper floor shall not be done until concrete of lower floor has set at least for 14 days.

Shuttering:

Accro Shuttering used shall be of sufficient stiffness to avoid excessive deflection and joints shall be tightly butted to avoid leakage of slurry. If required, rubberized lining of material as approved by the Engineer-in-Charge shall be provided in the joints.

(a) Runner Joists: RSJ, MS Channel or any other suitable section of the required size shall be used as runners.

(b) Assembly of beam head over props. Beam head is an adopter that fits snugly on the head plates of props to provide wider support under beam bottoms.

(c) Only steel shuttering shall be used, except for unavoidable portions and very small works for which 12 mm thick water proofing ply of approved quality may be used.

(a)

Form work shall be properly designed for self weight, weight of reinforcement, weight of fresh concrete, and in addition, the various live loads likely to be imposed during the construction process (such as workmen, materials and equipment).

(b)

Camber: Suitable camber shall be provided in horizontal members of structure, especially in cantilever spans to counteract the effect of deflection. The form work shall be so assembled as to provide for camber. The camber for beams and slabs shall be 4 mm per metre (1 to 250) or as directed by the Engineer-in-Charge, so as to offset the subsequent deflection, For cantilevers the camber at free end shall be 1/50th of the projected length or as directed by the Engineer-in-Charge.

(c) Walls :

The form faces have to be kept at fixed distance apart and an arrangement of wall ties with spacer tubes or bolts is considered best.

The two shutters of the wall are to be kept in place by appropriate ties, braces and studs, some of the accessories used for wall.

Removal of Form work (Stripping Time):

In normal circumstance and where various types of cements are used, forms, may generally be removed after the expiry of the following periods

| Type of Form Work | Minimum Period before Removal of Form Work |
|---|--|
| a) Vertical Form Work to Column, Walls and Beams | 16-24 Hours |
| b) Soffit Form Work to Slab (Props to be refixed immediately after removal of Form Work) | 3 days |
| c) Soffit Form Work to Beam (Props to be refixed immediately after removal of Form Work) | 7 Days |
| d) Props to slab (i) Span up to 4.5 Mtr (ii) Span over 4.5 Mtr | 7 Days 14 Days |
| e) Props to Beams and Arches (i) Span up to 6.0 Mtr (ii) Span over 6.0 Mtr | 14 Days 21 Days |

Surface Treatment

(a) Oiling the Surface:

Accro Shuttering gives much longer service life if the surfaces are coated with suitable mould oil which acts both as a parting agent and also gives surface protections.

Typical mould oil is heavy mineral oil or purified cylinder oil containing not less than 5% pentachlorophenol conforming to IS 716 well mixed to a viscosity of 70-80 centipoises.

After 3-4 uses and also in cases when shuttering has been stored for a long time, it should be recoated with mould oil before the next use.

The second categories of shuttering oils / leavening agents are Polymer based water soluble Compounds. They are available as concentrates and when used diluted with water in the ratio of 1:20 or as per manufacturer specifications. The diluted solution is applied by brush applications on the shuttering both of steel as well as ply wood. The solution is applied after every use.

The design of form work shall conform to sound Engineering practices and relevant IS codes.

Inspection of Form Work

The completed form work shall be inspected and approved by the Engineer-in-Charge before the reinforcement bars are placed in position.

Proper form work should be adopted for concreting so as to avoid honey combing, blow holes, grout loss, stains or discoloration of concrete etc. Proper and accurate alignment and profile of finished concrete surface will be ensured by proper designing and erection of form work which will be approved by Engineer-in-Charge.

Shuttering surface before concreting should be free from any defect/ deposits and full cleaned so as to give perfectly straight smooth concrete surface. Shuttering surface should be therefore checked for any damage to its surface and excessive roughness before use.

Erection of Form Work (Centering and shuttering):

Following points shall be borne in mind while checking during erection.

- (a) Any member which is to remain in position after the general dismantling is done, should be clearly marked.
- (b) Material used should be checked to ensure that, wrong items/ rejects are not used.
- (c) If there are any excavations nearby which may influence the safety of form works, corrective and strengthening action must be taken.
- (d)
 - (i) The bearing soil must be sound and well prepared and the sole plates shall bear well on the ground.
 - (ii) Sole plates shall be properly seated on their bearing pads or sleepers.
 - (iii) The bearing plates of steel props shall not be distorted.
 - (iv) The steel parts on the bearing members shall have adequate bearing areas.

- (e) Safety measures to prevent impact of traffic, scour due to water etc. should be taken. Adequate precautionary measures shall be taken to prevent accidental impacts etc.
- (f) Bracing, struts and ties shall be installed along with the progress of form work to ensure strength and stability of form work at intermediate stage. Steel sections (especially deep sections) shall be adequately restrained against tilting, overturning and form work should be restrained against horizontal loads. All the securing devices and bracing shall be tightened.
- (g) The stacked materials shall be placed as catered for, in the design.
- (h) When adjustable steel props are used. They should:
 - 1. be undamaged and not visibly bent.
 - 2. have the steel pins provided by the manufacturers for use.
 - 3. be restrained laterally near each end.
 - 4. have means for centralizing beams placed in the fork heads.
- (i). Screw adjustment of adjustable props shall not be over extended.
- (j) Double wedges shall be provided for adjustment of the form to the required position wherever any settlement/ elastic shorting of props occurs. Wedges should be used only at the bottom end of single prop. Wedges should not be too steep and one of the pair should be tightened/ clamped down after adjustment to prevent shifting.
- (k) No member shall be eccentric upon vertical member.
- (l) The number of nuts and bolts shall be adequate.
- (m) All provisions of the design and/or drawings shall be complied with.
- (n) Cantilever supports shall be adequate.
- (o) Props shall be directly under one another in multistage constructions as far as possible.
- (p) Guy ropes or stays shall be tensioned properly.
- (q) There shall be adequate provision for the movements and operation of vibrators and other construction plant and equipment.
- (r) Required camber shall be provided over long spans.
- (s) Supports shall be adequate, and in plumb within the specified tolerances.

Measurements

General: The form work shall include the following:

- (a) Splayed edges, notching, allowance for overlaps and passing at angles, sheathing battens, strutting, bolting, nailing, wedging, easing, striking and removal.
- (b) All supports, struts, braces, wedges as well as mud sills, piles or other suitable arrangements to support the form work.
- (c) Bolts, wire, ties, clamps, spreaders, nails or any other items to hold the sheathing together.
- (d) Working scaffolds, ladders, gangways, and similar items.
- (e) Filletting to form stop chamfered edges of splayed external angles not exceeding 20mm wide to beams, columns and the like.
- (f) Where required, the temporary openings provided in the forms for pouring concrete, inserting vibrators, and cleaning holes for removing rubbish from the interior of the sheathing before pouring concrete.
- (g) Dressing with oil to prevent adhesion and
- (h) Raking or circular cutting

Classification of Measurements:

Where it is stipulated that the form work shall be paid for separately, measurements shall be taken of the area of shuttering in contact with the concrete surface. Dimensions of the form work shall be measured correct to a cm. The measurements shall be taken separately for the following.

Foundations, footings, bases of columns etc. and for mass concrete

- (b) Walls (any thickness) including attached pilasters, buttresses, plinth and string courses etc.
- (c) Suspended floors, roofs, landings, shelves and their supports and balconies.
- (d) Lintels, beams, plinth beams, girders, bressummers and cantilevers.
- (e) Columns, pillars, piers, abutments posts and struts.

- (f) Stairs (excluding landings) except spiral staircase.
- (g) Spiral staircases (including landings).
- (h) Arches, Domes, vaults, shells roofs, arch ribs, curvilinear shaped folded plates
- (i) Extra for arches, domes, vaults exceeding 6 m span other than curvilinear shaped
- (j) Chimneys and shafts.
- (k) Well steining.
- (l) Vertical and horizontal fins individually or forming box, louvers and bands facias and eaves board
- (m) Waffle or ribbed slabs.
- (n) Edges of slabs and breaks in floors and walls (to be measured in running metres where below 200 mm in width or thickness).
- (o) Cornices and mouldings.
- (p) Small surfaces, such as cantilevers ends, brackets and ends of steps, caps and boxes to pilasters and columns and the like.
- (q) Chullah hoods, weather shades, chajjas, corbels etc. including edges and
- (r) Elevated water reservoirs.

No deductions from the shuttering due to the openings/ obstructions shall be made if the area of each openings/ obstructions does not exceed 0.4 square metre. Nothing extra shall be paid for forming such openings.

Form work of elements measured under categories of arches, arch ribs, domes, spiral staircases, well steining, shell roofs, curvilinear folded plates & curvilinear eaves board, circular shafts & chimneys shall not qualify for extra rate for circular work.

Rate

The rate of the form work includes the cost of labour and materials required for all the operations described above is included in R.C.C. work

Item No. 13

Providing TMT Fe 500 D bar reinforcement for RCC work including bending, binding and placing in position complete up to floor two level.

- 1 The type of reinforcement shall be as per the item description. The contractor shall submit the test certificate from steel manufacturer as and when required. The test results shall be verified, if required in any reputed laboratory.
- 2 Bar bending schedule shall be made by the contractor before starting the work. The payment shall be done based on quantity worked out in bar bending schedule. The bar bending schedule shall be prepared as per SP 34.
- 3 All the reinforcement bars shall be accurately placed in exact position shown on the drawings and shall be securely held in position with 16 gauge MS binding wire as approved by Engineer-in charge. The rebars shall be placed with stay blocks or metal chair spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals. Bars shall not be allowed to sag between supports nor displaced during concreting or any other operations of the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal supports shall not extend to the surface of concrete, except where shown on drawing. 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 at 1m c/c, Precast cover blocks in cement mortar 1:2 (1 cement : 2 coarse sand) about 4 X 4 cm square section or 4 cm dia round section or PVC cover blocks shall be used to maintain the cover of the concrete members as directed by Engineer in charge or Architect. Reinforcement after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement from corrosion, concrete cover shall be provided as indicated on drawing. All the bars projecting

from concrete and to which other bars are to be spliced and which are likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout.

- 4 Bars crossing each other where required shall be secured by 16 gauge GI binding wires (annealed) of size not less than 1 mm., in such manner than they do not slip over each other at the time of fixing and concreting.
- 5 As far as possible, bars of full length shall be used. In case this is not possible, overlapping of bars shall be done as directed. Where directed and practicable overlapping bars shall not touch each other, but be kept apart by 25 mm or 1.25 times the maximum size of the coarse aggregate, whichever is greater by concrete between them. Where not feasible, overlapping bars shall be bound with annealed wires not less than 1 mm. thick, twisted tight. The overlaps shall be staggered for different bars and located at points along the span where neither shear nor bending movement is maximum in beam and slab.
- 6 Whenever indicated on the drawings or desired by the Architect and Engineer-in-charge, bars shall be joined by couplings which shall have a cross section sufficient to transmit the full stresses of bars. The ends of the bars that are joined by coupling shall be upset for sufficient length so that the effective cross sectional the base of threads is not less than normal cross section of the bar. Threads shall be standard threads. Steel coupling shall conform to IS : 226.
- 7 When permitted or specified on the drawings, joints of reinforcement bars shall be welded with appropriate welding rod as per the instructions given by Structural Engineer. The type of welding, size of fillet etc shall be as approved by Structural Engineer. Welded joints shall preferably be located at points when steel will not be subject to more than 75 % of the maximum permissible stresses and welds so staggered that any one section not more than 20 % of the rods are welded. Only electric arc welding using a process which excludes air from the molten metal and conforms to any or all other special provisions for the work shall be accepted. Suitable means shall be provided for holding bars securely in position during welding. It shall be ensured that no voids are left in welding and when welding is done in 2 or 3 stages, previous surface shall be cleaned properly. Ends of the bars shall be cleaned of all loose scale, rust, grease paint and other foreign matter before welding. Only competent welders shall be employed on the work. The M.S electrodes used for welding shall conform to IS: 814. Welded pieces of reinforcement shall be tested. Specimen shall be taken from the actual site and their number and frequency of test shall be as directed. Welding shall be done by electric arc process as per IS : 816 and IS : 823.
- 8 At the time of concreting, a bar fitter shall remain at site to keep the reinforcement in position.
- 9 Rolling margin shall be checked for each lot of steel received at site. This rolling margin shall be considered for reconciliation of steel at the end of the project or after the end of each month as per the decision of engineer -in charge.

10 Mode of Measurement and Payment

- 10.1 Reinforcement shall be measured in length including overlaps, separately for different diameters as actually used in the work. Where welding or coupling is resorted to in place of lap joints, such joints shall be measured for payment as equivalent length of overlap as per design requirement. From the length so measured, the weight of reinforcement shall be calculated in Kg by using standard IS co-efficient. Length shall include hooks at the ends. The wastage of steel and binding wires shall not be measured and paid extra. The rolling margin of steel shall not be paid extra.
- 10.2 The rate for reinforcement shall include the cost of labour and material required for all operations described above like cleaning of reinforcement bars, straightening, cutting,

hooking, bending, binding, welding placing in position etc. as per the drawing or directed by the Architect or engineer-in-charge Rate shall also include the cost of GI binding wires of 16 to 18 gauge, devices like chairs, pins, spacer bars, cover blocks of PVC or cement mortar etc. for keeping reinforcement in position. The rate shall for unit of Kg.

Item No. 14

Providing, fabricating, erecting placing in position and connecting for all heights/spans MS box sections in roof trusses, columns, portal frames, beams, bracing, platforms, stairs & column nosing angle, brackets, Purlin , Girts etc. including cutting, wastage, welding (shop and site), bolting wherever necessary, with one coat of Zinc Chromate primer and two coats of synthetic enamel paint of (Approved Make and Shade) etc. all complete as directed by the Engineer in Charge.

1.0 Materials: The structural steel work shall conform to M-22. Red lead paint primer shall conform to I. S. : 102-1962.

2.0 Workmanship:

2.1 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.

2.2 Steel riveted or bolted in built up sections, frame work.

2.2.1 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.

2.2.2 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.

2.2.3 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, knicks, 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 spliced 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 than 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 flaws. 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 contact 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 machined 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 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 sunk 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.

2.2.4 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.

2.2.5 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.

3.0 Mode of measurement and payment:

3.1 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.

3.2 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.

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

Item No. 15

Providing, fabricating, erecting placing in position and connecting for all heights/spans MS structural sections (Pipes, I-section, Channel section, Angles, Insert plates etc.) in roof trusses, columns, portal frames, beams, bracing, platforms, stairs & column nosing angle, brackets, Purlin , Girts etc. including cutting, wastage, welding (shop and site), bolting wherever necessary, with one coat of Zinc Chromate primer and two coats of synthetic enamel paint of (Approved Make and Shade) etc. all complete as directed by the Engineer in Charge.

1.0 Materials: The structural steel work shall conform to M-22. Red lead paint primer shall conform to I. S. : 102-1962.

2.0 Workmanship:

2.1 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.

2.2 Steel riveted or bolted in built up sections, frame work.

2.2.1 The steel structure as shown in the drawings or as per direction of the Engineer-in-charge shall be laid out on 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.

2.2.2 Wooden templates 12 mm to 19 mm thick or metal sheet template shall be made to correspond to each connecting gusset 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.

2.2.3 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, bends, 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 flanges 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 spliced 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 than 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 flaws. 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 contact 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 machined 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 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 sunk 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.

2.2.4 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.

2.2.5 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.

3.0 Mode of measurement and payment:

3.1 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.

3.2 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.

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

Item No. 16

Supplying ,installing , & fixing Anchor Bolts SIZE 1.2 mt Legnth With Nuts in concrete foundation providing, auxiliary dummy structures, if any,necessary tying and welding to reinforcement,adjustment of shuttering, greasing exposed metal surfaces and covering with jute cloths etc. complete as per drawing and specifications and directions.(Weight of bolt and Nuts shall be measured for payment)

Bolts as per approved drawing shall be placed by Civil Contractor with proper Line and level as specified in Approved Drawing. Bolts will be supplied by the supplier of PEB. Executed work will be jointly checked by Civil Contractor and Supplier of PEB and approved by Engineer in Charge to avoid discrepancy in Future.

Mode of Measurement and Payment:

Work shall be measured and paid on No Basis after joint review of Civil Contractor and supplier of PEB and approved by Engineer in Charge. Supply of anchor bolts size 1.2 will be in scope of Supplier of PEB as per approved Drawing.

BRICK WORK:

Item No. 17

Brick work using common burnt clay building bricks having minimum crushing strength not less than 35 kg/ sq cm in foundation and plinth in cement mortar 1:6 (1 cement : 6 coarse sand) at any height/depth/floor upto plinth level.

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 as 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; closures 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 inside face shall be flushed with mortar before the next brick is laid and pressed against it. On completion of course, the vertical joints shall be fully filled from the top with mortar.

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

The brick shall be laid with frog up wards. A set of tools comprising of wooden straight edges, man son'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 futures, pipes, outlets of water, hold fasts of doors and windows etc. which are required to be built in wall shall be embedded in cement mortar

Joints:

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

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

Curing:

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

Preparation of foundation bed:

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

Mode measurements & payment

The measurements of this item shall be taken for the brick masonry fully completed in foundation up to plinth.

The limiting dimensions not exceeding those shown on the plinths 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, for any extra payment made for embedding in masonry or making holes in respect of following items:

Ends of joists, beams, posts, girders, purlins, trusses, corbel, steps etc. where cross sectional area

does not exceed 500 Sq.Cm. Openings not exceeding 1000 Sq.Cm. Wall plates and bed plates, bearing of slabs, chajjas and the like whose thickness does not exceed 10 Cms. and the bearing does not extend to the full thickness of wall. Drainage holes, and recesses for cement concrete blocks to embed hold fasts for doors, windows etc.

Iron fixtures, pipes up to 300 mm. dia hold fasts, and doors and windows built into masonry and pipes etc. for concealed wiring. Forming chases of section not exceeding 350 -Sq. Cm. in masonry.

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

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

Item No. 18

Brick work using fly-ash bricks having crushing strength not less than 35 Kgs. / Sq.cm. In Super structure above plinth level at any height/floor level. Conventional bricks in cement mortar of 1 cement : 6 coarse sand.

Following Indian Standards are necessary adjuncts to this specification.

| IS NO. | TITLE |
|-------------------|--|
| 712:1984 | Specification for building limes (third revision) |
| 1727:1967 | Method of test for pozzolanic materials (first revision) |
| 3812:1981 | Specification for fly ash for use as pozzolana and admixture (first revision) |
| 3495(PART-1):1976 | Method of test of burnt clay building bricks: part-1 Determination of compressive strength (second revision) |
| 3495(PART-2):1976 | Method of test of burnt clay building bricks: part-2 Determination of water absorption (second revision) |
| 3495(PART-3):1976 | Method of test of burnt clay building bricks: part-3 Determination of efflorescence (third revision) |
| 4139:1989 | Specifications for calcium silicate bricks (second version) |
| 5454:1976 | Method for sampling of clay burnt building bricks (first revision) |

1.0 Workmanship

The relevant specification of item No. 16 shall be followed except that the masonry work shall be carried out above plinth level for all Levels and all heights

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

Necessary scaffolding shall be provided. The supports of the scaffolding shall be sound and strong tied, together with horizontal pieces over which the scaffolding plunks shall be fixed. Simple scaffolding shall be allowed normally. In this case scaffolding hole shall rest in hole header

horizontal coarse only. Minimum number of holes be left in brick work for supporting horizontal scaffolding poles. The contractor is responsible for providing and maintaining sufficiently strong scaffolding so as to withstand all loads likely to come upon it.

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.

2.0 Materials.

- Fly ash 62%
- Lime 8%
- Gypsum 5%
- Sand or quarry dust 25%
- 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

3.0 Physical Characteristics:

- 3.1 Compressive strength should be greater than 70Kg./cm².
The Fly-Ash bricks shall be of the following classes depending upon their average compressive strength.

| Class | Average Compressive strength (N/mm ²) | |
|-------|---|-----------|
| | Not Less Than | Less Than |
| 7.5 | 7.5 | 10 |
| 10 | 10 | 15 |
| 15 | 15 | 20 |
| 20 | 20 | - |

- 3.2 Density 1700 Kg./m³.

- 3.3 Weight & dimension
230 x 100 x 75mm (weight @ 3.4 to 3.6 Kg.)

- 3.4 Drying shrinkage:
The average Drying shrinkage of the bricks when tested by the method described in IS 4139:1989 being the average of three units, shall not exceed 0.15%

- 3.5 Efflorescence Test:
The bricks when tested in accordance with the procedure laid down in IS:3495 (part-3):1976, shall have the rating of efflorescence not more than "moderate" up-to class 10 and "slight" for higher classes

- 3.6 Water Absorption:
The bricks when tested in accordance with the procedure laid down in IS 3495(part 2):1976, after immersion in cold water for 24 hours, shall have average water absorption not more than 20% by mass up to class 10, and 15% by mass for higher classes.

4.0 Process of manufacture

Fly ash, Hydrated lime, quarry dust and gypsum are manually feed into pan mixer where water is added in the required proportion for in time to mixing the proportion of the raw materials is generally in the ratio depend upon the quality of raw materials. After mixing the mixture is shifted to the hydraulic brick making machine. The bricks are carried on wooden pellets to the open area where they dried and water cured for 14 days. The bricks are tested and stored before dispatch.

5.0 Mode of measurements & payment

- 5.1 The measurements of this item shall be taken for the brick masonry fully completed in foundation up to plinth. The limiting dimensions not exceeding those shown on the plinths or as directed shall be final. Battered tapered and curved portions shall be measured net.
- 5.2. No deduction shall be made from the quantity of brick work, for any extra payment made for embedding in masonry or making holes in respect of following items:
- (1) Ends of joists, beams, posts, girders, purlins, trusses, corbel, steps etc. where cross sectional area does not exceed 500 Sq.Cm.
 - (2) Openings not exceeding 1000 Sq.Cm.
 - (3) Wall plates and bed plates, bearing of slabs, chajjas 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.
- 5.3. Apertures for fire places shall not be deducted nor shall be paid for separately.
- 5.4. The rate shall be for a unit of one cubic meter.

Item No. 19

Providing & laying half brick work using best available fly-ash bricks having minimum crushing strength of 35 kg./sq cm in cement mortar 1 cement : 4 coarse sand in super-structure and curing etc. complete at any height/floor level.

Following Indian Standards are necessary adjuncts to this specifications.

| IS NO. | TITLE |
|-------------------|--|
| 712:1984 | Specification for building limes (third revision) |
| 1727:1967 | Method of test for pozzolanic materials (first revision) |
| 3812:1981 | Specification for fly ash for use as pozzolana and admixture (first revision) |
| 3495(PART-1):1976 | Method of test of burnt clay building bricks: part-1 Determination of compressive strength (second revision) |
| 3495(PART-2):1976 | Method of test of burnt clay building bricks: part-2 Determination of water absorption (second revision) |
| 3495(PART-3):1976 | Method of test of burnt clay building bricks: part-3 Determination of efflorescence(third revision) |
| 4139:1989 | Specifications for calcium silicate bricks (second version) |
| 5454:1976 | Method for sampling of clay burnt building bricks (first revision) |

1.0 Workmanship

The relevant specification of item No. 16 shall be followed except that the masonry work shall be carried out above plinth level for all Levels and all heights

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

Necessary scaffolding shall be provided. The supports of the scaffolding shall be sound and strong tied, together with horizontal pieces over which the scaffolding plunks shall be fixed. Simple scaffolding shall be allowed normally. In this case scaffolding hole shall rest in hole header horizontal coarse only. Minimum number of holes be left in brick work for supporting horizontal scaffolding poles. The contractor is responsible for providing and maintaining sufficiently strong scaffolding so as to withstand all loads likely to come upon it.

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.

2.0 Materials.

- Fly ash 62%
- Lime 8%
- Gypsum 5%
- Sand or quarry dust 25%
- 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

3.0 Physical Characteristics:

- 3.1 Compressive strength should be greater than 70Kg./cm².
The Fly-Ash bricks shall be of the following classes depending upon their average compressive strength.

| Class | Average Compressive strength (N/mm ²) | |
|-------|---|-----------|
| | Not Less Than | Less Than |
| 7.5 | 7.5 | 10 |
| 10 | 10 | 15 |
| 15 | 15 | 20 |
| 20 | 20 | - |

- 3.2 Density 1700 Kg./m³.

- 3.3 Weight & dimension
230 x 100 x 75mm (weight @ 3.4 to 3.6 Kg.)

- 3.4 Drying shrinkage:
The average Drying shrinkage of the bricks when tested by the method described in IS 4139:1989 being the average of three units, shall not exceed 0.15%

- 3.5 Efflorescence Test:
The bricks when tested in accordance with the procedure laid down in IS:3495 (part-3):1976, shall have the rating of efflorescence not more than "moderate" up-to class 10 and "slight" for higher classes

- 3.6 **Water Absorption:**
The bricks when tested in accordance with the procedure laid down in IS 3495(part 2):1976, after immersion in cold water for 24 hours, shall have average water absorption not more than 20% by mass upto class 10, and 15% by mass for higher classes.

- 4.0 **Process of manufacture**
Fly ash, Hydrated lime, quarry dust and gypsum are manually feed into pan mixer where water is added in the required proportion for in time to mixing the proportion of the raw materials is generally in the ratio depend upon the quality of raw materials. After mixing the mixture is shifted to the hydraulic brick making machine. The bricks are carried on wooden pellets to the open are where they dried and water cured for 14 days. The bricks are tested and stored before dispatch.

5.0 Mode of measurement and payment

The limiting dimensions shall not exceed those shown in the plan or as directed. Any work done extra over specified dimensions shall be ignored. The rate shall be for a unit of one sq. meter for all level and all heights above plinth.

PLASTERING AND POINTING WORK:

Item No. 20

Providing 20mm thick double coat mala cement plaster on exterior brick/concrete work for plastering comprising of base coat of 12mm thick cement plaster in cement mortar (1 cement: 4 coarse sand) in rough finishing and 8mm thick top coat of cement mortar 1:2 (1 cement: 2 coarse sand) finished with trowel including scaffolding curing etc. complete. any height/floor level.

Materials :

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

2.0 Workmanship :

2.1 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.

2.2 Preparation of back-ground :

2.2.1 The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface shall be 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.

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

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

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

2.3 Applications of Plaster :

2.3.1 The plaster about 15 x 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 surfaces 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 chamfering corners, arrises junctions etc. shall be carried out with proper templates to the size required.

2.3.2 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 :

2.3.3 In suspending the work at the end of the day, the plaster shall be left out clean to the line both horizontally and vertically. When recommencing the plaster, the edges of the old work shall be scraped clean and wetted with cement putty before plaster is applied to the adjacent 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 copings as these invariably lead to leakage. No portion of the surface shall be left out initially to be packed up later on.

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

3.0 Mode of measurement & payment :

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

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

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

3.4 This item includes plastering upto floor two level.

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

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

3.7 For jambs, soffits, sills etc. for openings not exceeding 0.5 sq. mt. each in area for ends of joints, beams, posts, girders, steps etc. not exceeding 0.5 sq. mt. each in area and for openings exceeding 0.5 sq.mt. and not exceeding 3.0 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 openings 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 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. sills etc. of these openings. (i) When both faces of all wall are plastered with same plaster, deduction shall be made for one face only. (ii) When two faces of wall are plastered with different types of plasters or if one 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 reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from area of plaster and/or pointing as the case may be.

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

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

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

Item No. 21

Providing 15 mm thick cement plaster in single coat on fair side of wall for interior plastering upto at any height/floor level finished even and smooth in cement mortar 1: 3 (1 cement mortar: 3 fine sand).

1.0. Materials

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

2.0. Workmanship

2.1. Scaffolding:

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

2.2. Preparation of back ground :

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

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

- 2.2.3. The work shall not be soaked but only damped evenly before applying the plaster. If the surface becomes dry, such area shall be moistened again.
- 2.2.4. For external plaster, the plastering operation shall be started from top floor and carried downwards. For internal plaster, the plastering operations may be started wherever the building frame and cladding work are ready and the temporary supports of the ceiling resting on the wall of the floor have been removed. Ceiling plaster shall be completed before starting plaster to walls.
- 2.3. Application of plaster :
 - 2.3.1. The plaster about 15x15 cms. Shall be first applied horizontally and vertically at not more than 2 meters intervals over the entire surface to serve as gauge. The surfaces of these gauges shall be truly in plane of the finished plastered surface. The mortar shall then be applied in uniform surface slightly more than the specified thickness, then brought to a true surface by working a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally, the surface shall be finished off true with a trowel or wooden float according as a smooth or a smooth or a sandy granular texture is required. Excessive troweling or overworking the float shall be avoided. All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished. Hounding or chamfering, corners, arises junctions etc. shall be carried out with proper templates to be size required.
 - 2.3.2. Cement plaster shall be used within half an hour after addition of water and mortar or plaster which is partially set shall be rejected and removed forthwith from the site.
 - 2.3.3. In suspending the work at the end of the day, the plaster shall be left out clean to the line both horizontally and vertically, when recommencing the plaster, the edges of the old work shall be scraped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of the wall and nearer than 15 cm. to any corners or arises. It shall not be closed on the body of features such as plaster bands and cornices not at the corners or arises. Horizontal joints in plaster work shall not also occur on parapet tops and copings as these invariably lead to leakage. No portion of the surface shall be left out initially to be packed up later on.
 - 2.3.4. Each coat shall be kept damp continuously till the next coat is applied or for a minimum period of 7 days. Moistening shall commence as soon as plaster is hardened sufficiently. Soaking of walls shall be avoided and only as much water as can be readily absorbed shall be used, excessive evaporation on the sunny or windward side of building in hot air or dry weather shall be prevented by hanging matting or gunny bags on the outside of the plaster and keeping them wet.
 - 2.3.5. The plastering work shall be in single coat on rough side of half brick wall for interior plastering up to floor two level, finished even and smooth in C.M. 1:4.
- 3.0. Mode of measurements & payment
 - 3.1. The rate shall include the cost of all materials, labor and scaffolding etc. involved in the operations described under workmanship.
 - 3.2. All plastering shall be measured in square meters unless otherwise specified. Length breadth or height shall be measured correct to a centimeter.
 - 3.3. Thickness of the plaster shall be exclusive of the thickness of the key i.e. grooves or open joints in brick work, stone work etc. or space between laths. Thickness of plaster shall be average thickness with minimum 15 mm at any point on this surface.

- 3.4. This item includes plastering up to floor two level.
- 3.5. The measurement of wall plastering shall be taken between the walls or partition (dimensions before plastering being taken) for length and from the top of floor or skirting to ceiling for height. Depth of cover of cornices if any shall be deducted.
- 3.6. Soffits of stairs shall be measured as plastering on ceilings, following soffits shall be measured separately.
- 3.7. For jambs, soffits, sills etc. for openings not exceeding 0.5 sq. met each in area for ends of joints beams, posts, girders, steps etc. not exceeding 0.5 sq.mt each in area and for openings exceeding 0.5 sq.mt and not exceeding 3.00 sq.mt. in each area deductions and additions shall be made in the following manners.
- (a) No deductions shall be made for ends of joints, beams, posts etc. and openings not exceeding 0.5 sq. mt each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings, for finish to plaster around ends of joints, beams posts etc.
- (b) Deduction for openings exceeding 0.5 sq. mt but not exceeding 3 sq.mt. each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings, (i) When both faces of all wall are plastered with same plaster, deduction shall be made for one face only, (ii) When two faces of wall are plastered with different types of plasters or if one face is plastered and the other pointed, deductions shall be made from the plaster or pointing on the side of frame for door, window etc. on which width of reveals is less than that on the other side but no deductions shall be made on the other side. Where width of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from areas of plaster and / or pointing as the case may be.
- 3.8. For openings having door frames equal to or projecting beyond the thickness of wall, full deduction for opening shall be made from each plastered face of the wall.
- 3.9. In case of openings of area above 3 sq. mt. each, deduction shall be made for openings but jambs, soffits and sills shall be measured.
- 3.10. The rate shall be for a unit of One sq. meter.

Item No. 22

Providing 10 mm thick plaster in single coat on any wall for interior plastering at any height/floor level finished even and smooth in cement mortar 1:3 (1 cement : 3 fine sand).

1.0. Materials

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

2.0. Workmanship

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

2.2. Preparation of back-ground :

2.2.1. The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface shall be toughened by wire brushing

if it is not hard and by hacking if it is hard. In case of concrete surface, if a chemical 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 surfaces where necessary shall be carried out to get an even surface.

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

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

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

2.3. Application of plaster:

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

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

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

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

3.0. Mode of measurements & payment

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

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

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

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

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

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

3.7. For jambs, soffits, sills etc. for openings not exceeding 0.5 sq. met each in area for ends of joints beams, posts, girders, steps etc. not exceeding 0.5 sq. mt each in area and for openings exceeding 0.5 sq. mt and not exceeding 3.00 sq. mt. in each area deductions and additions shall be made in the following manners. (a) No deductions shall be made for ends of joints, beams, posts etc. and openings not exceeding 0.5 sq. mt each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings, for finish to plaster around ends of joints, beams posts etc. (b) Deduction for openings exceeding 0.5 sq. mt but not exceeding 3 sq.mt. each shall be made as follows and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings, (i) When both faces of all wall are plastered with same plaster, deduction shall be made for one face only, (ii) When two faces of wall are plastered with different types of plasters or if one face is plastered and the other pointed, deductions shall be made from the plaster or pointing on the side of frame for door, window etc. on which width of reveals is less than that on the other side but no deductions shall be made on the other side. Where width of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from areas of plaster and / or pointing as the case may be.

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

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

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

Item No. 23

Providing and Laying Water Proofing Treatment in sunk Portion of WC , Bath Room Etc. by applying Cement Slurry mixed with Water Proofing Compound Consisting of Applying

a) First Layer of Slurry of cement @ 0.488 Kg/ Sqmt mixed with Water Proofing Compound @ 0.253 Kg/ Sqmt .This Layer will be allowed to air cure for 4 Hrs.

b) Second Layer of Slurry of Cement @ 0.242 Kg/ Sqmt mixed with Water Proofing Compound @ 0.126 Kg/ Sqmt. This layer will be allowed to air cure for 4 Hours followed with Water Curing for 48 Hours. The rate includes preparation of Surface, treatment and sealing of joints, corner, junction of Pipes and masonry with Polymer Mixed slurry.

Materials:

water shall conform to M-1. cement weather proofing paint as per asian apex duracast texture.

Workmanship:

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

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

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

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

2.2. Preparation of surfaces : The surfaces painting shall be cleaned of all rust, scale, dirt and other foreign matter sticking to it with wire brushes, steel wool, scrapers, sand paper etc. This surface shall then be wiped finally with mineral turpentine which shall also remove grease and perspiration of hand marks. The surface shall then be allowed to dry.

2.3. Application of primer :

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

2.3.2. During painting, every time, after the priming coat has been worked out of the brush bristles or after the brush has been unloaded, the bristles of the brush shall be opened up by striking the brush against portion of the unpainted surface with the end of the bristles, held at right angles to the surface, so that bristles thereafter will collect the correct amount of paint when dipped again in to a paint container The prima/y coat shall be allowed to dry completely before painting is started.

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

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

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

2.4. Application of color :

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

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

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

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

2.5 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.

3.0. Mode of measurements and payment

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

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

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

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

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

3.4. In case of fabricated structural steel and iron work, priming coat of paint shall be included with fabrication. In case of trusses if measured in sq. m. compound girders, stanchions, lattices, grader and similar work, actual area shall be measured in sq. m. and no extra shall be paid for painting on bolts heads.

Item No. 24

Providing cement grit vata, 10 cm. x 10 cm. size, quarter round concave/ triangular in cement concrete 1:2:4 including neat cement finishing, curing, hacking the RCC surface, etc. complete.

1.0 Materials :

1.1 Water shall conform to M-12 . Cement mortar shall conform to M-11.

2.0 Workmanship :

2.1 The work of cement vata of 10 cms. x 10 cms. size shall be carried out at junctions of parapets 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 inter portion of rain water pipe shall be rounded off properly during constructing the vata. The work shall be cured for 7 days.

3.0 Mode of measurements & payment :

3.1 The work shall be measured for finished item in running meter.

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

Item No. 25

Providing and filling machine mixed cement cinder in the ratio of 1:10 i.e. 1 part of cement and 10 parts of cinder by volume in sunk toilet at all the floors, at all levels including watering etc. completed.

Material:

Cinder

Workmanship:

The machine mixed cement Cinder in the ratio of 1:10 1 part of cement and 10 part of cinder Laying and spreading in sunk area as per instructed by engineer in charge.

All related machinery, tools, labour and material included in above item.

Mode of Measurement;

the rates shall be for a unit of One Cu.mt

Item No. 26

Providing and applying exterior texture paint (Flat texture/synthetic paint) of approved make on any height. The rate includes applying one brush coats of PRIMER, On prepared surface final required coat of Semi gloss Medium Textured Flexible coating with crack bridging up to 2.6 MM and VOC content less than 100g/l, required scaffolding, jhulaa, tools and labor. The texture material shall be Pure Acrylic, Environment Friendly, Protect against Salt and Carbon dioxide, with excellent anti-Carbonation, UV Resistance, Moisture vapour transmission coating with third party test certificate applied up to 140 Microns DFT.

Materials

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

Workmanship

2.1. 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 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.

2.2. Preparation of surface :

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

2.2.2. All unnecessary nails shall be removed. Pitting in plaster shall be made good with plaster again with a fine grade sand paper and made smooth. A coat of 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 01) 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.

2.3. Preparation of Mix :

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

2.4. Application :

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

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

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

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

2.5. Precautions :

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

(b) In the preparation of wall for plastic emulsion painting, no oil base petals shall be sued 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 or surfaces treated with emulsion paint shall not be done within 3 to 4 weeks of Application

Mode of measurements and payment

3.1. 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 item shall be worked out to the nearest 0.01 sq.m.

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

3.2. No deductions shall be made for ends of joists, beams, posts, etc. and openings not exceeding 0.5 sq mt. each. No addition shall be made for reveals, jambs, soffits, sills etc. of these openings not for finish around ends of joints, beams, posts etc.

3.3. No deductions for openings exceeding 0.5 sq.mt. but not exceeding 3 sq. mt. each shall be made as follows and no addition will be made for reveals, jambs, soffits etc. of these openings :

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

(b) When each face of wall is provided with 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 to be made for reveals, jambs, soffits, sills etc.

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

3.5. No deductions shall be made for attachment such as casing, conducts, pipe, electric wiring and the like.

3.6. Corrugated surfaces shall be measured flat as fixed and not girth. The quantities so measured shall be increased by the following percentage and the resultant shall be included with the general areas:

- (a) Corrugated steel sheets..... 14%
- (b) Corrugated A.C. sheets..... 20%
- (c) Semi corrugated A.C. Sheets..... 10%
- (d) Nainital pattern roof (Plain sheeting sheets)..... 10%
- (e) Naintial pattern roof (with corrugated sheets)..... 25%

3.7. 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.

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

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

Item No. 27

Providing and applying paint on internal wall with Three coat Plastic emulsion paint of approved brand & manufacture & required shade on wall & Ceiling surfaces to give an even shade over & including a priming coat with a primer of approved brand & manufacture after thoroughly Brushing the surface free from mortar dropping & other foreign matter & also including preparing surface with birla white cement based putty sand papered smooth. Rate includes application for all heights.

Materials

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

Workmanship

2.1. 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 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.

2.2. Preparation of surface :

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

2.2.2. All unnecessary nails shall be removed. Pitting in plaster shall be made good with plaster again with a fine grade sand paper and made smooth. A coat of 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 01) 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.

2.3. Preparation of Mix :

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

2.4. Application :

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

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

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

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

2.5. Precautions :

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

(b) In the preparation of wall for plastic emulsion painting, no oil base petals shall be sued 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 or surfaces treated with emulsion paint shall not be done within 3 to 4 weeks of Application

Mode of measurements and payment

3.1. 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 item shall be worked out to the nearest 0.01 sq.m.

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

3.2. No deductions shall be made for ends of joists, beams, posts, etc. and openings not exceeding 0.5 sq mt. each. No addition shall be made for reveals, jambs, soffits, sills etc. of these openings not for finish around ends of joints, beams, posts etc.

3.3. No deductions for openings exceeding 0.5 sq.mt. but not exceeding 3 sq. mt. each shall be made as follows and no addition will be made for reveals, jambs, soffits etc. of these openings :

- (a) When both the faces of walls are provided with finish, deduction shall be made for one face only.
- (b) When each face of wall is provided with 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 to be made for reveals, jambs, soffits, sills etc.

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

3.5. No deductions shall be made for attachment such as casing, conducts, pipe, electric wiring and the like.

3.6. Corrugated surfaces shall be measured flat as fixed and not girth. The quantities so measured shall be increased by the following percentage and the resultant shall be included with the general areas:

- (a) Corrugated steel sheets..... 14%
- (b) Corrugated A.C. sheets..... 20%
- (c) Semi corrugated A.C. Sheets..... 10%
- (d) Nainital pattern roof (Plain sheeting sheets)..... 10%
- (e) Naintial pattern roof (with corrugated sheets)..... 25%

3.7. 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.

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

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

Item No.28

Providing and laying in position vitrified tiles Anti Skid (Full body matt finish) (of approved make & colour), of any size and thickness of first quality with 3-5 mm groove as per design, set in cement slurry (3.3 kg. cement/m2.) Avg. 35 mm (or more as required) thick cement mortar 1:3 bedding and laid to proper slope and level. Finishing should be done with specified Grout including curing and cleaning with mild oxalic acid etc. complete, as shown and specified, for Flooring and Dado etc. complete, as directed by Consultant / Engineer -in-charge. Grouting in Joints of 3 to 5 mm with ready mix polymer based cementitious Grout of BAL or equivalent of approved shade as approved by consultant. Basic Rate including all taxes and transportation- 70 Rs./SFT

Material:

- 2. water shall confirm to M-1 of specification booklet of tender.
- 3. cement mortar shall be confirm to M-11 of specification booklet of tender.
- 4. fully anti skid vitrified floor tiles shall be of shade approved by engineer in charge. The tiles shall be hard even/sound 1 regular in shape and uniformly coloured. It shall be without any soft vines and cracks of flow. The size of the tiles shall be as per drawings or

otherwise specified by engineer in charge scratch hardness minimum 7 on mohr' s scale with a density of 2.2 to 2.3.

workmanship:

each vitrified tiles cut to the required size and shape as shown in the working drawing supplied by engineer in charge. Each tiles shall be in mirror polished. All angles and edges of tiles shall be true square and free from chipping and giving a plain surface. The shade quality of Vitrified tiles shall be got approved by Engineer in charge.

Bedding for the Vitrified tiles shall be 25mm thick in cement mortar 1:3 (1 cement: 3 sand) of grey thickness as given in the description n of the sub grade shall be cleaned wetted and mopped. Mortar of the specified mix and thickness shall be than spread on the area. Sufficient to receive Vitrified tiles. The tiles shall be washed clean before laying.

It shall laid on top pressed tapped gently to bring it in with the adjoining tiles flooring. The top surface of mortar shall be corrected bit adding fresh motor of hollow and depressions. The mortar shall than be allowed to harden bit over the surface cement slurry of honey like consistence shall be applied . the joints shall be as thin as possible. 3 to 5mm groove shall be filled up by polymer based cemenititious grout (to match the shade of tiles.) the top surface shall be protected from scratches damages etc. by means of a thin layer & good quality POP & all grooves shall be protected with adhesive tape or as directed by engineer in charge.

Mode of Measurement;

The rate includes the cost of all material and labour involve in all operations described above. The flooring shall be measured on sq.mt. basis. Rates also include rubbing, sizing and cleaning of tiles etc. complete.

the rates shall be for a unit of One Sq.mt

Item No. 29

Providing and laying in position vitrified tiles skirting of (approved make & colour) & first quality as per design, set in cement slurry (3.3 kg. cement/m2.) Finishing should be done with flush pointing in white cement and pigment including curing and cleaning etc. complete, as shown and specified etc. complete as directed by Consultant / Engineer in-charge. Basic Rate including all taxes and transportation- 70 Rs./SFT

Materials:

- 1) Water shall confirm to M – 1 of specification booklet of tender.
- 2) Cement mortar shall be confirmed to M-11 of specification booklet of tender.
- 3) Fully polished Vitrified tiles shall be of shade approved by Engineer –In – Charge. The tiles shall be hard even / sound and regular in shape and uniformly coloured. It shall be without any soft vines and cracks of flow. The size of the tiles shall be as per drawings or otherwise specified by Engineer – In – Charge scratch hardness minimum 7 on Mohr's scale with a density of 2.2 to 2.3.

Workmanship:

2.1 Preparation of surface:- In case of brick / a block masonry wall the joints shall be raked out to a depth of at least 15 mm. While the masonry is being laid. In case of concrete wall surface shall be chiseled and roughed with wire brushes. The surface shall be cleaned and wetted thoroughly before commencing the laying work.

Laying :-

The wall surface shall be covered within 10mm thick plaster of cement mortar 1:3 mix and allowed to harden. The plaster shall be roughened with wire brushes both ways. The back of tiles shall be floated with grey cement slurry and edges with white cement slurry. The tiles shall be gently tapped in position one after the other keeping the joints as thin as possible. Top of skirting of dado shall be truly horizontal and joints vertical or as per required pattern.

Risers of steps, skirting and dado shall rest on top of treads of flooring. Where full size tiles cannot be fixed they shall be cut to the required size and the edges to smoothened.

The groove shall be cleaned and flush pointed with polymer based grout (to match the shade of tiles). The surface shall be kept wet for seven days. After curing the surface shall be washed clean.

Colour & size shall be of the Vitrified tiles should be provided as per instruction of Engineer – In – Charge.

Mode of measurement:

The rate shall be for unit of one Sq meter.

Item No. 30

Providing and laying in position vitrified tiles Dedo of (approved make & colour) & first quality as per design, set in cement slurry (3.3 kg. cement/m2.) Finishing should be done with flush pointing in white cement and pigment including curing and cleaning etc. complete, as shown and specified etc. complete as directed by Consultant / Engineer in-charge. Base Rate at site including all taxes and transportation- 70 Rs./SFT

Materials:

- 1) Water shall confirm to M – 1 of specification booklet of tender.
- 2) Cement mortar shall be confirmed to M-11 of specification booklet of tender.
- 3) Fully polished Vitrified tiles shall be of shade approved by Engineer –In – Charge. The tiles shall be hard even / sound and regular in shape and uniformly coloured. It shall be without any soft vines and cracks of flow. The size of the tiles shall be as per drawings or otherwise specified by Engineer – In – Charge scratch hardness minimum 7 on Mohr's scale with a density of 2.2 to 2.3.

Workmanship:

2.1 Preparation of surface:- In case of brick / a block masonry wall the joints shall be raked out to a depth of at least 15 mm. While the masonry is being laid. In case of concrete wall surface shall be chiseled and roughed with wire brushes. The surface shall be cleaned and wetted thoroughly before commencing the laying work.

Laying :-

The wall surface shall be covered within 10mm thick plaster of cement mortar 1:3 mix and allowed to harden. The plaster shall be roughened with wire brushes both ways. The back of tiles shall be floated with grey cement slurry and edges with white cement slurry. The tiles shall be gently tapped in position one after the other keeping the joints as thin as possible. Top of skirting of dado shall be truly horizontal and joints vertical or as per required pattern.

Risers of steps, skirting and dado shall rest on top of treads of flooring. Where full size tiles cannot be fixed they shall be cut to the required size and the edges to be smoothened.

The groove shall be cleaned and flush pointed with polymer based grout (to match the shade of tiles). The surface shall be kept wet for seven days. After curing the surface shall be washed clean.

Colour & size shall be of the Vitrified tiles should be provided as per instruction of Engineer – In – Charge.

Mode of measurement:

The rate shall be for unit of one Sq meter.

Item No. 31

Providing and Laying Ceramic Tiles 6mm thick in Skirting riser of steps and dado on 10mm thick cement plaster 1:3 (1-cement : 3-coarse sand) and joined with white cement slurry (up to 10 ton).

1.0. Materials

Water shall conform to M-1 Cement mortar shall conform to M-11 ceramic tiles shall conform to M-55

2.0. Workmanship

2.1. Preparation of Surface:

In case of brick masonry wall, the joints shall be raked out to a depth of least 15 mm. while the masonry is being laid. In case of concrete wall the surface shall be chiseled and roughed with wire brushes. The surface shall be cleaned and wetted thoroughly before commencing the laying work.

2.2. Laying ;

2.2.1. The wall surface shall be covered with 10 mm. thick plaster of cement mortar 1:3 mix and allowed to harden. The plaster shall be roughened with wire brushes both way. The back of tiles shall be floated with grey cement slurry set and edges with white cement slurry in bedding mortar. The tiles shall be gently tapped in position on after the other keeping the joints as thin as possible. Top of skirting or dado shall be truly horizontal and the joints vertical or as per required pattern.

2.2.2. 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 to the required size and the edges be smoothened.

2.2.3. The joints shall be cleaned and flush pointed with white cement. The surface shall be kept wet for seven days. After curing the surface shall be washed clean.

3.0. Mode of measurements and payment

3.1. The rate shall include the cost of all materials and labour required for various operations described above. Risers of steps, skirting and dedo shall be measured in square meters, length and height shall be measured along the finished face of the skirting or dedo including curves, where special such as covers, internal and external angles, etc., used. The length and height shall be measured correct to the centimeter except in case of risers and skirting where height shall be measured correct to 3 mm

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

Item No. 32

Providing and laying 18 to 20 mm thick granite stone (Colour as Approved by Consultant) for flooring, Door Window Jam and Skirting over 25 mm (or more as required) thk. Base of cement mortar 1:6 laid over and jointed with white cement slurry including rubbing and mirror/semi-mirror polishing etc. complete. Rate Shall be inclusive of providing and fixing of Skirting of approved size and Shade. Base Rate at site including all taxes and transportation:200 Rs/SFT

Material

Water shall confirm to M-1 (1.1 to 1.5 / P 9 / V .1). Cement mortar shall confirm to M-11 (11.1 to 11.32 / P 11 / V.1).

Granite stone shall be 18 mm ot 20 mm thk.

In addition to that, it shall be of approved quality, free from defects and dressed in fashion stated under specification. The thickness shall be as stated in the schedule with 3 mm tolerance. The stone shall be of uniform in colour with straight edges. The sides of machine cut and machine polished stone shall have perfect right angle and surface on earth.

Workmanship

The sill will be having finished level with wall thickness. The bearing of granite stone shall be 18 mm to 20mm all around in masonry or RCC work. The drip for bearing shall be formed by making gissi in walls. The gissi shall be 20 mm minimum deep in walls. line level and plumb. The thickness of base of cement mortar 1:6 laid over and joint with white cement slurry . Top slab shall consist of granite stone 18 mm thick placed and fixed in line level and plumb using adhesives with BAL ENDURA make Gold Star Adhesive with Polymer Additive ADMIX AD1 in ratio of 1 Bag of BAL Gold Star Adhesive (20 Kg) with 1 Ltr. Of Admix AD1. The workmanship shall be referred to the same as done as per wall cladding. After placing the granite stone in gissi it shall be filled & finished smooth. The top slab shall be in true line & level. The projected part of horizontal facia shall be moulded in half round shape.

The stone shall be fixed truly in plumb and in perfect line as shown in plans. The surface shall be protected from sun & rain and cured for ten days and shall be fairly polished.

Mode of measurement of payment

The rate includes cost of all materials, tools, plants and labour involved in satisfactory completion of work.

The rate shall be for unit of one Sq.mt .

The work shall be carried out as per detailed drawings and directed be E.I.C.

Measurement shall be in Sq.mt.

Item No. 33

Providing and laying 18 to 20 mm thick granite stone (Colour as Approved by Consultant) for Steps Riser and Dedo over 10 mm (or more as required) thk. Base of cement mortar 1:6 laid over and jointed with white cement slurry including rubbing and mirror/semi-mirror polishing etc. complete. Rate Shall be inclusive of providing and fixing of Skirting of approved size and Shade. Base Rate at site including all taxes and transportation:200 Rs/SFT

Material

Water shall confirm to M-1 (1.1 to 1.5 / P 9 / V .1). Cement mortar shall confirm to M-11 (11.1 to 11.32 / P 11 / V.1).

Granite stone shall be 18 mm or 20 mm thk.

In addition to that, it shall be of approved quality, free from defects and dressed in fashion stated under specification. The thickness shall be as stated in the schedule with 3 mm tolerance. The stone shall be of uniform in colour with straight edges. The sides of machine cut and machine polished stone shall have perfect right angle and surface on earth.

Workmanship

The sill will be having finished level with wall thickness. The bearing of granite stone shall be 18 mm to 20mm all around in masonry or RCC work. The drip for bearing shall be formed by making gissi in walls. The gissi shall be 20 mm minimum deep in walls. line level and plumb. The thickness of base of cement mortar 1:6 laid over and joint with white cement slurry . Top slab shall consist of granite stone 18 mm thick placed and fixed in line level and plumb using adhesives with BAL ENDURA make Gold Star Adhesive with Polymer Additive ADMIX AD1 in ratio of 1 Bag of BAL Gold Star Adhesive (20 Kg) with 1 Ltr. Of Admix AD1. The workmanship shall be referred to the same as done as per wall cladding. After placing the granite stone in gissi it shall be filled & finished smooth. The top slab shall be in true line & level. The projected part of horizontal fascia shall be moulded in half round shape.

The stone shall be fixed truly in plumb and in perfect line as shown in plans. The surface shall be protected from sun & rain and cured for ten days and shall be fairly polished.

Mode of measurement of payment

The rate includes cost of all materials, tools, plants and labour involved in satisfactory completion of work.

The rate shall be for unit of one Sq.mt .

The work shall be carried out as per detailed drawings and directed be E.I.C.

Measurement shall be in Sq.mt.

Item No. 34

Providing & laying approved quality machine cut river wash finished granite of approved shade, thickness 18-20 mm. (or more as required), in floor, otta, sill, skirting, dado etc. in required sizes (not exceeding 1.5 mt x 1.0 mt) and shapes, including average 25 mm (or more as required) thick cement mortar bedding in 1:6 laid and jointed with white cement and matching pigment including rubbing, re-polishing after fixing to remove any undulation between the joints (if required) with different grades of Emery, refilling of open joints, curing, daily cleaning and mopping, as directed for at least 15 days or up to the satisfaction of the Engineer in Charge (Only finished work will be measured.) etc. all complete as per approved sample by Architect, drawings and instruction of Engineer in Charge at all floors / all levels / all heights and all shapes. The rate includes machine cut edges of uniform thickness, rounding of edges, champhering and mirror polishing of edges, cutting in stone for electrical points/boxes etc. complete. The rate shall be inclusive of protecting the flooring by plaster of paris and plastic and/or bubble top sheets. Base Rate at site including all taxes and transportation:200 Rs/SFT

Material

Water shall confirm to M-1 (1.1 to 1.5 / P 9 / V .1). Cement mortar shall confirm to M-11 (11.1 to 11.32 / P 11 / V.1).

River wash finished Granite stone shall be 18 mm or 20 mm thk.

In addition to that, it shall be of approved quality, free from defects and dressed in fashion stated under specification. The thickness shall be as stated in the schedule with 3 mm tolerance. The stone shall be of uniform in colour with straight edges. The sides of machine cut and machine polished stone shall have perfect right angle and surface on earth.

Workmanship

The sill will be having finished level with wall thickness. The bearing of granite stone shall be 18 mm to 20mm all around in masonry or RCC work. The drip for bearing shall be formed by making gissi in walls. The gissi shall be 20 mm minimum deep in walls. line level and plumb. The thickness of base of cement mortar 1:6 laid and jointed with white cement . Top slab shall consist of granite stone 18 mm thick placed and fixed in line level and plumb using adhesives with BAL ENDURA make Gold Star Adhesive with Polymer Additive ADMIX AD1 in ratio of 1 Bag of BAL Gold Star Adhesive (20 Kg) with 1 Ltr. Of Admix AD1. The workmanship shall be referred to the same as done as per wall cladding. After placing the granite stone in gissi it shall be filled & finished smooth. The top slab shall be in true line & level. The projected part of horizontal facia shall be moulded in half round shape.

The stone shall be fixed truly in plumb and in perfect line as shown in plans. The surface shall be protected from sun & rain and cured for ten days and shall be fairly polished.

Mode of measurement of payment

The rate includes cost of all materials, tools, plants and labour involved in satisfactory completion of work.

The rate shall be for unit of one Sq.mt .

The work shall be carried out as per detailed drawings and directed be E.I.C.

Measurement shall be in Sq.mt.

Item No. 35

Providing and laying 18 to 20 mm thick first quality mirror polished Kota or equivalent stone for flooring and Skirting over 25 mm (or more as required) thk. Base of cement mortar 1:6 laid over and jointed with white cement slurry including rubbing and polishing etc. complete. Rate Shall be inclusive of providing and fixing of Skirting of approved size and Shade.

1.0 Materials :

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

2.0 Workmanship :

2.1 Each slab shall be cut to the required size and shape and fine chisel dressed at all the edges.

The sides 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 a plane surface. The thickness shall be 25 mm. (Average) as specified in the item but not less than 20 mm. At any place of the slab.

2.2 Bedding for the kotah stone slabs shall be cement mortar 1 : 6 (1 cement : 6 coarse sand) or L. M. 1 : 1.5 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 kotah 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 then be lifted and laid aside. Top surface of the mortar shall then be corrected by adding fresh mortar at hollows or depressions. The mortar shall then be allowed to harden bit. Over this surface, cement slurry of honey like consistency shall be applied. The slab shall then be gently placed in position and tapped with wooden mallet till it is properly padded in level with and close to the adjoining slab. The joint shall be as fine as possible. The slabs fixed in the floor adjoining the wall shall enter not less than 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.

2.3 The floor shall be kept wet for a minimum period of 7 days so that bedding and joints set properly.

2.4 Polishing shall be normally commenced after 14 days of laying the stone slab. First polishing shall be done with carborundum stones of 120 grade grit fitted in the heavy machine and then second polishing shall be done with carborundum stone of 220 to 350 grade grit fitted in heavy machine. Water shall be properly used during polishing. The stone shall then be washed clean with water. When directed by the Engineer-in-charge wax polish of approved quality shall be applied on the surface with the help of soft cloth over a clean and dry surface. Then the polish machine fitted with bobs shall be run over it.

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

3.0 Mode of measurements & payment :

3.1 The rate shall include the cost of all materials and labor involved in all the operations described above. The kotah stone flooring shall be measured in square meters correct to two places of decimal, length and breadth shall be measured correct to 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 areas upto 0.1 sq. Mt.

3.2 The rate shall be for a unit of one sq. Meter.

Item No. 36

Providing & Laying for any height/floor cement Concrete flooring 1:2:4 (1 cement :2 coarse sand :4 stone aggregate 20 mm. nominal size) laid in one layer finished with a floating coat of neat cement. Avg. 40 mm. thick or more as per requirement and instruction of EIC.

1.0. 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 of 1:2:4 proportion measured by volume shall conform to relevant specifications of ordinary grade 1:2:4 concrete.

2.0. Workmanship

2.1. The cement concrete flooring of 40 mm thick (Average) is to be laid as per the site condition. The concrete shall be mixed in a mechanical mixer at the work. Hand mixing may however be allowed for smaller quantities of work and in case of failure of machineries or as permitted by the Engineer-in-charge. It shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. However in such cases 10% more cement than otherwise required shall have to be used without any extra cost. The mechanical mixing shall be done for period of 1.1/2 to 2 minutes. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the purpose, Flooring or specified thickness shall be laid in accordance with approved pattern or as directed. Finishing operation shall depending upon the emperature 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 pressed twice by means of iron floats, once when the slurry is applied and he second time when cement setting and finished floated smooth The surface shall be marked with string or B.R.C. fabric jali to make the surface non-slippery as and when directed. The junction of floors with wall plaster, dedo or skirting shall be rounded off where sorequired up to 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 or sanitary fittings during execution of work shall be made good.

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

2.3. The form work shall be provided if necessary as directed by Engineer-in-charge. Concreting shall be done as per alternate bay method with necessary centering either by mastic or cement mortar as directed

3.0. Mode of measurements & payment

3.1. The rate shall include the cost of all materials and labour involved in all the operations described above. No deduction shall be made or extra paid for any opening up to 0.1 sq. mt. In area in the floor, nothing extra shall be paid for laying the floor at different levels in the same room or the counter yard.

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

Item No. 37

Providing and Laying broken china mosaic flooring for terrace using 12mm 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 cream out upto surface using.

Providing & laying broken white china mosaic flooring for plain and curved surfaces, comprising of 20 to 25 mm. size broken pieces of ceramic/glazed tiles (one or more colours, as directed), laid over cement mortar 1:6 bedding including applying cement slurry at the rate of 2.75 kg per sq.m. on plain or sloped surfaces and filling joints with white cement. The flooring shall be tampered to bring the mortar cream up to the surface, including rounding of the junctions and extending them up to 15 cm. along the parapet wall. The rate shall include bands, if different colour is used, any pattern or design as per drawing and direction, curing, etc. complete. (Wall to wall measurement will be considered only including vata)

1. Material

1.0. The chemicals used in water proofing are as under.

(A) Polysiloxane polymer bound sealant of std. make as approved by Engineer in charge.

(a) Specific gravity 1.0

(b) Tensile strength 1.5 Mpa.

(c) Flexibility +25 %

(B) Acrylic modifier based on polyacrylate latex of std make.

(a) Viscosity at 30C--35-40 CPS

(b) Specific gravity at 30-- 1.01- 1.02

(c) PH Value --8—9

(d) Particle size -200 Ym

(C) Grey cement

The material shall be excellent adhesion- bonds to porous and non porous surface.

The material shall be having properties resistance to the effect of long term weathering & durable in all climate conditions including UV attack.

Workmanship :

The whole mosaic tile surface shall be cleaned properly. After cleaning the surface , all the tile joints shall be cut electrically operated machine cutter in to "V" groove to the width 3-5mm. Bound sealant having excellent properties of adhesion & imperviousness. of std. make as approved by engineer in charge shall be filled in proportion of 1.28 kg/ 10 smt as per good engineering practice and direction in all the tiles groove.

After filling groove by sealant the application of first coat of acrylic modifier coating based on polyacrylate latex mixed with cement (in proportion of 1 liter of the acrylic modifier

to 2.78 kg of cement) shall be done thoroughly & properly. After it dries second coat over the surface shall be applied properly as per direction .The treatment is the cured for 3-4 days and ponds test is conducted. The coating converts in to flexible & impact resistant matrix.

The payment shall be made on appropriate stamped paper shall be given by the contractors to the Govt. office in the manner of form as prescribed.

MODE OF MEASUREMENT AND PAYMENT

For the surface area the length and breadth shall be measured current to Cm as be made not extra paid for any opening of the pipe etc. complete. Up to 0.1 Sq.mt the rate shall be include the cost of all labor and materials. Required for the operation involved for the satisfactory completion of this item.

The rate shall be for a unit of one Sq.mt. of the basis of the work done

Form of Guarantee Bond

I/ We -----(contractor)
Hereby Guarantee that work will remain in unaffected and will not be in any way damaged by water leakage on any other similar types of defects surface will get good for the period of five years after the completion of work of water proof as per the terms & condition of the contract & contractor here by identifies & agrees to save harres the Govt. of Gujarat from any loss or the similar type of the leakage and here by Guarantee to make good any loss or damage suffered by the Govt. of Gujarat further Guarantee to redo the effective work without claiming and any extra cost.

This Guarantee shall be remain force of the period of five years for the completion of the work under the contract and it shall remind bonding to the contractor for the period of five years.

The deposit at the rate of total 15% of the cost of this executed item from the running of the final bills as taken of guarantee for work shall be recovered and shall be released after the first three years after completion work of 1/3 of deposit and as half 1:3 amount shall be released for the tenth years after date of final balance of guarantee period, if no leakage is found.

Item No. 38

Providing and fixing five course water proofing treatment with bitumen felt consisting of second and forth course of blown bitument or and residual bitumen applied hot at 1.2 kg per Sqmt. Of area for each course and first course with fiber base bitumen saturaed under lay type and third course with fiber base self finished felt type 2 grade and fifth and finalcourse of stone grit 6 mm. and down size or pea sized gravel spead at 0.008 Cmt. including preparation of surface excluding grading complet.

1.0 Materials : The tar felt shall conform to M-76. The bitumen primer shall conform to I. S. 3388-1965. The bitumen shall conform to I. S. 702-1961. The grit or gravel shall conform to M-8.

2.0 Workmanship :

2.1 Preparation of surface :

- 2.1.1** Well-defined cracks other than hair cracks in the roof structure shall be cut to 'V' section cleaned and filled up flush with cement and slurry or with bitumen conforming to I.S. 702-1961. The surface to be treated shall have a minimum slope of 1 in 120. The grading shall be carried out prior to the application of water proofing treatment by cement mortar or lime surkhi mortar or as specified in description of item.
- 2.1.2** The surface of room, part of parapet and gutters, drain mouths etc. Over which the water proofing treatment is to be applied, shall be cleaned of all foreign matter such as fungus, moss and dust by wire brushing and dusting.
- 2.1.3** Drain outlet shall be suitably placed with respect to the roof gradient to ensure rapid drainage and prevent local accumulation of water on the roof, surface, masonry drain mouth, shall be widen sufficiently and rounded with cement mortar.
- 2.1.4** Form cast iron drain outlets, a groove shall be cut all round to touch the treatment.
- 2.1.5** When a pipe passess through a roof on which water proofing treatment is to be laid, a cement, concrete angle fillet shall be built round it and the water proofing treatment taken over the fillet.
- 2.1.6** In case of parapet wall over 450 mm. In height for tucking in the water proofing treatment, a horizontal grooves 75 mm. Wide and 65 mm. Deep at minimum height of 150 mm. Above roof level shall be left in the vertical face at the time of construction, the horizontal face of the groove shall be shaped with cement mortar 1 : 4.
- 2.1.7** In case of low parapet where the height does not exceed 450 mm. No groove shall be provided and the water proofing treatment shall be carried right over the top.
- 2.1.8** In case of existing R.C.C. and stone wall cutting the chase for tacking in the water proofing treatment is not recommended.
- 2.1.9** At the junction between the roof and veridical face of the parapet wall, a fillet 75 mm. In radius shall be constructed.
- 2.1.10** At the drain mouths the fillet shall be suitably cut back and rounded off for easy application of water proofing treatment and easy flow or water.
- 2.1.11** Outlet at every low dividing wall about less than 300 mm. In height shall be rounded smooth and corners rounded off for easy application of water proofing treatment.

2.2 Priming coat :

- 2.2.1** Bitumen primer shall conform to I.S. 3385-1965. A priming coat consisting of bituminous solution of low viscosity shall be applied with brush on the roof and wall surface at specified per unit area to assist adhesion of bonding materials as specified in the description of the item. Where a floating treatment of water proofing with self finished bitumen felt is required i.e. Where water proofing treatment is required to be isolated from the roof structure, layer of bitumen saturated felt (underlay) shall be spread over the roof surface and tucked into the flashing grooves. To keep the

underlay free from the structure no bonding materials shall be used below underlay. Overlapping to the adjoining strip of underlay shall be minimum of 75 mm. At sides and 10 mm. At ends and shall be sealed with the same bonding materials as used for the self finished felt treatment. The underlay shall be of type-1 saturated felt conforming to I.S. 1322-1970.

2.3 Laying of Felt :

2.3.1 The self-finished tar felt shall be cut to the required lengths, brushed clean of dusting materials laid out flat on the roof to eliminate curls and subsequent stretching. The felt shall be laid in length running at right angles to the direction of run off gradient commencing at the lowest level and working upto crest, so that the lower laps of the adjacent felt layer offer minimum obstruction to the flow of water. The felt shall not be laid in a single piece of very long lengths as it is likely to shrink 6 to 8 meters are suitable length. The roof shall be cleaned and dried before the felt treatment is begun. Each length shall be laid in position and rolled up for a distance of half its lengths. The hot bonding materials heated to correct working temperature as specified by manufacture shall be poured on to the roof across the full width of the felt as the latter is steadily unrolled and pressed down. The excess of bonding materials which squeezes out at the ends shall be removed as the laying proceeds. The pouring shall be so regulated that correct weight of the bonding materials as per unit area is spread uniformly over the surface. When the first half of the tar felt has been bonded to the roof, the other half shall be rolled up and then unrolled on the hot bonding materials in the same way. Subsequent strips shall also be laid in the same manner. Each strip shall overlap the preceding one by at least 75 mm. At the longitudinal edges and 100 mm. At the ends. All overlaps shall be firmly bonded with hot bitumen. Streaks and trailing of bitumen near edges of laps shall be leveled by heating the overlaps with blow lamp and leveling down unevenness.

2.3.2 Third layer of bonding materials in four course treatment shall be carried out in similar manner after the flashing has been complete.

2.3.3 Water proofing treatment shall be carried out in the drain pipe or outlets by at least 100 mm. The water proofing treatment laid on the surface shall overlap the upper edge of water proofing treatment in the drain outlets by at least 10 mm. Flashing felts shall be laid as flashing. Wherever junction of vertical horizontal surface occurs longitudinal laps shall be 100 mm. The lower layer of flashing felt shall overlap the roofing felt by 100 mm. On vertical and sloping faces. Last course of flashing should not be of stone, grit or pea sized gravel but it shall be replaced by providing two coats of bitumen solution of approved quality.

2.3.4 The lower edge of flashing shall overlap the flat portion of the roof and the upper edge of the flashing shall be tucked into the horizontal groove 75 mm. Thick wide, 65 mm. Deep provided at minimum height of 150 mm. From top of the roof surface. The flashing treatment shall be firmly held in place in the grooves with wooden wedges at intervals and the grooves shall be followed with cement mortar 1 : 4 (1 cement : 4 coarse sand) or cement concrete (1 : 2 : 4) (1 cement : 2 coarse sand : 4 graded stone aggregate 6 mm. Nominal size) and surface finished smooth with the rest of wall. The cement work shall be cured for 7 days. When dry the exposed plaster joints of grooves shall be pointed with bitumen and two coats of bituminous solution shall be applied on the vertical and sloping surface of flashing.

2.3.5 After the top flashing felt layer has been laid, the penultimate layer of bonding materials shall be applied over the roofing felt and horizontal overlap and vertical and sloping surface of flashing shall be spread uniformly over the hot bonding materials on the horizontal roof surface and pressed into it with wooden roller.

2.3.6 The material for surface finish shall be spread as described in the item over top layer.

2.3.7 If ballooning occurs the defects may be rectified as under :

2.3.8 Remove the gravel on the ballooned surface. Then cut open and squeeze out the trapped vapor by firm pressure applied by hand, seal the bitumen felt so lifted back on the surface by applying additional bitumen, finally seal the cut with piece of bitumen felt with bitumen application.

3.0 Mode of measurements & payment :

3.1 The measurements for the item shall be taken as under :

(a) Water proofing of roof with bitumen shall be measured in sq. Mt. Length and breadth shall be measured correct to centimeter.

(b) Measurement shall be taken for the superficial area of roofing and flashing treatment including flashing over the parapet Wall, low dividing walls and expansion joints and at the pipe projections etc. Overlapping and tucking into flashing grooves Shall not be measured.

(c) Sloping and vertical surface of water proofing treatment shall be measured under the four or five course treatment as the case

May be irrespective of the fact that the final course of grit or gravel is replaced by bitumen primer.

(d) In measurements, no deduction shall be made for either openings or recesses for chimney stacks roof light etc. For area upto

0.40 sq. Mt. Nor anything extra shall be paid or extra labor and materials in forming such openings. For similar area

Exceeding 0.40 sq. Mt. Deduction shall be made in measurements for full opening but nothing extra shall be paid for extra Labor and materials in forming such openings.

(e) The grading (coba bedding) shall be paid separately but cleaning of surface and treating the cracks shall not be paid Separately.

(f) Cutting of horizontal grooves in parapet walls for tucking in water proofing treatment shall not be measured or paid Separately.

3.2 The rate includes cost of all materials and labor.

3.3 The rate shall be for a unit of one sq. Meter.

Item No. 39

Fabrication, Supply and Installation of Stainless Steel (Grade 304) railing using hand rail pipe section 2.5" and baluster as round/square pipe section 2" both these pipe wall thickness not less than 16 gauge; connected with SS square pipe 2" intermediate as per detail drawing of architect and 8mm thick toughened glass fixed in between ss vertical members by the SS fixers. SS base plate of 100 x 8mm. The railing system shall be floor mounted with anchor faster and base plate of 4" having 8 mm thk. Completed as per detail drawing or as directed by the Architect / Engineering in charge with necessary fixtures fittings, brush finished, proper buffing & cleaning the welding marks etc. Shop drawing shall be submitted for approval.

Structural Steel:

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

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

Workmanship:

2.1. The S. S. Grill shall be prepared as per the drawings or as directed for fixing to designed locations etc.

2.2. The grill shall be fabricated as per the sections shown in the designs and patterns shown in the drawings and the weight shall be as directed and the joints shall be riveted or welded as shown in the plan or as directed. The grill so formed shall be fixed for stairs & for windows etc. as directed and as per specifications and erected in position. The grill shall be fixed with number of bolts and nuts of screws viz. bolt nut/screw per 30 cm. Of the length of outer strip subject to a minimum of 2 nos. on each side of the frame or as indicated in the drawings or as directed.

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

Mode of measurement and payment:

3.1. No payment shall be made for weight of screws, bolts, nuts etc. Only weight of grill shall be paid.

3.2. The rate shall be for unit of one Rmt.

Item No. 40

Fabrication, Supply and Installation of Stainless Steel (Grade 304) hand railing using hand rail pipe section 2.5" these pipe wall thickness not less than 16 gauge; The railing system shall be wall mounted with anchor faster and wall fixer with all material Completed as per detail drawing or as directed by the Architect / Engineering in charge with necessary fixtures fittings, brush finished, proper buffing & cleaning the welding marks etc. Shop drawing shall be submitted for approval.

Structural Steel:

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

1.2. 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.

Workmanship:

2.1. The S. S. Grill shall be prepared as per the drawings or as directed for fixing to designed locations etc.

2.2. The grill shall be fabricated as per the sections shown in to the designs and patterns shown in the drawings and the weight shall be as directed and the joints shall be riveted or welded as shown in the plan or as directed. The grill so formed shall be fixed for stairs & for windows etc. as directed and as per specifications and erected in position. The grill shall be fixed with number of bolts and nuts of screws viz. bolt nut/screw per 30 cm. Of the length of outer strip subject to a minimum of 2 nos. on each side of the frame or as indicated in the drawings or as directed.

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

Mode of measurement and payment:

3.1. No payment shall be made for weight of screws, bolts, nuts etc. Only weight of grill shall be paid.

3.2. The rate shall be for unit of one Rmt.

Item No. 41

STRUCTURAL GLAZING SYSTEM-Designing, fabricating, testing, protection, installing and fixing in position semi (grid) unitized system of structural glazing (with open joints) for linear as well as curvilinear portions of the building for all heights and all levels, including:

(A) Structural analysis and design and preparation of shop drawings for the specified design loads conforming to IS 875 part III (the system must passed the proof test at 1.5 times design wind pressure without any failure), including functional design of the aluminum sections for fixing glazing panels of various thicknesses, aluminium cleats, sleeves and splice plates etc. gaskets, screws, toggles, nuts, bolts, clamps etc., structural and weather silicone sealants, flashings, fire stop (barrier)-cum-smoke seals, microwave cured EPDM gaskets for water tightness, pressure equalisation and drainage and protection against fire hazard including:

(B) Fabricating and supplying serrated M.S. hot dip galvanised / Aluminium alloy of 6005 T5 brackets of required sizes, sections and profiles etc. to accommodate 3 Dimentional movement for achieving perfect verticality and fixing structural glazing system rigidly to the RCC/ masonry/structural steel framework of building structure using stainless steel anchor fasteners/ bolts, nylon seperator to prevent bimetallic contacts with nuts and washers etc. of stainless steel grade 316, of the required capacity and in required numbers.

(C) Providing and filling, two part pump filled, structural silicone sealant and one part weather silicone sealant compatible with the structural silicone sealant of required bite size in a clean and controlled factory / work shop environment , including double sided spacer tape, setting blocks and backer rod, all of approved grade, brand and manufacture, as per the approved sealant design, within and all around the perimeter for holding glass.

(D) Providing and fixing in position flashings of solid aluminium sheet 1 mm thick and of sizes, shapes and profiles, as required as per the site conditions, to seal the gap between the building structure and all its interfaces with curtain glazing to make it watertight.

(E) Making provision for drainage of moisture/ water that enters the curtain glazing system to make it watertight, by incorporating principles of pressure equalization, providing suitable gutter profiles at bottom (if required), making necessary holes of required sizes and of required numbers etc. complete. This item includes cost of all inputs of designing, labour for fabricating

and installation of aluminium grid, installation of glazed units, TandP, scaffolding and other incidental charges including wastages etc., enabling temporary structures and services, cranes or cradles etc. as described above and as specified. The item includes the cost of getting all the structural and functional design including shop drawings checked by a structural designer, dully approved by Engineer-in-charge. The item also includes 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 structural glazing as specified, cleaning and protection till the handing over of the building for occupation. In the end, the Contractor shall provide a water tight structural glazing having all the performance characteristics etc. all complete as required, as per the Architectural drawings, as per item description, as specified, as per the approved shop drawings and as directed by the Engineerin- Charge.

Note:- 1. The cost of providing extruded aluminum frames, shadow boxes, extruded aluminum section capping for fixing in the grooves of the curtain glazing and vermin proof stainless steel wire mesh shall be paid for separately under relevant items under this subhead. However, for the purpose of payment, only the actual area of structural glazing (including width of grooves) on the external face shall be measured in sqm. up to two decimal places.

Note:-2. The following performance test are to be conducted on structural glazing system if area of structural glazing exceeds 2500 Sqm from the certified laboratories accredited by NABL (National Accreditation Board for Testing and Calibration Laboratories), Department of Science & Technologies, India. Cost of testing is payable separately. The NIT approving authority will decide the necessity of testing on the basis of cost of the work, cost of the test and importance of the work. Performance Testing of Structural glazing system Tests to be conducted in the NBL Certified laboratories.

1. Performance Laboratory Test for Air Leakage Test (-50pa to – 300pa) & (+50pa to +300pa) as per ASTM E-283-04 testing method for a range of testing limit 1 to 200 mVhr”
2. Static Water Penetration Test. (50pa to 1500pa) as per ASTM E331-09 testing method for a range up to 2000 ml.”
3. Dynamic Water Penetration (50pa to 1500pa) as per AAMA 501.01-05 testing method for a range upto 2000 ml”
4. Structural Performance Deflection and deformation by static air pressure test (1.5 times desing wind pressure without any failure) as per ASTM E-330-10 testing method for a range upto 50 mm”
5. Seismic Movement Test (upto 30 mm) as per AAMA 501.4-09 testing method for Qualitative test”
- Tests to be conducted on site
6. Onsite Test for Water Leakage for a pressure range 50 kpa to 240 kpa (35psi) upto 2000ml”

The structure glazing glass system installation as per company specification or supplier guidelines.

Mode of Measurement:

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

Item No. 42

Providing and supplying Spandrel Glass Panels comprising of 6 mm thick heat strengthened monolithic float glass of approved colour and shade with reflective soft coating on surface # 2 of approved colour and shade so as to match the colour and shade of the IGUs in the vision panels etc. , all complete for the required performances as specified, as per the Architectural drawings, as per the approved shop drawings, as specified, and as directed by the Engineer- in- Charge. For payment, only the actual area of glass on face # 1 of the glass panels (but excluding the area of grooves and weather silicone sealant) provided and fixed in position, shall be measured in sqm.(Payment for fixing of Spandrel Glass Panels in the curtain glazing is included in cost of relevent Item). (i) Coloured tinted float glass 6mm thick substrate with reflective soft coating on face # 2, having properties as visible Light transmittance (VLT) of 25 to 35 %, Light reflection

internal 10 to 15%, light reflection external 10 to 20 %, shading coefficient (0.25- 0.28) and U value of 3.0 to 3.3 W/m2 degree K etc.

The properties of performance glass shall be decided by technical sanctioning authority as per the site requirement.

Material:

Spandrel Glass Panels comprising of 6 mm thick heat strengthened monolithic float glass of approved colour and shade with reflective soft coating on surface # 2 of approved colour and shade so as to match the colour and shade of the IGUs in the vision panels etc. , all complete for the required performances as specified, as per the Architectural drawings, as per the approved shop drawings, as specified, and as directed by the Engineer- in- Charge. For payment, only the actual area of glass on face # 1 of the glass panels (but excluding the area of grooves and weather silicone sealant) provided and fixed in position, shall be measured in sqm.(Payment for fixing of Spandrel Glass Panels in the curtain glazing is included in cost of relevant Item). (i) Coloured tinted float glass 6mm thick substrate with reflective soft coating on face # 2, having properties as visible Light transmittance (VLT) of 25 to 35 %, Light reflection internal 10 to 15%, light reflection external 10 to 20 %, shading coefficient (0.25- 0.28) and U value of 3.0 to 3.3 W/m2 degree K etc.

The properties of performance glass shall be decided by technical sanctioning authority as per the site requirement.

Mode of measurement and payment:

3.1. No payment shall be made for weight of screws, bolts, nuts etc. Only weight of grill shall be paid.

3.2. The rate shall be for unit of one Smt.

Item No. 43

Restroom Cubical: providing and installing ZMS SS Series Restroom Cubicles with all necessary tools hardware, labour, as per the company specs.

Providing & Fixing BESCO Cubicle partition system for toilet by using following Materials 12mm thick compact laminate with core of phenol resin treat papers with black color top layer treated with special melamine resin. Adjustable legs with bottom cap of SS 316, door lock with, gravity hinges with cover – combination of mild steel and Nylon PA6

And used following Accessories

Accessories Include:

- 1. Aluminium Top Rail (Stainless Steel Grade 304 with Satin Finish)**
- 2. SS Coat Hook with Door Stopper Option (Stainless Steel Grade 304 with Satin Finish)**
- 3. SS Gravity Hinges (Stainless Steel Grade 304 with Satin Finish)**
- 4. SS Latch cum Occupancy Indicator (Stainless Steel Grade 304 with Satin Finish)**
- 5. SS “U” Channel (Stainless Steel Grade 304 with Satin Finish)**
- 6. SS “F” Channel (Stainless Steel Grade 304 with Satin Finish)**
- 7. SS Palm Design Adjustable Foot (Stainless Steel Grade 304 with Satin Finish)**
- 8. SS Screws & Inserts (Stainless Steel Grade 304 with Satin Finish)**
- 9. Rubber Lining for Door Stopper**

Brand and Make : as approved by consultant.

1.0 Material & Workmanship

1.1 The relevant specifications of the above decrypted item shall be followed as per the specifications given in manual of ZMS Series of Marino Brand.

2.0 Mode of measurements and payment:

2.1 The rate shall be for a single unit.

Item No. 44

Providing and Fixing of 42mm solid cored both side Pre laminated Flush Door with 16 mm teakwood lapping tongued into door edges all round two side, both side 1mm thk. laminates of approved brand. also with 5 mm th. glass slit and fix glass above lintel Wooden Frame of 125mm x 75mm size in Ghana Teakwood including locks, Stopper, Floor spring/ Hinges and all Hardware materials of approved brand and make, all labour and Materials which will require for complete on site as per details and drawing or as per instruction of site In charge. Rate to include for painting all timber faces of frame in contact with wall surfaces with applying two coats of approved wood preservative and anti-insecticide paint before fixing in position and one under coat and two coats of enamel paint of approved make to exposed faces.

1.0 Materials & Workmanship:

The materials shall confirm to relevant Indian Standards.

Wooden flush door shutters (solid core):

1.1 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.

1.2 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.

1.3 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.

1.4 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 de-lamination 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 de-lamination occurs in the glue lines in the plywood and if no single de-lamination 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. De-lamination at the corner shall be measured continuously around the corner. De-lamination at the knots, knots holes and other permissible wood defects shall not be considered in assessing the sample.

1.5 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.

1.6 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.

1.7 Mild Steel wire (wire gauge jail)

Mild steel wire may be galvanized as indicated. All finished steel wire shall be well cleanly drawn to the dimension and size of wire as specified in item. The wire shall be sound, free from splits, surface flaws, rough and imperfect edges and other harmful surface defects and shall conform to IS 260-1978.

1.8 Plywood

The plywood for general purpose shall conform to IS 303-1975 Plywood is made by cementing together thin boards or sheets of wood in to panels. There are always an odd number of layers 3, 5, 7, 9. ply etc.

The plies are placed so that grain of each layer is at right angles to the grain in the adjacent layer.

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

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

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

1.8.4 According to IS 303-1975 the plywood for general purpose shall be of the grades namely BWR, WWR and CWR depending upon the adhesive used for bending the veneers and it will be further classified into six types namely AA, AB, AC, BB, BC and CC based on the quality of the plywood should be reconditioned to moisture content not less than 16 percent.

1.8.5 Thickness of plywood Boards:

| <i>Board</i> | <i>Thickness</i> | <i>Board</i> | <i>Thickness</i> | <i>Board</i> | <i>Thickness</i> | <i>Board</i> | <i>Thickness</i> |
|--------------|------------------|--------------|------------------|--------------|------------------|--------------|------------------|
| 3 Ply | 3 mm | 5 Ply | 5 mm | 7 Ply | 9 mm | 9 Ply | 16 mm |
| | 4 mm | | 6 mm | | 13 mm | | 19 mm |
| | 5 mm | | 8 mm | | 16 mm | 11 Ply | 19 mm |
| | 6 mm | | 9 mm | 9 Ply | 13 mm | | 25 mm |

1.9 fixtures and fastenings:

General:

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

1.9.2 They shall be iron, brass, aluminium, chromium plated iron, and chromium plated brass, copper oxidized iron, and copper oxidized brass or anodized aluminium as specified.

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

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

1.9.5 Brass and anodized aluminium fixtures and fastenings shall be bright or matt finished.

1.9.6 Holdfast: hold fast shall be made from mild steel flat 30 cm length and one of the holdfast shall be bent at right angle and two nos. Of 6 mm diameter holes, shall be made in it for fixing it to the frame with screws. At the other end the holdfast shall be forked and bent at right angles in opposite direction.

1.9.7 Butt hinges: railway type heavy type butt hinges shall be used when so specified.

Tee and strap hinges shall be manufactured from ms sheet.

1.9.9 Tower bolts (barrel type): tower bolts as specified in the item shall be used and shall be got approved.

1.9.10 Door latch: the size of door latch shall be taken as the length of latch.

1.9.11 Bathroom latch: bathroom latch shall be similar to tower bolt.

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

1.9.13 Door stopper: doorstopper shall be either floor door type or door catch type. Floor stopper shall be overall size as specified and shall have rubber cushion.

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

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

1.9.16 Pivot: the base and socket plated shall be made from minimum 3 mm thick plate, and projected pivot shall not be less than 12 mm diameter and 12 mm length and shall be firmly riveted to the base plate in case of iron pivot and in single base plate in the case of brass pivot.

1.10 Readymade shutters shall be of correct size and shall fit into the door or other opening without excessive scraping of edges. Adding of battens etc., to make up-to the size shall be allowed.

2.0 Mode of measurement and payment:

2.1 The dimension of the shutter shall be measured clear size of the shutter in close position between the grooves of the frame.

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

2.3 The rate for individual item mentioned in the schedule of quantities shall include cost of shutters etc., transporting charges and labour for fixing of fixtures and fastenings except fixing of door closers and painting and polishing as specified.

Item No. 45

Providing and fixing Anodized aluminum works for Door with extruded built up standard tubular and other section of approved make confirming to IS 733 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, glass of approved make etc. Aluminum sections shall be smooth, rust free ,straight.mitred and jointed mechanically wherever required including cleat angles aluminum snap beading for glazing /paneling, CP Brass/ Stainless steel screws, Stoppers, floor hing all complete as per architectural drawings and the direction of Engineer in Charge. rate incl. all type of aluminum sections for doors , windows and Vents with 5/8/12 mm th. tinted glass as per the detail Architectural dwg.

1.0 Materials

The materials shall confirm to relevant Indian Standards.

1.1 These shall be obtained from approved and established manufacturers and shall be of aluminium alloy conforming to IS: 733 and sections shall generally conform to IS: 1948. These shall be fabricated as per the drawings. The Section shall be as specified in the drawing and design. The fabrication shall be done as directed.

1.2 The hinges shall be cast or extruded aluminum hinges of same type as in windows but of large size.

1.3 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. A suitable lock for the operatable either from outside or inside shall be provided. in double shutter door the first closing shutter have concealed aluminum alloy bolt at top and bottom The fabrication shall be done as directed.

2.0 Workmanship:

2.1 GENERAL:

- i. The unit assemblies shall be as per drawing or as directed by the Architects.
- ii. The unit assemblies shall be anodized finished. Anodizing shall be minimum 20 to 25 microns thick, of matt non-directional and non-specular. Anodized surface shall be suitably protected during transportation, storage and erection.
- iii. Sub units shall be together by concealed screws, Jamb member shall be self mullioning type obtaining use of separate mullions, thus increasing clear height of each unit.
- iv. Joints shall either be mitered or coped. All joints shall be neat, hair line, and sealed with epoxy to make them water proof.
- v. Openable shutters shall have a single row continuous neoprene or PVC weather strip to prevent air infiltration. Weather strips shall not be interrupted by any fittings.
- vi. All windows shall be glazed from inside with PVC rubber or approved "Shalimar" putty. Glazing beads shall snap fit and shall be fitted without use of screws. No screws other than those on some of the hardware shall be visible.
- vii. Glazing shall be approved and specially selected quality glass of thickness as specified in the Bills of Quantities.

- viii. The rate shall include supplying and fixing with fittings and fixtures including approved locking arrangements.
- ix. Before handing over, the aluminium work shall be washed with mild solution of non-alkali soap and water.

2.2 Steel windows shall conform to IS: 1038 and shall have brass oxidized fittings. They may be of composite sizes and assembled and fixed as per the manufacturers specifications using special mastic and putty for steel windows. The size of section shall be such as to be adequate for the specific type shown on the drawing. They shall have necessary accessories such as handles, stays, lugs, etc. The members shall be assembled with electric flush butt-welded joints/welded smooth joints as directed. These items include all types of windows such as fixed partially fixed, partially hinged, side hung, bottom hung, top hung, centre hung, etc. This item also includes windows of curved shapes and all other windows as specified and detailed by the Architects/consulting Engineers. The necessary accessories such as handles, stays, stoppers, etc. shall be brass oxidized and shall be included in this item. The rate also includes glazing panels with plain or ground glass with aluminium/teak wood beads of the required size and mastic putty of the same colour, which shall be applied for full length and not at intervals. The contractor shall provide windows with threaded holes for fixing aluminium/wooden beading, with screws, required for fixing of thickness specified.

2.3 The windows shall have glazing fixed as shown in the drawing and the glass shall be float glass sheet glass of the best quality and approved by the Architect/Consulting Engineer. It shall be transparent or translucent as required by the Architect/Consulting Engineers. It shall be free from flaws, specks, and bubbles.

2.4 The glazing units, doors, windows and ventilators shall not be built into the walls but shall be fixed in the prepared opening with lugs in masonry or with screws and jute expansion plugs in holes carefully drilled in RCC work. Mastic compound shall be provided all around the frame of the glazing unit at the junction of the frame and opening to make the junction watertight.

2.5 FIXING GLASS LOUVERS:

Louvers shall be 6 mm thick of wired glass or frosted glass with ground/polished edges as specified and of approved quality. The work shall be measured in sq. meter inclusive of frames and shall be measured outside of frames both ways according to drawing. The rate includes providing & fixing glass, beading, paints or polishing etc.

2.6 Glazing:

- i. All glass shall be cut to size accurately and neatly to suit all openings to be glazed with a slight margin of about 2 to 4 mm on all sides as directed.
- ii. All glass shall be back putted and externally putted up the line of the casement and filling the rebate.
- iii. Glazing to steel doors and windows shall be done in compliance with the supplier's instructions, using the clips and the bends supplied.
- iv. Glass in wooden doors and casements shall be sprigged in position after fixing with back putty.
- v. Broken glass shall be neatly removed and replaced at the contractors' expenses.

- vi. Where indicated in the Bills of Quantities, glass shall be beaded with approved beading, properly fixed and primed.
- vii. Edges of glass louvers shall be grounded and left free from any sharp edges.
- viii. In the case of T.W beading or other specified beading, the putty shall be applied full in line all around the windows in back, in between beading and glass and shall be of same colour as that of the windows of beading.

2.7 Thickness & Sizes of the Glass shall be as per specifications or as shown in detailed drawings.

2.8 Typical approved samples of the glazing unit shall be kept in the office of the Architect till the satisfactory completion of work. The decision of the Architect whether a unit compares well with the approved sample shall be binding as final on the concerned parties.

3.0 Mode of measurement and payment:

3.1 Width and height shall be measured outside to outside of frame and measurement shall be in Smt.

3.2 The rate also includes a coat of primer (yellow zinc chromate) before erection and after erection, 3 coats of approved enamel paint of required shade to the windows. Fixed and openable window shall be paid separately. The measurement shall be square meter of over all size of the frame as per drawing.

3.3 Notes: The work mentioned in this section shall be measured separately only in cases where it is distinctly specified in the Bills of Quantities

Item No. 46

Providing and fixing Anodized aluminum works for windows (Two Track & Three Track) and vent with extruded built up standard tubular and other section of approved make confirming to IS 733 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, glass of approved make etc. Aluminum sections shall be smooth, rust free ,straight.mitred and jointed mechanically wherever required including cleat angles aluminum snap beading for glazing /paneling, CP Brass/ Stainless steel screws, Stoppers all complete as per architectural drawings and the direction of Engineer in Charge. rate incl. all type of aluminum sections for , windows and Vents with 5/8/12 mm th. tinted glass as per the detail Architectural dwg.

1.0 Materials

The materials shall confirm to relevant Indian Standards.

1.1 These shall be obtained from approved and established manufacturers and shall be of aluminum alloy conforming to IS: 733 and sections shall generally conform to IS: 1948. These shall be fabricated as per the drawings. The Section shall be as specified in the drawing and design. The fabrication shall be done as directed.

1.2 The hinges shall be cast or extruded aluminum hinges of same type as in windows but of large size.

1.3 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. A suitable lock for the operatable either from outside or inside shall be provided. in double shutter door the

first closing shutter have concealed aluminum alloy bolt at top and bottom The fabrication shall be done as directed.

2.0 Workmanship:

2.1 GENERAL:

- x. The unit assemblies shall be as per drawing or as directed by the Architects.
- xi. The unit assemblies shall be anodized finished. Anodising shall be minimum 20 to 25 microns thick, of matt non-directional and non-specular. Anodized surface shall be suitably protected during transportation, storage and erection.
- xii. Sub units shall be together by concealed screws, Jamb member shall be self mullioning type obtaining use of separate mullions, thus increasing clear height of each unit.
- xiii. Joints shall either be mitred or coped. All joints shall be neat, hair line, and sealed with epoxy to make them water proof.
- xiv. Openable shutters shall have a single row continuous neoprene or PVC weather strip to prevent air infiltration. Weather strips shall not be interrupted by any fittings.
- xv. All windows shall be glazed from inside with PVC rubber or approved "Shalimar" putty. Glazing beads shall snap fit and shall be fitted without use of screws. No screws other than those on some of the hardware shall be visible.
- xvi. Glazing shall be approved and specially selected quality glass of thickness as specified in the Bills of Quantities.
- xvii. The rate shall include supplying and fixing with fittings and fixtures including approved locking arrangements.
- xviii. Before handing over, the aluminium work shall be washed with mild solution of non-alkali soap and water.

2.2 Steel windows shall conform to IS: 1038 and shall have brass oxidized fittings. They may be of composite sizes and assembled and fixed as per the manufacturers specifications using special mastic and putty for steel windows. The size of section shall be such as to be adequate for the specific type shown on the drawing. They shall have necessary accessories such as handles, stays, lugs, etc. The members shall be assembled with electric flush butt-welded joints/welded smooth joints as directed. These items include all types of windows such as fixed partially fixed, partially hinged, side hung, bottom hung, top hung, centre hung, etc. This item also includes windows of curved shapes and all other windows as specified and detailed by the Architects/consulting Engineers. The necessary accessories such as handles, stays, stoppers, etc. shall be brass oxidized and shall be included in this item. The rate also includes glazing panels with plain or ground glass with aluminium/teak wood beads of the required size and mastic putty of the same colour, which shall be applied for full length and not at intervals. The contractor shall provide windows with threaded holes for fixing aluminium/wooden beading, with screws, required for fixing of thickness specified.

2.3 The windows shall have glazing fixed as shown in the drawing and the glass shall be float glass sheet glass of the best quality and approved by the Architect/Consulting Engineer. It shall be transparent or translucent as required by the Architect/Consulting Engineers. It shall be free from flaws, specks, and bubbles.

2.4 The glazing units, doors, windows and ventilators shall not be built into the walls but shall be fixed in the prepared opening with lugs in masonry or with screws and jute expansion plugs in

holes carefully drilled in RCC work. Mastic compound shall be provided all around the frame of the glazing unit at the junction of the frame and opening to make the junction watertight.

2.5 FIXING GLASS LOUVERS:

Louvers shall be 6 mm thick of wired glass or frosted glass with ground/polished edges as specified and of approved quality. The work shall be measured in sq.meter inclusive of frames and shall be measured outside of frames both ways according to drawing. The rate includes providing & fixing glass, beading, paints or polishing etc.

2.6 Glazing:

- ix. All glass shall be cut to size accurately and neatly to suit all openings to be glazed with a slight margin of about 2 to 4 mm on all sides as directed.
- x. All glass shall be back putted and externally putted up the line of the casement and filling the rebate.
- xi. Glazing to steel doors and windows shall be done in compliance with the supplier's instructions, using the clips and the bends supplied.
- xii. Glass in wooden doors and casements shall be springed in position after fixing with back putty.
- xiii. Broken glass shall be neatly removed and replaced at the contractors' expenses.
- xiv. Where indicated in the Bills of Quantities, glass shall be beaded with approved beading, properly fixed and primed.
- xv. Edges of glass louvers shall be grounded and left free from any sharp edges.
- xvi. In the case of T.W beading or other specified beading, the putty shall be applied full in line all around the windows in back, in between beading and glass and shall be of same colour as that of the windows of beading.

2.7 Thickness & Sizes of the Glass shall be as per specifications or as shown in detailed drawings.

2.8 Typical approved samples of the glazing unit shall be kept in the office of the Architect till the satisfactory completion of work. The decision of the Architect whether a unit compares well with the approved sample shall be binding as final on the concerned parties.

3.0 Mode of measurement and payment:

3.1 Width and height shall be measured outside to outside of frame and measurement shall be in Smt.

3.2 The rate also includes a coat of primer (yellow zinc chromate) before erection and after erection, 3 coats of approved enamel paint of required shade to the windows. Fixed and openable window shall be paid separately. The measurement shall be square meter of over all size of the frame as per drawing.

3.3 Notes: The work mentioned in this section shall be measured separately only in cases where it is distinctly specified in the Bills of Quantities

Item No. 47

Providing and fixing chicken wire mesh of gauge 0.18mm and 0.18mm wide with necessary screws and nail at joints cracks of brick work R.C.C work as per drawing and specification and direction of Engineer in-charge.

Materials

Chicken wire mesh jail , Nails

Workmanship

Fixing of chicken wire mesh of 24 gauge of 300 mm width at the junction of brick work and rcc work fixing it with nail and rawl plugs etc before applying plaster as per drawing/instruction of Clerk- Of-Work etc. complete. For all levels, heights and leads of works.

Mode of Measurements

The rate shall be for a unit of one sqm

Item No. 48

Providing and fixing Extruded aluminum section 15 Microns Regular anodized Coating (with matt-Finished and excellent outdoor durability) Louvers profile section as per detailed drawings and specifications given by Architect complete as per the following sections For Ventilation.

Materials

Materials shall be of approved quality and shall generally confirm to latest IS specifications and size of the sections are as specified in the item description. All units shall conform to AA – Aluminum Standards and data, latest edition. The contractor shall order all the materials required for the execution of work as early as necessary and ensure that such materials are on site well ahead of requirement for use in the work. The work involved calls for high standard of workmanship combined with speed and to the entire satisfaction of the Consultant.

Workmanship

The contractor shall furnish all labour, materials, equipments & appliances required for the complete execution of the work as shown on drawings and as specified herein. The contractor shall make his own arrangement for necessary scaffolding/staging, etc. for erection.

Contractor shall submit Samples prior to work. Samples shall include colour & finish samples for each finish type required.

The aluminum sections shall confirm to the following parameters also

The minimum tensile strength shall be 19kgf/m.

The maximum allowable deviation in length from a straight line shall be 0.5mm/metre.

The maximum allowable deviation from straight line shall be one degree.

The maximum permissible twist shall be 0.5 mm/meter.

The contractor shall execute the works as per working drawings provided of louver units and accessories including plans, elevations, sections & Details showing profiles, angles, spacing of louvers, unit dimensions related to openings & constructions, free areas for each size indicated.

All aluminum section shall be anodized with matt finish colour & shade anodizing shall be 6 microns thick prior to anodizing to all aluminum members shall be rendered uniform in appearance free from scratches, stains or other blemishes.

Mode of measurement and payment

Measurement shall be taken in length and width of completed dimension. The rate includes for execution of whole item and shall be paid for a unit of one sq. meter as per actual work done.

Item No. 49

ROOFING SYSTEM:TOP SHEET: TOP SHEET: Supply of colour coated LYSAGHTTRIMDEK® BARE ZINCALUME profile sheet of nominal.1015 mm effective cover width and nominal 28 mm deep ribs with subtle square fluting in the five pan at nominal 203 mm

centre-to-centre. The end rib shall be designed for anti-capillary action, to avoid any seepage of water through the lateral overlap. The feed material shall be of 0.47 mm TCT with min 550 MPa yield strength, metallic hot-dipped coated with Al-Zn alloy (55% Aluminium, 43.5% Zinc, 1.5% Si) as per AS1397 / IS15961 - ZINCALUME® AZ150 (min. 150 g/m2 total on both sides)suitable for exterior application conforming to AS/NZS 2728 type-4 / IS15965 class 3of approved make. also includes all the accessories like gutter/ flashing / capping shall be made from the same material which is used for main cladding application.

Insulation: Fiberglass insulation 24 kg/Cmt density and 50mm thk. In rolled form to be placed over liner sheet. GI spacer (sub-gird) having size 50x50x50mm 1.5mm th. in z shape should be placed over purlin location above liner sheet

LINER(Bottom) SHEET: Supply of COLORBOND Zincalume FLEXICLAD Profiled Roofing sheet 1160mm cover width of 1110 mm. The end rib shall be designed for anti-capillary action, to avoid any seepage of water through the lateral overlap. The feed material shall be of 0.45 mm BMT (0.50mm TCT excluding paint thickness) COLORBOND® XRW steel- High tensile with min 550 MPa yield strength, metallic hot-dipped coated with Al-Zn alloy (55% Aluminium, 43.5% Zinc, 1.5% Si) as per AS1397 / IS15961 - ZINCALUME® AZ150 (min. 150 g/m2 total on both sides) with Super Durable Polyester COLORBOND® steel XRW quality paint system of approved color, suitable for exterior application conforming to AS/NZS 2728 type-4 / IS15965 class 3 of Tata BlueScope Steel make. The sheet shall have a total coating thickness of 35 microns, super durable polyesterCOLORBOND® XRW quality paint system of 20 microns on exposed surface and 5 micron reverse polyester coat on back surface over 5 micron primer coat on both surfaces.

The paint system should have stable resin & inorganic pigments for paint durability and Lead free for water harvesting. The steel sheet shall have brand marking of coated steel manufacturer (product details, date, mfg name, etc) on back side at regular interval confirming genuineness of the material. The steel sheet shall be fastened with nominal 40 µm zinc coated or nominal 25 µm Zinc-Tin alloy coated, Hex head, self-drilling screw as per AS 3566-2002 Class 3 fasteners with EPDM washer and also as per the requirement considering the profile shape and design load. The profile sheet, fastener size etc. shall be approved by the concern authority. All the accessories like gutter/ flashing / capping shall be made from the same material which is used for main cladding application. The measurement shall be based on finished/covered surface area.

Workmanship

The contractor has to install roofing system as per the company specifications and technical assistance. Contractor has to submit the shop drawings for the system before execution for approval.

Mode of Measurement

The out to out measurement of the roof in SMT shall be considered for the payment.

Item No. 50

Providing and laying in position approved quality pre-moulded 40 mm thick joint filler or Shalitex board or Capcell Board, sealing in expansion joints of 40 mm thickness at all locations; including sand fill, edge preparation, cleaning, drying complete in all respects as per scope of work, detailed construction drawings, site sketches, and instructions of site Er. in charge.

Polyurethane from filler shall be Capcell HD-100 of approved make. It should comply with BS 5628 Part-3. It should be semi-rigid; UV resistant, high performance laminated closed cell polyethylene foam joint filler in sheet form.

The density of polyurethane shall be 100Kgs / cum. The water absorption should be 0.012%. The operating temperature of foam filler should be between -40 c to +100 c.

It should be bitumen free and chemical resistant. It should possess excellent recovery after compression.

Mode of Measurement and Payment:

Rate shall be measured and paid in Sqmt of actual surface area.

Item No. 51

Providing and placing polysulphide sealant, over Capcell board in the expansion joints in specified locations; including sand fill, edge preparation by machine cut, cleaning, drying complete in all respects as per scope of work, detailed construction drawings, site sketches, technical specifications and directions of Engineer-in charge.

The polysulphide sealant shall be of approved make as approved by the architect or engineer-in-charge. It shall conform to relevant IS codes.

It shall be a two component polysulphide sealant. The mix ratio of both the parts should be as per manufacture's specification. It should not contain chloride or other corrosive substance.

It should accommodate continuous and pronounced cyclic movements. Material should be low in shrinkage, UV resistance, water resistant to bio-degradation. It should be water resistant to occasional spillage of dilute acids, alkalis, petrol, aviation fuels, diesel, kerosene, lubricating oils etc. It should be non-toxic.

The density of the material should be 1.58 ± 0.03 Kg / ltr. Hardness should be 16 to 22 after complete curing. Movement accommodation should be 25% for butt joints and 50% for lap joints. Joint size should be 5 to 50 mm. and depth to width ratio should be 1:2 (min). For joints with skew movement the ratio shall be 1:1

Mode of Measurement and Payment:

Rate shall be measured and paid in Rmt.

Item No. 52

Providing and fixing zinc sheet with CNC cutting design as per drawing and the structural framing of MS member size of 75mm x 38mm all vertical and horizontal member fixed by necessary hardware for proper finishing with one coat of zinc oxide & two coats of enamel paint. The designer panel shall have hollow cut as per design. The Panel Fixing properly without any air gap and finishing with selected as per design. The zinc panel shall be as per approved shade. Rate shall include necessary labor, scaffolding for all heights, tools, all taxes, transportation all complete

Mode of Measurement and Payment:

Rate shall be measured and paid in SMT.

Item No. 53

Providing Special superior quality of approved shape & size rubber mould interlock pavers block 60 mm thick of M-25 grade. Hydraulically pressed in machine of natural pigment or colour for paving in flooring, footpath etc. incl labour for fixing of blocks upto 50 mm thk sand bedding, levelling watering rate also incl average 30 cm depth for excavation & filling, carting away the debris/excavated material upto 5 km & cleaning the site etc. completed - Laying on 5 Cms thick Sand bedding (Recycled and Ecofriendly).

Scope of work :

Excavation and compaction up to 30 cm in height in all sorts of soil murrum including sorting outs and stacking of useful materials stuff up to 50 mt. lead from excavated place and same well be carting. Up to 5 km. as dir. By Eng. In charge.

The work includes :

1.1 Verification of the existing site condition and advising our project in charge to lay suitable base course if required. Contractors are required to satisfy themselves with quality of sub grade, sub-base course before the paver blocks are laid and suggest strengthening if required.

1.2 Clearing the site by removing all obstacles such as stones, debris etc. for laying of paver blocks.

1.3 Manufacturing of paver blocks in your plant as per requirements in technical specification enclosed.

1.4 Supplying of paver blocks at site, including handling at both ends.

1.5 Laying of paver blocks at site as per requirement in technical specification, within shortest possible time. The site being existing operating Retail Outlets, care should be taken to ensure that the operation is not closed. The job of laying may required to be carried out during night also.

1.6 Testing of paver blocks through reputed Govt./Non Govt. Test house and submission of test results as per requirements in Technical Specifications. HPCL reserves the right to carry out test

at random. Cost for such tests to be borne by party.

1.7 The contractor shall guarantee that all material and components designed, fabricated, supplied and laid by him shall be free from any type of defect due to faulty material and/or

workmanship/erection for a period of One year from the date of completion of work at individual sites. However, the contractor for two years shall render free maintenance.

TECHNICAL SPECIFICATIONS :

I) Paver Block Manufacturing Facilities :

The Paver Block shall be made in factory with following minimum facilities :

1.1 Concrete Block making Machines :

The machine should be capable of producing high quality Paver Blocks by obtaining high level of compaction by application of hydraulic compaction and also by high intensity vibration to the

moulds. The machine should have automatic control panel for uniformity in strength.

1.2 Concrete Batching & Mixing Plant : (Not essential)

The concrete Mix Design should be followed for each batch of materials. The concrete ingredient should be mixed in concrete Batching & Mixing plant with minimum capacity of 30 cum/hour. All material like Aggregate & Sand shall be of recycle material obtained from recycling of construction waste.

The plant should be equipped with automatic control panel for maintaining water cement ratio from batch to batch to obtain concrete of uniform quality and strength. The plant should be

equipped with adequate mechanism for mechanized loading of raw materials into mixer and conveyor belt for transportation of concrete from mixer to concrete block making machine to maintain quality of wet cement.

1.3. Curing:

The factory should have well designed curing area to ensure adequate curing of paver blocks.

1.4 Laboratory (Desirable but not essential) : The factory should have the following: (i) Compression testing machine of adequate capacity.

(ii) Other tools and equipment for testing raw materials and paver blocks

(iii) (1). Systematic record of test results of various paver blocks manufactured in the factory. (2). Concrete Mix Design for various grade of concrete used for making of paver blocks.

II) SPECIFICATIONS FOR COLOURED PAVER BLOCKS :

Coloured concrete paver blocks shall be manufactured as per attached specifications using approved colour Pigment of "BAYER" Make "BAYFERROX IRONOXIDE PIGMENTS" with minimum colour pigment of 3% by weight of cement. The colour shade shall be "RED" as selected by HPCL before commencement of the work. White cement shall be used for colored pavers to obtain the desired colour shade. The job also includes providing 50 mm thick sand bedding to match the shade of the paver block. The colour of the paver block shall be guaranteed against fading of colour for period of 12 months from the date of laying of the same at site. All other technical specifications & Procedure for testing, laying

& sampling of coloured pavers will be as per attachment. III) PAVERS BLOCK CHARACTERISTICS :

The concrete pavers should have perpendicularities after release from the mould and the same should be retained until the laying. The surface should be reasonably smooth and of anti skid and

anti glare type. The paver should have uniform chamfers to facilitate easy drainage surface run off. The pavers should have uniform interlocking space of 2mm to 3mm to ensure compacted sand filling after vibration on the paver Surface. The concrete mix design should be followed for each batch of materials separately and automatic batching plant is to be used to achieve uniformity in strength and quality. The pavers shall be manufactured in single layer only. Skilled labour should be employed for laying blocks to ensure line and level of laying, desired shape of the surface and adequate compaction of the sand in

the joints. The pavers shall be of cement gray colour without any pigment & for coloured pavers refer

"specifications for coloured pavers.". IV) Paver Block Dimensions :

Thickness 66mm Shape Uniregular (Uniform Shape with no Hollow Or Creacks) Chamfer 4mm to

6mm along top edges Colour a. Natural cement grey colour without use of any pigment. b. For coloured pavers refer "specifications for coloured pavers" Dimensional Tolerance

(+/-) 2mm for length & width,

(+/-) 3mm for Height (Thickness) V) Testing of Paver Blocks : SR.NO. * TEST SPECIFICATION
Average Values (Average of Minimum Five Samples/Site)

1. Compressive Strength Min. 35 N/Sq.mm * Sampling and Testing procedure as per enclosed specifications

SAMPLING AND TESTING PROCEDURES FOR PAVER BLOCKS.

Sample Size :

Average of minimum 3 samples per 5000 Blocks.

1. Sampling For Testing Sampling for testing of paver blocks shall be done in accordance with

Appendix-A.

2. Compressive Strength Testing for compressive strength shall be undertaken in accordance with Appendix-B.

The average compressive strength of the blocks tested shall be 40 N/Sqmm.

3. Abrasion Resistance Testing for abrasion shall be in accordance with IS 1237 (Specifications for

Cement Concrete Floor Tiles)

– Appendix C.

4. Flexural Strength Testing for flexural shall be in accordance with IS 1237 (Specifications for Cement

Concrete Floor Tiles) – Appendix D.

5. Water Absorption

Testing for water absorption shall be in accordance with IS 2185:1979 : Part I (Specifications for

Concrete Masonry Units) Appendix E. Appendix – A

Sampling of Paver blocks.

1. Method of sampling :

Before laying paver blocks, each designated section comprising not more than 50000 blocks, shall be divided into ten approximately equal groups. Three blocks shall be drawn from each group.

2. Marking and identification :

All samples shall be clearly marked at the time of sampling in such a way that the designated section of part thereof, and the consignment represented by the

sample, are clearly defined. The sample shall be dispatched to the approved test laboratory taking precaution to avoid damage to the paving in transit. Protect the paving from damage and contamination until they have been tested. The testing shall be carried as soon as possible, after the sample has been

taken. As soon as practicable after sampling. The samples shall be stored in water at 20 degree C \pm 5 degree C for 24 hours prior to testing.

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

Item No. 54:

Providing , Supplying & Fixing Precast C.C.Kerbing Block (M-20) having size of 380x300x150 mm Depth as per Design conveying it to the site jointing in to C:M 1:3 & racking out the joints incl. With necessary excavation in any type of soil / asphalt cutting including Disposing of the unserviceable material within 5 k.m. lead etc.complete as directed.

Laying :-

Trenches of specified width and depth shall first be made along the edges of the wearing course of the road or along the line of paver block flooring to receive the restraint block. The bed of the trenches shall be compacted manually with steel rammers on a firm and even surface and then stones shall be set in P.C.C. The edge restraint blocks shall be laid with their length running parallel to the paving edge, true in line and gradient. The joints of blocks shall be not more than 2 mm and filled with the CM 1 :3 (1 cement : 3 fine sand/) which shall be cured for 7 days.

Finishing

The edge shall be restored and all surplus earth including rubbish etc. disposed off as directed by the engineer in charges.

Measurement

Length of the finished work shall be measured in running meter along the edge of the paving correct to a cm.

Rate

The rate shall include the cost of the materials and labor including stone of specified materials involved in all the operation described above.

The rate shall be for a unit of one Running meter

Item No. 55:

Core cutting of 75 mm dia to 150mm dia. in the slab or /beam of any width as on site for Ref. piping, cabling and drain piping where ever required as per the site conditions.

1.00 Materials:

1.1 The material and equipment required(i.e tools and plants) for Core cutting of 75 mm dia to 150mm dia. in the slab or /beam of any width as per site have to be brought on site.

2.00 Workmanship:

2.1 Carrying out core cutting of 75 mm dia to 150mm dia. shall have to be done as per direction of engineer in charge without any extra rate over and above the rate as quoted for this item.

3.00 Mode of Measurement:

3.10 The Payment shall be made on number basis

Item No. 56 to 61

Providing & fixing concealed centre point to wall ceiling & floor CPVC SDR-13.5 PIPE having National Sanitation Foundation (NSF) seal for potable water of 15 mm dia nominal bore tube fittings and clamps including making good the wall, ceiling and floor etc complete. 15.00 mm inside dia .15 mm dia, 25mm dia, 32mm dia, 50mm dia, 75mm dia, 100mm dia. Cold water pipe.

1.0. Materials

1.1. The C-PVC pipe SDR-13.5 , working pressure. The Pipes, specials and fittings required shall be of best quality (prince, Finolex or equivalent).

2.0. Workmanship

2.1. The C-PVC pipes of specified diameter shall be fixed as directed. Due to thermal expansion of C-PVC pipes, due allowance shall be made particularly in over ground pipe lines for any change in length

of pipe line which may occur during installation or when pipe line which may occur during installation or

when pipe line is in service.

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

2.3. The C-PVC pipe lines should not be kept exposed above ground when it passes through public places, railway lines, road side and foot paths.

2.4. C-PVC pipes shall be supported at the following intervals:

-20 mm. dia 500 mm. -25 mm. dia 750.mm. -32 mm. dia.900 mm.

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

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

2.7. C-PVC pipes shall be fixed on wall with wooden plugs and suitable plastic clamps.

2.8. Jointing the pipes :

2.8.1. The pipes and sockets shall be accurately cut. The ends of the pipes and fittings should be absolutely free from dirt and dust. The outside surface of the pipes and the inside of the fittings shall then

be roughened with emery paper, and then solvent cement joint. Since solvent cement is aggressive to C-PVC. care must be taken to avoid applying excessive cement to the inside of pipe sockets as any surplus

cement cannot be wiped of after jointing. Empty solvent cement tins, brushes, rags, or paper impregnated

with cement should not be buried in the trenches. They should be gathered not left scattered about, as they

can prove to be a hazard to animals, which may chew them.

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

2.9. Laying pipes in Trenches :

2.9.1. The pipes shall be laid over uniform relatively soft fine trained soil found to be free of presence of

hard object such as large flints, rocky projections, large tree roots etc. The width of the trenches shall be

minimum width required for working.

2.9.2. The pipes laid underground shall not be less than one meter from the ground level. The pipe shall

be positioned in the trenches so as to avoid any induced stressed due to deflection. Any deviation required

shall be obtained by using proper type of rubber ring joints.

3.0. Mode of measurements & payment

3.1. The relevant specifications of item 23.2. (A) shall be followed except that the C-PVC pipes of specified dia. shall be paid under this item.

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

Item No 62

Providing and fixing PVC SWR nahni trap IS 14735 FOR DRAIN-75 mm dia meter with jalli of the following nominal diameter of self cleaning design with C.I. screwed down of hinged grating incl. cost of cutting and making good the walls & floors

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

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

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

Item No 63 & 64

Providing and fixing to wall,ceiling and floor 6 kg/sq.cm working pressure PVC RAIN WATER pipe with 'O' ring 300 & 100 mm dia Rate inclusive of all fittings like single or double "Y" with door, reducer, coupler single T with door bend, pipe clip on wooden patti etc.complete.300 mm dia & 100mm dia

1.0. Materials

1.1. The low density polythene pipe of specified diameter with 6Kg/Sq. Cm, working pressure shall conform to I.S. 3076-1968. The specials and fittings required shall be of best quality.

2.0. Workmanship

2.1. The P.V.C. pipes of specified diameter shall be fixed as directed. Due to thermal expansion of rigid ' P.V.D. pipes, due allowance shall be made particularly in over ground pipe lines for any change in length (163) of pipe line which may occur during installation or when pipe line which may occur during installation or when pipe line is in service.

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

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

2.4. P.V.C. pipes shall be supported at the following intervals :
-20 mm. dia 500 mm. -25 mm. dia 750.mm. -32 mm. dia.900 mm.

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

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

2.7. P.V.C. pipes shall be fixed on wall with wooden plugs and suitable plastic clamps.

2.8. Jointing the pipes :

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

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

2.9. Laying pipes in Trenches :

2.9.1. The pipes shall be laid over uniform relatively soft fine trained soil found to be free of presence of hard object such as large flints, rocky projections, large tree roots etc. The width of the trenches shall be minimum width required for working.

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

3.0. Mode of measurements & payment

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

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

Item No 65:

Providing and fixing to wall, ceiling and floor U.PVC/SWR soil waste pipe with 'O' ring 75mm of ISI 13592/92. Rate inclusive of all fittings like single or double "Y" with door, reducer, coupler single T with door bend, pipe clip on wooden patti etc. complete and making good the wall,ceiling and floor.

1.0 Material

1.1. The U PVC/SWR shall be of 80 schedule(Finolex, prince or equivalent).

2.0. Workmanship

2.1. The fixing of U.PVC/SWR soil, waste and ventilating pipe shall be carried out as under.

The pipes shall be fixed to wall with M.S. clamps. The pipes will ends shall be secured with 40 mm before steel or iron barrel distance pieces or

boils and stout galvanised iron nails 10 cms long into hand wool plug fixed in walls. Access doors to fittings shall be provided with 3 mm. rubber insertion packing and secured without screws to make air and water tight. The joints shall be filled with appropriate solvent of ISI mark.

2.2. All soil pipes shall be earned up above the roof and shall have a wire ball on guarded or a cowl.

2.3. The ventilating pipe or shaft shall be carried out to a height of at least one meter above the outer Covering of the roof of the building or in the case of windows in a gable wall or a dormer windows, it shall be carried up to a ridge of the roof or at least two meters above the top of the windows. In case of flat roof to which access for use is provided, it shall be carried out up to a height of at least one meter above the parapet or two meters measured vertically from the top of any windows or opening which any exist up to a horizontal distance of five meters from the vent pipe into such building and in no case shall be carried out to a height less than three meters.

2.4. Where ventilating pipes are carried in pipe shafts, the shaft shall be of a minimum size of one meter. If the shafts are also used to give light and air to rooms, the ventilating pipes must be carried out to a horizontal distance at root level not less than five meter from the site of the shaft.

2.5. The U PVC/SWR pipes above parapet shall be fixed with M.S. clamps and stays. The clamps shall be made from 1.5 mm. thick MS flat or 3 mm. width band to the required shape and size to fit tightly on the sockets when tightened with screw bolts. It shall be formed of two semi circular pieces with flanged ends on both sides, with holes to fit in the screw bolts and nuts 40 mm. dia. M.S. Bars, One end of the stay shall be bent to form a hook to be fixed with clamps by means of bolts and the other end shall be bent for embedding in wall.

2.6. The connection between the main pipe and branch pipes shall be made by using branches and Bends with access doors for cleaning

2.7. The waste from lavatories, kitchens basins, sinks, baths and other floor traps shall be separately connected to respective stacks of upper floor. The waste stack of lavatories shall be connected directly to main hole while the waste stack of other shall be separately discharged over gully trap.

3.0. Mode of measurements and payment

3.1. The length of pipe shall be measured including all fittings along its length in running meters correct to a centimeter. No allowance shall be made for the portion of pipe length entered in the sockets of the adjacent pipe or fittings.

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

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

Item No 66:

Providing and fixing square-mouth S.W. gully trap class SP-1 complete with C.I. grating brick masonry chamber with water tight C.I. cover with frame of 300 x300 mm size (inside) the weight of cover to be not less than 4.50 kg and frame to be not less than 2.70 kg as per standard

design :

1.0. Materials : (t) Water shall conform to M-1. (2) Cement mortar of proportion 1:5 shall conform to M-

1.1 (3) Burnt brick shall conform to M-15. (4) The S.W. Galley trap of 100 mm. x 100 mm. size shall confirm to M-70.

2.0. Workmanship

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

2.2. Fixing:

2.2.1. The gully trap shall be fixed over cement concrete 1:5:10 (1 cement : 5 sand : 10 graded brick bats aggregate 40 mm nominal size) foundation. 650 square and 100 mm. thick The depth of top of concrete below the ground level shall be 675 mm. The jointing of gulley outlet to the branch drain shall be done similar to jointing of S.W. pipe ac; described in item No. 24.1 (A).

2.3. Brick masonry chamber : After fixing and testing gulley and branch drain, a brick masonry 300 x 330 mm. inside with bricks in CM 1:5 (1 cement : 5 sand) shall be built with a 100 mm. brick work round OH; gulley trap from the top of bed concrete up to ground level. The space between the chamber walls and the trap shall be filled with cement concrete 1:5:10. The upper portion of the chamber i.e. above the top level of the trap shall be plastered inside with cement mortar 1:3 (1 cement: 3 sand) finished with floating coat of neat cement. The corners and bottom of the chamber shall be rounded of so as to slope towards the grating.

2.4. C.I. cover with frame 300 mm, x 300 mm. (inside) size shall then be fixed on the top of the brick masonry with C.c. 1:2:4 (1 lent : 2 coarse sand : 4 graded aggregate 20 mm. nominal size) 40 mm. thick and rendered smooth. The finished top of the cover shall be left about 40 mm. above the adjoining ground level so as to exclude the surface water from entering the gulley trap.

3.0. Mode of measurements & payment

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

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

Item No 67:

Construction brick masonry chamber for underground C.I. inspection chamber and bends with brick having crushing strength not less than 35 kg/cm² in C:M 1:5 C.I. cover with frame (light duty) 445x610 mm internal dimensions total wight of cover with frame to be not less than 38 kg and weight 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) at 15 cm.c/c and providing and fixing precast R.C.C. cover size 0.60 x 0.45 x 0.07 m with 40 x 40 x 5mm angle frame and foundation concrete 1:5:10 inside plaster 15mm thick with cement mortar (1:3) finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete . (A) Inside dimension 455mm x 610mm and 450mm deep for Multi purpose pipe line.

1.0. Materials :

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Brick shall conform to M-15. Stone aggregate 40 mm. nominal size shall conform to M-12. coal tar shall conform to relevant M- 5.

2.0. Workmanship

2.1. The chamber shall be of size 455 mm. x 610 mm. internal clear dimensions between the masonry wall faces. The height of 500 mm. shall be measured from the top of the bed concrete to the top of the RCC frame. The size of grating indicate the clear internal dimensions of the RCC frame 40x40x5mm angle .

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

2.3. The foundation concrete shall consist of 150 Cms x 100 Cms x 15 cms thick C.C. 1:5:10(1 cement : 5 sand : 10 graded stone aggregate 40 mm. nominal size).

2.4. The wall of the chamber shall be constructed in brick work C.M. 1:5 and 23 Cms. thick as per relevant specifications of item 6.12(8).

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

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

2.7. The chamber shall have connection pipe, the length of which in meter between the road gully chamber and the manhole of the drain shall not be less than 1/40 times the nominal diameter of the pipe in MM. i.e. for 150 mm* connection pipe the length shall not be cement plaster on the bed concrete.

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

3.0. Mode of measurements and payment

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

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

Item No 68:

Extra over above item for additional depth 0.1 mt. or part thereof beyond 450mm depth for brick masonry chamber for 455mm x 610mm size.

1.0. Materials : Water shall conform to M-1. Cement shall conform to M-3. Coarse sand shall conform to M-5. Brick shall conform to M-15. Stone aggregate shall conform to M-12. Brick bat shall conform to M-14 M.S. bar shall conform to M-18.

2.0. Workmanship

2.1. C.I. inspection chamber with provision of C.I. bends of specified size with bolts, nuts and felt

washers for underground drain shall be enclosed in masonry chamber which shall be constructed as under:

2.2. The excavation shall be done true to dimensions and level shown in one the plans or as directed.

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

2.4. The chamber shall be of size 500 mm. x 450 mm. internal clear dimensions between the masonry wall faces. The height of 500 mm. shall be measured from the top of the bed concrete to the top of the C.I. frame. The size of grating indicate the clear internal dimensions of the C.I. frame of the grating. The excavation shall be done to true dimensions and levels. The foundation concrete shall consist of 150 Cms x 100 Cms x 15 cms thick C.C. 1:5:10 (1 cement: 5 sand : 10 graded stone aggregate 40 mm. nominal size).

The wall of the chamber shall be constructed in brick work C.M. 1:5 and 23 Cms. thick as per relevant specifications of item 6.12(8). The walls and the bed concrete of chamber shall be plastered inside with 12 mm. thick cement plaster 1 : 3 (1 cement : 3 coarse sand) finished smooth. The gully grating cover shall be hinged to frame to facilitate its opening for cleaning and repairs. The frames of the gully grating g shall be fixed on the top of masonry wall of the chamber in 15 cms. thick C.C. 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) laid over the full thickness of walls..

The chamber shall have connection pipe, the length of which in meter between the road gully chamber and the manhole of the drain shall not be less than 1/40 times the nominal diameter of the pipe in MM. i.e. for 150 mm* connection pipe the length shall not be cement plaster on the bed concrete.

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

2.5. 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 of as directed.

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

3.0. Mode of measurements & payment

3.1 The earth work in excavation, providing and laying C.I. inspection chamber and bends shall be measured and paid for separately. except that the extra shall be paid for, providing additional depth of 0.1 M. or M.

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

Item No 69

Extra over above item for additional depth 0.1 mt. or part thereof beyond 450mm depth for brick masonry chamber for 900mm x 1200mm size.

1.0. Materials : Water shall conform to M-1. Cement shrill conform to M-3. Coarse sand shall conform to M-5. Brick shall conform to M-15. Stone aggregate shall conform to M-12. Brick bat shall conform to M-14 M.S. bar shall conform to M-18.

2.0. Workmanship

- 2.1.** C.I. inspection chamber with provision of C.I. bends of specified size with bolts, nuts and felt washers for underground drain shall be enclosed in masonry chamber which shall be constructed as under:
- 2.2.** The excavation shall be done true to dimensions and level shown in one the plans or as directed.
- 2.3.** Bed concrete shall be 15 Cms, thick C.C. 1:5:10 (1 cement : 5 coarse sand : 10 graded brick bat aggregates. The projection of bed concrete beyond the masonry waifs shall be 7.5 cms.
- 2.4.** The chamber shall be of size 500 mm. x 450 mm. internal clear dimensions between the masonry wall faces. The height of 500 mm. shall be measured from the top of the bed concrete to the top of the C.I. frame. The size of grating indicate the clear internal dimensions of the C.I. frame of the grating. The excavation shall be done to true dimensions and levels. The foundation concrete shall consist of 150 Cms x 100 Cms x 15 cms thick C.C. 1:5:10 (1 cement: 5 sand : 10 graded stone aggregate 40 mm. nominal size).

The wall of the chamber shall be constructed in brick work C.M. 1:5 and 23 Cms. thick as per relevant specifications of item 6.12(8). The walls and the bed concrete of chamber shall be plastered inside with 12 mm. thick cement plaster 1 : 3 (1 cement : 3 coarse sand) finished smooth. The gully grating cover shall be hinged to frame to facilitate its opening for cleaning and repairs. The frames of the gully grating shall be fixed on the top of masonry wall of the chamber in 15 cms. thick C.C. 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) laid over the full thickness of walls..

The chamber shall have connection pipe, the length of which in meter between the road gully chamber and the manhole of the drain shall not be less than 1/40 times the nominal diameter of the pipe in MM. i.e. for 150 mm* connection pipe the length shall not be cement plaster on the bed concrete.

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

- 2.5.** 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 of as directed. The manholes shall be built on a bed of cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 brick bats) (40) to 50 mm. nominal size) to the thickness of the bed concrete shall be 15 cms. for manhole up to 1. M. depth and 20 cms. for manholes over meter and up to over meter and up to 2 meters, depth and 30 cms. for manholes o greater depth. Projection of bed concrete beyond the masonry wall shall be 15 cms.

3.0. Mode of measurements & payment

- 3.1** The earth work in excavation, providing and laying C.I. inspection chamber and bends shall be measured and paid for separately. except that the extra shall be paid for, providing additional depth of 0.1 M. or M.
- 3.2.** The rate shall be for a unit of One number.

Item No. 70

Providing, laying (to level or slopes) and jointing with stiff mixture of cement mortar in the proportions of 1:1 (1 cement : 1 sand) ,salt glazed stoneware pipes of 150 mm dia including testing of pipes and joints complete..(B) 150mm dia

1.0. Materials

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

2.0. Workmanship

2.1. The trenches for stoneware pipe drains shall be carried out as per relevant specifications of item No. 23.4 (A) except that the work is for stoneware pipes of 100 mm. dia.

2.2. Laying:

2.2.1. The pipes shall be laid accurately and perfectly true to line, levels and gradients, Great care shall be taken to prevent sand etc. from entering the pipes. The pipes between two manholes shall be laid truly in a straight line without vertical or horizontal undulation. All junctions and changes in direction and diameter shall be made inside manholes by means of curved 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 a even level bed grips being made or left on the bed to receive the sockets of the pipes.

2.3. Jointing:

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

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

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

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

2.3.5. The mortar shall be cured for 10 days.

2.4. Testing of Joints:

2.4.1. If any leakage is visible the defective part of the work shall be made good at no extra cost. The pipe line shall be tested as directed.

2.4.2. 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.

3.0. Mode of measurements and payment

3.1. Pounding or buttering of the fit trenches bed to the lower part of the pipe and "Grips" dug to take socket, collars etc. are included in the rate of laying the pipes.

3.2. 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,

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

Item No. 71

Providing and fixing in position SWR PVC COWEL VENT to pipe 110 mm dia directed.

1.0. Materials

1.1. The specified dia. SWR PVC COWEL VENT pipe shall conform company specs..

2.0. Workmanship

2.1. The fixing of SWR PVC COWEL VENT pipe shall be carried out as per relevant specifications

2.2. All soil pipes shall be earned up above the roof and shall have a wire ball on guarded or a cowl.

2.3. The ventilating pipe or shaft shall be carried out to a height of at least one meter above the outer covering of the roof of the building or in the case of windows in a gable wall or a dormer windows, it shall tcarried up to a ridge of the roof or at least tow meters above the top of the windows. In case of flat roof to which access for use is provided, it shall be carried out up to a height of at least on meter above the parapet or two meters measured vertically from the top of any windows or opening which any exist up to a horizontal distance of five meters from the vent pipe into such building and in no case shall be carried out to a height less then three meters.

2.4. Where ventilating pipes are carried in pipe shafts, the shaft shall be of a minimum size of one meter. If the shells are also used to give fight and air to rooms, the ventilating pipes must be carried out to a horizontal distance at root level not loss than five meter from the site of the shaft.

2.6. The connection between the main pipe and branch pipes shall be made by using branches and bends with access doors for cleaning

2.7. The waste from lavatories, kitchens basins, sinks, baths and other floor traps shall be separately connected to respective stacks of upper floor. The waste stack of lavatories shall be connected directly to main hole while the waste stack of other shall be separately discharged over gulley trap.

3.0. Mode of measurements and payment

3.1. The length of pipe shall be measured including all fittings along its length in running meters correct to a centimeter. No allowance shall be made for the portion of pipe length entered in the sockets of the adjacent pipe of fittings.

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

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

Item No. 72

Providing and fixing in position SWR PVC COWEL VENT to pipe 75 mm dia directed.

1.0. Materials

1.1. The specified dia. SWR PVC COWEL VENT pipe shall conform company specs..

2.0. Workmanship

- 2.1. The fixing of SWR PVC COWEL VENT pipe shall be carried out as per relevant specifications
- 2.2. All soil pipes shall be earned up above the roof and shall have a wire ball on guarded or a cowl.
- 2.3. The ventilating pipe or shaft shall be carried out to a height of at least one meter above the outer covering of the roof of the building or in the case of windows in a gable wall or a dormer windows, it shall tcarried up to a ridge of the roof or at least tow meters above the top of the windows. In case of flat roof to which access for use is provided, it shall be carried out up to a height of at least on meter above the parapet or two meters measured vertically from the top of any windows or opening which any exist up to a horizontal distance of five meters from the pipe into such building and in no case shall be carried out to a height less then three meters.
- 2.4. Where ventilating pipes are carried in pipe shafts, the shaft shall be of a minimum size of one meter. If the shells are also used to give fight and air to rooms, the ventilating pipes must be carried out to a horizontal distance at root level not loss than five meter from the site of the shaft.
- 2.6. The connection between the main pipe and branch pipes shall be made by using branches and bends with access doors for cleaning
- 2.7. The waste from lavatories, kitchens basins, sinks, baths and other floor traps shall be separately connected to respective stacks of upper floor. The waste stack of lavatories shall be connected directly to main hole while the waste stack of other shall be separately discharged over gulley trap.

3.0. Mode of measurements and payment

- 3.1. The length of pipe shall be measured including all fittings along its length in running meters correct to a centimeter. No allowance shall be made for the portion of pipe length entered in the sockets of the adjacent pipe of fittings.
- 3.2. The rate includes all labour, and materials, tools and plant etc. required for satisfactory completion of this item.
- 3.3. The rate shall be for a unit of One running meter.

Item No 73

Providing and fixing Wash Basin single hole for pillar tap with C.I or M.S. bracket painted with including cutting holes and making good the same but including fitting (A) Vitreous chaina : (II) Flat back wash basin 550mm x 400mm size in white colour .

1.0. Materials

- 1.1. The white glazed earthenware wash basin shall be 550 mm. x 400mm. of 1st quality and make as approved by the Engineer-in-charge. The wash basin shall-conform to M-59.

2.0. Workmanship

- 2.1. The washbasin shall be fixed on the wall as and where directed. The wash basin shall be supported on a pair of M.S. or C.I. brackets fixed in C.M. 1:3 (1 cement : 3 sand). The bracket shall conform to I.S. : 775-1962. The wall plaster on the rear shall be cut to rest the top edge

of the washbasin. After fixing the basing, plaster shall be made good and surface finished to match the existing one.

2.2. The brackets shall be painted white with ready-mixed paint.

2.3. The C.I. brass trap and union shall be connected to 32 mm. dia. waste pipe which shall be suitably bent towards the wall and which shall discharge into an open drain leading to a gully trap or direct in to gully-trap on the ground floor and shall be connected to a waste pipe through a floor trap on the upper floors. C.P. brass trap and union may not be provided where the surface drain or a floor trap is placed directly under the basin and the waste is discharged in to vertically.

2.4. The height of the front edge to the wash basin from the floor level shall be 80 cms.

2.5. The necessary inlet, outlet connections and fittings such as pillar cocks, CP dress waste trap waste pipe, stop cock, chain wish rubber plug etc. shall be fixed.

2.6. The payment of fittings shall be made separately under separate items.

3.0. Mode of measurements & payment

3.1. The rate includes cost of all labour, materials, tool3 and plant etc. required for satisfactory completion of this item as specified in workmanship.

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

Item No 74:

Providing and fixing Oval or round shape Wash Basin with C.I or M.S. bracket painted with including cutting holes and making good the same but including fitting (A) Vitreous chaina : size and color selected by architect or as per detail.

Wash basin shall be of white porcelain first quality best Indian make and it shall conform to I.S. 2556 (Part -IV) -1972 and I.S. 771-1979. The size of the wash basin shall be as specified in item. Wash basin shall be of one piece construction with continued over flow arrangements All internal angles shall be designed so as to facilitate cleaning. Wash basin shall have single tap hole as specified. Each basin shall have a circular waste hole which is either riveted or beveled internally with 65 mm. diameter at top and 10 mm. depth to suit the waste fitting. The necessary stud slot to receive the bracket on the under side of the basin shall be provided Basin shall have an internal soap holder which shall fully drain into the bowl.

1.0. Materials

1.1. The white glazed earthenware wash basin shall be 550 mm. x 400mm. of 1st quality and make as approved by the Engineer-in-charge. The wash basin shall-conform to M-59.

2.0. Workmanship

2.1. The washbasin shall be fixed on the wall as and where directed. The wash basin shall be supported on a pair of M.S. or C.I. brackets fixed in C.M. 1:3 (1 cement : 3 sand). The bracket shall conform to I.S. : 775-1962. The wall plaster on the rear shall be cut to rest the top edge of the washbasin. After fixing the basing, plaster shall be made good and surface finished to match the existing one.

2.2. The brackets shall be painted white with ready-mixed paint.

2.3. The C.I. brass trap and union shall be connected to 32 mm. dia. waste pipe which shall be suitably bent towards the wall and which shall discharge into an open drain leading to a gully trap or direct in to gully-trap on the ground floor and shall be connected to a waste pipe through a floor trap on the upper floors. C.P. brass trap and union may not be provided where the surface drain or a floor trap is placed directly under the basin and the waste is discharged in to vertically.

2.4. The height of the front edge to the wash basin from the floor level shall be 80 cms.

2.5. The necessary inlet, outlet connections and fittings such as pillar cocks, CP dress waste trap waste pipe, stop cock, chain wish rubber plug etc. shall be fixed.

2.6. The payment of fittings shall be made separately under separate items.

3.0. Mode of measurements & payment

3.1. The rate includes cost of all labour, materials, tool3 and plant etc. required for satisfactory completion of this item as specified in workmanship.

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

Item No 75

Providing and fixing wash down water closet EUROPEAN TYPE W/C PAN with intergral "P" or "S" trap including jointing the trap with soil pipe in cement mortar (1:1) (1 cement;1 fine sand vitereous china. Rate inclusive of providing and fixing seat cover of the same make.

1.0. Materials

Wash down water closet (European type W.C. Pan) shall conform to M-60. Cement mortar shah conform to M-11.

2.0. Workmanship

2.1. The closet shall be fixed to the floor by means of 75 mm. long 6.5 mm. diameter counter sunk bolts and nuts embedded in the floor concrete using rubber or before washers so as not to allow any lateral displacement The joint between the trap of W.C. and soil pipe shall ho made with C M. 1:1 (1 cement : 1 fine sand).

3.0. Mode of measurements and payment

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

3.2. The rate includes cost of all labour for fixing pans and sent and cover, inlet, connections etc. complete including testing the same. The payment of seat and cover shall be made separately.

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

Item No 76

Providing and fixing 25mm dia Chromium plated Metropole flush cock including fixing in pipe line etc. complete

1.0. Materials :

Chromium plated brass half turn flush cock shall conform to M-67.

2.0. 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 Zinc. The fixing work shall be carried out as per relevant specifications of item No. 23.2(4).

3.0. Mode of measurements and payment

3.1. The rate includes cost of all materials and labour required for satisfactory completion of this item including fittings.

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

Item No 77

Providing and fixing 15mm dia Auto closing concealed urinal flush valve Code: PRS-073 Jaquar make or equivalent. Including all related material etc. complete.

1.0. Materials :

Chromium plated brass half turn flush valve shall conform to as per company specification.

2.0. 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 Zinc. The fixing work shall be carried out as per relevant specifications of item No. 23.2(4).

3.0. Mode of measurements and payment

3.1. The rate includes cost of all materials and labour required for satisfactory completion of this item including fittings.

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

Item No 78:

Providing and fixing 15mm dia wall mounted basin tap (auto closing) Including all related material etc. complete.

Item No 79:

Providing and fixing screw down bib tap of 15 mm dia 9a) Brass screw down bib tap polished bright with all related material etc. complete.

1.0. Materials :

15 mm. dia. brass screw down with bright polished finished shall conform to I.S. 781-1977. The bib cock shall be best Indian make and quality.

2.0. Workmanship

2.1. The screw down bib cock 15 mm. as specified above shall be fixed as directed. The threaded portion shall be smeared with white or red lead and around with a few turns of fine spun yarn round the screwed end of the pipe. The bib cock shall be then screwed and fixed to water tight position.

3.0. Mode of measurements and payment

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

3.2. The rate shall be for a unit of One Number.

Item No.80

Providing and fixing C.P. brass Angular cock of approved quality. (a) 15mm with all ralted material etc. complete.

1.0. Materials

1.1. The low level vitreous china (Enamel) flushing tank shall conform to M-65 except that the flushing

cistern shall be 12.5 liters low level type as mentioned in the item.

2.0. Workmanship

2.1. The low level cistern shall be firmly fixed on two C.I. or mild steel, brackets which shall be firmly embedded in the wall in C.M. 1:4 (1 cement : 4 fine sand).

2.2. The height of the bottom of the cistern from the top of the pan shall be 30 cms of low level flushing cistern shall be connected to the closet by means of 40 mm. dia, white porcelain enameled flush bend using Indian rubber adapts joints. The flush pipe shall be securely connected to the cistern outlet by means of coupling nut made of any non-corrosive materials, non-ferrous metal or galvanised steel. The flush pipe from the cistern shall be connected to the closet by means of cement of red-lead.

3.0. Mode of measurements & payment

3.1. The rate shall include the cost of all materials fitting and labour involved in al! the operations described under workmanship including testing.

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

Item No 81:

Providing and fixing S. S. Bottle Tap with necessary concealed fitting and cover panels. All the damages incurred while fixing shall be repaired to the satisfaction of the engineer in-charge . S. S. Bottle Tap shall be as approved by engineer in-charge .

1.0. Materials :

15 mm. dia. brass screw down with bright polished finished shall conform to I.S. 781-1977. The bib cock shall be best Indian make and quality.

2.0. Workmanship

2.1. The screw down bib cock 15 mm. as specified above shall be fixed as directed. The threaded portion shall be smeared with white or red lead and around with a few turns of fine spun yarn round the screwed end of the pipe. The bib cock shall be then screwed and fixed to water tight position.

3.0. Mode of measurements and payment

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

3.2. The rate shall be for a unit of One Number.

Item No. 82

Providing and fixing Pillar Tap, capstan head, screw down high pressure with screws, shanks and back nuts (I) 15 mm dia with all related material etc. complete.

1.0. Materials :

The capstan head pillar tap of specified dia. of C.R over brass shall be best quality and shall conform to I.S. : 1975 - 1961. The pillar taps shall be tested quality.

2.0. Workmanship

2.1. The capstan head pillar tap of specified dia. shall be fixed as directed with required washers of selected leather or rubber asbestos composition or of plastic as directed. The cock shall fixed with pipe line white Zink end spun yarn, to make joint water tight. The work shall be carried out in best workman like manner.

3.0. Mode of measurements and payment

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

Item No 83:

Providing and fixing urinal of approved quality including connection with trap and with integral longitudinal flush pipe. (A) Squating plate pattern white earthenware 550mmx300mm Including all materials and labour etc. complete as per detail drawing and instruction of engineer-in charge

Materials :

The squatting plate pattern, white glazed earthenware urinal of 550mmx300mm shall conform to I.S. 771-1063. It shall be test India make.

2.0. Workmanship

2.1. The squatting plate urinal shall be fixed as directed.

2.2. The top edge of the squatting plate shall be flush with the finished floor level adjacent to it. It shall be embedded on a layer of 25 mm. thick cement mortar 1:8 (1 cement: 8 fine sand) laid over a bed of burnt brickbat cement 1:5 :10(1 cement: 5 fine sand, 10 graded brick aggregate 20 mm. nominal size). There shall be 100 mm. dia. glazed earthenware or vitreous china channel as specified with stop and outlet pieces suitably fixed in floor in cement mortar 1:3 (1 cement: 3 coarse sand) and joint finished with white cement. The earthenware vitreous china shall discharge into 65 mm. C.P. brass outlet grating. The trap and fitting shall be fixed as directed.

3.0. Mode or measurements and payment

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

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

Item No 84:

Providing & Fixing magnifying mirror of approved make. Including providing & fixing screws, washers, cutting & making good the walls.size as per architecture detail.

1.0. Materials

1.1. The 600 mm. x 450 mm. size mirror shall be of superior glass with edge rounded offer beveled as specified. It shall be free from flaws specks, or bubbles and its thickness shall not be less than 6 mm.

The

glass for the mirror shall be uniformly silver plated at the back and shall be free from silvering defects Silvering shall have a protective uniform covering of red lead paint. The 6 mm thick ply wood shall conform to M-37. The 6 mm. thick A.C. sheets shall conform to M-24.

2.0. Workmanship

2.1. The mirror of 600 mm. x 450 mm. size mounted on A.C. Sheet or plywood 6 mm thick with C.P. brass clips shall be fixed as directed, by fixing wooden plugs in wall and C.P brass screws and washers. The work shall be carried out in best workman like manner.

3.0. Mode of measurements & payment

3.1. The rate includes cost of all labour and materials, tools and plant etc. required for satisfactory completion of this item. The rate shall be for a .unit of One number.

Item No 85:

Providing & fixing C.P. brass towel ring fixed to rawl plug with C.P. brass screws.

1.0. Materials

1.1. The C.P. brass towel rail shall be 600 x 20 mm. of best quality as approved by the Engineer-incharge The brackets shall be of C.P. brass. The rail shall conform to I.S. 1068-1958.

2.0. Workmanship

2.1. The brackets of the towel rail shall be fixed by means of C.P. brass screws to wooden firmly embedded in the wall with C.M. 1:3 (1 cement : 3 coarse sand). The **towel** rail shall be fixed as and where directed.

3.0. Mode of measurements and payment

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

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

Item No 86:

Providing & fixing of Superior quality of approved type of design cp of Tissue paper holder with complete fittings.

1.0. Materials : The toilet paper holder shall be of best quality and make, chromium plating shall be of grade 'B' type conforming to I.S. 1068-2958.

2.0. Workmanship

2.1. The toilet paper holder shall be fixed in position by means of screws and wooden plugs embedded in wall with cement 1:3 (1 cement : 3 coarse sand).

3.0. Mode of measurements and payment

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

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

Item No. 87

Providing & fixing of Superior quality of approved type of design Hand Dryer with complete fittings

1.0. Materials : The hand dryer shall be of best quality and make, chromium plating shall be of grade 'B' type conforming to I.S. 1068-2958.

2.0. Workmanship

2.1. The hand dryer shall be fixed in position by means of screws and wooden plugs embedded in wall with cement 1:3 (1 cement : 3 coarse sand).

3.0. Mode of measurements and payment

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

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

Item No. 88

Providing & fixing C.P. brass liquid soap dispenser 500ml of best quality of approved make.

1.0. Materials : The liquid soap dispenser 500ml shall be of best quality and make, chromium plating shall be of grade 'B' type conforming to I.S. 1068-2958.

2.0. Workmanship

2.1. The liquid soap dispenser 500ml shall be fixed in position by means of screws and wooden plugs embedded in wall with cement 1:3 (1 cement : 3 coarse sand).

3.0. Mode of measurements and payment

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

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

Item No. 89

Providing & fixing towel rack of approved make including, providing & fixing C.P. brass screws, making holes in walls & making good.

1.0. Materials

1.1. The C.P. brass towel rack shall be of best quality as approved by the Engineer-in-charge. The brackets shall be of C.P. brass. The rail shall conform to I.S. 1068-1958.

2.0. Workmanship

2.1. The brackets of the towel rack shall be fixed by means of C.P. brass screws to wooden firmly embedded in the wall with C.M. 1:3 (1 cement : 3 coarse sand). The towel rack shall be fixed as and where directed.

3.0. Mode of measurements and payment

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

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

Item No. 90

Fixing stainless steel recessed type soap dish of approved make. Including providing & fixing screws, washers, cutting & making good the walls.

1.0. Materials

1.1. The stainless steel soap dish shall be of best quality as approved by the Engineer-in-charge. The brackets shall be of stainless steel.

2.0. Workmanship

2.1. The stainless steel soap dish shall be fixed by means of company specifications and engineer in charge

3.0. Mode of measurements and payment

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

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

Item No. 91

Providing & fixing of Chrome Finish Hand Shower (Health Faucet), with 8mm Dia, 1Rmt Long PVC Tube and Wall Hook accessories to complete the item.
HYGIENE FAUCET : It consisting of Hand shower with trigger control, Wall shower holder, Shower hose Angle valve 15mm

1.0. Materials

1.1. The chrome finish hand shower shall be of best quality as approved by the Engineer-in-charge. The brackets shall be of chrome.

2.0. Workmanship

2.1. The chrome finish hand shower shall be fixed by means of company specifications and engineer in charge

3.0. Mode of measurements and payment

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

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

Item No. 92

Providing & fixing in position best Indian make toilet recessed type paper holder with cover chrome finish complete in all respects including cutting and making good the walls etc.

1.0. Materials : The toilet paper holder shall be of best quality and make, chromium plating shall be of grade 'B' type conforming to I.S. 1068-2958.

2.0. Workmanship

2.1. The toilet paper holder shall be fixed in position by means of screws and wooden plugs embedded in wall with cement 1:3 (1 cement : 3 coarse sand).

3.0. Mode of measurements and payment

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

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

Item No. 93

Providing and fixing grab bar fabricated from 32mm dia seamless stainless steel tube 2mm thick in bath room with non slip gripping surface, polished wall flange at end of bars with heavy duty anchor fasteners & accessories.

1.0. Materials : The grab bar 32mm dia shall be of best quality and make, stainless steel shall be of specified standards IS 781:1977

2.0. Workmanship

2.1. The grab bar shall be fixed in position by means of screws and wooden plugs embedded in wall with cement 1:3 (1 cement : 3 coarse sand). and fabricated as per company specifications

3.0. Mode of measurements and payment

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

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

Item No. 94 to 98

Supply, installation, testing & commissioning of gunmetal, male or female threaded isolation control valve (Ball Valve), confirming to IS 778, PN 1.0, with necessary specials, union, nipples etc., to complete the job.

| |
|---|
| (Internal Toilet Control Valve+ Shaft Area) |
| 15mm dia |
| 20mm dia. |
| 25mm dia. |
| 32mm dia. |
| 40mm dia. |
| 50mm dia. |

1.0. Materials

1.1. The high level gun metal ball valve shall conform to is 778:1971 pn 1.0, except that the flushing cistern shall be of 12.5 liters high level C.I. cistern as mentioned in the item.

2.0. Workmanship

2.1. The cistern shall be fixed on two C.I. or mild steel brackets which shall be firmly embedded in the wall in cement mortar 1:4 (1 cement : 4 fine sand).

2.2. The height of the bottom of the cistern from the top of the pan shall be two meters.

2.3. The W.C. Pan shall be connected to the cistern by galvanized steel flush pipes of 32 mm. nominal internal diameter. The flush pipe shall be fixed to wall by using clamps. The flush pipe from the cistern shall be connected to the closet by means of cement of red-lead. The flush pipe shall be securely connected to the cistern outlet by means of coupling nut made of any non-corrosive materials non-ferrous metal or galvanized steel.

2.4. The chain and the pull union shall be fixed to the protruding level arm of the flushing cistern.

2.5. The whole installation shall be tested for leak-proof joints and satisfactory functioning.

3.0. Mode of measurements & payment

3.1. The rate shall include the cost of all materials, fittings, and labour involved in all the operations described under workmanship including testing.

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

Item No. 99 & 100

Supply, installation, testing & commissioning of butterfly valve with dual plat flanze joint , isolation control valve confirming to latest IS , PN 1.0, with necessary specials, bolt and nuts , EPDM gasket all etc., to complete the job.

| |
|---|
| (External Vertical Shaft Riser Control + Ring Main Works) |
| 25mm dia. |
| 32mm dia. |
| 40mm dia. |
| 50mm dia. |
| 75mm dia. |
| 100mm dia. |

1.0. Materials : The butterfly l check or not return full way wheel valve or specified dial, shall conform to I.S. : 778-1964. The non-return valve shall be of tested quality.

2.0. Workmanship

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

3.0. Mode of measurements and payment

3.1. The rate includes all labors, materials, tools and plant etc. required for satisfactory completion of this item.

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

Item No. 101 to 102

Supplying, fitting & fixing Non return valve (Spring type Dual plate type) as per API 594/598 , tested to 10 kg/sq.cm etc. complete.

| |
|-------------------|
| 25mm dia. |
| 32mm dia. |
| 40mm dia. |
| 50mm dia. |
| 75mm dia. |
| 100mm dia. |

1.0. Materials : The spring type check or not return full way wheel valve or specified dial, shall conform to I.S. : 778-1964. The non-return valve shall be of tested quality.

2.0. Workmanship

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

3.0. Mode of measurements and payment

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

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

Item No. 103

Plain false ceiling work (Gypsum Board)

Providing & fixing suspended false ceiling, which includes Gypsteel ULTRA™ CRP surface ribbed perimeter channels (having one flange of 20mm and another flange of 30mm and a web of 27mm) along the perimeter of ceiling, screw fixed to brick wall/partition with the help of nylon sleeves and screws, at 610mm centres. Then suspending Gypsteel ULTRA™ CRP surface ribbed intermediate channels of size 45mm (with two flanges of 15mm each) from the soffit at 1220mm centres with Gypsteel ULTRA™ CRP surface ribbed ceiling angle of width 25mmx10mm fixed to soffit with GI cleat and steel expansion fasteners(Mfg by Saint Gobain Gyproc). Then Gypsteel ULTRA™ CRP surface ribbed Ceiling section of having web of 51.5mm and two flanges of 26mm each with lips of 10.5mm are then fixed to the Gypsteel ULTRA™ intermediate channel with the help of connecting clip and in direction perpendicular to the Gypsteel intermediate™ channel at 457mm centres. Single layer of 12.5mm tapered edge Gyproc® MR (conforming to IS 2095 part 1, 2011) is then screw fixed to ceiling section with 25mm drywall screws at 230mm centres. Single layer of 12.5mm tapered edge Gyproc® MR (conforming to IS 2095 part 1, 2011) is then screw fixed to ceiling section with 25mm drywall screws at 230mm centres. Screw fixing is done mechanically either with screw driver or drilling machine with suitable attachment. Finally square and tapered edges of the boards are to be jointed and finished so as to have a flush look which includes filling and finishing with Gyproc Jointing compound and Gyproc Joint Paper tape (as per recommended practices of Saint- Gobain Gyproc India) including cost of required Cut-Outs, finishing items /Scaffolding, and for all heights as per complete as per instruction of engineer-in charge and consultant.

Mode of measurements and payment

1. The rate includes all labours, materials etc. required for satisfactory completion of this item.
2. The rate shall be for unit of one Sq.mt

Item No. 104

Plain false ceiling patta work (Gypsum Board)

Providing & fixing suspended false ceiling, which includes Gypsteel ULTRA™ CRP surface ribbed perimeter channels (having one flange of 20mm and another flange of 30mm and a web of 27mm) along the perimeter of ceiling, screw fixed to brick wall/partition with the help of nylon sleeves and screws, at 610mm centres. Then suspending Gypsteel ULTRA™ CRP surface ribbed intermediate channels of size 45mm (with two flanges of 15mm each) from the soffit at 1220mm centres with Gypsteel ULTRA™ CRP surface ribbed ceiling angle of width 25mmx10mm fixed to soffit with GI cleat and steel expansion fasteners(Mfg by Saint Gobain Gyproc). Then Gypsteel ULTRA™ CRP surface ribbed Ceiling section of having web of 51.5mm and two flanges of 26mm each with lips of 10.5mm are then fixed to the Gypsteel ULTRA™ intermediate

channel with the help of connecting clip and in direction perpendicular to the Gypsteel intermediate™ channel at 457mm centres. Single layer of 12.5mm tapered edge Gyproc® MR (conforming to IS 2095 part 1, 2011) is then screw fixed to ceiling section with 25mm drywall screws at 230mm centres. Single layer of 12.5mm tapered edge Gyproc® MR (conforming to IS 2095 part 1, 2011) is then screw fixed to ceiling section with 25mm drywall screws at 230mm centres. Screw fixing is done mechanically either with screw driver or drilling machine with suitable attachment. Finally square and tapered edges of the boards are to be jointed and finished so as to have a flush look which includes filling and finishing with Gyproc Jointing compound and Gyproc Joint Paper tape (as per recommended practices of Saint- Gobain Gyproc India) including cost of required Cut-Outs, finishing items /Scaffolding, and for all heights as per complete as per instruction of engineer-in charge and consultant.

Mode of measurements and payment

1. The rate includes all labours, materials etc. required for satisfactory completion of this item.
3. The rate shall be for unit of one RMT.

Item No. 105

Grid ceiling work (600mm x 600mm Tile)

Providing and fixing Gyproc/Armstrong pre coated (Exposed portion only) GI T Grid system in 600x600mm module which includes providing and fixing wall angle along the perimeter of the room with help of nylon sleeves and wooden screws at 300mm centers. Then suspending the main tee of Gyproc/Armstrong 15mm black bolt slot size from the soffit with help of soffit cleat, rawl plugs and wire rod with Leveling spring clip at 1200mm c/c. 1200mm Cross Tee of Gyproc/Armstrong 15mm black bolt slot size is then interlocked into the pre-cut slots in the main Tees at 600mm centres in direction perpendicular to the main Tee to make a grid of 600x1200mm. Finally 600mm Cross tees are then interlocked into the pre cut slots in the 1200mm tees at 1200mm centres and in direction parallel to the main tee. Cross Tees having length more than 600mm are to be supported independently. 15mm thick SAINT-GOBAIN Gyproc India Celotex / Armstrong Fine Fissured Narrow Reveal Edge mineral fibre tiles of size 595x595mm shall be placed into the grid size of 600x600mm. including cost of required Cut-Outs, finishing items/Scaffolding, and for all heights as per complete as per instruction of engineer-in charge and consultant. complete as per instruction of engineer-in charge and consultant.

Mode of measurements and payment

1. The rate includes all labours, materials etc. required for satisfactory completion of this item.
4. The rate shall be for unit of one Sq.mt

MAKE OF MATERIALS

CIVIL AND ALLIED WORKS

LIST OF APPROVED MAKES

LIST OF APPROVED CIVIL MATERIALS / BRANDS FOR BUILDING WORKS

| Sr. No. | Item | Approved Make |
|---------|--|---|
| 1. | Cement –SRC | Ultratech, Ambuja, Siddhi ,Wonder Cement |
| 2. | Reinforcement Steel-Fe 500 SRS | Tata-Tiscon, Vizag, SAIL, Essar, Electro TMT, ASR |
| 3. | Structural Steel | Tata, SAIL, Essar, ASR |
| 4. | Water proofing Compounds | Pidillite, Fosroc, Roffe, CICO or equivalent |
| 5. | Hardeners | 'Ironite', 'Ferrok', 'Hardonate'or equivalent |
| 6. | Plastic emulsion Paints : Interior | Jotun, Asian Paints, ICI Dulux |
| 7. | Red Oxide (For IPS Flooring) | 'Shalimar', 'Garware'or equivalent, |
| 8. | Premium Quality Weather proof paint : Exterior | Jotun jotashield, Apex Ultima, Dulux weather shield |
| 9. | Glass/ Structural Glass | Saint Gobain LOW-e, ASAHI |
| 10. | Ceramic Tiles | Somani,Johnson, Asian, or as approved by consultant. |
| 11. | Vitrified Tiles (Note : Vitrified Tiles shall have to be whole body homogenous & Matt finish) | Somani,Johnson, Asian, or as approved by consultant. |
| 12. | Stone | Mirror polished kota, Machine cut river polished granite. |
| 13. | Water proofing Membrane type | As per specification & as approved by Consultant/Client |
| 14. | Aluminum Sections for Doors/Windows | Jindal, Bianco or as approved by Consultant/Client |
| 15. | Teak Wood | Ghana Teak Wood as approved by Consultant/Client |
| 16. | Ply Wood | Century, Greenply, Marino |
| 17. | Marine ply | Century, Greenply, Marino |
| 18. | PVC Tank | Syntex or as approved by Consultant/Client |
| 19. | Anti termite materials | Chlorophyriphos or materials as approved by Consultant/Client |
| 20. | Adhesive for tiles fixing | Ardex Andura, MRF |
| 21. | Hardware | Heltich, Dorma, Doorset, Ozone as approved by consultant |
| 22. | Expansion joint sil flex(cap cell HD 100) | Supreme industries, Softex industries pvt.ltd. Bengal bitumen |
| 23.. | Rolling shutters | Rama shutter.co. , Akash shutter, Olympic rolling shutters |
| 24. | Dowelling and rebarring | Hilti system or Equivalent as approved by consultant |
| 25. | White Cement putti | Birla white cement, J K Wall putti |
| 26. | Quartz manufacturer | Classic marble company, jayantilal & sons or as approved by consultant |
| 27. | Stainless steel railing | Ozone, Kitch, Orbit or as approved by consultants |
| 28. | Structural and spider glazing | Dorma, Ozone |
| 29. | Glass railing | Ozone pvt.ltd., Kitch or as approved by consultants |
| 30. | Cubical partition system for restroom | Merino-Bosco.co. or as approved by consultants |
| 31. | Automatic glass doors | GEZE Automated Door System, Dorma, Ozone or equivalent as approved by consultant. |
| 32. | Exterior Texture | Jotun UltraTEX, Asian- duracast or as approved by consultants |

| | | |
|----|--|---|
| 33 | Epoxy paint | Nerolac, Shalimar, Cico, Dubond, Berger, Asian |
| 34 | Pavers & Paving Tiles, Kerb stone (Recycled and Ecofriendly) | Amdavad Enviro Projects Pvt.Ltd.Vyara, or as approved by Consultant |
| 35 | F.R.C. Light Duty [LD-3.00] Chamber Covers & frames (680 x 530 x 35mm rectangular cover, 600 x 450mm clear opening) | Amdavad Enviro Projects Pvt.Ltd.Vyara, or as approved by Consultant |
| 36 | R.C.C. Precast Benches (Recycled and eco-friendly) | Amdavad Enviro Projects Pvt.Ltd. or as approved by Consultant |
| 37 | Construction Chemicals i.e., Plasticisers, Floor Hardeners, Water Proofing Compounds, Cement Grouts, Epoxy Grouts Etc. | Sika, BSAF, Pidilite, Cico, ACC ,Roffe, choksi, Fosroc, Samrock, M.C.Bauchemie, Shalimar Tar products |

LIST OF APPROVED PLUMBING MATERIALS / BRANDS FOR BUILDING WORKS

| Sr. No. | Item | Approved Make |
|----------------|--|--|
| 1 | SWR PVC PIPE & FITTINGS 6 KG CM ² ; FITTINGS : 6 KG CM ² ECO. DRAIN PIPE & FITTINGS | FINOLEX /PRINCE SUPREME/ ASTRAL |
| 2 | GULLY TRAP | GIRCO / TIRUMALA / SUPREME/ ASTRAL |
| 3 | RCC HUME PIPES EXTERNAL MAIN UNDER GROUND PIPE | INDIAN HUME PIPE / PRANALI |
| 5 | C.I. PIPE & FITTINGS | NICO OR EQ. |
| 6 | PPR PIPES & PPR FITTINGS | SUREME/PRINCE/ |
| 7 | M.S/G.I. PIPES FOR WATER SUPPLY | TATA / JINDAL/ SWASTIK |
| 8 | ASTM/CPVC PIPE & FITTINGS FOR WATER SUPPLY | ASTRAL / SUPREME/ASHIRWAD / |
| 9 | COMPOSITE PLUMBING PIPE & COMPOSITE FITTINGS | KITEC OR EQ. |
| 10 | G.I. PIPES FITTINGS WATER SUPPLY | DRP-M / R-BRAND / ZOLOTO |
| 11 | GI TO GI JOINTS | CHAMPION / EQUIVALENT |
| 12 | SOLVENT CEMENT | SUPREME / KISSAN / FINOLEX |
| 13 | BALL VALVES | LEADER / ZOLOTO / AUDCO |
| 14 | WHEEL VALVES | LEADER / ZOLOTO/AUDCO |
| 15 | DCV / NRV | ZOLOTO/SPIREX/AUDCO |
| 16 | TAR | SHALIBIND / TIKIBOND-BS |
| 17 | SELF PRIMING SEWAGE PUMPS | HBD / GRUNDFOS |
| 18 | VALVES | AUDCO/ZOLOTO / R.B. / KBL / KSB |
| 19 | PUMPS | KIRLOSKAR / GRUNDFOSS/ |
| 20 | STARTER | SIEMENS / L&T |
| 21 | PRESSURE GAUGE | BELLS / H GURU |
| 22 | BOTTLE TRAP & WASTE COUPLING | GROHE / JAQUAR / KOHLER |
| 23 | DEWATERING PUMPS | GRUNDFOSS/KIRLOSKAR/ KSB |
| 24 | HYDROPNEUMATIC SYSTEM | GRUNDFOSS OR EQUIVALENT |
| 25 | SANITARY FIXTURES | HINDWARE / PARRYWARE / CERA /KOHLER |
| 26 | PLUMBING FITTING | GROHE / JAQUAR / KOHLER or as approved by consultants. |
| 27 | METALLIC BELLOWS | BELLOW FLEX / PRICISION / DHRUV / B.D. |

| Sr. No. | Item | Approved Make |
|----------------|------------------------|--|
| | | ENGR. |
| 28 | R.O.PLANT | ION EXCHANGE /POWER H2O / THERMAX |
| 29 | SOFTENER PLANT | ION EXCHANGE /POWER H2O / THERMAX |
| 30 | SOLAR SYSTEM | SOAHEART/RACOLD/TATA-BP |
| 31 | ELECTRIC GEYSER | A-O SMITH/ RACOLD/SPHERHOT |
| 32 | HOT WATER GENERATOR | THERMAX/A.O.SMITH / KEPL/ BENCHMARK OR EQUIVALNET |
| 33 | SEWAGE TREATMENT PLANT | THERMAX / ION EXCAHNGE / EQUIVALNET |

The successful tenderer shall have to use the makes from above only after approval of client / consultant.