

## ITEMWISE SPECIFICATION

### SCHEDULE-B

#### Item no.1

**Clearing and grubbing road land including uprooting rank vegetation grass bushes, shrubs, sapling and trees girth up to 300 mm removal of stumps of trees cut earlier and disposal of unserviceable materials(A) By manual means in area of light jungle**

##### **201.1. Scope**

This work shall consist of cutting, removing and disposing of all materials such as trees, bushes, shrubs, stumps, roots, grass, weeds, top organic soil not exceeding 150 mm in thickness, rubbish etc., which in the opinion of the Engineer are unsuitable for incorporation in the works, from, the area of road land containing road embankment, drains, cross-drainage structures and such other areas as may be specified on the drawings or by the Engineer. It shall include necessary excavation, backfilling of pits resulting from uprooting of trees and stumps to required compaction, handling, salvaging, and disposal of cleared materials. Clearing and grubbing shall be performed in advance of earthwork operations and in accordance with the requirements of these Specifications.

**201.2. Preservation of Property/Amenities** Roadside trees, shrubs, any other plants, pole lines, fences, signs, monuments, buildings, pipelines, sewers and all highway facilities within or adjacent to the highway which are not to be disturbed shall be protected from injury or damage. The Contractor shall, provide and install at his own expense, suitable safeguards approved by the Engineer for this purpose. During clearing and grubbing, the Contractor shall take all adequate precautions against soil

erosion, water pollution, etc., and where required, undertake additional works to that effect vide Clause 306. Before start of operations, the Contractor shall submit to the Engineer for approval, his work plan including the procedure to be followed for disposal of waste materials, etc., and the schedules for carrying out temporary and permanent erosion control works as stipulated in Clause 306.3.

**201.3. Methods, Tools and Equipment's** Only such methods, tools and equipment as are approved by the Engineer and which will not affect the property to be preserved shall be adopted for the Work. If the area has thick vegetation/roots/trees, a crawler or pneumatic tyred dozer of adequate capacity may be used for clearance purposes. The dozer shall have ripper attachments for removal of tree stumps. All trees, stumps, etc., falling within excavation and fill lines shall be cut to such depth below ground level that in no case soil within 500 mm of the subgrade. Also, all vegetation such as roots, under-growth, grass and other deleterious matter unsuitable for incorporation in the embankment/subgrade shall be removed between fill lines to the satisfaction of the Engineer. On areas beyond these limits, trees and stumps required to be removed as directed by the Engineer shall be cut down to 1 m below ground level so that these do not present an unsightly appearance. All branches of trees extending above the trimmed as directed by the Engineer. All excavations below the general ground level arising out of the removal of trees, stumps, etc., shall be filled with suitable material and compacted thoroughly so as to make the surface at these points conform to the surrounding area. Ant-hills both above and below the ground, as are liable to collapse and obstruct free subsoil water flow shall be removed and their workings, which may extend to several metres, shall be suitably treated.

**201.4. Disposal of Materials** All materials arising from clearing and grubbing operations shall be the property of Government and shall be disposed of by the Contractor as hereinafter provided or directed by the Engineer.

Trunks, branches and stumps of trees shall be cleaned of limbs and roots and stacked. Also boulders, stones and other materials usable in road construction shall be neatly stacked as directed by the Engineer. Stacking of stumps, boulders, stones etc., shall be done at specified spots with all lead and lift.

All products of clearing and grubbing which, in the opinion of the Engineer, cannot be used or auctioned shall be cleared away from the roadside in a manner as directed by the Engineer. Care shall be taken to see that unsuitable waste materials are disposed of in such a manner that there is no likelihood of these getting mixed up with the materials meant for embankment, sub grade and road construction.

**201.5. Measurements for Payment** Clearing and grubbing for road embankment, drains and cross-drainage structures shall be measured on area basis in terms of hectares. Clearing and grubbing of borrow areas shall be deemed to be a part of works preparatory to embankment construction and shall be deemed to have been included in the rates quoted for the embankment construction item and no separate payment shall be made for the same.

Cutting of trees up to 900 mm in girth including removal of stumps and roots, and trimming of branches of trees extending above the roadway shall be considered incidental to the cleaning and grubbing operations. Removal of stumps left over after trees have been cut by any other agency shall also be considered incidental to the clearing and grubbing operations.

#### **201.6. Rates**

**201.6.1.** The Contract unit rates for the various items of clearing and grubbing shall be payment in full for carrying out, the required operations including full compensation for all labour, materials, tools, equipment and incidentals necessary to complete the work. These will also include removal of stumps of trees less than 900 mm in girth as well as stumps left over after cutting of trees carried out by another agency, excavation and back-filling to required density, where necessary, and handling, salvaging, piling and disposing of the cleared materials with all lead and lifts.

## **Item no.2**

**Excavation requirement for gabion installation. Manually or by mechanical means complete in all respects. Preparation of levelled ground for placing gabions of the first layer as per mentioned in the specifications or as per instructions of Engineer in Charge.**

#### **All sorts of soil**

Any soil which generally require close application of picks or jumpers or scarifiers to loosen it stiff clay, gravel and stone etc. fall under this category.

#### **1.0. General**

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

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

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

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

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

After clearing the site the center lines will be given by the Engineer-in-charge. The contractor shall assume full responsibility for alignment, elevation and dimension of each and all parts of

the work. Contractor shall supply labors materials, etc. required for setting out the reference marks and bench 'marks and shall maintain them as long as required and directed.

**4.0. Excavation**

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

**5.0. Disposal of the excavated stuff**

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

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

**6.0. Mode of measurements & payment**

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

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

**Item no.3**

**Excavation for base footings upto depth 1.5 m. including sorting out and disposing of the excavated material upto 50 m lead (loose or soft soil)**

**All sorts of soil**

Any soil which generally require close application of picks or jumpers or scarifiers to loosen it stiff clay, gravel and stone etc. fall under this category.

**1.0. General**

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

**2.0. Clearing the site**

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

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

**3.0. Setting out**

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

**4.0. Excavation**

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

**5.0. Disposal of the excavated stuff**

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

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

**6.0. Mode of measurements & payment**

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

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

**Item no.4**

**Excavation for foundation for depth from 1.5 m to 3.0 m including sorting out and stacking of useful materials and disposing of the excavated stuff upto 50 Meter lead.(A) Loose or soft soil**

**All sorts of soil**

Any soil which generally require close application of picks or jumpers or scarifiers to loosen it stiff clay, gravel and stone etc. fall under this category.

**1.0. General**

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

**2.0. Clearing the site**

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

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

**3.0. Setting out**

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

**4.0. Excavation**

The excavation in foundation shall be carried out in true line and level and shall have the width and depth as shown in the drawings or as directed. The contractor shall do the necessary shoring and shutting or providing necessary slopes to a safe angle, at his own cost. The payment for such precautionary measures shall be paid separately if not specified. The bottom of the excavated area shall be leveled both longitudinally and transversely as directed by removing and watering as required. No earth filling will be allowed for bringing it to level, if by mistake or any excavation is made deeper or wider than that shown on the plan or directed. The extra depth or width shall be made up with concrete of same proportion as specified for the foundation concrete at the cost of the contractor. The excavation **1.5 up to 3.00 mt. depth** shall be measured under this item.

**5.0. Disposal of the excavated stuff**

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

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

**6.0. Mode of measurements & payment**

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

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

**Item no.5**

**Boring with hydraulic piling rigs with power units, providing and installing cast in situ single under reamed piles of specified diameter and length below pile cap in M-25 cement concrete, to carry a safe working load not less than specified, excluding the cost of steel reinforcement but including the cost of boring with bentonite solution and the length of the pile to be embedded in pile cap etc. all complete. (Length of pile for payment shall be measured upto to the bottom of pile cap) : 450mm Dia**

**Specification -Cast-in-Situ Under-Reamed Piles**

(450 mm Dia – All Types of Soil)

Providing and installing cast-in-situ single under-reamed piles of 450 mm diameter of specified length below pile cap using hydraulic piling rigs with power units, capable of controlled boring, forming bulbs and maintaining verticality, including boring in all types of soil using bentonite / drilling slurry to maintain the bore stability; placing reinforcement cage (reinforcement cost excluded), concreting with M-25 grade cement concrete, mechanically compacted by tremie / suitable method to ensure sound and homogeneous concrete, forming under-reamed bulbs of specified size and shape, finishing pile top to required level, and protecting pile head till casting of pile cap – complete as per drawings, specifications and engineer-in-charge instructions.

The rate shall include the cost of:

- boring and stabilizing bore using bentonite solution,
- equipment, tools, tackles, power unit, fuel, labour and operator charges,
- preparation of working platform and site arrangements,
- setting out, positioning and plumbing of piles,

- removal and disposal of excavated soil / slurry,
- recording pile data and maintaining pile log sheets,
- portion of pile embedded in pile cap,  
but excluding the cost of steel reinforcement.

#### Measurement & Payment

Length of pile for payment shall be measured from pile toe up to the bottom of pile cap (embedded length within pile cap included), as executed at site.

#### Mode of measurement and payment

As per Bill Of Quantities

### **Item no.7**

**Excavation for foundation in sand, gravel, clay soft soils and murrum etc. including shoring, strutting dewatering as necessary and disposing of the excavated stuff as directed.(A) Depth upto 3.0 M. and lead upto 100m for 10 Cum**

#### **1.0 General**

- 1.1** The excavation for trenches will generally, refers to open excavation for trenches in wet / dry conditions for pipe laying work.

#### **2.0 Clearing of Sites:**

- 2.1** The site on which the pipelines are to be laid and shown on plan and the area required for setting out and other operations shall be cleared and all obstruction loose stones and materials, rubbish of all kinds, stumps, brushwood as trees shall be removed as directed the roots shall be entirely grubbed up.
- 2.2** The products of the clearing to restacked in such a place and in such a manner, as directed by the engineer in charge.
- 2.3** All holes or hollows whether originally existing or produced by digging up roots, shall be carefully filled up with earth, well watered, well rammed leveled off, as may be directed.
- 2.4** The agency has to obtain necessary permission for diverting the traffic or public as per requirement from competent authority for carrying out the work.

#### **3.0 Setting Out:**

The center lines of all pipe trenches etc. shall be given by the Engineer-in-charge and it will be the responsibility of the contractor to install substantial reference marks, bench marks, etc. and maintain them as long as required true to line, level curve and slopes. The contractor shall assure full responsibility for alignment, and dimension of trench.

The labour materials etc. required for setting out and establishing benchmarks and other reference marks shall be arranged by the contractor at his own cost.

#### **4.0 Excavation**

- 4.1** The excavation for the pipe trenches shall also include removal of all materials of whatever nature and whether wet or dry condition necessary for laying of pipelines exactly in accordance with alignment, levels grades and curves shown on the plans or as directed by the Engineer-in-charge. Trenches shall be excavated to the exact width and depth according to the size of pipe and the sides shall be left vertical as far as possible or according to the angle of repose of various

soils. Unless there is a specific extra provision in the contract for shoring and strutting or for cutting side slopes the contractor shall at his own cost do the necessary shoring and strutting or cutting of slopes to the angle of repose or both approved by the Engineer-in-charge. The contractor shall notify the Engineer before starting excavation to enable him to take cross sectional levels for purpose of measurements before the ground is disturbed. The bottom of the trenches shall be leveled both longitudinally and transversely or slopped as directed by the Engineer. The contractor shall at his own cost to remove such portions of boulders or rocks, as are rectified to make the bottom of the trench level. No filling shall be allowed to bring the trench to level. If by contractor's mistake excavation is made deeper than shown on the plans and if ordered by the Engineer the extra depth shall have to be made with selected excavated stuff only with watering, ramming etc. as directed, by the Engineer and at the cost of the contractor. Other hard excavation shall be cleared of all sorts including loose materials and cut to firm surface, either level, stepped as directed by the Engineer. The Engineer may order such changes in the dimensions and alignment of pipe trench as may be deemed necessary to secure satisfactory cover over pipeline.

After each excavation is completed, the contractor shall notify the Engineer to that effect and no laying of pipeline will be allowed to be laid until Engineer has approved the depth and dimensions of trenches, level and measurements.

#### **Excavation by the Use of Explosives**

Unless otherwise stated herein, I.S. Specification "IS: 4081: Safety Code for Blasting and IS 3764-1966 safety code of Excavation works and related Drilling Operations" shall be followed. As far as possible all blasting shall be completed prior to commencement of construction. At all stages of excavation, precautions shall be taken to preserve the rock below and beyond the lines specified for the excavation, in the soundest possible condition. The quantity and strength of explosives used shall be such as will neither damage nor crack the rock outside the limits of excavation. All precautions, as directed by Employer's Representative, shall be taken during the blasting operations and care shall be taken that no damage is caused to adjoining buildings or structures as a result of blasting operations. In case of damage to permanent or temporary structures, Contractor shall repair the same to the satisfaction of Employer's Representative at his cost. As excavation approaches its final lines and levels, the depth of the charge holes and amount of explosives used shall be progressively and suitably reduced.

The contractor shall obtain a valid Blasting License from the authorities concerned. No explosive shall be brought near the work in excess of quantity required for a particular amount of firing to be done; and surplus left after filling the holes shall be removed to the magazine. The magazine shall be built as a way as possible from the area to be blasted. Employer's Representative's prior approval shall be taken for the location proposed for the magazine.

In no case shall blasting be allowed closer than 30 meters to any structure or to locations where concrete has just been placed. In the latter case the concrete must be at least 7 days old. Blasting for excavation in hard rock will only be allowed if permitted by competent authority otherwise shall be done with chiseling only.

#### **For blasting operations, the following points shall be observed.**

- i) Contractor shall employ a competent and experienced supervisor and licensed blaster in-charge of each set of operation, which shall be held personally responsible to ensure that all safety regulations are carried out.
- ii) Before any blasting is carried out, Contractor shall intimate Employer's Representative and obtain his approval in writing for resorting to such operations. He shall intimate the hours of firing charges, the nature of explosive to be used and the precautions taken for ensuring safety.
- iii) Contractor shall ensure that all workmen and the personnel at site are excluded from an area

- within 200 m radius from the firing point, at least 15 minutes before firing time by sounding warning whistle. The area shall also be given a warning by sounding a distinguishing whistle.
- iv) The blasting of rock near any existing buildings, equipments or any other property shall be done under cover and Contractor has to make all such necessary muffling arrangements. Covering may preferably be done by MS plates with adequate dead weight over them. Blasting shall be done with small charges only and where directed by Employer's Representative; a trench shall have to be cut by chiseling prior to the blasting operation, separating the area under blasting from the existing structures.
  - v) The firing shall be supervised by a Supervisor and not more than 6 (six) holes at a time shall be set off successively. If the blasts do not tally with the number fired, the misfired holes shall be carefully located after half an hour and when located, shall be exploded by drilling a fresh hole along the misfired hole (but not nearer than 600 mm from it) and by exploding a new charge.
  - vi) A wooden tamping rod with a flat end shall be used to push cartridges home and metal rod or hammer shall not be permitted. The charges shall be placed firmly into place and not rammed or pounded. After a hole is filled to the required depth, the balance of the hole shall be filled with stemming, which may consist of sand or stone dust or similar inert material.
  - vii) Contractor shall preferably detonate the explosives electrically.
  - viii) The explosives shall be exploded by means of a primer, which shall be fired by detonating a fuse instantaneous detonator (F.I.D) or other approved cables. The detonators with F.I.D. shall be connected by special nippers.
  - ix) In dry weather and normal dry excavation, ordinary low explosive gunpowder may be used. In damp rock, high explosive like gelatin with detonator and fuse wire may be used. Underwater or for excavation in rock with substantial accumulated seepage electric detonation shall be used.
  - x) Holes for charging explosives shall be drilled with pneumatic drills, the drilling pattern being so planned that rock pieces after blasting will be suitable for handling without secondary blasting.
  - xi) When excavation has almost reached the desired level, hand trimming shall have to be done for dressing the surface to the desired level.
  - xii) Any rock excavation beyond an over break limit of 75 mm shall be filled up as instructed by Employer's Representative, with concrete of strength not less than M10. Stopping in rock excavation shall be done by hand trimming.
  - xiii) Contractor shall be responsible for any accident to workmen, public or Employer's property due to blasting operations. Contractor shall also be responsible for strict observance of rules, laid by Inspector of explosives, or any other Authority duly constituted under the State and / or Union Government as applicable at the place of excavation.

### **Stripping Loose Rock**

All loose boulders, detached rocks partially and other loose material which might move therewith not directly in the excavation but so close to the area to be excavated as to be liable, in the opinion of Employer's Representative, to fall or otherwise endanger the workmen, equipment, or the work shall be stripped off and removed from the area of the excavation. The method used shall be such as not to render unstable or unsafe the portion, which was originally sound and safe.

Any material not requiring removal in order to complete the permanent works, but which, in the opinion of Employer's Representative, is likely to become loose or unstable later, shall also be promptly and satisfactorily removed.

### **Classification of Strata:**

The decision regarding, classification of strata shall rest with the Engineer in charge and his decision shall be final and binding to the contractor.

All the materials encountered in the excavation shall be classified as under:-

### **Ordinary soil and soft murrum:**



These will include all materials of an earthy or sandy nature, which can be easily ploughed or small shingle, and gravel, which can be easily removed.

**Hard murrum:**

This shall include all kinds of disintegrated rock or shale or inundated clay which can be removed with a shovel without difficulty and which do not require blasting.

**Soft rock:**

This shall include all materials which is rock or hard conglomerate, all decomposed and weathered rock, highly fissured rock old masonry and also soft rock boulders bigger than 1/2 cubic meter and other varieties of rock. Which do not require blasting and which can be removed with the pie crowbars wedges and hammer.

**Hard rock:**

This shall include rocks, occurring in masses, which could best be removed by chiseling.

**5.0 Shoring and Strutting:**

- 5.1 Shoring & strutting if required shall have to be carried out by the contractor, for which any extra charge will not be paid.
- 5.2 During excavation if water connections, sewage connections, telephone lines khalkuva (soak pits) etc. are damaged by the contractor, the same shall have to be restored by the contractor without any extra cost.

**6.0 Protection**

- 6.1 The trenches shall be strongly fenced and red light signal shall be kept at night and arrangement of watchman to prevent accidents should be done. Sufficient care and protective measure shall be taken to see that the excavation shall not affect or damage the adjoining structure. The contractor shall be entirely responsible for any injury to life and damage to the properties etc. Necessary protection work such as guide ropes, crossing places, barricades, caution boards etc. shall be provided by the contractor.

- 7.0 The excavation in all sorts of soil, hard murrum, soft rock or hard rock or any type of soil shall have to be carried out up to the required depth by the agency

**8.0 Disposal of Excavated Stuff**

- 8.1 No excavated stuff from trench are to be placed even temporarily nearer than 1.5 meter or greater distance up to 90 meter or as prescribed by the Engineer from the outer edge of trench. All excavated material will be the property of the owner. The rate of excavation includes sorting out of useful materials and stacking them separately as directed within specified lead. The excavated stuff suitable and useful for refilling or for other use shall be stacked at convenient places. The materials not useful in any way shall be disposed off as directed by the Engineer from the outer edge of trench.
- 8.2 The site should be cleared off on completion of work.

**9.0 Additional Requirements**

- 9.1 At the joints of pipes, the trench shall be excavated to an additional depth of 15 cm. and width of 30 cm. And length of 15 cm. beyond the edge of collar on both the sides or as directed. The rate include for such extra excavation made at the joints. The trenches shall be excavated perfectly in straight line. The bottom of the trench shall be kept as per invert level or as directed. To

maintain the proper slope the usual method of site rails and boning rods shall be adopted. The contractor shall have to provide and fix and maintain sight rails and boning rods without any extra cost.

If the contractor fails or makes delay to give hydraulic test of the pipe line laid in any of the section, without any genuine reason, he shall be responsible to get any part of the length trenches refill in such case (i.e. before testing) for safety of pedestrian and/or vehicular traffic as found necessary by the engineer-in-charge without any extra cost. If found necessary and directed by the Engineer-in-charge, the contractor shall have to excavate the refilled trenches, during hydraulic test without any extra cost.

At all road crossings, trenches shall be excavated only for half width of the road and pipe shall be laid. The other half shall be excavated only after back filling over the laid pipeline is done so as to make it suitable for the traffic. The contractor shall provide diversion when the pipeline is to be laid along the road as required and shall maintain the diversion or any part of it, without any extra cost. At all road crossings, the pipe shall be laid below the crest of road.

- 9.2** The contractor shall break the road surface by chiseling to the exact width and length as shown on the drawing or as directed by the Engineer-in-charge.  
The excavated stuff shall be deposited in uniform layers to avoid mixing with other kind of materials at non-objectionable place or as directed by the Engineer-in-charge.

## **10.0 Measurement and Payment**

- 10.1** Payment shall be made as per actual work done. On cu mt. unit bases

- 10.2** The rate for the item of excavation shall include the following unless and otherwise mentioned.
- (a) Clearing of site
  - (b) Setting out work including all materials and labour.
  - (c) Providing and subsequently removing, shoring and strutting outing slopes etc.
  - (d) Excavation and removal and staking of all excavated stuff as directed.
  - (e) Necessary protection including labour materials equipment etc. to ensure safety and protection against risk or accident.
  - (f) Providing facilities for inspection and damage to property if caused during progress of work.
  - (g) Compensation for injury to life and damage to property if caused during progress of work.
  - (h) Restoring of water supply connections, sewer connections, telephone lines, khalkuva soak pits Septic Tank etc. if damaged by contractor without extra payment.
  - (j) Clearing the site on completion of works directed by the Engineer.

## **Item no.8**

**Excavation for foundation in sand, gravel, clay soft soils and murrum etc. including shoring, strutting dewatering as necessary and disposing of the excavated stuff as directed.(B) Depth from 3.0 to 6.0 M.and lead upto 100m for 10 Cum**

### **1.1 General**

- 1.1** The excavation for trenches will generally, refers to open excavation for trenches in wet / dry conditions for pipe laying work.

### **2.0 Clearing of Sites:**

- 2.1** The site on which the pipelines are to be laid and shown on plan and the area required for setting out and other operations shall be cleared and all obstruction loose stones and materials, rubbish of all kinds, stumps, brushwood as trees shall be removed as directed the roots shall be entirely grubbed up.
- 2.2** The products of the clearing to restacked in such a place and in such a manner, as directed by the engineer in charge.
- 2.3** All holes or hollows whether originally existing or produced by digging up roots, shall be carefully filled up with earth, well watered, well rammed leveled off, as may be directed.
- 2.4** The agency has to obtain necessary permission for diverting the traffic or public as per requirement from competent authority for carrying out the work.

### **3.0 Setting Out:**

The center lines of all pipe trenches etc. shall be given by the Engineer-in-charge and it will be the responsibility of the contractor to install substantial reference marks, bench marks, etc. and maintain them as long as required true to line, level curve and slopes. The contractor shall assure full responsibility for alignment, and dimension of trench.

The labour materials etc. required for setting out and establishing benchmarks and other reference marks shall be arranged by the contractor at his own cost.

### **4.0 Excavation**

- 4.1** The excavation for the pipe trenches shall also include removal of all materials of whatever nature and whether wet or dry condition necessary for laying of pipelines exactly in accordance with alignment, levels grades and curves shown on the plans or as directed by the Engineer-in-charge. Trenches shall be excavated to the exact width and depth according to the size of pipe and the sides shall be left vertical as far as possible or according to the angle of repose of various soils. Unless there is a specific extra provision in the contract for shoring and strutting or for cutting side slopes the contractor shall at his own cost do the necessary shoring and strutting or cutting of slopes to the angle of repose or both approved by the Engineer-in-charge. The contractor shall notify the Engineer before starting excavation to enable him to take cross sectional levels for purpose of measurements before the ground is disturbed. The bottom of the trenches shall be leveled both longitudinally and transversely or slopped as directed by the Engineer. The contractor shall at his own cost to remove such portions of boulders or rocks, as are rectified to make the bottom of the trench level. No filling shall be allowed to bring the trench to level. If by contractor's mistake excavation is made deeper than shown on the plans and if ordered by the Engineer the extra depth shall have to be made with selected excavated stuff only with watering, ramming etc. as directed, by the Engineer and at the cost of the contractor. Other hard excavation shall be cleared of all sorts including loose materials and cut to firm surface, either level, stepped as directed by the Engineer. The Engineer may order such changes in the dimensions and alignment of pipe trench as may be deemed necessary to secure satisfactory cover over pipeline.

After each excavation is completed, the contractor shall notify the Engineer to that effect and no laying of pipeline will be allowed to be laid until Engineer has approved the depth and dimensions of trenches, level and measurements.

### **Excavation by the Use of Explosives**

Unless otherwise stated herein, I.S. Specification "IS: 4081: Safety Code for Blasting and IS

3764-1966 safety code of Excavation works and related Drilling Operations” shall be followed. As far as possible all blasting shall be completed prior to commencement of construction. At all stages of excavation, precautions shall be taken to preserve the rock below and beyond the lines specified for the excavation, in the soundest possible condition. The quantity and strength of explosives used shall be such as will neither damage nor crack the rock outside the limits of excavation. All precautions, as directed by Employer’s Representative, shall be taken during the blasting operations and care shall be taken that no damage is caused to adjoining buildings or structures as a result of blasting operations. In case of damage to permanent or temporary structures, Contractor shall repair the same to the satisfaction of Employer’s Representative at his cost. As excavation approaches its final lines and levels, the depth of the charge holes and amount of explosives used shall be progressively and suitably reduced.

The contractor shall obtain a valid Blasting License from the authorities concerned. No explosive shall be brought near the work in excess of quantity required for a particular amount of firing to be done; and surplus left after filling the holes shall be removed to the magazine. The magazine shall be built as a way as possible from the area to be blasted. Employer’s Representative’s prior approval shall be taken for the location proposed for the magazine.

In no case shall blasting be allowed closer than 30 meters to any structure or to locations where concrete has just been placed. In the latter case the concrete must be at least 7 days old. Blasting for excavation in hard rock will only be allowed if permitted by competent authority otherwise shall be done with chiseling only.

**For blasting operations, the following points shall be observed.**

- i) Contractor shall employ a competent and experienced supervisor and licensed blaster in-charge of each set of operation, which shall be held personally responsible to ensure that all safety regulations are carried out.
- ii) Before any blasting is carried out, Contractor shall intimate Employer’s Representative and obtain his approval in writing for resorting to such operations. He shall intimate the hours of firing charges, the nature of explosive to be used and the precautions taken for ensuring safety.
- iii) Contractor shall ensure that all workmen and the personnel at site are excluded from an area within 200 m radius from the firing point, at least 15 minutes before firing time by sounding warning whistle. The area shall also be given a warning by sounding a distinguishing whistle.
- iv) The blasting of rock near any existing buildings, equipments or any other property shall be done under cover and Contractor has to make all such necessary muffling arrangements. Covering may preferably be done by MS plates with adequate dead weight over them. Blasting shall be done with small charges only and where directed by Employer’s Representative; a trench shall have to be cut by chiseling prior to the blasting operation, separating the area under blasting from the existing structures.
- v) The firing shall be supervised by a Supervisor and not more than 6 (six) holes at a time shall be set off successively. If the blasts do not tally with the number fired, the misfired holes shall be carefully located after half an hour and when located, shall be exploded by drilling a fresh hole along the misfired hole (but not nearer than 600 mm from it) and by exploding a new charge.
- vi) A wooden tamping rod with a flat end shall be used to push cartridges home and metal rod or hammer shall not be permitted. The charges shall be placed firmly into place and not rammed or pounded. After a hole is filled to the required depth, the balance of the hole shall be filled with stemming, which may consist of sand or stone dust or similar inert material.
- vii) Contractor shall preferably detonate the explosives electrically.
- viii) The explosives shall be exploded by means of a primer, which shall be fired by detonating a fuse instantaneous detonator (F.I.D) or other approved cables. The detonators with F.I.D. shall be connected by special nippers.
- ix) In dry weather and normal dry excavation, ordinary low explosive gunpowder may be used. In damp rock, high explosive like gelatin with detonator and fuse wire may be used. Underwater or for excavation in rock with substantial accumulated seepage electric detonation shall be used.
- x) Holes for charging explosives shall be drilled with pneumatic drills, the drilling pattern being so

- planned that rock pieces after blasting will be suitable for handling without secondary blasting.
- xi) When excavation has almost reached the desired level, hand trimming shall have to be done for dressing the surface to the desired level.
  - xii) Any rock excavation beyond an over break limit of 75 mm shall be filled up as instructed by Employer's Representative, with concrete of strength not less than M10. Stopping in rock excavation shall be done by hand trimming.
  - xiii) Contractor shall be responsible for any accident to workmen, public or Employer's property due to blasting operations. Contractor shall also be responsible for strict observance of rules, laid by Inspector of explosives, or any other Authority duly constituted under the State and / or Union Government as applicable at the place of excavation.

### **Stripping Loose Rock**

All loose boulders, detached rocks partially and other loose material which might move therewith not directly in the excavation but so close to the area to be excavated as to be liable, in the opinion of Employer's Representative, to fall or otherwise endanger the workmen, equipment, or the work shall be stripped off and removed from the area of the excavation. The method used shall be such as not to render unstable or unsafe the portion, which was originally sound and safe.

Any material not requiring removal in order to complete the permanent works, but which, in the opinion of Employer's Representative, is likely to become loose or unstable later, shall also be promptly and satisfactorily removed.

### **Classification of Strata:**

The decision regarding, classification of strata shall rest with the Engineer in charge and his decision shall be final and binding to the contractor.

All the materials encountered in the excavation shall be classified as under:-

#### **Ordinary soil and soft murrum:**

These will include all materials of an earthy or sandy nature, which can be easily ploughed or small shingle, and gravel, which can be easily removed.

#### **Hard murrum:**

This shall include all kinds of disintegrated rock or shale or inundated clay which can be removed with a shovel without difficulty and which do not require blasting.

#### **Soft rock:**

This shall includes all materials which is rock or hard conglomerate, all decomposed and weathered rock, highly fissured rock old masonry and also soft rock boulders bigger than 1/2 cubic meter and other varieties of rock. Which do not require blasting and which can be removed with the pie crowbars wedges and hammer.

#### **Hard rock:**

This shall include rocks, occurring in masses, which could best be removed by chiseling.

## **5.0 Shoring and Strutting:**

- 5.1 Shoring & strutting if required shall have to be carried out by the contractor, for which any extra charge will not be paid.
- 5.2 During excavation if water connections, sewage connections, telephone lines khalkuva (soak pits) etc. are damaged by the contractor, the same shall have to be restored by the contractor without any extra cost.

## **6.0 Protection**

6.1 The trenches shall be strongly fenced and red light signal shall be kept at night and arrangement of watchman to prevent accidents should be done. Sufficient care and protective measure shall be taken to see that the excavation shall not affect or damage the adjoining structure. The contractor shall be entirely responsible for any injury to life and damage to the properties etc. Necessary protection work such as guide ropes, crossing places, barricades, caution boards etc. shall be provided by the contractor.

7.0 The excavation in all sorts of soil, hard murram, soft rock or hard rock or any type of soil shall have to be carried out up to the required depth by the agency

## **8.0 Disposal of Excavated Stuff**

8.1 No excavated stuff from trench are to be placed even temporarily nearer than 1.5 meter or greater distance up to 90 meter or as prescribed by the Engineer from the outer edge of trench. All excavated material will be the property of the owner. The rate of excavation includes sorting out of useful materials and stacking them separately as directed within specified lead. The excavated stuff suitable and useful for refilling or for other use shall be stacked at convenient places. The materials not useful in any way shall be disposed off as directed by the Engineer from the outer edge of trench.

8.2 The site should be cleared off on completion of work.

## **9.0 Additional Requirements**

9.1 At the joints of pipes, the trench shall be excavated to an additional depth of 15 cm. and width of 30 cm. And length of 15 cm. beyond the edge of collar on both the sides or as directed. The rate include for such extra excavation made at the joints. The trenches shall be excavated perfectly in straight line. The bottom of the trench shall be kept as per invert level or as directed. To maintain the proper slope the usual method of site rails and boning rods shall be adopted. The contractor shall have to provide and fix and maintain sight rails and boning rods without any extra cost.

If the contractor fails or makes delay to give hydraulic test of the pipe line laid in any of the section, without any genuine reason, he shall be responsible to get any part of the length trenches refill in such case (i.e. before testing) for safety of pedestrian and/or vehicular traffic as found necessary by the engineer-in-charge without any extra cost. If found necessary and directed by the Engineer-in-charge, the contractor shall have to excavate the refilled trenches, during hydraulic test without any extra cost.

At all road crossings, trenches shall be excavated only for half width of the road and pipe shall be laid. The other half shall be excavated only after back filling over the laid pipeline is done so as to make it suitable for the traffic. The contractor shall provide diversion when the pipeline is to be laid along the road as required and shall maintain the diversion or any part of it, without any extra cost. At all road crossings, the pipe shall be laid below the crest of road.

9.2 The contractor shall break the road surface by chiseling to the exact width and length as shown on the drawing or as directed by the Engineer-in-charge. The excavated stuff shall be deposited in uniform layers to avoid mixing with other kind of materials at non-objectionable place or as directed by the Engineer-in-charge.

## **10.0 Measurement and Payment**

- 10.1** Payment shall be made as per actual work done. On cu mt. unit bases
- 10.2** The rate for the item of excavation shall include the following unless and otherwise mentioned.
- (a) Clearing of site
  - (b) Setting out work including all materials and labour.
  - (c) Providing and subsequently removing, shoring and strutting outing slopes etc.
  - (d) Excavation and removal and staking of all excavated stuff as directed.
  - (e) Necessary protection including labour materials equipment etc. to ensure safety and protection against risk or accident.
  - (f) Providing facilities for inspection and damage to property if caused during progress of work.
  - (g) Compensation for injury to life and damage to property if caused during progress of work.
  - (h) Restoring of water supply connections, sewer connections, telephone lines, khalkuva soak pits Septic Tank etc. if damaged by contractor without extra payment.
  - (j) Clearing the site on completion of works directed by the Engineer.

### **Item no.9**

**Excavation for foundation in sand, gravel, clay soft soils and murrum etc. including shoring, strutting dewatering as necessary and disposing of the excavated stuff as directed.(C) Depth from 6.0 to 9.0 M.and lead upto 100m**  
**OR**

### **Item no.10**

### **Carting lead For soil upto 5 km.**

#### **1.2 General**

- 1.1** The excavation for trenches will generally, refers to open excavation for trenches in wet / dry conditions for pipe laying work.

#### **2.0 Clearing of Sites:**

- 2.1** The site on which the pipelines are to be laid and shown on plan and the area required for setting out and other operations shall be cleared and all obstruction loose stones and materials, rubbish of all kinds, stumps, brushwood as trees shall be removed as directed the roots shall be entirely grubbed up.

- 2.2** The products of the clearing to restacked in such a place and in such a manner, as directed by the engineer in charge.

- 2.3** All holes or hollows whether originally existing or produced by digging up roots, shall be carefully filled up with earth, well watered, well rammed leveled off, as may be directed.

- 2.4** The agency has to obtain necessary permission for diverting the traffic or public as per requirement from competent authority for carrying out the work.

#### **3.0 Setting Out:**

The center lines of all pipe trenches etc. shall be given by the Engineer-in-charge and it will be the responsibility of the contractor to install substantial reference marks, bench marks, etc. and maintain them as long as required true to line, level curve and slopes. The contractor shall assure full responsibility for alignment, and dimension of trench.

The labour materials etc. required for setting out and establishing benchmarks and other reference marks shall be arranged by the contractor at his own cost.

#### **4.0 Excavation**

**4.1** The excavation for the pipe trenches shall also include removal of all materials of whatever nature and whether wet or dry condition necessary for laying of pipelines exactly in accordance with alignment, levels grades and curves shown on the plans or as directed by the Engineer-in-charge. Trenches shall be excavated to the exact width and depth according to the size of pipe and the sides shall be left vertical as far as possible or according to the angle of repose of various soils. Unless there is a specific extra provision in the contract for shoring and strutting or for cutting side slopes the contractor shall at his own cost do the necessary shoring and strutting or cutting of slopes to the angle of repose or both approved by the Engineer-in-charge. The contractor shall notify the Engineer before starting excavation to enable him to take cross sectional levels for purpose of measurements before the ground is disturbed. The bottom of the trenches shall be leveled both longitudinally and transversely or slopped as directed by the Engineer. The contractor shall at his own cost to remove such portions of boulders or rocks, as are rectified to make the bottom of the trench level. No filling shall be allowed to bring the trench to level. If by contractor's mistake excavation is made deeper than shown on the plans and if ordered by the Engineer the extra depth shall have to be made with selected excavated stuff only with watering, ramming etc. as directed, by the Engineer and at the cost of the contractor. Other hard excavation shall be cleared of all sorts including loose materials and cut to firm surface, either level, stepped as directed by the Engineer. The Engineer may order such changes in the dimensions and alignment of pipe trench as may be deemed necessary to secure satisfactory cover over pipeline.

After each excavation is completed, the contractor shall notify the Engineer to that effect and no laying of pipeline will be allowed to be laid until Engineer has approved the depth and dimensions of trenches, level and measurements.

#### **Excavation by the Use of Explosives**

Unless otherwise stated herein, I.S. Specification "IS: 4081: Safety Code for Blasting and IS 3764-1966 safety code of Excavation works and related Drilling Operations" shall be followed. As far as possible all blasting shall be completed prior to commencement of construction. At all stages of excavation, precautions shall be taken to preserve the rock below and beyond the lines specified for the excavation, in the soundest possible condition. The quantity and strength of explosives used shall be such as will neither damage nor crack the rock outside the limits of excavation. All precautions, as directed by Employer's Representative, shall be taken during the blasting operations and care shall be taken that no damage is caused to adjoining buildings or structures as a result of blasting operations. In case of damage to permanent or temporary structures, Contractor shall repair the same to the satisfaction of Employer's Representative at his cost. As excavation approaches its final lines and levels, the depth of the charge holes and amount of explosives used shall be progressively and suitably reduced.

The contractor shall obtain a valid Blasting License from the authorities concerned. No explosive shall be brought near the work in excess of quantity required for a particular amount of firing to be done; and surplus left after filling the holes shall be removed to the magazine. The magazine shall be built as a way as possible from the area to be blasted. Employer's Representative's prior approval shall be taken for the location proposed for the magazine.

In no case shall blasting be allowed closer than 30 meters to any structure or to locations where concrete has just been placed. In the latter case the concrete must be at least 7 days old. Blasting for excavation in hard rock will only be allowed if permitted by competent authority otherwise



shall be done with chiseling only.

**For blasting operations, the following points shall be observed.**

- i) Contractor shall employ a competent and experienced supervisor and licensed blaster in-charge of each set of operation, which shall be held personally responsible to ensure that all safety regulations are carried out.
- ii) Before any blasting is carried out, Contractor shall intimate Employer's Representative and obtain his approval in writing for resorting to such operations. He shall intimate the hours of firing charges, the nature of explosive to be used and the precautions taken for ensuring safety.
- iii) Contractor shall ensure that all workmen and the personnel at site are excluded from an area within 200 m radius from the firing point, at least 15 minutes before firing time by sounding warning whistle. The area shall also be given a warning by sounding a distinguishing whistle.
- iv) The blasting of rock near any existing buildings, equipments or any other property shall be done under cover and Contractor has to make all such necessary muffling arrangements. Covering may preferably be done by MS plates with adequate dead weight over them. Blasting shall be done with small charges only and where directed by Employer's Representative; a trench shall have to be cut by chiseling prior to the blasting operation, separating the area under blasting from the existing structures.
- v) The firing shall be supervised by a Supervisor and not more than 6 (six) holes at a time shall be set off successively. If the blasts do not tally with the number fired, the misfired holes shall be carefully located after half an hour and when located, shall be exploded by drilling a fresh hole along the misfired hole (but not nearer than 600 mm from it) and by exploding a new charge.
- vi) A wooden tamping rod with a flat end shall be used to push cartridges home and metal rod or hammer shall not be permitted. The charges shall be placed firmly into place and not rammed or pounded. After a hole is filled to the required depth, the balance of the hole shall be filled with stemming, which may consist of sand or stone dust or similar inert material.
- vii) Contractor shall preferably detonate the explosives electrically.
- viii) The explosives shall be exploded by means of a primer, which shall be fired by detonating a fuse instantaneous detonator (F.I.D) or other approved cables. The detonators with F.I.D. shall be connected by special nippers.
- ix) In dry weather and normal dry excavation, ordinary low explosive gunpowder may be used. In damp rock, high explosive like gelatin with detonator and fuse wire may be used. Underwater or for excavation in rock with substantial accumulated seepage electric detonation shall be used.
- x) Holes for charging explosives shall be drilled with pneumatic drills, the drilling pattern being so planned that rock pieces after blasting will be suitable for handling without secondary blasting.
- xi) When excavation has almost reached the desired level, hand trimming shall have to be done for dressing the surface to the desired level.
- xii) Any rock excavation beyond an over break limit of 75 mm shall be filled up as instructed by Employer's Representative, with concrete of strength not less than M10. Stopping in rock excavation shall be done by hand trimming.
- xiii) Contractor shall be responsible for any accident to workmen, public or Employer's property due to blasting operations. Contractor shall also be responsible for strict observance of rules, laid by Inspector of explosives, or any other Authority duly constituted under the State and / or Union Government as applicable at the place of excavation.

**Stripping Loose Rock**

All loose boulders, detached rocks partially and other loose material which might move therewith not directly in the excavation but so close to the area to be excavated as to be liable, in the opinion of Employer's Representative, to fall or otherwise endanger the workmen, equipment, or the work shall be stripped off and removed from the area of the excavation. The method used shall be such as not to render unstable or unsafe the portion, which was originally sound and safe.

Any material not requiring removal in order to complete the permanent works, but which, in the

opinion of Employer's Representative, is likely to become loose or unstable later, shall also be promptly and satisfactorily removed.

**Classification of Strata:**

The decision regarding, classification of strata shall rest with the Engineer in charge and his decision shall be final and binding to the contractor.

All the materials encountered in the excavation shall be classified as under:-

**Ordinary soil and soft murrum:**

These will include all materials of an earthy or sandy nature, which can be easily ploughed or small shingle, and gravel, which can be easily removed.

**Hard murrum:**

This shall include all kinds of disintegrated rock or shale or inundated clay which can be removed with a shovel without difficulty and which do not require blasting.

**Soft rock:**

This shall include all materials which is rock or hard conglomerate, all decomposed and weathered rock, highly fissured rock old masonry and also soft rock boulders bigger than 1/2 cubic meter and other varieties of rock. Which do not require blasting and which can be removed with the pie crowbars wedges and hammer.

**Hard rock:**

This shall include rocks, occurring in masses, which could best be removed by chiseling.

**5.0 Shoring and Strutting:**

- 5.1 Shoring & strutting if required shall have to be carried out by the contractor, for which any extra charge will not be paid.
- 5.2 During excavation if water connections, sewage connections, telephone lines khalkuva (soak pits) etc. are damaged by the contractor, the same shall have to be restored by the contractor without any extra cost.

**6.0 Protection**

- 6.1 The trenches shall be strongly fenced and red light signal shall be kept at night and arrangement of watchman to prevent accidents should be done. Sufficient care and protective measure shall be taken to see that the excavation shall not affect or damage the adjoining structure. The contractor shall be entirely responsible for any injury to life and damage to the properties etc. Necessary protection work such as guide ropes, crossing places, barricades, caution boards etc. shall be provided by the contractor.

- 7.0 The excavation in all sorts of soil, hard murrum, soft rock or hard rock or any type of soil shall have to be carried out up to the required depth by the agency

**8.0 Disposal of Excavated Stuff**

- 8.1 No excavated stuff from trench are to be placed even temporarily nearer than 1.5 meter or greater distance up to 90 meter or as prescribed by the Engineer from the outer edge of trench. All excavated material will be the property of the owner. The rate of excavation includes sorting out of useful materials and stacking them separately as directed within specified lead. The excavated stuff suitable and useful for refilling or for other use shall be stacked at convenient places. The materials not useful in any way shall be disposed off as directed by the Engineer from the outer edge of trench.

**8.2** The site should be cleared off on completion of work.

**9.0 Additional Requirements**

**9.1** At the joints of pipes, the trench shall be excavated to an additional depth of 15 cm. and width of 30 cm. And length of 15 cm. beyond the edge of collar on both the sides or as directed. The rate include for such extra excavation made at the joints. The trenches shall be excavated perfectly in straight line. The bottom of the trench shall be kept as per invert level or as directed. To maintain the proper slope the usual method of site rails and boning rods shall be adopted. The contractor shall have to provide and fix and maintain sight rails and boning rods without any extra cost.

If the contractor fails or makes delay to give hydraulic test of the pipe line laid in any of the section, without any genuine reason, he shall be responsible to get any part of the length trenches refill in such case (i.e. before testing) for safety of pedestrian and/or vehicular traffic as found necessary by the engineer-in-charge without any extra cost. If found necessary and directed by the Engineer-in-charge, the contractor shall have to excavate the refilled trenches, during hydraulic test without any extra cost.

At all road crossings, trenches shall be excavated only for half width of the road and pipe shall be laid. The other half shall be excavated only after back filling over the laid pipeline is done so as to make it suitable for the traffic. The contractor shall provide diversion when the pipeline is to be laid along the road as required and shall maintain the diversion or any part of it, without any extra cost. At all road crossings, the pipe shall be laid below the crest of road.

**9.2** The contractor shall break the road surface by chiseling to the exact width and length as shown on the drawing or as directed by the Engineer-in-charge.  
The excavated stuff shall be deposited in uniform layers to avoid mixing with other kind of materials at non-objectionable place or as directed by the Engineer-in-charge.

**10.0 Measurement and Payment**

**10.1** Payment shall be made as per actual work done. On cu mt. unit bases

**10.2** The rate for the item of excavation shall include the following unless and otherwise mentioned.

- (a) Clearing of site
- (b) Setting out work including all materials and labour.
- (c) Providing and subsequently removing, shoring and strutting outing slopes etc.
- (d) Excavation and removal and staking of all excavated stuff as directed.
- (e) Necessary protection including labour materials equipment etc. to ensure safety and protection against risk or accident.
- (f) Providing facilities for inspection and damage to property if caused during progress of work.
- (g) Compensation for injury to life and damage to property if caused during progress of work.
- (h) Restoring of water supply connections, sewer connections, telephone lines, khalkuva soak pits Septic Tank etc. if damaged by contractor without extra payment.
- (j) Clearing the site on completion of works directed by the Engineer.

**Item no.11**

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

**1.0 WORKMANSHIP**

- 1.1. The earth to be used for filling shall be free from salts, organic or other foreign matter all clots of earth shall be broken.
- 1.2. As soon as the work in foundation has been completed and measured the site of foundation shall be cleared of all debris brick bats mortar dropping etc. and filled with earth in layers not exceeding 20cms. 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 ends of crow-bars, where rammer cannot be used.
- 1.3 The plinth shall be similarly filled with earth in layers not exceeding 20 cms adequately watered and consolidated by ramming with iron or wooden rammers. When filling reaches finished level the surface shall be flooded with water for at least 24 hours and allowed to dry and then rammed and consolidated.
- 1.4 The finished level of filling shall be kept to shape intended to be given to floor.
- 1.5 In case of large heavy duty flooring like factory flooring, the consolidation may be done by power rollers, where so specified. The extent of consolidation required shall also be as specified.

**2.0. Mode of Measurements & Payment**

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

**ITEM NO.12**

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

**1.0 MATERIALS**

- 1.1. Murrum or selected soil shall be clean, of good binding quality and of approved quality obtained from approved pits / quarries of disintegrated rocks which contain silicon's material and natural mixture of clay of local origin. The P.I. value of selected soil used shall not be more than 6.0.

**2.0 WORKMANSHIP**

- 2.1 The murrum or selected soil to be used for filling shall be free from salts, organic or other foreign matter all clots of murrum or selected soil shall be broken.
- 2.2 As soon as the work in foundation has been completed and measured the site of foundation shall be cleared of all debris brick bats mortar dropping etc. and filled with

murrum or selected soil in layers not exceeding 20 cms. Each layer shall be adequately watered, rammed and consolidated before the succeeding layer is laid. The murrum shall be rammed with iron rammers where feasible and with the but ends of crow bars. Where rammer cannot be used.

- 2.3 The plinth shall be similarly tilled with murrum or selected soil 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.
- 2.4 The finished level of filling shall be kept to shape intended to be given to floor.
- 2.5 In case of large heavy duty flooring like factory flooring, the consolidation may be done by power rollers, where so specified. The extent of consolidation required shall also be as specified.

### **3.0. MODE OF MEASUREMENTS & PAYMENT**

- 3.1 The payment shall be made for filling in plinth and foundation no deduction shall be made for shrinkage or voids, if consolidated as instructed above.
- 3.2 The rate includes cost of collecting and carting murrum / or selected earth of approved quality with all lead and labor required for filling in trenches and plinth.
- 3.3 The rate shall be for a unit of one Cum.

### **Item no.13**

**Filling in foundation and plinth with murrum or selected soil in layers of 20cm thickness including watering, ramming and consolidating etc. complete. (filling - Structural fill inside reinforced soil zone. As per MoRTH specifications and specifications provided.)**

#### **1.0 MATERIALS**

- 1.1. Murrum or selected soil shall be clean, of good binding quality and of approved quality obtained from approved pits / quarries of disintegrated rocks which contain silicon's material and natural mixture of clay of clastic origin. The P.I. value of selected soil used shall not be more than 6.0.

#### **2.0 WORKMANSHIP**

- 2.1 The murrum or selected soil to be used for filling shall be free from salts, organic or other foreign matter all clods of murrum or selected soil shall be broken.
- 2.2 As soon as the work in foundation has been completed and measured the site of foundation shall be cleared of all debris brick bats mortar dropping etc. and filled with murrum or selected soil in layers not exceeding 20 cms. Each layer shall be adequately

watered, rammed and consolidated before the succeeding layer is laid. The murrum shall be rammed with iron rammers where feasible and with the but ends of crow bars. Where rammer cannot be used.

- 2.3 The plinth shall be similarly tilled with murrum or selected soil 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.
- 2.4 The finished level of filling shall be kept to shape intended to be given to floor.
- 2.5 In case of large heavy duty flooring like factory flooring, the consolidation may be done by power rollers, where so specified. The extent of consolidation required shall also be as specified.

### **3.0. MODE OF MEASUREMENTS & PAYMENT**

- 3.1 The payment shall be made for filling in plinth and foundation no deduction shall be made for shrinkage or voids, if consolidated as instructed above.
- 3.2 The rate includes cost of collecting and carting murrum / or selected earth of approved quality with all lead and labor required for filling in trenches and plinth.
- 3.3 The rate shall be for a unit of one Cum.

### **Item no.14**

**Providing & fixing BIS Certified and CE Marked Metal Gabions of 1.0m length x 1.0m width x 1.0m height. The gabion box shall be indigenously manufactured as per required section and made of mechanically woven hexagonal shaped double twist wire mesh of 10x12 type, edges mechanically selvaged, wire shall be heavily (Zinc+PVC) coated G.I. wire with diameter 2.70/3.70 mm Ø (ID/OD), edge wire 3.40/4.40 mm Ø (ID/OD) and meeting the specifications of IS 16014:2018. The gabion boxes shall be filled with 150 to 250mm size hard stones whose loss angeles abbrasion value shall be less than 45 and meeting the requirements of IRC SP 116:2018 including conveying with all leads and lifts and placing at required places in required line, level, slope, section as directed, etc. and tied by 3% lacing wire 2.20/3.20 mm Ø (ID/OD) as directed by Engineer-in-charge. complete (Specification: IS 16014, MoRTH 2500). (Excluding cost of stone procurement)**

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

Providing, supplying, assembling, placing and tying Metal Gabion Boxes of 1.0 m height, indigenously manufactured and conforming to IS 16014:2018 and MoRTH Clause 2500, complete in all respects (excluding cost of stone procurement), as directed by the Engineer-in-Charge.

The work includes:

- Supplying BIS Certified and CE Marked gabion boxes manufactured from mechanically woven, hexagonal shaped double twist wire mesh of 10 × 12 type.

- Mesh edges mechanically selvaged.
  - Wire made of heavily (Zinc + PVC) coated GI wire:
    - Mesh wire diameter: 2.70/3.70 mm Ø (ID/OD)
    - Edge wire diameter: 3.40/4.40 mm Ø (ID/OD)
  - Supplying and using lacing wire 2.20/3.20 mm Ø (ID/OD), Zinc + PVC coated.
  - Assembling and placing gabion boxes at required location in proper line, level, slope and section.
  - Filling the gabion boxes with hard stones of 150 mm to 250 mm size, having Los Angeles Abrasion Value less than 45, conforming to IRC SP 116:2018.
  - Conveying and placing materials with all leads and lifts.
  - Proper tying and securing with minimum 3% lacing wire by weight of gabion.
  - Complete finishing as per approved drawings and directions of Engineer-in-Charge.
- (Cost of stone procurement shall be paid separately unless otherwise specified.)*

## 2. Materials & Specifications

- Gabion Mesh: Double twist hexagonal wire mesh (10×12 type).
- Coating: Heavy Zinc + PVC coating.
- Wire Quality: Conforming to IS 16014:2018.
- Stones: Hard, durable, angular stones (150-250 mm size), LA Abrasion value < 45.
- Work shall comply with IS 16014, IRC SP 116:2018 and MoRTH Clause 2500.

## 3. Workmanship

- Gabion boxes shall be assembled on firm and level foundation.
- Adjacent units shall be securely tied to form a continuous structure.
- Stones shall be hand placed on exposed faces to ensure proper packing and alignment.
- Internal voids shall be minimized by proper packing.
- Lacing shall be done tightly to avoid bulging or deformation.
- Final structure shall be true to line, level, slope and section as shown in drawings.
- All works shall be carried out to the satisfaction of Engineer-in-Charge.

Mode of measurement and payment

As per Bill Of Quantities

## **Item no.15**

**Providing & fixing BIS Certified and CE Marked Metal Gabions of 1.0m length x 1.0m width x 0.50m height. The gabion box shall be indigenously manufactured as per required section and made of mechanically woven hexagonal shaped double twist wire mesh of 10x12 type, edges mechanically selvaged, wire shall be heavily (Zinc+PVC) coated G.I. wire with diameter 2.70/3.70 mm Ø (ID/OD), edge wire 3.40/4.40 mm Ø (ID/OD) and meeting the specifications of IS 16014:2018. The gabion boxes shall be filled with 150 to 250mm size hard stones whose loss angeles abbrasion value shall be less than 45 and meeting the requirements of IRC SP 116:2018 including conveying with all leads and lifts and placing at required places in required line, level, slope, section as directed, etc. and tied by 3% lacing wire 2.20/3.20 mm Ø (ID/OD) as directed by Engineer-in-charge. complete (Specification: IS 16014, MoRTH 2500). (Excluding cost of stone procurement)**

## 1. Scope of Work

Providing, supplying, assembling, placing and tying Metal Gabion Boxes of 0.50 m height, indigenously manufactured and conforming to IS 16014:2018 and MoRTH Clause 2500, complete in all respects (excluding cost of stone procurement), as directed by the Engineer-in-Charge.

The work shall include:

- Supplying BIS Certified and CE Marked gabion boxes manufactured from mechanically woven hexagonal shaped double twist wire mesh of 10 × 12 type.
- Edges mechanically selvedged to ensure strength and durability.
- Wire made of heavily (Zinc + PVC) coated G.I. wire with following specifications:
  - Mesh wire diameter: 2.70/3.70 mm Ø (ID/OD)
  - Edge wire diameter: 3.40/4.40 mm Ø (ID/OD)
- Providing lacing wire of 2.20/3.20 mm Ø (ID/OD), Zinc + PVC coated.
- Assembling and placing gabion boxes at required locations in proper line, level, slope and section.
- Filling gabion boxes with hard, durable stones of 150 mm to 250 mm size, having Los Angeles Abrasion Value less than 45, conforming to IRC SP 116:2018.
- Conveying materials to site with all leads and lifts.
- Tying and securing with minimum 3% lacing wire by weight of gabion mesh.
- Completion of work as per approved drawings and directions of Engineer-in-Charge.

*(Cost of stone procurement shall be paid separately unless otherwise specified.)*

## 2. Materials & Specifications

- Double twist hexagonal wire mesh (10×12 type).
- Heavy Zinc + PVC coated G.I. wire conforming to IS 16014:2018.
- Hard angular stones (150-250 mm size) with LA Abrasion value < 45.
- Work shall conform to IS 16014, IRC SP 116:2018 and MoRTH Clause 2500.

## 3. Workmanship

- Gabions shall be assembled on prepared and level foundation.
- Adjacent units shall be securely connected to ensure monolithic action.
- Stones shall be hand placed on exposed faces to achieve proper alignment and packing.
- Internal voids shall be minimized to prevent settlement.
- Lacing shall be done tightly to prevent bulging and deformation.
- Finished structure shall be true to line, level, slope and section as shown in drawings.
- Mode of measurement and payment
- As per Bill Of Quantities

## **Item no.16**

**Providing and laying CE Marked Needle Punched and Mechanically Bonded Non-Woven Geotextile PR 20 (MoRTH Type 2) of behind gabion units, indigenously manufactured from high quality polypropylene staple fibres installed on the prepared surface for separation, drainage &**



**filtration application with necessary overlaps as per drawing etc. complete. (Specification: MORTH Section 700 )**

### 1. Scope of Work

Providing, supplying and laying CE Marked Needle Punched and Mechanically Bonded Non-Woven Geotextile PR 20 (MoRTH Type-2) behind gabion units, indigenously manufactured from high quality polypropylene staple fibres, for separation, drainage and filtration applications, complete as per drawings and directions of the Engineer-in-Charge and conforming to MoRTH Section 700.

The work shall include:

- Supplying CE Marked Non-Woven Geotextile PR 20 (Type-2).
- Surface preparation behind gabion units by dressing and removing sharp objects.
- Laying geotextile on prepared surface in required line and level.
- Providing necessary longitudinal and transverse overlaps as per approved drawings/specifications.
- Proper anchoring and securing to prevent displacement during backfilling.
- Placing and maintaining geotextile without wrinkles, folds or damage.
- Completing the work in all respects as per MoRTH Section 700.

### 2. Materials & Specifications

- Type: Needle punched, mechanically bonded non-woven geotextile.
- Grade: PR 20 (MoRTH Type-2).
- Raw Material: High quality polypropylene staple fibres.
- Application: Separation, drainage and filtration behind gabion structures.
- Conforming to MoRTH Section 700 and relevant IRC guidelines.

### 3. Workmanship

- The laying surface shall be smooth, free from stones, roots and sharp projections.
- Geotextile shall be laid with minimum overlaps (generally 300 mm or as specified in drawings).
- Adjacent sheets shall be overlapped properly to ensure continuity of filtration layer.
- Geotextile shall be protected from direct sunlight and mechanical damage before covering.
- Backfilling shall be done carefully to avoid tearing or displacement.
- Damaged portions, if any, shall be replaced at contractor's cost.
- Entire work shall be executed to the satisfaction of Engineer-in-Charge.

Mode of measurement and payment  
As per Bill Of Quantities

### **Item no.17**

**Providing, supplying, and placing Black Boulder Rubble stones having 150 mm to 250 mm Size for filling of gabion retaining wall units, including proper hand packing to minimize voids and ensure stability. The stones shall be hard, durable, durable and free from weathered or fractured pieces. The work includes fabrication, assembling, placing the gabion boxes in proper**

line and level, and use of gabion units below the foundation level as required, including transportation, loading, unloading, and filling of stones inside the gabion mesh units as per approved design and specifications. The item includes all labour, materials, tools, transportation, and incidental charges required to complete the work as directed by the Engineer-in-Charge or concerned authorities.

#### 1. Scope of Work

Providing, supplying and placing approved quality stones of 150 mm to 250 mm size for filling of gabion retaining wall units, complete in all respects as directed by the Engineer-in-Charge or concerned authorities.

The work shall include:

- Procurement of hard, durable and angular stones from approved quarry/source.
- Loading, transportation, unloading and stacking at site with all leads and lifts.
- Sorting and selection of stones of specified size (150-250 mm).
- Hand placing stones into gabion boxes to ensure proper interlocking and compact packing.
- Proper arrangement of stones on exposed faces to achieve neat appearance and stability.
- Filling voids to minimize empty spaces and ensure structural integrity.
- Completion of work as per approved drawings and directions.

#### 2. Materials

- Stones shall be hard, sound, durable and free from cracks, weathered surfaces, organic impurities or soft patches.
- Size: 150 mm to 250 mm.
- Stones shall conform to relevant IRC/MoRTH requirements.
- Los Angeles Abrasion value (where specified) shall generally be less than 45.

#### 3. Workmanship

- Stones shall be hand placed (not dumped) to achieve tight packing.
- Larger stones shall be placed on outer faces for proper finish and stability.
- Voids shall be minimized by proper selection and arrangement of stones.
- Filling shall be carried out in layers and properly compacted manually.
- Work shall be executed carefully to avoid bulging or deformation of gabion units.
- Entire work shall be completed to the satisfaction of Engineer-in-Charge.

Mode of measurement and payment

As per Bill Of Quantities

#### Item no.18

Carring out plinth treatment to post construction /existing structure by spraying chemical solution for termite control treatment including labour and material consistment with I.S.I specification. Using Chlordene and Chiorpurfiles 20 EC. As Per 6131\_paret-II Consentration Weight one percent is recommended i.e one litre 20 EC chemical emulsion with 19 liter give 1 %

## **concentration inclusive of one litre chemical emulsion application at the rate of 5 Litre chemical / Sqm of surface is recommended as per I.S**

Applying general insecticide pest control treatment to floors, cupboards etc including labor materials etc. complete. Using Imidacloprid 30.5 SCas Per IS 6313 part -II( (0.075% concentration by mass) is recommended 10.5ml chemical diluted with 5 liters of water application 0.5 litre chemical /Sqm of surface is recommended as per I.S.

### **1.0 MATERIALS**

The chemicals used for the soil treatment shall be only one of the following with concentration shown against each in aqueous emulsion.

<b>Chemicals</b>	<b>Concentration</b>
1 Aldrin	1.00% (By Weight)
2 Heptachlor	0.50% (By Weight)
3 Chlordane	0.50% (By Weight)

### **2.0 WORKMANSHIP**

2.1 The chemicals barrier shall be complete and continuous under whole of the structure to be protected.

2.2 The bottom and the sides of foundations up to a height of 30 cms from the bottom of excavation made for masonry foundation and for basement column pits shall be treated with the chemical emulsion at the rate 5 liters/sq. Meters of the surface area.

2.3 The chemical treatment shall be carried out when the surface is quite dry. Chemical treatment shall not be carried out when it is raining or when the soil wet with rain or sub soil water.

2.4 Once formed, treated soil barriers shall be not disturbed. If by chance, treated soil barriers and disturbed, immediately steps shall be taken to restore the continuation and compactness of the barrier system.

2.5 The treatment against termite infection shall remain fully effective for a period not less than 10 years from date of issue of the final certificate to completion of work. If at any time during this period, any defects in treatment are revealed or any evidence of infection in any part of the building or structure is noticed, the contractor shall be rectify the concerned failure to do so, the Engineer-in-charge any get the same rectified through any other agency at Contractor's risk and cost, any decision of Engineer-in-charge as to the cost payable by contractor for the same shall be binding to the contractor.

2.6 A Guarantee bond on appropriately stamped paper shall be given by the contractor to the Department in the manner and form prescribed below.

### **FORM OF GUARANTEE BOND**

I/ We (Contractor) here by guarantee that work will remain unaffected an will not be in anyway damaged by termite or any other germs of similar types. For a period for 10 years after completion of the work of anti-termite as per the terms and conditions of the contract and damage that might be caused on account of termite and or other similar type of germs and hereby Guarantee to make good any loss of damages suffered by the Govt. of Gujarat and further guarantee to redo effective work without claiming any extra cost

2.7 This guarantee shall remain in force for the period of 10 years from the completion of the work under the contract and lit shall remain binding to the contractor for period of 10 years.

2.8 The deposit at the rate of 50% of the cost of this item from the running and final bills shall be recovered and remained for the first one year after completion of the work or at least on monsoon season passed whichever is later and 10% shall be retained for the balance of the guarantee period land shall be refunded only after completion of the guarantee period.

### **3.0 MODE OF MEASUREMENT AND PAYMENT**

3.1. The length and breadth shall be measured correct to a cm. as per the dimensions of sanctioned plans. No deduction shall be made nor extra paid for any opening for pipes etc. up to 0.1.sq. mt. The rate shall include the cost of all labor and materials required for the operation involved for satisfactory completion of this item. The sides of the trenches 30 cms, each side and bottom shall be measured under this item.

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

## **Item no.19**

**Providing and laying cement concrete 1:3:6 (1 Cement, 3 coarse sand, 6 hand broken stone aggregates 20mm nominal size) and curing complete excluding cost of formwork in (A) Foundation and Plinth.**

**1.0. Materials**

1.1. Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Aggregate 20 mm. nominal size shall conform to M-12.

**2.0. Workmanship**

**2.1. General**

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

**2.2. Proportion of Mix:**

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

**2.3. Mixing:**

2.3.1. The concrete shall be mixed in a mechanical mixer at the site of work. Hand mixing may however be allowed for smaller quantity of work if approved by the Engineer-in-charge. When hand mixing is permitted by the Engineer-in-charge in case of breakdown 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.

**2.4. Transporting & Placing the Concrete:**

2.4.1. 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.

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

2.5.1. 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.

**2.6. Curing:**

2.6.1. 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.

**3.0. Mode of measurement and payment**

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

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

### **Item no.20**

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

#### **1.0. Materials**

1.1. Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Aggregate 20 mm. nominal size shall conform to M-12.

#### **2.0. Workmanship**

##### **2.1. General**

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

##### **2.2. Proportion of Mix:**

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

##### **2.3. Mixing:**

2.3.1. The concrete shall be mixed in a mechanical mixer at the site of work. Hand mixing may however be allowed for smaller quantity of work if approved by the Engineer-in-charge. When hand mixing is permitted by the Engineer-in-charge in case of breakdown 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.

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

2.4.1. 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.

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

2.5.1. 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.

##### **2.6. Curing:**

2.6.1. 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.

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

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

#### **Item no.21**

**Providing and laying Black Boulder rubble Stone for apron (each stone weighting not less than 40Kg.) including and packing and filling in the interstices with quarry-spalls.**

1. The work shall consist of laying boulders directly on the prepared surface for protection against scour.
2. The stones used in apron shall be sound, hard, durable & fairly regularly in shape. Stone subject to marked deterioration by water or weather shall not be used. The thickness and shape of apron shall be as indicated on the drawings or as directed by the Engineer-in-charge. The surface on which the apron is to be laid shall be levelled and prepared for the length and width as shown on the drawings. The size of stone shall be as large as possible & weight shall be as specified in the item but in no case any fragment shall weight less than 40 Kg. The specific gravity of stone shall be as high as possible and it shall not be less than 2.50. To ensure regular and orderly disposition of the full intended quantity of stone in the apron. template cross walls in dry masonry shall be built about a metre wide and to the full weight of the specified thickness of the apron at intervals of 30 metres and all along the length and width of the apron. Within these walls, the stone then shall be hand-packed.
3. Payment shall be made on Cu.m. basis of chata. The materials shall have to be stacked at site before laying. Preparation of base for laying bedding shall be deemed incidental to the work nothing shall deducted for voids.
4. The rate shall include cost of materials, labour & tools to complete the job.
5. Payment shall be made on **Cu.m.** basis.

#### **Item no.22**

**Providing and laying controlled cement concrete M 250 and curing complete including the cost of formwork but Excluding the cost of reinforcement for concrete work in .**

- a -- do -- for R.C.C. Column Footing
- b -- do -- for R.C.C. Column Up to pl

- c -- do -- for R.C.C. Column Super Structure
- d -- do -- for Wall
- e -- do -- for Ground Beam
- f -- do -- for Coping
- g -- do -- for Plinth Beam
- h -- do -- for R.C.C. Lintel
- i -- do -- for R.C.C. Chhajja
- j -- do -- for R.C.C. Beam
- k -- do -- for R.C.C. Slab
- l -- do -- for R.C.C. Grade Slab
- m -- do -- for R.C.C. Stair

## 1.0. Materials

- 1.1. Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Grit shall conform to M-8. Coarse aggregate shall conform M-12.
- 1.2. The shuttering to be provided shall be of ordinary timber plank and shall conform to M-26.
- 1.3. The dimensions of scantlings and battens shall conform to the design. The strength of the wood shall not be less than that assumed in the design.

## 2.0. General

- 2.1. The concrete mix shall be designed from preliminary tests. The proportion of the concrete mix shall be 1:2:4 (1 cement: 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) by volume concrete work shall have exposed concrete surface or as specified in the item.
- 2.2. The proportioning of cement and aggregates shall be done by weight and necessary precautions shall be taken in the production to ensure that the required work cube strength is attained and maintained. The controlled concrete shall be in grades of M-100, M-150, M-200, M-250, M-300, M-350 & M-400 with prefix controlled added to it. The letter M refers to mix and the numbers specify 28 days work cube compressive strength of 200 mm. cubes of the mix expressed in Kg./cm.
- 2.3. The proportion of cement, sand and coarse aggregate shall be determined of weight. The weigh batch machine shall be used for maintaining proper control over the proportion of aggregates as per mix design. The strength requirements of different grades of concrete shall be as under:

Grade of Concrete	Compressive strength of 15 cms. cubes in kg/cmt. at 28 days, conducted in accordance with I.S. 516-1959.	
	Preliminary test Min.	Work Test Min.
M 150	200	150
M 200	260	200
M 250	320	250
M 300	380	300
M 350		350
M 400	500	400

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

### **3.0. Workmanship**

- 3.1. The proportions for ingredients chosen shall be such that concrete has adequate workability for conditions prevailing on the work question and can be properly compacted with means available except where it can be shown to the satisfaction of the Engineer-in-charge, that supply of properly graded aggregate of uniform quality can be maintained till the completion of work, grading of aggregate shall be controlled by obtaining the coarse aggregates in different sizes and blending them in the right proportions as required. Aggregates of different sizes shall be stocked in separate stock piles. The required quantity of material shall be stock piled several hours, preferably a day before use. The grading of coarse and fine aggregate shall be checked as frequently as possible, the frequency for a given job being determined by Engineer-in-charge to ensure that the suppliers are maintaining the uniform grading as approved for samples used in the preliminary tests.
- 3.2. In proportioning concrete, the quantity of both cement and aggregate shall be determined by weight. Where the weight of cement is determined by accepting the maker's weight per bag, a reasonable number of bags shall be weighted separately to check the net weight. Where cement is weighted from bulk stocks at site and not by bags, it shall be weighed separately from the aggregate. Water, shall either be measured by volume in calibrated tanks or weighed. All measuring equipment shall be maintained in clean and serviceable condition. Their accuracy shall be periodically checked.
- 3.3. It is most important to keep the specified water cement ratio constant and at its correct value. To this end, moisture content in both fine and coarse aggregates shall be determined by the Engineer-in-charge according to the weather conditions. The amount of mixing water shall then be adjusted to compensate for variations in the moisture content. For the determination of moisture content in the aggregates I.S. 2386 (Part-III) shall be referred to. Suitable adjustments shall also be made in the weights of aggregates due to variation in their moisture content. Minimum quantity of cement to be used in controlled concrete shall not be less than 220 kg./m<sup>3</sup> in plain concrete and not less than 250 kg/m<sup>3</sup> in reinforced concrete.
- 3.4 The form work shall conform to the shape lines and dimensions as shown on the plans and be constructed as to remain sufficiently rigid during the placing and compacting of the concrete. Adequate arrangements shall be made by the contractor to safe-guard against any settlement of the form-work during the course of concreting and after concreting. The form work of shuttering, centering, scaffolding, bracing etc. shall be as per design.

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



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

#### **5.0 Stripping time:**

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

(a) Sides of walls columns and vertical faces of beams.....24 to 48 hours.

(b) Beam soffits, (props, left under).....7 days.

(c) Removal of props slabs:

(i) Slabs spanning up to 4.5. m.....7 days.

(ii) Spanning over 4.5 mm.....14 days.

(d) Removal of props t beams and Arches:

(i) Spanning up to 6 mm.....14 days.

(ii) Spanning over 6 m.....21 days.

#### **6.0 Procedure when removing the form work :**

6.1. All form work shall be removed without such shock or vibrations as would damage the reinforced concrete surface. Before the soffits form work and struts are removed, the soffits and the concrete surface shall be exposed where necessary in order to ascertain that the concrete has sufficiently hardened.

#### **7.0 Centering:**

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

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

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

#### **8.0 Scaffolding:**

8.1. All scaffolding, hoisting arrangements and ladders etc. required for the facilitating of conceding shall be provided and removed on completion of work by contractor at his own expense. The scaffolding, hoisting arrangements and ladders etc. shall be strong enough to

with sand all live, dead and impact loads expected to act and shall be subject to the approval of the Engineer-in-charge. However contractor shall be solely responsible for the safety of the scaffolding, hoisting arrangement, ladders, work and workman etc.

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

**8.3.** The rate is applicable to all condition of working and height up to 4 mts. The rate shall include the cost of materials and labour for various operations involved such as :

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

**9.0 Re-Use:**

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

**10.0. Mode of measurement & payment**

**10.1.** The consolidated cubical contents of concrete work as specified in item shall be measured. No deduction shall be made for

- (a) Ends of dissimilar materials such as joints, beams, posts, girders, falters, purling trusses, corbels and steps etc. up to 500 Sq, Cm. in section.

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

**10.3.** Form work to secondary beams shall be measured up to the sides of main beams but no deduction shall be made from the form work of the main beam at the inter section point. No deduction shall be made from the form work of a column at inter section of beams.

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

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

**Item no.23**

**Providing and supplying TMT Fe-550D bar steel reinforcement for R.C.C work including bending, binding and placing in position etc. complete.**

**1.0. GENERAL**

This work shall consist of furnishing and placing coated, or uncoated or high strength deformed reinforcement, bars (intentioned) of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer in charge.

## **2.0. MATERIAL**

### **2.1. TMT Bars**

Reinforcements may be either T.M.T. tensile steel, confirms to IS 1786-2008 bars. They may be uncoated or coated with epoxy or with approved protective coatings.

2.2. T.M.T. bars reinforcement for R.C.C. work shall conform IS 432 (Part II) 1982 (Reaffirmed 1995) and shall be of tested quality. It shall also comply with relevant part of IS 456-2000.

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

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

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

### **3.0. Pitch**

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

### **4.0. Binding wire**

4.1. Mild steel binding wire shall be of 1.63 mm or 1.22 mm (16 to 18 gauge diameter and shall conform IS 280-2006.

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

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

## **5.0. PROTECTION OF REINFORCEMENT**

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

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

## **6.0. Workmanship**

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

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

## **7.0. BENDING OF REINFORCEMENT**

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

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

**7.3.** Bars shall be bent cold to the specified shape and dimensions or directed by the Engineer using a proper bar bender operated by hand power to obtain the correct radius of bends and shape.

Bars shall not be bent or straightened in a manner that will damage parent material or the coating bars bent during transport or handling shall, be straightened before being used on work and shall not be heated to facilitate straightening.

## **8.0. PLACING OF REINFORCEMENT**

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

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

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

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

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

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

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

**8.8.** Bars coated with epoxy or any other approved protective coating shall be placed on supports that do not damage the coating. Supports shall be installed in a manner such that planes of weakness are not created in hardened concrete. The coated reinforcing steel shall be held in place by use of plastic or plastic coated binding wires especially manufactured for the Purpose.

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

## **9.0. Lapping**

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

#### 10.0. Welding

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

10.2. While welding may be permitted for T.M.T. reinforcing bars conforming to IS:432, welding of deformed bars conforming to IS: 1786 shall in general be prohibited. Welding may be permitted in case of bars of other than S 240 grade including special. Welding grade of S 500D grade bars conforming to IS: 1786, for which necessary chemical analysis has been secured and the carbon equivalent (CE) calculated from the chemical composition using the formula:

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

is 0.4 or less.

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

10.4. Bars shall be bent cold to the specified shape and dimensions or as directed by Engineer in charge using the proper bender tool, operated by hand or power to attain proper radius of bends. Bars shall not be bend or straightened in a manner that will injure the material. Bars bent during transport or handling shall be straightened before being used in the work. Bars shall not be heated to facility bending.

10.5. Unless otherwise specified a 'U' type hook at the end of each bar shall invariably be provided to main reinforcement. The radius of the bane shall not be less than twice the diameter of the round bar and the length of the straight part of the bar beyond the end of the curve shall be at least four times of the diameter of the round bar. In case of bars which are not round and in case of deformed bars, the diameter shall be taken as the diameter of circle having an equivalent effective area. The hooks shall be suitably encased to prevent any spiting of the concrete.

10.6. All reinforcement bars shall be accurately placed in exact position shown on the drawings and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm in size and by using say blocks or metal chairs spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals, Bars shall not be allowed to sag between supports not displaced during concreting or any other operations of the work All devices used for positioning shall be of not corrodible material wooden and metal supports shall not extended to the surface of the concrete, except where shown in drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed. Pieces of broken stone or brick and wooden blocs shall not be used Layers of bars shall be separated by spacer bars pre-cast mortar blocks or other approved devices. Reinforcement after bending placed in position shall be maintained in a clean condition until completely embedded in concrete, Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement form corrosion, concrete cover shall be provided as indicated on drawings. All bars protruding from concrete and to which other bars are to be sliced and which are likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout.

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

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

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

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

## **11.0 MODE OF MEASUREMENTS & PAYMENT**

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

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

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

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

The unit Rate for coated reinforcement shall be deemed to also include cost of all material, labour, tools and plant, royalty, transportation and expertise required to carry out the work. The rate shall also cover sampling, testing and supervision required for the work.

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

## **Item no.24**

**Brick work using common burnt building bricks having crushing strength not less than 35 Kg./cm<sup>2</sup> in C.M. (1:6) (1 Cement, 6 fine sand) racking out joints curring etc. complete directed by Engineer-in-charge.**

### **1.0. Materials**

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

### **2.0. Workmanship**

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

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

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

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

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

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

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

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

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

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

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

#### **2.4. Joints:**

2.4.1. Bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not exceed 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 be done.

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

**2.5. Curing:**

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

**2.6. Preparation of foundation bed:**

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

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

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

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

**3.0. Mode of measurements & payment**

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

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

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

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

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



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

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

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

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

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

3.4. The rate shall befor a unit of **one cubic meter**.

### **Item No.25**

**Brick work using common burnt building bricks having crushing strngth not less than 35 Kg./cm<sup>2</sup> in super structure for Ground Floor in C.M. (1:6) (1 Cement, 6 fine sand) racking out joints curring etc. complete directed by Engineer-in-charge.**

**Detailed technical Specification As per Item no.24.**

### **Item No.26**

**Providing, laying and constructing half brick masonry work with conventional building bricks having crushing strength not less that 35 Kg./Cm<sup>2</sup> for super structure for G.F. in cement mortar (1:4) (1 Cement, 4 fine sand) including ranking out joints, curing scaffolding etc. complete.**

#### **1.0. Materials**

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

#### **2.0. Workmanship**

2.1. Relevant specifications of bricks, wetting and laying of bricks, joints, curing etc shall conform to **Item No. 13** except that the brick work of half brick shall be carried out.

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

2.3. All bricks shall be laid stretcher wise, breaking joints with those in the upper and lower courses. The wall shall be taken truly plumb. All courses shall be said truly horizontal and all vertical joints shall be truly vertical. The bricks shall be laid with frogs upwards. A set of masons tools shall be maintained on work as requiredfor frequent checking. After every three course 2 nos. of 6mm mild steel bars shall be embedded in cement mortar.

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

3.1. The half brick masonry work in super structureshall be measured under this item the limiting dimensions shall not exceed those shown in the planoras directed. Any work done extra over the specified dimensions shall be ignored.

3.2. The relevant specifications of **Item No. 24**

shall be followed. The length shall be measured nearest to one cm.

- 3.3. The rate includes the cost of providing 2 nos. of 6mm steel bars after every three course.
- 3.4. The rate shall be for a unit of one sq. meter.

## Item No.27

**Providing and fixing glazed louverd glass windows and ventilators with teakwood frame 10cm x 7cm size including the cost of oil painting to wood work etc. complete.**

### 1.0. Materials

Water shall conform to M-1 Cement mortar shall conform to M-11. **White glazed tiles 6mm thick as approved by Engineer in charge** shall conform to M-55

### 2.0. Workmanship

#### 2.1. Bedding :

- 2.1.1. The sub grade shall be cleaned, wetted and mopped. The bedding shall then be laid evenly over the surface tamped and corrected to desired level and allowed to harden enough to offer a rigid cushion to tiles and to enable the monsoon to place wooden planks across and squat on it.
- 2.1.2. The **white glazed tiles** shall be laid on cement mortar bedding of 12 mm. thick in C.M. 1:3. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of bedding. The base shall be cleared and well wetted. The mortar shall then be spread in thickness not less than 12 mm. at any place and average 12 mm. thickness. The proportion of the cement mortar shall be as specified in the item.

#### 2.2. Fixing tiles :

- 2.2.1. The tiles before laying shall be soaked in water for at least two hours. Neat gray cement grout at 33 kg/Cement/Sq.mt. of honey like consistency shall be spread over the mortar bedding as directed. The edges of the tiles shall be smeared with neat cement slurry. The tiles shall be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straightline or as per pattern.
- 2.2.2. The tiles shall not have staggered joints. The joints shall be true to centre line both ways. The Nahni trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed they shall be cut (Sawn) to the required size and the edges rubbed smooth to ensure straight and true joints. The joints shall be filled with grey cement grout with wire brush or trowel to a depth of 5 mm. and loose material removed. White cement shall be used for pointing the joints. After fixing the tiles finally in an even plane the flooring shall be kept wet and allowed to nature undisturbed for 7 days.

#### 2.3. Cleaning :

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

### 3.0. Mode of measurements & payment

- 3.1. The work done shall be measured in sq.mt. for visible area of work done. The length and width of the flooring shall be measured not between the faces of skirting or dedos or plastered face of wall as the case may be. The paving under dedo or skirting shall not be measured. No deduction shall be made not extrapaidfor any opening in the floor of area up to 0.1 sq.mt. Nothing extra shall bepaidfor laying the floors at different levels in the same rooms.
- 3.2. The paymentwillbe made on **square meter** basis of the finished work.

### **Item No.28**

**Providing and fixing 35mm thick water proof flush door solid core single shutter on 18mm thk. granite stone frame with 1mm thick laminated sheet on both side of the shutter with teak wood frame of size 100mm X 65mm for door frame, Magnetic catcher triple strip vertical type(1 No),S.S. 304 tower bolt (barrel type) 300x10 mm (1 No) (Make : Define, Kich : TBF312S), Main door set 19mm dia mortise handle MAKE: DEFINE: Mortise handle (DF ESRH 01),(kich:Morties Handle-PRLH 193S) & 60mm X 85mm lock body with strike plate (DEFINE - Lock Body: DF-ML 100) (Kich : Lock body: PRMLB 9S), thumb turn cylinders 70mm (Kich : thumb turn cylinder: PRPCKN S70, Define : DF-OSK-70) and SS matt Hinges of 100mm X 65mm X 3.2mm (Make : Kich Item No.PRBHT2B34 and Define Make - Item No. DF-BBH-04) with necessary fixtures and fastenings etc. complete as directed by Engineer-in-charge.**

#### 1. Scope of Work

The work includes providing and fixing 35 mm thick waterproof flush door – solid core, single shutter, installed on 18 mm thick granite stone frame, finished with 1 mm thick laminated sheet on both sides, complete with approved hardware and fittings, including:

#### Door & Frame Assembly

- 35 mm thick waterproof flush door shutter – solid core
- Laminate finish 1.0 mm thick on both sides
- Teak wood frame of size 100 mm × 65 mm
- Granite frame 18 mm thick (where applicable)
- Edge lipping and finish as approved

#### Hardware Fittings (Approved Make / Model)

- Magnetic catcher – Triple strip vertical type (1 No.)
- SS-304 Tower Bolt (Barrel Type) – 300 × 10 mm (1 No.)  
(Make: Define / Kich – Model: TBF312S)
- Main Door Mortise Handle – 19 mm dia  
Define: DF-ESRH-01  
Kich: PRLH-193S

- Lock Body with Strike Plate — 60 mm × 85 mm  
*Define: DF-ML-100*  
*Kich: PRMLB-9S*
- Thumb-Turn Cylinder — 70 mm  
*Kich: PRPCKN-S70*  
*Define: DF-OSK-70*
- SS Matt Hinges — 100 mm × 65 mm × 3.2 mm  
*Kich: PRBHT2B34*  
*Define: DF-BBH-04*

Including:

- screws, nuts, fasteners and fittings
- cutting, embedding and alignment
- making good to masonry and finishing surfaces

All work shall be completed as directed by the Engineer-in-Charge.

## 2. Workmanship

- Door shutter shall be:
  - waterproof, solid core, factory pressed
  - free from warping, swelling or defects
- Laminate shall be:
  - uniform in color and texture
  - firmly bonded without bubbles or wrinkles
- Teak frame and granite jambs shall be:
  - true to plumb, level and line
  - firmly anchored and properly finished
- Hinges, lockset and hardware shall be:
  - installed square and aligned
  - firmly fixed with stainless steel screws
  - free from play and smooth in operation
- Mortise lock, handle and cylinder shall be:
  - tested for smooth movement
  - properly seated with strike plate alignment
- Exposed edges shall be:
  - finished and sealed
  - free from sharp corners

Defective or damaged components shall be replaced at no extra cost.

## 3. Mode of Measurement

## Item No.29

Providing and fixing FRP frame size 100x50 mm and 28mm thick FRP depress panel shutter having extra reinforcement on sides & edges in Gel coat finish. The core of the shutter & frame is to be filled up with injected fire retardant grade polyurethane foam done in situ alongwith embedded wooden pieces for stiffening & also taking hinges & fixtures. The whole FRP frame & shutter is to be water proof weather proof, termite proof & resistance to mild acid/alkali. Rates are to be inclusive of S.S hinges with necessary screws & aluminium fixtures & fastenings & fastener sleeve.

### **1.0 SHUTTER MATERIAL :**

28 mm thick FRP single / double shutter in depress panel design shall be having frame size 100 x 50 mm FRP thickness fire retardant grade FRP skin and embedded wooden pieces for stiffening as well as holding hinges and fixtures all moulded into one piece shutter. Core material shall be injected fire retardant grade rigid polyurethane foam done in situ having density 32 to 36 Kg/m<sup>3</sup>, compressive strength 1.8 to 2.0 kg/cm<sup>2</sup>, flexural strength 3.5 to 4.5 kg/cm<sup>2</sup>. Whole shutter shall be water proof, weather proof, termite proof and mild acid / alkali resistance.

### **2.0 SHUTTER :**

28 mm thick depress panel FRP single / double shutter shall be jointless. It shall be straight and smooth and of standard shape finished in gel coat. All necessary fixtures and fastening shall be fixed where wooden piece provided.

### **3.0 SHUTTER WORKMANSHIP :**

Shutter shall be fixed in line, level and proper manner having 2.0 to 3.0 mm play i.e. air space for smooth and easy working. Three S.S. hinges shall be fixed properly with necessary screws.

### **4.0 SHUTTER TOLERANCE :**

1.5 mm tolerance will be allowed in thickness of shutter.

### **5.0 SHUTTER FIXTURES AND FASTENING :**

All fixtures & fastening like S.S. aldrops, latches or baby-latches, stoppers, handles shall be fixed with shutter in usual manner.

The shutter shall be fixed to frame using fixing necessary Khila or screws including drilling in granite frame as directed.

During fixing of shutter if the granite frame is damaged the same will be replaced by contractor's own cost without any extra payment.

Product is from reputed company having ISO 9001-2000 certificate and with three years performance guarantee.

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

Rate includes the cost of all materials, S.S. fixtures and fastening with necessary screws for fixing in position, labour, tools, equipments etc. required for satisfactory completion of item as directed by the Engineer in charge with all lead and lift.

The payment shall be made on unit of smt. basis.

### **Item No.30**

Providing, fabricating and fixing Stainless Steel Railing System of Grade SS 316 with matt/satin finish, comprising of vertical members (balusters) of 75mm x 75 mm box pipe with minimum 3 to 5 mm wall thickness, spaced at a maximum of 900 mm centre to centre or closer as required for structural stability, rigidly fixed over RCC surface/waist slab using SS 316 base plates 10 cm x 10 cm of minimum 9-10 mm thickness anchored with approved make anchor fasteners with suitable bolts and embedment, complete with SS cover caps; the railing shall include horizontal tie members (mid rails) of 35mm mm outer diameter with minimum 2-3 mm thickness, provided in 4 to 5 continuous parallel rows between vertical members and securely connected using stainless steel fixtures; the system shall be completed with a top handrail of 75mm x 75 mm box pipe with minimum 3 to 5 mm wall thickness,, properly aligned and curved as per stair profile; overall railing height shall be minimum 1000 mm or above from finished floor level; all joints shall be properly welded, ground, buffed and polished to achieve uniform finish, with internal bushings provided wherever required for additional strength; the work shall include all necessary stainless steel accessories such as fasteners, bolts, connectors, brackets, base cover caps, etc., and complete installation with all labour, materials, tools & tackles at all levels and heights as per drawings and instructions of Engineer-in-charge, ensuring a rigid, durable and aesthetically finished railing system.

#### **□ Material Procurement**

- Supplying all required SS 316 grade stainless steel materials, including vertical posts (75 mm × 75 mm box pipe), horizontal members (35 mm OD pipe), top handrails (75 mm × 75 mm box pipe), base plates, anchor fasteners, cover caps, connectors, brackets and other required accessories.
- All materials shall be of approved make and conform to relevant standards suitable for outdoor, riverfront or high-moisture conditions.

#### **□ Fabrication Work**

- Fabrication of railing components including cutting, bending, shaping and welding of stainless steel sections as per approved drawings.
- Preparation of vertical members, horizontal rails and handrails to required dimensions and profiles, including curves where required for staircases or ghat steps.
- Providing internal bushings, stiffeners and supports wherever required to ensure structural stability and rigidity.

#### **□ Surface Preparation and Finishing**

- Grinding, buffing and polishing of all welded joints to achieve uniform matt/satin finish.
- Removal of sharp edges, welding marks and surface irregularities to obtain smooth and aesthetic finish.

#### **□ Installation and Fixing**

- Positioning and fixing of vertical balusters at maximum 900 mm centre-to-centre spacing or as directed by the Engineer-in-Charge.
- Fixing vertical members to RCC surface / waist slab using SS 316 base plates (minimum 100 mm × 100 mm × 9–10 mm thick) with approved anchor fasteners and bolts.
- Providing and fixing SS base cover caps to conceal base plate connections.
- Installation of horizontal tie members (4 to 5 rows) between vertical posts using stainless steel connectors and fixtures.
- Fixing of top handrail properly aligned along the railing line and stair profile.

#### **□ Alignment and Structural Stability**

- Ensuring proper vertical alignment, level, spacing and rigidity of the railing system.
- Carrying out necessary adjustments to maintain structural strength and aesthetic appearance.

#### **□ Accessories and Hardware**

- Supplying and fixing all SS fasteners, bolts, nuts, anchor fasteners, connectors, brackets, cover plates, and caps required for complete installation.
- **Labour, Tools and Equipment**
  - Providing all skilled labour, tools, tackles, machinery, scaffolding, safety equipment and transportation necessary for fabrication and installation at site.
- **Cleaning and Finishing**
  - Cleaning of railing surfaces after installation and removal of stains, welding residues or fingerprints to maintain the final satin finish.
- **Completion**
  - The work shall be completed at all heights, levels and locations, strictly as per drawings, specifications and instructions of the Engineer-in-Charge, ensuring a durable, rigid and aesthetically finished stainless steel railing system.

**Mode of Measurement**

**As Per Bill of quantities**

## **Item No.31**

**Providing 15mm thick cement plaster in single coat on Rough (Similar) side of single or half brick walls for interior plastering upto floor two level and finished even and smooth in (i) Cement mortar 1:3 (1-cement :4-sand) finishing with a floating coat of neat cement slurry.**

### **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 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 residues are left on the surface. Trimming of projections on brick/concrete surfaces where necessary shall be carried out to get an even surface.

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

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

**2.2.4.** For external plaster, the 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 brick / concrete walls for interior plastering up to floor two level, finished even and smooth **in C.M. 1:4.**

**2.3.6** The coat of cement and fine sand mortar of proportion 1:1 (15 mm thick about) shall be applied to the plastered surface with a trowel to provide uniform texture while the base coat is still plastic.

**2.3.7.** In any continuous face of wall the finishing treatment should be carried out continuously and day to day breaks made to coincide with architectural breaks in order to avoid unsightly Junctions

**2.3.8. Curing:** All the plaster work shall be kept damp continuously for a period 7 days.



2.3.9. Providing necessary grooves between structural members as directed by Engineer in charge.

**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 **15 mm** at any point on this surface.
- 3.4. This item includes plastering for all floors.
- 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 payment shall be made for a unit of 1.0 sq.mt of work done over and above the finishing of work of base coat.
- 4.0. The rate shall be for a unit of **one sq. meter**.

**Item no.32**

**Providing 10mm thick cement plaster in single coat on brick/concrete walls for interior plastering upto floor two level and finished even and smooth in (ii) Cement mortar 1:4 (1-cement :4-sand) finishing with a floating coat of neat cement slurry.**

**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 and soffits of stairs 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 foreignmatter 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 pestering 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 fair side of brick / concrete work for interior plastering upto floor two level and finished even and smooth in **C.M. 1:4**.
- 2.3.6 The coat of cement and fine sand mortar of proportion 1:1 (1.5 mm thick about) shall be applied to the plastered surface with a trowel to provide uniform texture while the base coat is still plastic.
- 2.3.7. In any continuous face of wall the finishing treatment should be carried out continuously and day to day breaks made to coincide with architectural breaks in order to avoid unsightly Junctions

The smooth concrete shall be suitably say read to provide necessary bond before plastering.

- 2.3.8. **Curing:** All the plaster work shall be kept damp continuously for a period 7 days.

### **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 **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 payment shall be made extra for this work over and above the plaster work
- 3.11. The rate shall be for a unit or 1 Kg of water proofing materials used in 1 bag of weighing 50 Kg. cement used extra over the rate of plastering work.
- 3.12. The rate shall be for a unit of One sq. meter.

#### **ITEM NO.33**

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

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

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

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

- 2.1. The work shall be carried out in the coats. The backing coat (base coat) shall be 12 mm. thick in C.M. 1:3.

##### **2.2. 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.

### **2.3. Preparation of back ground :**

- 2.3.1.** The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreignmatter 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 is left on the surface. Trimming of projections on brick/concrete surfaces where necessary shall be carried out to get an even surface.
- 2.3.2.** Raking of joints in case of masonry where necessary shall be allowed to dry out for sufficient period before carrying out the plaster work.
- 2.3.3.** 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.
- 2.3.4.** 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.

### **2.4. Application of plaster :**

- 2.4.1.** 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 casemay be and shall be carefully finished. Hounding or chamfering, corners, arises junctions etc. shall be carried out with proper templates to be size required.
- 2.4.2.** 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.
- 2.4.3.** 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.

- 2.4.4. 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.
- 2.4.5. Before the first coat hardens its surface shall be beaten up by edges of wooden tapers and close dents shall be made on the surface. The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days, depending upon the weather conditions. The surface shall not be allowed to dry during this period.
- 2.4.6. The second coat shall be completed to 8 mm. thickness in C.M. 1:1 as described above, including raising sand facing by bushing. The sample of sand face shall be got approved before the work is started. The whole work shall be carried out uniformly as per sample approved.
- 2.4.5. The plastering work shall be in double coat mala cement plaster on interior brick / concrete work for plastering comprising of base coat of 12 mm thick cement plaster in cement mortar 1:3 (1 cement : 3 sand) in rough finishing.

**2.4.6 Curing :**

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

- 2.4.7. The finishing shall be gutkha finishing with 1 cm x 1 cm grooves shall be done as directed.

**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 20 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.34**

**Providing and Laying 20 mm thick sand face cement plaster on Walls upto height of 10 mts. Above ground level consisting of 12mm thick backing coat of C.M 1:3 (1 Cement, 3 Sand ) and 8 mm thick finishing coat of C.M 1:1 (1 Cement, 1 Sand) etc. complete.**

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

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

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

**2.1.** The work shall be carried out in the coats. The backing coat (base coat) shall be 12 mm. thick in C.M. 1:3.

##### **2.2. 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.

##### **2.3. Preparation of back ground :**

**2.3.1.** 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 residue is left on the surface. Trimming of projections on brick/concrete surfaces where necessary shall be carried out to get an even surface.

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

**2.3.3.** 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.

**2.3.4.** 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.

**2.4. Application of plaster :**

**2.4.1.** 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.

**2.4.2.** 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.

**2.4.3.** 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.

**2.4.4.** 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.

**2.4.5.** Before the first coat hardens its surface shall be beaten up by edges of wooden tapers and close dents shall be made on the surface. The subsequent coat shall be applied after this coat has been allowed to set for 3 to 5 days, depending upon the weather conditions. The surface shall not be allowed to dry during this period.

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



**2.4.5.** 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. 1:3.

**2.4.6 Curing :**

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

**2.4.7.** The finishing shall be gutkha finishing with 1 cm x 1 cm grooves shall be done as directed.

**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 20 mm at any point on this surface.

**3.4.** This item includes plastering up to floor two level including making necessary cornices as directed.

**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. No extra payment for making necessary cornices shall be made.**

## **ITEM NO.35**

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

### **1.0. Materials**

- 1.1. Oil bound washable distemper and primer shall be of approved brand and manufacture. The distemper shall be of required color and shade and the same shall conform to I.S. : 428-1969. The shade shall be approved by Engineer in charge. Birla or Asian acrylic putty (putty) and primer shall be of approved brand and manufacture.

### **2.0. Workmanship**

The distemping shall be carried out on wall surfaces to give an even shade.

### **2.1. Scaffolding**

Where scaffolding is required, it shall be erected in such a way that as far as possible no part of scaffolding shall rest against the surface to be distempered. A properly secured and well tied suspended platform (Joola) may be used for distemping. Where ladders are used, pieces of old gunny bags shall be tied at top and bottom to prevent scratches to the walls and floors. For distemping to ceiling, 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 distemping, 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.
- 2.2.3 The lappy (putty) shall be carried out on wall surfaces to give an even shade.**

### **2.3. Priming coat :**

- 2.3.1. A priming coat of distemper primer of approved manufacture and shade shall be applied over the papered surface in case of new work on undecorated surface. If the distemper priming is done after the wall surface dries completely, the distemper primer shall be applied.
- 2.3.2. Application of primer shall be done as under: The primer shall be applied with a brush on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks. It shall be allowed to dry for at least 48 hours before oil bound distemper or paint is applied.
- 2.3.3. Oil bound distemper is not recommended to be applied within six months of the completion of wall plaster.

### **2.4. Preparation of oil bound distemper :**

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

## **2.5. Application of Distemper coat:**

- 2.5.1.** For undecorated surfaces, after the primer coat is dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the distemper, taking care not to rub out priming coat. All loose particles shall be dusted off after rubbing. Minimum two coats of distemper shall be applied with brushes in horizontal strokes followed immediately by vertical strokes which together shall constitute one coat. The subsequent coats shall be applied after a time interval of at least 24 hours between consecutive coats to permit proper drying of the proceeding coat. The finished surface shall be even and uniform without patches, brush marks, distemper drops etc.
- 2.5.2.** Sufficient quantity of distemper shall be mixed to finish one room at a time. The application of a coat in each room shall be finished in one operation and no work shall be started in any room which cannot be completed on the same day.
- 2.5.3.** 15 cm. double bristled distemper brush shall be used. After day's work brushes shall be thoroughly washed in hot water with soap solution and hung down to dry. Old brushes which are dirty and caked with distemper shall not be used on the work.
- 2.6. Protective measurements :** The surfaces of doors, windows, floors, articles of furniture etc. and such other parts of the buildings as are not to be distempered shall be protected from being splashed upon. Such surfaces shall be cleaned of distemper splashes if any.

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

- 3.1.** Priming coat of distemper primer, scraping of surface spoiled by struck roots, removal of oil and grease spots, treatment for infestation of effloresces., mould moss, fungi, algae and lichen and patch repairs to plaster shall be included in this item for which nothing extra shall be paid.
- 3.2.** All the work shall be measured net in the decimal system as in place subject to the following limits unless otherwise stated hereinafter:
- (a) Dimensions shall be measured to the nearest 0.01 m.
  - (b) Area in individual items shall be worked out to the nearest 0.01 sq. m. All work 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 not for finish around ends of joints, beams, posts etc.
- 3.3.** Deductions of opening exceeding 0.5 sq.m. but not exceeding 3 sq. m. each shall be made as follows and net addition shall be made for reveals, jambs, soffits etc. of these openings :
- (a) When both the faces of wall are provided with same finish, deductions shall be made for one face only.
  - (b) When each face of wall is provided with different finish, deduction shall be made for that side of frame for doors, windows etc. on which width of reveals is less than that of the other side but no deduction shall be made on the other side. Where the width of reveals on the both the faces of wall are equal, deduction of 50% of area of opening on each face shall be made from area of finish.
  - (c) When only one face of wall is treated and the other face is not treated, full deductions shall be made if the width of the reveal on treated side is less than that on untreated side but if the width of the reveal is equal or more than that on untreated side neither deductions nor additions to be made for reveals, jambs, soffits, sills etc.
- 3.4.** In case of opening of area exceeding 3 sq. m. each deduction shall be made for openings but jambs, sills and soffits shall be measured.
- 3.5.** No deductions shall be made for attachments such as casings, conduits, pipes, electric wiring and the like.
- 3.6.** Item includes removing nails, making good holes, patches with materials similar in composition of distemper.
- 3.7.** The extra rate shall be paid for carrying out distemping work on ceiling/sloping roofs over and above.
- 3.8.** The rate includes cost of all materials, labours, scaffolding, protective measures etc. involved in all the operations described above. This shall also include conveyance, delivery, handling, unloading, storing work etc.

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

## **ITEM NO.36**

**Distempering (Three Coat) with oil bound washable distemper of approved brand and manufacture and of required shade on wall surfaces to give an even shade over and including a primer coat with alkali resistance primer of approved brand after thoroughly brushing the surface to give an even shade free from foreign matter and also including preparing the surface even and smooth.**

### **1.0. Materials**

**1.1.** Oil bound washable distemper and primer shall be of approved brand and manufacture. The distemper shall be of required color and shade and the same shall conform to I.S. : 428-1969. The shade shall be approved by Engineer in charge. Birla or Asian acryliclappy (putty) and primer shall be of approved brand and manufacture.

### **2.0. Workmanship**

The distempering shall be carried out on wall surfaces to give an even shade.

### **2.1. Scaffolding**

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

### **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.

**2.2.3 The lappy (putty) shall be carried out on wall surfaces to give an even shade.**

### **2.3. Priming coat :**

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

**2.3.2.** Application of primer shall be done as under: The primer shall be applied with a brush on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly as possible leaving no brush marks. It shall be allowed to dry for at least 48 hours before oil bound distemper or paint is applied.

**2.3.3.** Oil bound distemper is not recommended to be applied within six months of the completion of wall plaster.

### **2.4. Preparation of oil bound distemper:**

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

### **2.5. Application of Distemper coat:**

**2.5.1.** For undecorated surfaces, after the primer coat is dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the distemper, taking care not to rub out priming coat. All loose particles shall be dusted off after rubbing. Minimum two coats of distemper shall be applied with brushes in horizontal strokes followed immediately by vertical strokes which together shall constitute one coat. The subsequent coats shall be applied after a

time interval of at least 24 hours between consecutive coats to permit proper drying of the proceeding coat. The finished surface shall be even and inform without patches, brush marks, distemper drops etc.

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

**2.5.3.** 15 cm. double bristled distemper brush shall be used. After day's work brushes shall be thoroughly washed in hot water with soap solution and hung down to dry. Old brushes which are dirty and caked with distemper shall not be used on the work.

**2.6. Protective measurements :** The surfaces of doors, windows, floors, articles of furniture etc. and such other parts of the buildings as are not to be distempered shall be protected form being splashed upon. Such surfaces shall be cleaned of distemper splashes if any.

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

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

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

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

(b) Area in individual items shall be worked out to the nearest 0.01 sq. m. All work 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 not for finish around ends of joints, beams, posts etc.

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

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

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

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

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

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

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

**3.7.** The extra rate shall be paid for carrying our distempering work on ceiling/sloping roofs over and above.

**3.8.** The rate includes cost of ail materials, labours, scaffolding, protective measures etc. involved in all the operations described above. This shall also include conveyance, delivery, handing, unloading, storing work etc.

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

### **ITEM NO.37**

**Finishing wall with Weather Proof Exterior Emulsion Paint on wall surface (two coat) to give and even shade and of approved brand and manufacture including throughly brooming and brushing the surface to remove all dirts, and remians of loose powdered material.**

This work shall consist of painting the walls with weather proof exterior emulsion paint on wall surface two coats of painting and one coat of primer coat paint of the shape and dimensions shown on the drawings and conforming to these specifications or as approved by the Engineer in charge.

## **MATERIALS**

### **1.0 Exterior Emulsion Paint**

Exterior emulsion paint shall be of specified colour as approved by Engineer in charge the ready mixed exterior emulsion paint shall not be allowed, If however ready mix emulsion paint of specified shade or tint is not available white ready mixed paint with approved Steiner will be allowed in such case the contractor shall ensure that the shade of the paint so allowed shall be uniform exterior emulsion paint shall meet with the following general requirements

1. Exterior emulsion paint shall not show excessive setting in freshly opened full can and shall easily be redepressed with a paddle to a smooth homogeneous state. The exterior emulsion paint shall show no curding, livering cracking or colour separation and shall be free from lumps and skins.
2. The exterior emulsion paint as received shall brush easily possess good leveling properties and show no running or sagging tendencies.
3. The exterior emulsion paint shall not skin within 48 hours in a three quarters filled closed container
4. The exterior emulsion paint shall dry to a smooth uniform finish free from roughness grit unevenness and other imperfections
5. Ready mix exterior emulsion paint if allowed for specified shade, shall be used exactly as received from the manufacturers and generally according to their instruction and without any admixtures whatsoever.

### **2.0 WORKMAN SHIP**

#### **2.1 Scaffolding :**

Where scaffolding is required, it shall be erected in such a way that as far as possible no part of scaffolding shall rest against the surface to be distempered. A properly secured strong and well tied suspended platform (joola) may be used for distempering. Where ladders are used, pieces of old gunny bags.

#### **3.0 Application coat :**

The exterior emulsion paint on wall surface two coats of painting and one coat of primer coat paint of shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer only. Sufficient quantity of distemper required for a day's work shall be prepared.

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

immediately by vertical strokes which together shall constitute one coat. The subsequent coats shall be applied after a time interval of at least 24 hours between consecutive coats to permit proper drying of the preceding coat. The finished surface shall be even and uniform without patches, brush marks, distemper drops etc.

**3.2** Sufficient quantity of the exterior emulsion paint shall be mixed to finish one room at a time.

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

**3.1.** The unitrate wall painting with exterior emulsion paint shall include the cost of all materials, tools and plant required for mixing, cleaning brushing sand papering & painting with all required specials and Lapi compound, finishing as per direction of the Engineer-in-charge, and all other incidental expenses for producing pipe line work of specified diameter to complete the structure or its components as shown on the drawings and according to these specifications. They shall also include the cost of making, fixing and removing of all scaffolding and forms required for the work.

**3.2** The rate of wall painting with exterior emulsion paint shall include the cost of all labour, materials tools and plant scaffolding and all incidental expenses as described herein above.

**3.3.** The wall painting with exterior emulsion paint shall be measured for its length and height limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one square meter.

**3.4.** The payment will be made on **square meter** basis of the finished work.

### **ITEM NO.38**

**Finishing wall with water proofing cement paint of on wall surfaces (Two coats) to give an approved brand and manufacture and of required shape even shade after thoroughly brushing the surface to remove all dirt and remains of loose powered materials.**

#### **1.0. Materials**

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

#### **2.0. 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 surface shall be thoroughly cleaned of all dust, dirt, mortar cropping and other foreign matter before water proofing cement paint is to be applied.

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

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

**2.2.4.** All unsound portion of the surface plaster shall be removed to full depth of plaster in rectangular patches and plastered again after raking the masonry joints properly. Such portion shall be wetted and allowed to dry. They shall then be given one coat of water proofing cement paint.

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

The surface shall be thoroughly wetted with clean water before cement water proofing paint is applied.

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

**2.4. Application of Paint:**

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

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

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

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

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

**2.4.6.** The cement paint shall be applied with a brush with relatively short stiff hog or fiber bristles. The paint shall be brushed in uniform thickness and shall be free from excessively heavy brush marks. The lamps shall be brushed out.

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

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

**2.6. Protective measure :**



The surface of doors, windows, floors, articles, of furniture etc. and such other parts of the building not to be Water proof cement paint shall be protected from being splashed upon. Such surfaces shall be cleaned of Water proof cement paint splashed if any.

### **3.0. 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. each in area, for ends of joists, posts, beams, girders, steps etc. not exceeding 0.5 sq.mt. each in area and for openings exceeding 0.5 sq.mt. and not exceeding 3.0 sq.mt. each in area, deductions and additions shall be made as under.

**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) Naintial 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** Extra payment shall be done on ceiling and sloping roofs.

- 3.9. The rate shall include the cost of all materials, labour, scaffolding, protective measures etc. involved in all the operations described above.
- 4.0 The rate shall be for a unit of **One sq.** meter.

#### **ITEM NO.39**

**Providing and laying white glazed tiles 6 mm thick in flooring, treads of steps and landing laid on bed of 12 mm thick cement mortar 1:3 (1 Cement : 3 Coarse Sand) finished with flush pointing in white cement.**

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

Water shall conform to M-1 Cement mortar shall conform to M-11. **White glazed tiles 6mm thick as approved by Engineer in charge** shall conform to M-55

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

##### **2.1. Bedding :**

- 2.1.1. The sub grade shall be cleaned, wetted and mopped. The bedding shall then be laid evenly over the surface tamped and corrected to desired level and allowed to harden enough to offer a rigid cushion to tiles and to enable the monsoon to place wooden planks across and squat on it.
- 2.1.2. The **white glazed tiles** shall be laid on cement mortar bedding of 12 mm. thick in C.M. 1:3. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of bedding. The base shall be cleared and well wetted. The mortar shall then be spread in thickness not less than 12 mm. at any place and average 12 mm. thickness. The proportion of the cement mortar shall be as specified in the item.

##### **2.2. Fixing tiles :**

- 2.2.1. The tiles before laying shall be soaked in water for at least two hours. Neat gray cement grout at 33 kg/Cement/Sq.mt. of honey like consistency shall be spread over the mortar bedding as directed. The edges of the tiles shall be smeared with neat cement slurry. The tiles shall be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straightline or as per pattern.
- 2.2.2. The tiles shall not have staggered joints. The joints shall be true to centre line both ways. The Nahni trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed they shall be cut (Sawn) to the required size and the edges rubbed smooth to ensure straight and true joints. The joints shall be filled with grey cement grout with wire brush or trowel to a depth of 5 mm. and loose material removed. White cement shall be used for pointing the joints. After fixing the tiles finally in an even plane the flooring shall be kept wet and allowed to nature undisturbed for 7 days.

##### **2.3. Cleaning :**

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

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

- 3.1. The work done shall be measured in sq.mt. for visible area of work done. The length and width of the flooring shall be measured not between the faces of skirting or dedos or plastered face of wall as the case may be. The paving under dedo or skirting shall not be measured. No deduction shall be made not extrapaidfor any opening in the floor of area up to 0.1 sq.mt. Nothing extra shall bepaidfor laying the floors at different levels in the same rooms.
- 3.2. The paymentwillbe made on **square meter** basis of the finished work.

#### ITEM NO.40

**Providing and laying white glazed tiles 6 mm thick in flooring, treads of steps and landing laid on bed of 12 mm thick cement mortar 1:3 (1 Cement : 3 Coarse Sand) finished with flush pointing in white cement slurry.**

1.0. **Materials**

Water shall conform to M-1 Cement mortar shall conform to M-11. **White glazed tiles 6mm thick as approved by Engineer in charges** shall conform to M-55

2.0. **Workmanship**

2.1. **Bedding :**

- 2.1.1. The sub grade shall be cleaned, wetted and mopped. The bedding shall then be laid evenly over the surface tamped and corrected to desired level and allowed to harden enough to offer a rigid cushion to tiles and to enable the monsoon to place wooden planks across and squat on it.
- 2.1.2. The **whiteglazed tiles** shall be laid on cement mortar bedding of 12 mm. thick in C.M. 1:3. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of bedding. The base shall be cleared and well wetted. The mortar shall then be spread in thickness not less than 12 mm. at any place and average 12 mm. thickness. The proportion of the cement mortar shall beas specified in the item.

2.2. **Fixing tiles :**

- 2.2.1. The tiles before laying shall be soaked in water for at least tow hours. Neat gray cement grout at 33 kg/Cement/Sq.mt. of honey like consistency shall bespread over the mortar bedding as directed. The edges of the tiles shall be smeared with neat cement slurry. The tiles shall be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straightline or as per pattern.
- 2.2.2. The tiles shall not have staggered joints. The joints shall betrue to centre line both ways. The Nahni trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed they shall be cut (Swan) to the required size and the edges rubbed smooth to ensurestraight and true joints. The joints shall be filled with grey cement grout with wire brush or trowel to a depth of 5 mm. and loose material removed. White cement shall be used for pointing the joints. After fixing the tiles finally in an even plane the flooring shall be kept wet and allowed to nature undisturbed for 7 days.

2.3. **Cleaning :**

- 2.3.1. The surplus cement grout that may have come out of the joints shall be cleaned off before it sets. Once the floor has set, it shall be carefully washed, cleared by dilute acid and dried. Proper

precautions and measures shall be taken to ensure that the tiles are not damaged in any way till the completion of the construction.

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

- 3.1.** The work done shall be measured in sq.mt. for visible area of work done. The length and width of the flooring shall be measured not between the faces of skirting or dedos or plastered face of wall as the case may be. The paving under dedo or skirting shall not be measured. No deduction shall be made not extrapaidfor any opening in the floor of area up to 0.1 sq.mt. Nothing extra shall be paidfor laying the floors at different levels in the same rooms.
- 3.2.** The paymentwillbe made on **square meter** basis of the finished work.

## **ITEM NO.41**

**Providing and laying polished kota stone slab 25 mm thick in risers of steps, skirting Dedo and pillars laid on 10 mm thick cement mortar 1 : 3 (1 cement : 3 course sand) and jointed with gray cement slurry mixed with pigment to match the shade of slab including rubbing and polishing & Groove cutting etc. complete.**

### **1.0. Materials**

- 1.1.** Water shall conform to M-1. Lime mortar shall conform to M-10. Cement mortar shall conform to M-11. **25mm thick hand dressed polished blue kota stone slab** shall conform to M-49.

### **2.0. Workmanship**

- 2.1.** Each slab shall be cut to the requiredsize and shape and fine chisel dressed at all the edges. The sides trust dressed shall have a full contract 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 10 mm. at any place of the slab.
- 2.2.** Bedding for the polished blue kota stone slabs shall be of cement plaster 1:3 (1 cement : 3 coarse sand) or L.M. 1:1.5 of average thickness 10 mm given in the description of the item. Sub grade shall be cleaned, wetted and mopped Mortar of the specified mix and thickness shall then be spread on an area sufficient to receive one blue kota stone slab. The slab shall be washed clean before laying. It shall be laid on top, pressed, tapped gently to bring it in level with the other slabs. It shall then be lifted and laid aside. Top surface of the mortar shall then be corrected by adding fresh mortar at hollows or depressions. The mortar shall then be allowed to harden bit. Over this surface, cement slurry of honey like consistency shall be applied. The slab shall then be gently placed in position and tapped with wooden mallet till it is properly padded in level with and close to the adjoining slab. The joint shall be as fine as possible. The slabs fixed in the floor adjoining, the walls shall enter not less than 10 mm. under the plaster, skirting or dedo. The junction between the wall and floor shall be finished neatly. The finished surface shall be true to levels and slopes as directed.
- 2.3.** The floor shall be kept wetfor a minimumperiod 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 polishing machine fitted with bobs shall be run over it.

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

### **3.0. Measurement & payment**

3.1. The risers of steps, skirting or dedo shall be measured in sq. meter Length shall be measured along the finished faces of risers, skirting or dedo. Height shall be measured from finished level of treads of floor to top. Lining of pillars shall be measured under this item.

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

## **ITEM NO.42**

**Providing and laying polished kota stone slab flooring over 20 mm (average) thick base of cement mortar 1 : 6 (1 cement : 6 coarse sand) or L.M. 1 : 1.5 (1: Lime putty : 1.5 coarse sand ) laid over and jointed with grey cement slurry mixed with pigment to match the shade of slab including rubbing and polishing & Groove cutting etc. complete. (A) 25 mm thick.**

### **1.0. Materials**

1.1. Water shall conform to M-1. Lime mortar shall conform to M-10. Cement mortar shall conform to M-11 Polished kota 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 must be dressed shall have a full contract 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 Kota stone slabs shall be of cement mortar 1:6 (1 cement : 6 coarse sand) or L.M. 1:1.5 of average thickness 20 mm given in the description of the item. Sub grade shall be cleaned, wetted and mopped Mortar of the specified mix and thickness shall then be spread on an area sufficient to receive one kota stone slab. The slab shall be washed clean before laying. It shall be laid on top, pressed, tapped gently to bring it in level with the other slabs. It shall then be lifted and laid aside. Top surface of the mortar shall then be corrected by adding fresh mortar at hollows or depressions. The mortar shall then be allowed to harden bit. Over this surface, cement slurry of honey-like consistency shall be applied. The slab shall then be gently placed in position and tapped with wooden mallet till it is properly padded in level with and close to the adjoining slab. The joint shall be as fine as possible. The slabs fixed in the floor adjoining, the walls shall enter not less than 10 mm. under the plaster, skirting or dedo. The junction between the wall and floor shall be finished neatly. The finished surface shall be true to levels and slopes as directed

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

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

soft cloth over a clean and dry surface. Then the polishing machine fitted with bobs shall be run over it.

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

3.0. Measurement & payment

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

The kota stone flooring shall be measured in square meters correct to two places decimal, length and breadth shall be measured correct to a centimeter and between the finished face of skirting dedo plaster and no deduction shall be made nor extra paid for any opening in floor of areas up to 0.1 sq

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

## **ITEM NO.43**

**Providing and laying broken chine mosaic flooring for terrace using 12 mm to 20 mm broken pieces of glazed tiles to be laid over cement mortar 1:3 to plain or slope and to be tempered to bring mortar creme out upto surface using white cement including rounding off junctions and extending them upto 15 cm along the wall, clearing with water and oxalic acid etc. as directed.**

### **1.0 MATERIAL - WATER**

1.1 Water shall not be salty brackish and shall be clean, reasonably clear and free of objectionable quantities of silt and traces of oil injurious alkalis salts organic matter and other deleterious material which will either weaken the mortar of concrete or cause efflorescence or attack the steel in R.C.C. container for transport storage and huddling of water shall be clean. Water shall conform to the Standard Specification in I.S. 455 - 1978.

1.2 If required by the Engineer in charge, it shall be tested by comparison with distilled water compression shall be made by means of standard cement tests for soundness, time of setting and mortar strength as specified in I.S. 269 - 1976. Any indication of unsoundness change in time of setting by 50 minutes or more or decrease of more than 10 percent strength of mortar prepared with distilled water sample when compared with the result obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.

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

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

1.5 Hard and bitter water shall not be used for curing.

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

### **2.0 CEMENT**

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

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

### **3.0 SAND**

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

**COARSE SAND** - The fineness modules of coarse sand shall not be less than 2.5 and shall not exceed 3.0. The sieve analysis of coarse sand be asunder :

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

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

I.S. Sieve Designation	% by wt. passing
4.75 mm	100
2.36 mm	100
1.18 mm	70 to 100
600 MC	40 to 85
300 MC	05 to 50
150 MC	00 to 10

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

**1.4 WATER PROOFING COMPOUND**

Water proofing compound shall be of approved quality and make as approved by Engineer in charge.

**1.5 CHINA MOSAIC TILE PIECES**

China mosaic tiles pieces shall be of 50 mm to 90 mm nominal size, tiles pieces shall be made from hard and good quality of tiles.

**1.7 WHITE CEMENT**

White cement shall be of approved make it shall confirm definition of I.S. 8042-E-1978 the sample of white cement shall be approved by Engineer in charge.

**WORKMANSHIP**

**A** First of all surface of the entire terrace shall be cleaned by thoroughly brooming and then by wire brushes. All the loose material, dust and debris shall be removed thoroughly from the entire surface of the terrace.

All joints and cracks shall be raked off and cut in trench which shall be filled by neat cement slurry admixed with water proofing compound. The joints with parapet shall be raked up to 30 cm height and shall be applied by neat cement slurry admixed with water proofing compound. Neat cement slurry shall be prepared and a water proofing compound of approved make shall be mixed with the slurry in proportion specified by the manufacturer of the compound and shall be laid throughout the surface of the terrace by the use of brushes mala etc. Cement slurry shall be prepared by adding adequate quantity of water so as to spread it uniformly on the surface. Applying neat cement slurry 2.75 Kgs./Smt. of cement admix with water proofing compound after cleaning the surface.

**B** (b) laying cement concrete using brick bats 25mm to 100mm size with 50% cement mortar 1:3 (1 Cement: 3 Coarse Sand) admixed mortar proofing compound over 20 mm thick layer of cement mortar 1:5 to required slope including rounding of junctions of walls and slabs

**C** After two days of proper curing applying a second coat of cement slurry on entire surface of the terrace.

**D** The entire surface shall be finished with 20 mm thick C.M. 1:4 and China mosaic tiling in true level and slope as directed by Engineer in charge and finally finishing the surface with trowel

with white cement slurry (Specification of white glazed tiles flooring shall be followed for the execution of this item).

**E** Finishing the surface with 20 mm thick C.M. 1:3 and China mosaic tiling and finally finishing the surface with trowel with white cement slurry.

**F** After two days proper curing the terrace shall be flooded for 15 days.

#### **7.0 MODE OF MEASUREMENT AND PAYMENT**

**7.1** The unit rate of flooring shall include the cost of all materials, tools and plant required for mixing, laying of base layer in true level and slope as required applying and placing broken pieces of china mosaic tile in position, compacting, finishing, curing, providing treatment of 30 cm high all over the length of parapets and corners and sill of doors etc. and all other incidental expenses for producing flooring work to complete the structure of its components as shown on the drawings and according to these specifications. Item shall also include the cost of making, fixing of all scaffolding and forms required for the work.

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

**7.2** The plaster work shall be measured for its length and width, limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one Square Meter.

**7.4** A guarantee bond on appropriately stamped paper shall be given by the contractor to the Department in the manner and form prescribed below.

**7.3** The payment will be made on **Square Meter** basis of the finished work.

### **ITEM NO.44**

**Providing and fixing to wall ceiling and floor 10.0 Kg. F/Cm<sup>2</sup> working pressure polythene pipes of the following outside Dia. Low density, complete with special flange compression type fittings, wall clip etc. including making good the wall ceiling and floor. (110mm)**

#### **1.0. Materials**

**1.1.** The low density polythene pipe of specified diameter with **10.0 Kg./Sq.cm.** working pressure shall conform to I.S. 3076-1968. The specials and fittings required shall be of best quality.

#### **2.0. Workmanship**

**2.1.** The P.V.C. pipes of specified diameter shall be fixed as directed. Due to thermal expansion of rigid P.V.C. pipes, due allowance shall be made particularly in over ground pipe lines for any change in length of pipe line which may occur during installation or when pipe line 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 of 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 off after jointing. Empty solvent cement tins, brushes, rags, or paper impregnated with cement should not be buried in the trenches. They should be gathered not left scattered about, as they can prove to be a hazard to animals, which may chew them.

**2.8.2.** 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 description of the item shall, unless otherwise stated be held to include where necessary conveyance and delivery, handling, unloading, storing fabrication, hoisting, all labour for finishing to required shape and size, setting, fitting in position straight, cutting and waste return of packing etc.
- 3.2.** The length shall be measured on running meter basis of finished work. The length shall be taken along the centre line of the pipe and fittings. The pipes fixed to wall, ceiling, floors etc shall be measured and paid under this item.
- 3.3.** All the work shall be measured in decimal system as fixed in its place, subject to tolerance given below unless otherwise stated.  
(i) Dimension shall be measured to the nearest 0.01 meter. (ii) Area shall be worked out to the nearest 0.01 sq. meter.
- 3.4.** All measurements of cutting shall unless otherwise stated be held to include the consequent waste
- 3.5.** In case of fitting of unequal bore, the targets bore shall be measured for the test.
- 3.6.** Testing of pipe lines fittings, and joints include for providing all plant appliances necessary for obtaining access to the work to be tested and carrying out the tests
- 3.7.** The rate includes P.V.C. pipes with screwed socket joints. to gather with all fittings (such as bends, sockets springs, elbows, test, crosses, short pieces, clamps and plugs, unions etc.) and fixing complete with clamping wall hooks, wooden plug etc. and also curing, screwing and waste and for making forged (or hand made) bends on piping as required. Connector shall be inserted where required or directed. The rate also includes cutting through walls, floors etc. and their making good and painting exposed threads with anti-corrosive paint as above and testing where tubes are to be fixed to wall, ceiling and flooring, the rates shall not include painting of pipes, providing sleeves and sand filling under floor for which separate payment shall be made.
- 3.8.** The unit rate shall be for a unit of **One running meter.**

## **ITEM NO.45**

**Providing erecting and fixing double coated ISI water tank of required capacity each with all necessary fitting sand connection etc. complete on terrace**

### **General**

This work shall consist of furnishing and placing providing and fixing double coated I.S.I. mark PVC water tank with necessary G.I. fittings of the shape and dimensions shown on the drawings and conforming to these specifications or as approved by the Engineer in charge.

### **1.0 MATERIAL**

#### **1.1 PVC WATER TANK**

PVC Water tank of specified capacity and of I.S.I. mark of approved in liters of approved make and quality equivalent to syntax product.

Net capacity shall be net volume of water stored between the lowest level of overflow and lowest specified level.

#### **1.2 NIPPLE**

Galvanize pipe nipple shall be of approved make and of best quality. Relevant specification given in Booklet of Building specification shall be applied for the execution of this item.

### 1.3 BALL VALVE

Ball valve shall be of approved make and of best quality. Relevant specification given in Booklet of Building specification shall be applied for the execution of this item.

### 1.4 CONNECTIONS

Connection shall be of approved make and of best quality. Relevant specification given in Booklet of Building specification shall be applied for the execution of this item. 99

### 2.0 WORKMANSHIP

2.1 Tank shall be approved quality and as per IS standard make. Material used in manufacturing tank shall be confirmed to relevant IS code. The material of tank and lead and fittings which may come in contact of water should be such that it does not impart any taste, colour or odour. It does not have any toxic effect and it does not contaminate the water. Thereby making it unpotable.

2.2 The tank shall be fixed properly in a level position and making all required necessary correction like inlet outlet flushing overflow and air vent. Tank shall be satisfying the standards of public health.

### 3.0 MODE OF MEASUREMENT AND PAYMENT

3.1 The unit rate of **PVC Water tank** shall include the cost of all materials, tools and plant required for lifting to required height with all lead and lift, placing and fixing in position, all required specials and jointing adhesive compound, finishing as per direction of the Engineer-in-charge, and all other incidental expenses for producing **PVC water tank** work of specified diameter to complete the structure or its components as shown on the drawings and according to these specifications, they shall also include the cost of making, fixing and removing of all scaffolding and forms required for the work.

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

3.2 The **PVC water tank** work shall be measured for its volume to specified capacity to those specified on plan or as directed. The rate shall be for a unit of one litre basis.

### ITEM NO.46

Providing and fixing wash down water closet (Indian Type W.C. Pan) size 580mm with Viterous China 100mm size integral P or S trap including jointing the trap with soil pipe in cement mortar 1:1 ( 1 cement : 1 fine sand). Rates including Providing and fixing in cement mortar 1:3 (1 cement : 3 fine sand) a pair of white viterous china 250mm x 130mm x 30mm footrest to long pattern squatting pan water closet and 25mm dia chromium plates brass half turn flush cock of approved quality etc. complete as directed.

## **P/F Wash Basin**

### **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.

## **P/F C.P. Brass Waste 32mm dia**

### **1.0. Materials**

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

### **2.0. Workmanship**

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

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

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

3.2. The idle shall be for a unit of One number.

## **Providing and Fixing M.I. Fisher union 32mm**

### **1.0. Materials**

1.1. Tho 32 mm dia M.1. Fisher union shall be of best quality and made as approved by the Engineer-in-charge.

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

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

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

## **15mm dia Stop Tap**

### **1.0. Materials**

The chromium plated brass screw down stop tap of 15mm dia shall conform to IS. : 781 -1977. The stop tap shall be of tested quality and approved by Engineer in charge.

### **2.0 Workmanship**

The stop tap shall be fixed in position by means of Jam nut and socket. The stop tap shall be fixed near the inlet of the water meter oras directed. The joints shall be done with white zinc and spun yarn. The joint shall be tested forleak proofing. All necessary testing should be carried out.

3.0. Mode of measurements and payment

3.1. The rate includes cost of 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.

### **15mm dia pillar tap**

**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.

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### **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 be fixed with pipe line white Zinc 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.47**

**Providing and fixing wash down water closet (European type W.C. Pan) with integral P or S trap including jointing the trap with soil pipe in cement mortar 1:1 ( 1 cement : 1 fine sand). Rates including providing and fixing plastic seat cover with C.P. brass hinges and rubber buffers, Jet spray heavy duty with S.S. braided hose 60 cm long and 25mm dia chromium plates brass half turn flush cock of approved quality etc. complete as directed.**

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.

### **1.0. Materials**

Wash down water closet (European type W.C. Pan) shall conform to M-60. Cement mortar shall 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 be made with C M. 1:1 (1 cement : 1 fine sand).

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

**3.1.** The rate shall include 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 seat 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**.

## **G.I. inlet connection for flush pipe with W.C. Pan.**

### **1.0. Materials**

1.1. The G.I. inlet connection for flush pipe shall conform to M-56.

**2.0. Workmanship**

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

**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**.

**Providing and Fixing Plastic Seat Cover**

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.

**25mm dia flush cock**

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 Zink. 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**.

100mm size P or S Trap.

1.0. **Materials** : The 100 mm. size 'P' or 'S' trap for water closet shall confirm to M-62. Cement mortar shall conform to M-11.

**2.0. Workmanship**

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

**3.0. Mode of measurements and payment**

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

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

**ITEM NO.48**

**Providing and fixing 430mm x 260mm x 350mm size white earthen ware flat back or corner type urinal of approved quality including. 15mm Dia Stop Tap and Necessary Connections the urinal with waste pipe etc. complete.**

1.0. **Materials:** The white earthenware flat back or comer type urinal of size 4'30 mm. x 260 mm. x 350 mm. shall conform to M-64.

**2.0. Workmanship**

2.1. The urinals shall be fixed in position by using wooden plugs and screws and shall be at a height 65 cms. from the Moor level to the top of the lip of urinal, unless otherwise directed. The wooden plugs shall be of 50 mm. x 50 mm. at base tapering to 38 mm. x 38 mm. at top 50 mm. in length shall be fixed in wall in steel waste pipe which shall discharge in the channel or floor a tap. The connection between the urinal and flush or waste pipe shall be made by means of putty or white lead mixed with chopped hemp.

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

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

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

#### **ITEM NO.49**

Providing and fixing white vitreous china flat back wash basin of 550mm x 400mm size with single hole for pillar tap with C.I. or M.S. brackets painted white including cutting holes and making good the same. Rates including providing and fixing 32mm dia C.P. Brass waste couplin, 32mm dia M.I. Fisher unit, Brass screw down stop tap of 15mm dia pillar tap capstan head, screw down high pressure with screws, shanks, back nuts, PVC pipe & 32mm dia flexible waste pipe up to Nani Trap etc. complete as directed by engineer in charge.

#### **P/F Wash Basin**

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

1.1. The white glazed earthenware wash basin shall be 550 mm. x 400mm. of 1st quality and make as approved by the Engineer-in-charge. The wash basin shall conform to M-59.

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

2.1. The washbasin shall be fixed on the wall as and where directed. The wash basin shall be supported on a pair of M.S. or C.I. brackets fixed in C.M. 1:3 (1 cement : 3 sand). The bracket shall conform to I.S. : 775-1962. The wall plaster on the rear shall be cut to rest the top edge of the washbasin. After fixing the basing, plaster shall be made good and surface finished to match the existing one.

2.2. The brackets shall be painted white with ready-mixed paint.

2.3. The C.I. brass trap and union shall be connected to 32 mm. dia. waste pipe which shall be suitably bent towards the wall and which shall discharge into an open drain leading to a gully trap or direct in to gully-trap on the ground floor and shall be connected to a waste pipe through a floor trap on the upper floors. C.P. brass trap and union may not be provided where the surface drain or a floor trap is placed directly under the basin and the waste is discharged in to vertically.

2.4. The height of the front edge to the wash basin from the floor level shall be 80 cms.

2.5. The necessary inlet, outlet connections and fittings such as pillar cocks, CP dress waste trap waste pipe, stop cock, chain with rubber plug etc. shall be fixed.

2.6. The payment of fittings shall be made separately under separate items.

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

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

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

#### **P/F C.P. Brass Waste 32mm dia**

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

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

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

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

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

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

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

#### **Providing and Fixing M.I. Fisher union 32mm**

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

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

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

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

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

item.

### **15mm dia Stop Tap**

#### **1.0. Materials**

The chromium plated brass screw down stop tap of 15mm dia shall conform to IS. : 781 -1977. The stop tap shall be of tested quality and approved by Engineer in charge.

#### **2.0 Workmanship**

The stop tap shall be fixed in position by means of Jam nut and socket. The stop tap shall be fixed near the inlet of the water meter or as directed. The joints shall be done with white zinc and spun yarn. The joint shall be tested for leak proofing. All necessary testing should be carried out.

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

3.1. The rate includes cost of 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.

### **15mm dia pillar tap**

**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.

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#### **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 be fixed with pipe line white Zinc 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.50**

**Providing and fixing screw down bib taps of following size.(A) Brass screw down bib tap polished bright.(i) 15mm dia..**

1.0. Materials : 15 mm. dia. brass screw down with bright polished finished shall conform to I.S. 781-1977. The bib cock shall be best Indian make and quality.

#### **2.0. Workmanship**

2.1. The screw down bib cock 15 mm. as specified above shall be fixed as directed. The threaded portion shall be smeared with white or red lead and around with a few turns of fine spun yarn round the screwed end of the pipe. The bib cock shall be then screwed and fixed to water tight position.

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

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

3.2. The rate shall be for a unit of One Number

### **ITEM NO.51**

**Providing and fixing screw down bib taps of following size.(B) Brass chromium plated screws down Bib Tap .(i) 15mm dia.**

**General**

This work shall consist of providing and fixing screw down quarter turn bib taps of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer in charge.

## **1.0 MATERIAL**

### **1.0 Bib Cock**

**1.1.** Bib cock of specified 15 mm diameter nominal bore shall conform to I.S. 781-1977. The Bib Cock shall be best Indian make and quality.

**1.2** Bib cock shall be brass chromium plated screw down of best quality.

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

**1.4** They shall be screw down type and or brass chromium plated screw down 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 chromium plated.

**1.5** 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.

**1.6.** The Necessary galvanized fittings like Nipple, Casing etc, of best quality and makes as approved by the Engineer-in-charge required for specified dia. bore Bib cock shall be used for fitting Bib cock as necessary.

## **2.0. WORKMANSHIP**

### **Curing, Laying & Jointing**

**2.1.** When the Bib cock is to be fitted, the ends shall be carefully filed out so that no obstruction to bore is offered. The Bib cock shall be fitted with pipes carefully in such a manner as will not result in slackness of joints when the two pieces are screwed together.

**2.2** In jointing the Bib cock the inside of the socket and the screwed end of the Bib cock shall be oiled and smeared with the white or red lead and wrapping around with a few turns of fine spun yarn round the screwed end of the Bib cock. The end shall then be tightly screwed in the socket, Tees etc with a pipe wrench. Care shall be taken that all items are free from dust, dirt and rust during fixing. Burr from the joints shall be removed after screwing. After laying the open ends of the Bib cock shall be temporarily plugged to prevent excess of water soil or any other foreign matter.

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

## **TESTING OF JOINTS**



After fitting, the Bib cocks shall be inspected under working conditions of pressure and flow. Any joints found like shall be redone, and all leaking Bib cocks shall be removed and replaced without extra cost. The Bib cocks after they are fitted shall be tested to hydraulic pressure of 6 kg / sq. cm. The Bib cock shall be slowly and carefully charged with water allowing all air to escape and avoiding all shock and water hammer. The drawoff takes and stop cock shall then be closed and specified hydraulic pressure shall be applied gradually. The Bib cocks shall be tested in sections as the work laying proceeds, keeping the joints exposed for inspection during the testing.

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

**3.1.** The unit rate of bib cock shall include the cost of all materials, tools and plant required for fitting, the same to specified position as per drawings, and as directed by Engineer in charge finishing structure, etc. and all other incidental expenses for producing Bib cock work to complete the structure or its components as shown on the drawings, and as directed by Engineer in charge and according to these specifications. They shall also include the cost of making, fixing and removing of all scaffolding and forms required for the work.

The rate of bib cocks shall include the cost of all labour, materials, G. I. fittings as required, tools and plant scaffolding and all incidental expenses as described herein above including testing.

**3.2.** The bib cock shall be measured for its Number, limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one Number.

**3.3.** The payment will be made on **number** basis of the finished work.

### **ITEM NO.52**

#### **Providing and fixing gun metal check or non return fullway wheel valve. (A) 15 mm Dia**

**1.0. Materials :** The gun metal check or non 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 gun metal check or non return valve shall be fully cleared of all foreign matter before fixing. The fixing of shall be done by means of bolts nuts and 3 mm. rubber insertions with flaps 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.53**

#### **Providing and fixing C.P. brass towel rail complete with C.P. brass brackets fixed to wooden plugs with C.P. brass screws (B) 600 mm x 20 mm size.**

#### **1.0. Materials**

**1.1.** The C.P. brass towel rail shall be 600 mm x 20 mm. 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 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 towelrail shall be fixed as and where directed. All necessary testing should be carried out.

**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.54**

**Providing and fixing toilet paper holder (A) C.P. brass.**

**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.55**

**Providing and fixing 100 mm dia sand cast iron grating for gully, floor or nanhi trap.**

**1.1.** The- 100 mm. dia. sand cast iron gratings for gully, floor or Nahni trap shall be of best quality and make as approved.

**2.0. Workmanship**

**2.1.** The CAST IRON grating shall be provided to gully trap floor or Nahni trap as the case may be in best workmen like manner.

**3.0. Mode of measurements and payment**

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

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

## ITEM NO.56

**Providing and fixing Cast Iron (Spun nahni trap of the 100mm. Inlet and 50mm. Dia outlet having self cleaning design with C. I. Screwed down or hinged grating and stainless steel jali at F.F.I. Including cost of making cuts in walls slab floor etc. and making them as per original testing etc. complete as directed by Engineer-in-charge.**

**1.1.** The cast iron (spun) Nahni trap shall conform to M-69. The C.I. hinged or screwed down cover shall be of best quality.

### **2.0. Workmanship**

**2.1.** The Nahni trap with 100 mm. dia inlet and 50 mm. dia. outlet shall be fixed as per drawing or as directed.

**2.2.** The Nahni trap shall be jointed with C.I. Pipe, 75 mm. dia. with lead joints. The lead joints shall be done in conformation with I.S. 782.-1976.

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

**3.1.** The rate includes cost of all labor, materials, tools and plants etc. required for satisfactory completion of this item including lead, jointing and testing.

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

## ITEM NO.57

**Providing and fixing 150mm x 100mm size "P" or "S" type square mount stone ware gully trap with c. I. Grating brick masonry chamber and water tight C. I. Cover with frame of inside 300mm x 300mm size with cutting and making good the walls floors etc. complete as directed by Engineer-in-charge.**

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

The work includes providing and fixing 150 mm × 100 mm size stoneware gully trap of "P" or "S" type, square-mount pattern, complete with:

- CI grating on inlet
- brick masonry gully chamber
- plastered internal surface (where specified)
- water-tight Cast Iron cover with frame (300 mm × 300 mm inside size)
- necessary sand / cement mortar bedding
- cutting, excavation, and preparation of opening in wall / floor
- connection to drain / waste pipe
- making good the walls, floors and surrounding surfaces

The item shall be completed including all labour, materials, fittings and accessories, as directed by the Engineer-in-Charge.

### **2. Workmanship**

- Gully trap shall be of approved make stoneware, free from:
  - cracks, warping, or glazing defects
- Jointing shall be done with:
  - cement mortar / approved jointing compound
  - neatly finished and watertight
- Brick masonry chamber shall be:
  - properly bonded and cured
  - plastered smooth internally (where specified)
- CI grating and CI cover frame shall:
  - be of adequate thickness and weight
  - fit properly and sit flush without rattling
  - ensure water-tightness

- Pipe connections shall be:
  - correctly aligned
  - at proper slope
  - free from leakage

Surfaces disturbed during installation shall be restored to original condition.

All work shall conform to good plumbing practice and instructions of the Engineer-in-Charge.

### 3. Mode of Measurement

As per Bill Of Quantities.

## ITEM NO.58

**Providing, laying and constructing brick masonry chamber for underground C. I. Inspection Chamber with Inside Dimension 600mm x 850mm x 450mm dedo for single pipe line with bends having crushing strength not less than 35Kg./Cm<sup>2</sup> on C. M. (1:5) (1 cement, 5 Sand) C. I. Cover with frame (light duty) of 455mm x 610mm internal dimension total weight of cover with frame to be not less than 38.00 Kgs. (Wt. of Cover 23 Kgs. and wt. of Frame 15 Kgs.) with R.C.C. top slab with 1:2:4 (1 cement, 2 Coarse sand, 4 graded stone (Kapachi) ) foundation concrete 1:5:10 (1 cement, 5 Coarse sand, 10 brick bats of 40mm nominal size) inside plaster 15mm. thick with C. M. 1:3 (1 cement, 3 Coarse sand) finished smooth with a floating coat of neat cement slurry on walls and bed concrete including curing etc. complete as directed by Engineer-in-charge.**

**1.0. Materials :** Water shall conform to M-1. Cement shall conform to M-3. Coarse sand shall conform to M-5. Brick shall conform to M-15. Stone aggregate shall conform to M-12. Brick bat shall conform to M-14 M.S. bar shall conform to M-18.

### **2.0. Workmanship**

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

**2.2.** The excavation shall be done true to dimensions and level shown in one the plans or as directed.

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

**2.4.** Masonry walls and plaster work shall be carried out as per relevant specifications of item 24.40.

**1.0. Materials :** Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Brick shall conform to M-15. C.I. Grating of 500 x 450 mm. size of standard make shall be of approved quality. 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 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.

**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.

**2.5.** The cover slab shall be constructed as per relevant specifications of 24.27 (I).

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

**3.1.** The earth work in excavation, providing and laying C.I. inspection chamber and bends shall be measured and

paid for separately.

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

### **ITEM NO.59**

**Providing and laying (To level or slopes) and jointing with stiff mixture of cement mortar in proportion 1:1 salt glazed stone ware pipes including testing of pipes and joint complete. (B) 150 mm Dia**

#### **1.0. Materials**

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

#### **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.60**

**Providing and fixing 600 mm x 450 mm bevelled edge mirror of superior glass mounted on 6 mm thick A.C Sheets or plywood sheet and fixing to wooden pluge with c.p brass screws and washers.**

1.1. The 600 mm. x 450 mm. size mirror shall be of superior glass with edge rounded over beveled as specified. It shall be free from flaws specks, or bubbles and its thickness shall not be less than 6 mm. The glass for the mirror shall be uniformly silver plated at the back and shall be free from

silvering defects Silvering shall have a protective uniform covering of red lead paint. The 6 mm thick 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 labor 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.61**

**Providing, laying and jointing in true line and level 32 mm dia U.P.V.C. Pipe (SCH-40) including fittings make as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two meter c/c. or shall be concealed as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.**

### **1.0. Materials**

- 1.1.** The pipes shall be standard I.S.I. mark U.P.V.C. pipe (SCH-40) for cold water of specified dia.
- 1.2.** The fittings, clamps etc. required for specified dia. bore pipes shall be of best quality and make as approved by the Engineer-in-charge. Necessary accessories with inner/ outer brass thread shall be used as required and in accordance with instruction by Engineer in charge.

### **2.0. Workmanship**

#### **2.1. Cutting, Laying & Jointing**

- 2.1.1.** When the tubes are to be cut or rethreaded, the ends shall be carefully filed out so that no obstruction to bore is offered. The ends of the tubes shall then be threaded conforming to the requirements of I.S. 554-1955 with pipe dies and taps carefully in such a manner that it will not result in slackness of joints when the two pieces are screwed together.
- 2.1.2.** The taps and dies shall be used only for straightening screw threads which have become bent or damaged and shall not be used for turning of the threads so as to make them slack as the latter procedure may not result in the water tight joint. The screw threads for tube and fitting shall be protected from edge until they are fitted.
- 2.1.3.** In jointing the tubes, the inside of the socket and the screwed end of the tubes shall be oiled and smeared with white or red lead and wrapped around with a few turns of fine spun yarn round the screwed end of the tube. The end shall then be tightly screwed in the socket, tees, etc. with a pipe wrench. Care shall be taken that all times free from dust and dirt during fixing. But from the joints shall be removed after screwing. After laying the open ends of the pipes shall be temperately plugged to prevent access of water, soil, or any other foreign matter. Jointing shall be carried out with proper chemical adhesive material and allow to dry.
- 2.1.4.** Any threads exposed after jointing shall be painted or in the case of underground piping thickly coated with approved anti-corrosive paint to prevent corrosion.

#### **2.2. Fixing concealed to wall, ceiling & floors.**

- 2.2.1.** In case of fixing concealed cement pipes to walls or ceilings, these shall run on the surface of the wall, or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern, holder clamps keeping the pipes about 15 mm. clear of the wall. When it is found necessary to pattern, holder clamps keeping the pipes about 15 mm. clear of the wall. When it is found necessary to conceal the pipes and when specified so, chasing may be adopted or pipe fixed in ducts or recesses etc. provided that there is sufficient space to work on the pipe with usual tools. The pipe shall not ordinarily be buried in walls or solid floors, where unavoidable, pipe may be buried for short

distances provided that adequate protection is given against damage and where so required joints are not buried. Where required M.S. tube sleeve shall be fixed at a place a pipe is passed through a wall or floor for expansion and contraction and other movements. In case the pipe is embedded in walls or floors, it should be painted with anti-corrosive bitumastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe is affected by lime. Under the floors, the pipe shall be laid in layer of sand filling.

**2.2.2.** All pipes and fittings shall be fixed truly vertical and horizontal unless unavoidable. The pipes shall be fixed to walls with standard pattern clamps of required size and shape, one end of which shall be properly plugged or cemented into walls with cement mortar 1:3 (1 cement : 3 coarse sand) and the other tightened round the pipes to hold it securely. These clamps shall be spaced at regular intervals in straight lengths at 2 MC/C interval in horizontal run and 2.5 m. interval in vertical run. For pipe of 15 mm. dia. up to 25 mm. dia the holes in the walls and floors shall be made by drilling with chisel or jumper and not by dismantling the brick work or concrete. However for bigger diameter pipes the holes shall be carefully made (1 cement : 3 coarse sand), and properly finished to match the adjacent surface.

### **2.3. Testing of joints :**

**2.3.1.** After laying and jointing, the pipes and fillings shall be inspected under working conditions of pressure and flow. Any joints found leaky shall be redone, and all leaking pipes removed and replaced without extra cost.

**2.3.2.** The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 Kg./Sq cm. The pipe shall be slowly and carefully charged with water allowing all air to escape and avoiding all shocks and water hammer. The draw off takes and stop cock shall then be closed and specified hydraulic pressure shall be applied gradually. The pressure gauge must be accurate. The pipes and fittings shall be tested in sections as the work laying proceeds, keeping, the joints exposed for inspection during the testing.

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

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

**3.2.** The length shall be measured on running meter basis of finished work. The length shall be taken along the center line of the pipe and fittings. The pipes fixed to wall, ceiling, floors etc. shall be measured and paid under this item.

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

(i) Dimension shall be measured to the nearest 0.01 meter.

(ii) Area shall be worked out to the nearest 0.01 sq. meter.

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

**3.5.** In case of fitting of unequal bore, the target bore shall be measured for the test.

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

**3.7.** The rate includes U.P.V.C. pipe (SCH-40) with screwed socket joints to gather with all fittings (such as bends, sockets springs, elbows, tees, crosses, short pieces, clamps and plugs, unions etc.) and fixing complete with clamping wall hooks, wooden plug etc. and also curing, screwing and waste and for making forged (or hand made) bends on piping as required. Connector shall be inserted where required or directed. The rate also includes cutting through walls, floors etc. and their making good and painting exposed threads with anti-corrosive paint as above and testing where tubes are to be fixed to wall, ceiling and flooring, the rates shall not include painting of pipes, providing sleeves and sand filling under floor for which separate payment shall be made.

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

## **ITEM NO.62**



**Providing, laying and jointing in true line and level 25 mm dia U.P.V.C. Pipe (SCH-40) including fittings make as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two meter c/c. or shall be concealed as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.**

**1.0. Materials**

- 1.1. The pipes shall be standard I.S.I. mark U.P.V.C. pipe (SCH-40) for cold water of specified dia.
- 1.2. The fittings, clamps etc. required for specified dia. bore pipes shall be of best quality and make as approved by the Engineer-in-charge. Necessary accessories with inner/ outer brass thread shall be used as required and instruction by Engineer in charge.

**2.0. Workmanship**

**2.1. Cutting, Laying & Jointing**

- 2.1.1. When the tubes are to be cut or rethreaded, the ends shall be carefully filed out so that no obstruction to bore is offered. The ends of the tubes shall then be threaded conforming to the requirements of I.S. 554-1955 with pipe dies and taps carefully in such a manner that it will not result in slackness of joints when the two pieces are screwed together.
- 2.1.2. The taps and dies shall be used only for straightening screw threads which have become bent or damaged and shall not be used for turning of the threads so as to make them slack as the latter procedure may not result in the water tight joint. The screw threads for tube and fitting shall be protected from edge until they are fitted.
- 2.1.3. In jointing the tubes, the inside of the socket and the screwed end of the tubes shall be oiled and smeared with white or red lead and wrapped around with a few turns of fine spun yarn round the screwed end of the tube. The end shall then be tightly screwed in the socket, tees, etc. with a pipe wrench. Care shall be taken that all times free from dust and dirt during fixing. But from the joints shall be removed after screwing. After laying the open ends of the pipes shall be temperately plugged to prevent access of water, soil, or any other foreign matter. Jointing shall be carried out with proper chemical adhesive material and allow to dry.
- 2.1.4. Any threads exposed after jointing shall be painted or in the case of underground piping thickly coated with approved anti-corrosive paint to prevent corrosion.

**2.2. Fixing concealed to wall, ceiling & floors.**

- 2.2.1. In case of fixing concealed cement pipes to walls or ceilings, these shall run on the surface of the wall, or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern, holder clamps keeping the pipes about 15 mm. clear of the wall. When it is found necessary to conceal the pipes and when specified so, chasing may be adopted or pipe fixed in ducts or recesses etc. provided that there is sufficient space to work on the pipe with usual tools. The pipe shall not ordinarily be buried in walls or solid floors, where unavoidable, pipe may be buried for short distances provided that adequate protection is given against damage and where so required joints are not buried. Where required M.S. tube sleeve shall be fixed at a place a pipe is passed through a wall or floor for expansion and contraction and other movements. In case the pipe is embedded in walls or floors, it should be painted with anti-corrosive bitumastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe is affected by lime. Under the floors, the pipe shall be laid in layer of sand filling.
- 2.2.2. All pipes and fittings shall be fixed truly vertical and horizontal unless unavoidable. The pipes shall be fixed to walls with standard pattern clamps of required size and shape, one end of which shall be properly plugged or cemented into walls with cement mortar 1:3 (1 cement : 3 coarse sand) and the other tightened round the pipes to hold it securely. These clamps shall be spaced at regular intervals in straight lengths at 2 MC/C interval in horizontal run and 2.5 m. interval in vertical run. For pipe of 15 mm. dia. up to 25 mm. dia the holes in the walls and floors shall be made by drilling with chisel or jumper and not by dismantling the brick work or concrete. However for bigger diameter pipes the holes shall be carefully made (1 cement : 3 coarse sand), and properly finished to match the adjacent surface.

### **2.3. Testing of joints :**

- 2.3.1.** After laying and jointing, the pipes and fillings shall be inspected under working conditions of pressure and flow. Any joints found leaky shall be redone, and all leaking pipes removed and replaced without extra cost.
- 2.3.2.** The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 Kg./Sq cm. The pipe shall be slowly and carefully charged with water allowing all air to escape and avoiding all shocks and water hammer. The drawoff tap and stop cock shall then be closed and specified hydraulic pressure shall be applied gradually. The pressure gauge must be accurate. The pipes and fittings shall be tested in sections as the work laying proceeds, keeping, the joints exposed for inspection during the testing.

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

- 3.1.** The description of the item shall, unless otherwise stated be held to include where necessary conveyance and delivery, handling, unloading, storing fabrication, hoisting, all labour for finishing to required shape and size, setting, fitting in position straight, cutting and waste return of packing etc.
- 3.2.** The length shall be measured on running meter basis of finished work. The length shall be taken along the center line of the pipe and fittings. The pipes fixed to wall, ceiling, floors etc. shall be measured and paid under this item.
- 3.3.** All the work shall be measured in decimal system as fixed in its place, subject to tolerance given below unless otherwise stated.
  - (i) Dimension shall be measured to the nearest 0.01 meter.
  - (ii) Area shall be worked out to the nearest 0.01 sq. meter.
- 3.4.** All measurements of cutting shall unless otherwise stated be held to include the consequent waste.
- 3.5.** In case of fitting of unequal bore, the target bore shall be measured for the test.
- 3.6.** Testing of pipe line fittings, and joints include for providing all plant appliances necessary for obtaining access to the work to be tested and carrying out the tests.
- 3.7.** The rate includes U.P.V.C. pipe (SCH-40) with screwed socket joints to gather with all fittings (such as bends, sockets, elbows, tees, crosses, short pieces, clamps and plugs, unions etc.) and fixing complete with clamping wall hooks, wooden plug etc. and also curing, screwing and waste and for making forged (or hand made) bends on piping as required. Connector shall be inserted where required or directed. The rate also includes cutting through walls, floors etc. and their making good and painting exposed threads with anti-corrosive paint as above and testing where tubes are to be fixed to wall, ceiling and flooring, the rates shall not include painting of pipes, providing sleeves and sand filling under floor for which separate payment shall be made.
- 3.8.** The rate shall be for a unit of **one running meter**.

### **ITEM NO.63**

**Providing, laying and jointing in true line and level 15 mm dia U.P.V.C. Pipe (SCH-40) including fittings make as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two meter c/c. or shall be concealed as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.**

#### **1.0. Materials**

- 1.1.** The pipes shall be standard I.S.I. mark U.P.V.C. pipe (SCH-40) for cold water of specified dia.
- 1.2.** The fittings, clamps etc. required for specified dia. bore pipes shall be of best quality and make as approved by the Engineer-in-charge. Necessary accessories with inner/ outer brass thread shall be used as required and instruction by Engineer in charge.

#### **2.0. Workmanship**

##### **2.1. Cutting, Laying & Jointing**

- 2.1.1.** When the tubes are to be cut or rethreaded, the ends shall be carefully filed out so that no obstruction to bore is offered. The ends of the tubes shall then be threaded conforming to the requirements of I.S.

554-1955 with pipe dies and taps carefully in such a manner that it will not result in slackness of joints when the two pieces are screwed together.

- 2.1.2. The taps and dies shall be used only for straightening screw threads which have becoming bent or damaged and shall not be used for turning of the threads so as to make them slack as the latter procedure may not result in the water tight joint. The screw threads for tube and fitting shall be protected from edge until they are fitted.
- 2.1.3. In jointing the tubes, the inside of the socket and the screwed end of the tubes shall be oiled and smeared with white or red lead and wrapping around with a few turns of fine spun yarn round the screwed end of the tube. The end shall then be tightly screwed in the socket, tees, etc. with a pipe wrench. Care shall be taken that all times free from dust and dirt during fixing. But from the joints shall be removed after screwing. After laying the open ends of the pipes shall be temperately plugged to prevent access of water, soil, or any other foreign matter. Jointing shall be carried out with proper chemical adhesive material and allow to dry.
- 2.1.4. Any threads exposed after jointing shall be painted or in the case of underground piping thickly coated with approved anti-corrosive paint to prevent corrosion.

## **2.2. Fixing concealed to wall, ceiling & floors.**

- 2.2.1. In case of fixing concealed cement pipes to walls or ceilings, these shall run on the surface of the wall, or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern, holder clamps keeping the pipes about 15 mm. clear of the wall. When it is found necessary to conceal the pipes and when specified so, chasing may be adopted or pipe fixed in ducts or recesses etc. provided that there is sufficient space to work on the pipe with usual tools. The pipe shall not ordinarily be buried in walls or solid floors, where unavoidable, pipe may be buried for short distances provided that adequate protection is given against damage and where so required joints are not buried. Where required M.S. tube sleeve shall be fixed at a place a pipe is passed through a wall or floor for expansion and contraction and other movements. In case the pipe is embedded in walls or floors, it should be painted with anti-corrosive bitumastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe is affected by lime. Under the floors, the pipe shall be laid in layer of sand filling.
- 2.2.2. All pipes and fittings shall be fixed truly vertical and horizontal unless unavoidable. The pipes shall be fixed to walls with standard pattern clamps of required size and shape, one end of which shall be properly plugged or cemented into walls with cement mortar 1:3 (1 cement : 3 coarse sand) and the other tightened round the pipes to hold it securely. These clamps shall be spaced at regular intervals in straight lengths at 2 MC/C interval in horizontal run and 2.5 m. interval in vertical run. For pipe of 15 mm. dia. up to 25 mm. dia the holes in the walls and floors shall be made by drilling with chisel or jumper and not by dismantling the brick work or concrete. However for bigger diameter pipes the holes shall be carefully made (1 cement : 3 coarse sand), and properly finished to match the adjacent surface.

## **2.3. Testing of joints :**

- 2.3.1. After laying and jointing, the pipes and fittings shall be inspected under working conditions of pressure and flow. Any joints found leaking shall be redone, and all leaking pipes removed and replaced without extra cost.
- 2.3.2. The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 Kg./Sq cm. The pipe shall be slowly and carefully charged with water allowing all air to escape and avoiding all shocks and water hammer. The draw off tap and stop cock shall then be closed and specified hydraulic pressure shall be applied gradually. The pressure gauge must be accurate. The pipes and fittings shall be tested in sections as the work laying proceeds, keeping, the joints exposed for inspection during the testing.

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

- 3.1. The description of the item shall, unless otherwise stated be held to include where necessary conveyance and delivery, handling, unloading, storing fabrication, hoisting, all labour for finishing to required shape and size, setting, fitting in position straight, cutting and waste return of packing etc.
- 3.2. The length shall be measured on running meter basis of finished work. The length shall be taken along the center line of the pipe and fittings. The pipes fixed to wall, ceiling, floors etc. shall be measured and paid under this item.
- 3.3. All the work shall be measured in decimal system as fixed in its place, subject to tolerance given below unless otherwise stated.
  - (i) Dimension shall be measured to the nearest 0.01 meter.
  - (ii) Area shall be worked out to the nearest 0.01 sq. meter.
- 3.4. All measurements of cutting shall unless otherwise stated be held to include the consequent waste.
- 3.5. In case of fitting of unequal bore, the target bore shall be measured for the test.
- 3.6. Testing of pipe lines fittings, and joints include for providing all plant appliances necessary for obtaining access to the work to be tested and carrying out the tests.
- 3.7. The rate includes U.P.V.C. pipe (SCH-40) with screwed socket joints to gather with all fittings (such as bends, sockets, elbows, tees, crosses, short pieces, clamps and plugs, unions etc.) and fixing complete with clamping wall hooks, wooden plug etc. and also curing, screwing and waste and for making forged (or hand made) bends on piping as required. Connector shall be inserted where required or directed. The rate also includes cutting through walls, floors etc. and their making good and painting exposed threads with anti-corrosive paint as above and testing where tubes are to be fixed to wall, ceiling and flooring, the rates shall not include painting of pipes, providing sleeves and sand filling under floor for which separate payment shall be made.
- 3.8. The rate shall be for a unit of **one running meter**.

#### **ITEM NO.64**

**Providing and fixing 15mm. Dia C. P. Brass screw down bib cock of approved quality including fixing the same in pipeline and testing etc. complete as directed 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 labor, 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.65**

**Providing and fixing 15mm. Dia C. P. Brass stop cock of approved quality including fixing the same in pipeline and testing etc. complete as directed by Engineer-in-charge.**

#### **1.0. Materials**

The concealed type C.P. stop cock of 15mm dia. heavy duty with cap shall conform to IS. : 781 -1977. The **stop cock** shall be of tested quality and approved by Engineer in charge.

## **2.0 Workmanship**

The **stop cock** shall be fixed in position by means of Jam nut and socket. The **stop cock** shall be fixed near the inlet of the water meter or as directed. The joints shall be done with white zinc and spun yarn. The joint shall be tested for leak proofing. All necessary testing should be carried out.

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

**3.1.** The rate includes cost of 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.66**

**Providing and fixing gun metal check or non return fullway wheel valve. (A) 25 mm Dia.**

**1.0. Materials :** The gun metal check or non 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 gun metal check or non return valve shall be fully cleared of all foreign matter before fixing. The fixing of shall be done by means of bolts nuts and 3 mm. rubber insertions with flaps 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.67**

**Providing and constructing SOAK WELL of 2.50m internal dia and 6.00 depth depth internal clear dimension including the cost of excavation, PCC 1:4:8 foundation for honey combed masonry in C.M. 1:4 (1cement : 4 sand), casting R.C.C. 1:2:4 (1cement: 2 sand: 4 graded stone aggregate 20mm nominal size) top slab 12 thick with C.I. manhole cover 600mm x 450mm size of 35 kg. weight and 75mm dia C.I. pipe 1800mm long with 75mm dia cowel vent and filling the wall 1000mm in depth with dry brick bats including providing vata in C.M. 1:3 (1cement: 3 sand), curing including cost of reinforcement etc. complete as per detailed drawing and directed by E.I.C**

The work includes providing and constructing a soak well of 2.50 m internal diameter and 6.00 m internal clear depth, complete in all respects as per detailed drawings and as directed by the Engineer-in-Charge (E.I.C.).

The scope shall include:

- Setting out and layout at site.
- Excavation in all types of soil including hard murum, soft rock (if encountered), shoring, strutting and dewatering wherever required.
- Disposal of surplus excavated material within specified lead.
- Providing and laying PCC foundation.
- Constructing honeycomb brick masonry.
- Providing dry brick bat filling.
- Providing vata in cement mortar.
- Casting RCC top slab including reinforcement.
- Fixing C.I. manhole cover and frame.
- Providing and fixing C.I. vent pipe with cowl.
- Curing and finishing.
- All leads, lifts, labour, materials, tools and tackles required to complete the work.

The item shall be executed strictly as per approved drawing and instructions of E.I.C.

## 2. Workmanship

### 2.1 Excavation

Excavation shall be carried out to required depth and diameter in all types of soil including necessary shoring, strutting and dewatering. Bottom shall be properly leveled and dressed.

### 2.2 PCC Foundation

Providing and laying Plain Cement Concrete in proportion 1:4:8 (1 cement : 4 coarse sand : 8 graded stone aggregate of 40 mm nominal size) of required thickness as foundation base, well compacted and cured.

### 2.3 Honeycomb Masonry

Constructing honeycomb brick masonry in Cement Mortar 1:4 (1 cement : 4 sand) in circular shape as per drawing. Honeycomb openings shall be uniformly maintained to facilitate seepage. Joints shall be properly finished and cured adequately.

### 2.4 Brick Bat Filling

Providing and filling 1000 mm depth around the outer periphery of masonry with dry brick bats, properly packed and consolidated to ensure effective percolation.

### 2.5 Vata

Providing and laying vata in Cement Mortar 1:3 (1 cement : 3 sand) as required around top portion or as shown in drawing.

#### 2.6 RCC Top Slab

Providing and casting 120 mm thick RCC slab in proportion 1:2:4 (1 cement : 2 sand : 4 graded stone aggregate of 20 mm nominal size), including:

- Centering and shuttering
- Mixing, placing and vibrating
- Proper compaction
- Finishing and curing

Reinforcement steel shall be provided as per detailed structural drawing including cutting, bending, binding and placing in position.

#### 2.7 Manhole Cover

Providing and fixing C.I. manhole cover 600 mm × 450 mm size, weighing approximately 35 kg including frame, properly embedded in concrete.

#### 2.8 Vent Pipe

Providing and fixing 75 mm diameter C.I. pipe, 1800 mm long, with 75 mm diameter C.I. cowl vent, properly secured in position.

#### 2.9 Curing

All masonry and concrete works shall be cured for minimum specified period to achieve required strength.

### **Mode of measurement and payment**

#### **As per Bill Of Quantities**

### **ITEM NO.68**

**Construction Septic tank Inside dimension of 4.00 m in length & 2.50 m in width & 2.00 m depth Including excavating any type of soil as shown and mentioned in the drawing, providing and laying 0.10 m thick plain cement concrete 1:3:6 (1 cement: 3 coarse sand: 6 graded stone agg.) 40 mm thick IPS flooring at bottom with brick masonry 0.23 m thick walls CM 1:5 (1 cement: 5 coarse sand) and intermediate partition CM 1:4 & RCC Top slabs 12 cms thick in 1:2:4 (1 cement: 2 coarse sand: 4 graded stone agg) including reinforcement as per design and 15 mm thick cement plaster in CM 1:4 with floating coat of neat cement slurry Inside, top and around tank below 15 cm on ground level, Also provide Two nos CI Manhole frame and cover of size 60 cm x 45 cm & 75 mm dia. PVC 10 kgf/Sq cm pressure air vent pipe in 3.00 length with cowl etc complete as per direction of Engineer in charge.**

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

Providing and constructing septic tank of 4.00 m internal length, 2.50 m internal width and 2.00 m internal depth, including excavation in all types of soil, PCC bed, IPS flooring, brick masonry walls and partition, RCC top slab with reinforcement, internal plastering, manhole covers, vent pipe and all allied works complete as per approved drawing and as directed by the Engineer-in-Charge.

The rate shall include all materials, labour, tools & tackles, centering, shuttering, curing, dewatering, leads & lifts and all incidental works required to complete the work.

## 2. Workmanship & Technical Specification

### 2.1 Excavation

Excavation shall be carried out in all types of soil to required depth and size as per drawing including dressing of sides and leveling of bottom. Dewatering and disposal of surplus excavated material within specified lead shall be included.

### 2.2 PCC Bed

Providing and laying 100 mm thick Plain Cement Concrete (PCC) 1:3:6 (1 cement : 3 coarse sand : 6 graded stone aggregate of 40 mm nominal size) as leveling course, properly compacted and cured.

### 2.3 IPS Flooring

Providing and laying 40 mm thick IPS flooring over PCC base, finished smooth and level.

### 2.4 Brick Masonry

- Constructing 230 mm thick brick masonry walls in Cement Mortar 1:5 (1 cement : 5 coarse sand).
- Providing intermediate partition wall in Cement Mortar 1:4 (1 cement : 4 coarse sand).
- Masonry shall be properly bonded, aligned and cured.

### 2.5 RCC Top Slab

Providing and casting 120 mm thick RCC slab in proportion 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm nominal size) including:

- Centering and shuttering
- Mixing, placing, compacting and vibrating
- Finishing and curing

Reinforcement steel shall be provided as per structural design including cutting, bending, binding and placing in position.

### 2.6 Plastering



Providing 15 mm thick cement plaster in CM 1:4 to inside walls, partition walls, underside of slab and around tank up to 15 cm below ground level, finished smooth with floating coat of neat cement slurry to make surface waterproof and impervious.

## 2.7 Manhole Cover

Providing and fixing Two Nos. C.I. manhole frame and cover of size 60 cm × 45 cm, properly embedded in RCC slab.

## 2.8 Vent Pipe

Providing and fixing 75 mm diameter PVC air vent pipe (10 kg/cm<sup>2</sup> pressure rating), 3.00 m long, with suitable PVC cowl, properly secured in position.

## 2.9 Curing

All concrete, masonry and plaster work shall be properly cured for specified duration to achieve required strength and durability.

Mode of measurement and payment  
As per Bill Of Quantities

## ITEM NO.69

**S.S.box type letters:-The Signage letters shall be in Gujarati / English of following sizes. Signage(a)Box type metal letters forming composite box made from 1mm thick stainless steel plate of grade 304 having brush finish/as required of following font size to be fixed at various structures in english and or Gujrati . 125mm high**

### 1. Scope of Work

Providing, fabricating and fixing Stainless Steel (S.S.) box type signage letters in Gujarati and/or English language of 125 mm height, made from 1.0 mm thick stainless steel plate of Grade 304 with brush finish or as specified, complete in all respects as per approved design, drawing and direction of the Engineer-in-Charge.

The work shall include fabrication, supply, transportation, fixing, anchoring and all incidental works required for proper installation at site.

### 2. Workmanship & Technical Specification

#### 2.1 Material

- Stainless Steel Sheet:  
1.0 mm thick, Grade 304, corrosion resistant.
- Finish:  
Brush finish / matt finish / as approved by Engineer-in-Charge.

- Letter Height:  
125 mm (English / Gujarati font as approved).

## 2.2 Fabrication

- Letters shall be fabricated in box type construction, forming a composite hollow box structure.
- Front face and side returns shall be neatly folded and welded.
- Joints shall be TIG welded and ground smooth to achieve seamless appearance.
- Edges shall be smooth, burr-free and properly finished.
- Depth of letter shall be proportionate (generally 20-50 mm or as approved).

## 2.3 Fixing Arrangement

- Letters shall be provided with necessary S.S. studs/bolts welded at back.
- Fixing shall be done with proper anchoring system using fasteners, nylon sleeves, chemical anchors or as required depending on surface condition.
- Alignment, spacing and layout shall be strictly as per approved artwork.
- Letters shall be fixed plumb, level and in proper alignment.

## 2.4 Protection & Finishing

- Protective film shall be removed after installation.
- Surface shall be cleaned properly after fixing.
- Any scratches or damages during fixing shall be rectified.
- Mode of measurement and payment
- As per Bill Of Quantities

## ITEM NO.70

**Interior Signage- Laser Cut Sign Board :Providing & fixing approved stainless steel laser cut display signage panel/ board on building at all levels and heights in form of letters/ numbers/ symbol/ logo, for Address/ Information / designation of person/officer as per details. The Signage letters language shall be in Gujarati/Hindi/English and of any sizes, color and width / height/ length. The plate shall be atleast 50mm extra on all sides of the letters for large size signages and Min. 25mm for all Small size signages to be placed within the building, including cutting, finishing, fixtures and fittings.**

### 1. Scope of Work

The scope of work includes providing, fabricating, and fixing approved **stainless steel laser-cut display signage panels/boards** inside the building at all levels and heights. The signage may include **letters, numbers, symbols, or logos** for purposes such as **addressing, information, or designation of persons/officers**, as per approved design and drawings.

The work includes:

- Fabrication of letters, symbols, or logos in **Gujarati, Hindi, or English** of approved size, color, width, height, and thickness.
- Provision of backing plate/panel with at least **50 mm extra on all sides** for large signages and **25 mm** for small signages.
- Cutting, polishing, finishing, and treatment of stainless steel surfaces.
- Providing and fixing all necessary **fixtures, fasteners, brackets, screws, anchors, and adhesives**.
- Installation at all levels and heights within the building ensuring proper alignment, leveling, and aesthetics.
- Cleaning, protection, and removal of debris after installation.
- Complete execution as per **approved drawings, design, and directions of the Engineer-in-Charge**.

## 2. Material Specifications

- **Stainless Steel:** Grade **304 or 316**, thickness as approved per sign size.
- **Finish:** Brushed, mirror-polished, or powder-coated (as approved).
- **Lettering:** Laser-cut letters/symbols/logo, smooth edges, clean finish.
- **Backing Plate:** Same stainless steel or approved material, with appropriate border (50 mm for large signs, 25 mm for small signs).
- **Fasteners & Fixtures:** Stainless steel screws, anchors, brackets, spacers, or adhesive suitable for wall/fixed surface.

## 3. Workmanship

- Precision **laser cutting** for clean edges without burrs or sharp corners.
- Surface polishing and finishing to remove scratches or imperfections.
- Proper alignment, spacing, and leveling of letters/symbols as per approved design.
- Secure and durable fixing ensuring stability and aesthetic appearance.
- Coordination with site conditions to prevent damage to walls, panels, or surrounding finishes.

## 4. Payment

- Payment shall be made **per completed and fixed signage panel/board**, including all materials, fabrication, finishing, fixtures, fasteners, labor, and incidentals.
- No separate payment shall be made for minor consumables or scaffolding required for installation.
- Any rectification or adjustment during or after installation due to workmanship defects shall be carried out by the contractor **without extra cost**.
- Measurement for payment shall be based on **number of signage panels/boards installed**.

## ITEM NO.71

Providing & Fixing Granite "Takti" of size 0.75 x 0.90mt. with palment & roller curtain with using 20mm thic black granite with computerised golden colour letteing fixng in wall with teakwood decorative 0.07 x 0.03 cms size bettern pattin and palment will be made by 18mm thick plywood with 4mm thick viniar wit teakwood bettern patti with approved febric roller bling with necessary fixture & fastening of polishing work etc complete

## 1. Granite Plate

- Size: **0.75 m × 0.90 m**
- Thickness: **20 mm Black Granite**, mirror-polished on the front surface and all exposed edges.
- Edges: Chamfered/half-round edge as approved.
- Lettering:
  - **Computerised engraved lettering** filled with **golden colour enamel / epoxy paint**.
  - Layout and text as approved by the Engineer-in-Charge.
- Fixing:
  - Granite shall be firmly fixed to the plywood panel using **stainless steel screws**, metal clamps, and approved adhesive (e.g., epoxy-based stone adhesive).

## 2. Teakwood Decorative Frame

- Frame size: **0.07 m × 0.03 m** (70 mm × 30 mm) teakwood molding, decorative pattern.
- Teakwood: First-class seasoned teakwood, smooth-finished.
- Polishing:
  - **Melamine / PU polish** in approved shade.
  - Minimum two coats after proper surface preparation.

## 3. Back Panel (Palmet / Paneling)

- Material:
  - **18 mm thick plywood (BWP / ISI marked)**.
  - Finished with **4 mm thick teak veneer** (viniar).
- Veneer treatment:
  - Stain + melamine / PU polish to match teak frame.
- Fixing:
  - Plywood panel shall be fixed to the wall using aluminum/Z-shaped brackets, screws, and fasteners.

## 4. Roller Curtain (Roller Blind)

- Type: **Fabric roller blind** with approved fabric/design.
- Mechanism:
  - Smooth rolling mechanism with spring/chain operating system.
  - Aluminum top tube and bottom bar.
- Installation:
  - Mounted above the granite Takti such that it fully covers and protects the granite nameplate when rolled down.
  - Includes all fixtures, brackets, and accessories.

## 5. Fittings, Fasteners & Installation

- Use of **stainless steel screws**, anchor fasteners, brackets, clamps, and adhesives as required.
- Alignment, leveling, and wall surface preparation included.
- Site protection, cleaning, and removal of debris included.

## 6. Finishing

- All teakwood surfaces properly polished.
- All edges smoothed and cleaned.
- Granite lettering checked for correctness and clarity.
- Complete installation shall be neat, firm, and free from defects.

## 7. Completion

The item shall be executed **complete in all respects**, including materials, labour, finishing, polishing, equipment, scaffolding, and all incidentals, **as per the approved design and the instructions of the Engineer-in-Charge.**

### ITEM NO.72

**Providing & laying weep hole in Abutments, and returns by using A.C. pipe of 100mm including laying in proper grede and jointing the completed as per detailed specification.**

The weep holes in the masonry and returns shall be provided of the A.C. pipes of 100 mm dia. The pipe shall be fixed of suitable length & in full thickness of the masonry / concrete work. Necessary C.I. grating shall be provided on back side of abutment & returns on the inlet of opening of weep holes.

Materials the A.C. pipes of 100mm dia.

The Asbestos cement pipe of diameters specified in description of the item shall conform to I.S. 1626-1900. The interior of pipe shall have a smooth finish, regular surface & regular internal diameter.

The tolerance in all dimensions shall be as per IS 1926-Part-I 1980.

The grating shall be of C.I. 100 mm. dia. & per IRC specification.

The weep holes shall be provided 1 meter C/C shall be placed in staggered. After laying weep holes, it shall be clear of earth and other materials from its complete length.

The rate shall be paid on Number basis.

### ITEM NO.73

**Cautionary Warning Sign :-Providing and fixing sign boards made out of 2mm aluminium sheet / 4mm ACP (Aluminum composite Panel); size 90 x 90 x 90 cms. equilateral triangle as per design of IRC-67-2012. Pre treated with phosphating process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint ;reflectorised with Micro Prismatic Grade retro reflective sheeting of Type-11 as per ASTM D-4956 and latest M.O.S.T. Specifications; 3.6mtr longstand post of 75 x 75 x 6mm / 65NB Circular MS Pipe as required and frame fabricated from suitable size iron angle of 35 x 35 x 3mm; painted with best quality epoxy coatings in black and white bends. The details of symbol for each board shall be as per the instruction of engineer in charge. The fixing at site shall be in 1:2:4 CC block of size 45 x 45 x 60 Cms. for each leg.including excavation, curing etc. complete under the supervision of engineer in charge. A warranty for 10 years for the Retro reflective sheeting from original**

**manufacturer & a certified copy of 3 year outdoor exposure test report from third party test lab for the product offered shall be submitted by contractor. (A) Class-C Type-11 Retro Reflective sheeting**

Placement of road signs will be within road users' view. To aid in conveying proper meaning, road signs will be positioned with respect to the location or situation to which it applies. The location and legibility of the road sign will be such as to provide adequate response time to road users to read and take action at the operating speed.

### **Orientation of Signs**

The signs will be placed at right angles to the line of travel of the approaching traffic. Where light reflection from the sign face is encountered to such an extent as to reduce legibility, the sign should be turned slightly away from the road. On horizontal curves, the sign should not be fixed normal to the carriageway but the angle of placement will be determined with regard to the course of the approaching traffic.

Sign faces will be normally vertical, but on gradients it may be desirable to tilt a sign forward or backward from the vertical to make it normal to the line of sight and improve the viewing angle.

**Cautionary/warning** and mandatory signs will be fabricated through process of screen printing. In case the facility is not locally available in the region of work, these signs and informatory signs may have inscription /message having cut letters of non- reflective black sheeting which shall be bonded well or the base sheeting as directed by Engineer in charge.

### **1. Material for Signs:**

The various materials and fabrication of road signs shall conform to the following requirements:

#### **1.1 Concrete**

Concrete for footing shall be of the grade shown on the contract drawings or of minimum M15 grade conforming to section 800 of the specifications for MORD.

#### **1.2 Reinforcing Steel**

Reinforcing steel shall conform to the requirements of IS 1786 unless otherwise specified.

#### **1.3 Bolts, Nuts and Washers**

High strength bolts shall conform to IS 1367 whereas precision bolts, nuts, etc. shall conform to IS 1364.

#### **1.4 Plates and Supports**

Plates and support sections for the signposts shall conform to IS 226 and IS 2062 or any other stated IS specification.

#### **1.5 Substrate**

Aluminium Composite Material (ACM) conforming to following subsections.

### a) Aluminium Sheet

Aluminium sheets used for sign boards shall be of smooth, hard and corrosion resistant aluminium alloy conforming to IS 736 - Material Designation 24345 or 1900.

### b) Aluminum Composite Material (ACM)

ACM sheets used for sign boards is a sandwiched construction with a thermoplastic core of „Low Density Polyethylene“ (LDPE) between two thick skins/sheets of Aluminium with overall thickness of 4 mm and 3 mm, and Aluminium skin thickness of 0.4- 0.5 mm and 0.25 - 0.3 mm respectively on both sides. The retro reflective sheeting must be applied on the top surface with aluminum surface with recommended surface preparation from sheeting manufacturer. A fluorocarbon coating may be applied over the exposed surface of aluminium to ensure corrosion resistant and weatherability and shall conform to relevant ASTM. The mechanical properties of 4mm and 3mm ACM and that of its Aluminum skin shall conform to the requirement given in Table 1.1, when tested in accordance with the test methods mentioned against each of them

Table 1.1 Specifications for Aluminum Composite Material (ACM)

Sl No.	Description	Specification for 4mm		Specification for 3mm
		Standard test	Acceptable value	Acceptable value
A	<b>Mechanical Properties of ACM</b>			
1	Peel off strength with retro reflective sheeting. (Drum Peel Test)	ASTM D903	Min. 4N/mm	Min. 4N/mm
2	Tensile strength	ASTM E8	Min. 40N/mm <sup>2</sup>	Min. 30 N/mm <sup>2</sup>
3	0.2% Proof Stress	ASTM E8	Min. 34N/mm <sup>2</sup>	Min. 34 N/mm <sup>2</sup>
4	Elongation	ASTM E8	Min. 6%	Min. 5%
5	Flexural strength	ASTM C393	Min. 130N/mm <sup>2</sup>	Min. 120 N/mm <sup>2</sup>
6	Shear strength with Punch shear test	ASTM D732	Min. 18N/mm <sup>2</sup>	Min. 18 N/mm <sup>2</sup>
B	<b>Properties of Aluminium Skin</b>			
1	Tensile strength (Rm)	ASTM E8	Min. 150N/mm <sup>2</sup>	Min. 130 N/mm <sup>2</sup>
2	Modulus of elasticity	ASTM E8	Min. 70,000 N/mm <sup>2</sup>	Min. 70,000 N/mm <sup>2</sup>

<b>3</b>	Elongation	ASTME8	A <sub>50</sub> Min.2%	A50Min.2%
<b>4</b>	0.2%Proof Stress	ASTME8	Min.110N/mm <sup>2</sup>	Min. 110 N/mm <sup>2</sup>

### c)PlateThickness

Shoulder mounted ground signs with a maximum side dimension not exceeding 600 mm shall not be less than 3 mm thick with Aluminium Composite Material. All other signs shall be at least 4 mm thick with Aluminium Composite Material. The thickness of the sheet shall be related to the size of the sign and its support and shall be such that it does not bend or deform under prevailing wind and other loads. All overhead signs made with Aluminium Composite Material shall be minimum 4 mm thick to withstand wind and other loads without deformation.

### 1.6 RetroReflectiveSheeting

The retro reflective sheeting used on the signs shall consist of white or coloured sheeting having a smooth outer surface, which has the property of retro reflection over its entire surface. It shall be weather resistant and exhibit colour fastness. It shall be new and unused and show no evidence of cracking, scaling, and pitting, blistering, edge lifting or curling and shall have negligible shrinkage or expansion. A certificate of having the sheeting tested for coefficient of retro reflection, daytime colour and luminance, shrinkage, flexibility, liner removal, adhesion, impact resistance, specular gloss and fungus resistance, 3 years outdoor weathering and its having passed these tests shall be obtained from International/Government laboratory/Institute by the manufacturer of the sheeting and in case the certificate is obtained from international agency, it should also be obtained from Indian agency within 3 years of launching of product by the manufacturer abroad. Alternatively, a certificate conforming to ASTM Specification (D 4956-09) on artificial accelerated weathering requirements from a reputed laboratory in India will be accepted. The supplier will have to submit performance guarantee of meeting the requirement of three years outdoor weathering of the sheeting.

All micro prismatic grade sheets will be as per ASTM D 4956-09 Type IV. The reflective sheeting shall be made of micro prismatic retro-reflective material. The retro-reflective surface, after cleaning with soap and water and in dry condition shall have the minimum co-efficient of retro reflection (determined in accordance with ASTM D 4956-09). When totally wet, the sheeting shall show not less than 90 percent of the values, of retro-reflection indicated in

**6.4.** at the end of the 7 years, the sheeting shall retain at least 80 percent of its original retro-reflectance.

Table 6.4: Acceptable Minimum Coefficient of Retro-reflection for Type-IV Prismatic Grade

Sheeting (Candelas per Lux per Square Metre)

Observation Angle	Entrance Angle	White	Yellow	Orange	Green	Red	Blue	Brown	Green	Yellow-Fluorescent	Fluorescent Yellow	Fluorescent Orange	Fluorescent
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0.1° <sup>B</sup>	-4°	500	380	200	70	9 0	42	25	400	300	150
0.1° <sup>B</sup>	+30°	240	175	94	32	4 2	20	12	185	140	70
0.2°	-4°	360	270	145	50	6 5	30	18	290	220	105
0.2°	+30°	170	135	68	25	3 0	14	8.5	135	100	50
0.5°	-4°	150	110	60	21	2 7	13	7.5	120	90	45
0.5°	+30°	72	54	28	10	1 3	6	3.5	55	40	22

<sup>A</sup>Minimum Coefficient of Retroreflection ( $R_A$ ) ( $\text{cd.lx}^{-1}.\text{m}^{-2}$ ).

<sup>B</sup>Values for 0.1° observation angles are supplementary requirements that shall apply only when specified by the purchaser in the contract or order.

**1.7 Messages/borders:** The message (legends, letters, numerals etc.) letter, numerals, symbols /legend/arrow etc.in Gujarati, Hindi and /or English, should either be screen- printed or to be cut out from durable transparent Overlay Electrocutable film or cutout from the same type of reflective sheeting for the cautionary /mandatory sign boards. The screen printing shall be processed and finished with materials and in a manner specified by the sheeting manufacturer. For the informative and other sign boards, the messages (legends, letters, numerals etc.) and borders shall be cut out from durable transparent overlay film or cut-out from the same reflective sheeting only. Cut out shall be from durable transparent overlay materials as specified by the sheeting manufacturer and shall be bonded with the sheeting in the manner specified by the manufacturer. For screen-printed transparent coloured areas on white sheeting, the coefficient of retro-reflection shall not be less than 50 per cent of the values of corresponding colour in the above table. Cut-out messages and borders, wherever used, shall be either made out of retro reflective sheeting or made out of durable transparent overlay except those in black which shall be of non-reflective sheeting or opaque in case of durable transparent overlay.

**1.8 Adhesives:** The sheeting shall have a pressure-sensitive adhesive of the aggressive-tack type requiring no heat, solvent or other preparation for adhesion to a smooth clean surface. The adhesive shall be protected by a removable liner (removable by peeling without soaking in water or other solvent) and shall be suitable for the type of material of the base plate used for the sign. The adhesive shall form a durable bond to smooth, corrosion

and weather resistant surface of the base plate such that it shall not be possible to remove the sheeting from the sign base in one piece by use of sharp instrument. In case of pressure-sensitive adhesive sheeting, the sheeting shall be applied in accordance with the manufacturer's Specifications.

### **1.9 Fabrication:**

Surface to be reflectorised shall be effectively prepared to receive the retroreflective sheeting. The aluminum sheeting shall be de-greased either by acid or hot alkaline etching and all scale/dust removed to obtain a smooth plain surface before the application of retro-reflective sheeting. If the surface is rough, approved surface primer may be used. After cleaning, metal shall not be handled, except by suitable device or clean canvas gloves, between all cleaning and preparation operation and application of reflective sheeting/primer. There shall be no opportunity for metal to come in contact with grease, oil or other contaminants prior to the application of retro-reflective sheeting. Complete sheets of the material shall be used on the signs except where it is unavoidable. At splices, sheeting with pressure-sensitive adhesives shall be overlapped not less than 5mm. Where screen printing with transparent colours is proposed, only butt joint shall be used. The material shall cover the sign surface evenly and shall be free from twists, cracks and folds. Cut-outs to produce legends and borders shall be bonded with the sheeting in the manner specified by the manufacturer.

### **1.10 Installation**

**1.10.1** Signposts, their foundations and sign mountings shall be so constructed as to hold these in a proper and permanent position against the normal storm wind loads or displacement by vandalism. Normally, signs with an area upto 0.9 sq. m. shall be mounted on a single post, and for greater area two or more supports shall be provided. Sign supports may be of mild steel, reinforced concrete or galvanized iron (G.I.). Post( s) shall be firmly fixed to the ground by means of properly designed foundation. The work of foundation shall conform to relevant Specifications as specified.

**1.10.2** All components of sign and supports, other than the reflective portion and MS / G.I. posts shall be thoroughly descaled, cleaned, primed and painted with two coats of epoxy paint. Any part of mild steel (M.S.) post below ground shall be painted with three coats of red lead paint.

**1.10.3** The signs shall be fixed to the posts by welding in the case of steel posts and by bolts and washers of suitable size in the case of reinforced concrete or G.I. posts. After the nuts have been tightened, the tails of the bolts shall be furred over with a hammer to prevent removal.

#### **1.10.4 Fixing**

##### **1.10.4.1 Materials**

The various materials and fabrication of the traffic signs shall conform to the following requirements:

**4.1.1. Concrete:** Concrete shall be of the M20 grade or as shown on the Contract drawings or otherwise as directed by the Engineer.

**4.1.2. Water:** Water shall conform to IS: 456-1978. Storage & handling of water shall be clean.

**4.1.3. Cement:** Cement shall conform to IS: 269-1976 or IS: 455-1976.

**4.1.4. Sand, aggregates:** Sand, aggregate & its gradation shall conform to M6, M12 & M13 of General Technical Specifications for Building Works..

#### **1.10.4.2. Installation**

**4.2.1.** The supporting structure and signs shall be fabricated and erected as per details given in the plans.

**4.2.2.** The work of construction of foundation for sign supports including excavation and backfill, forms, steel reinforcement, concrete and its placement shall conform to the relevant Specifications given in these Specifications.

**4.2.3.** Signs posts, their foundations and sign mountings shall be so constructed as to hold signs in a proper and permanent position to adequately resist swaying in the wind or displacement by vandalism.

**4.2.4** After installation of signs is complete, the signs shall be inspected by the Engineer. If specular reflection is apparent on any sign, its positioning shall be adjusted by the Contractor to eliminate or minimize this condition.

**1.11 Warranty and durability:** The Contractor shall obtain from the manufacture a seven-year warranty for satisfactory field performance including stipulated retro reflectance of the retro-reflectance sheeting. And submit the same to the Engineer. The Contractor/supplier shall also furnish a certification that the signs and materials supplied against the assigned work meets all the stipulated requirements and carry the stipulated warranty. Processed and applied in accordance with recommended procedures, the reflective material shall be weather resistant and, following cleaning, shall show no appreciable discolouration, cracking, blistering or dimensional change and shall not have less than 50 per cent of the specified minimum reflective intensity values (Table 800-1 and 800-2) when subjected to accelerated weathering for 1000 hours, using type E or EH weatherometer (AASHTO Designation M 268).

#### **1.12 Measurements for Payment**

The measurement of standard cautionary, mandatory and information signs supplied and fixed, while for direction and place identification signs, these shall be measured in No. basis.

### **1.13 Rate**

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

#### **ITEM NO.74**

**Facility Informatory Sign :-**Providing and fixing sign boards made out of 2mm aluminium sheet / 4mm ACP (Aluminum composite Panel); size 80 x 60 cms rectangular as per design of IRC-67-2012. Pre treated with phosphating process & acid etching; coated with one coat of epoxy primer and two coats of best quality epoxy paint ;reflectorised with Micro Prismatic Grade retro reflectivesheeting of Type-11 as per ASTM D-4956 and latest M.O.S.T.Specifications; 3.6mtr long stand post of 75 x 75 x 6mm / 65NB Circular MS Pipe as required and frame fabricated from suitable size iron angle of 35 x 35 x 3mm; painted with bestquality epoxy coatings in black and white bends. The details of symbol foreach board shall be as per theinstruction of engineer in charge. The fixing at site shall be in 1:2:4 CC block of size 45 x 45 x 60 Cms. for each leg.including excavation, curing etc.complete under the supervision of engineer in charge. A warranty for 10 years for the Retro reflective sheeting from original manufacturer & a certified copy of 3 year outdoor exposure test report from third party test lab for the product offered shall be submitted by contractor. (A) Class-C Type-11 Retro Reflective sheeting

### **Detailed Technical Specification As Per Item No.73**

#### **ITEM NO.75**

**Direction (Junction) Sign :-**Providing and fixing sign boards made out of 2mm aluminium sheet / 4mm ACP (Aluminum composite Panel); size 244x122 cms. rectangular as per design of IRC-67-2012. Pre treated with phosphating process & acid etching; coated with one coat of epoxyprimer and two coats of best quality epoxy paint ; reflectorised with High Intensity Prismatic Grade retro reflectivesheeting of Type-4 as per ASTM D-4956 and latest M.O.S.T.Specifications; 4.0mtr (2 Nos.) long stand post of Iron Angle 75 x 75 x 6mm / 65NB Circular MS Pipe as required and frame fabricated from suitable size iron angle of 50x50x5mm; painted with bestquality epoxy coatings in black and white bends. The details of symbol for each board shall be as per the instruction of engineer in charge. The fixing at site shall be in 1:2:4 CC blockof size 45 x 45 x 60 Cms. for each leg including excavation, curing etc.complete under the supervision of engineer in charge. A warranty for 7 years for the Retro reflective sheeting from original manufacturer & a certified copy of 3 year outdoor exposure test report from third party test lab for the product offered shall be submitted by contractor. (B) Class-B Type-4 Retro Reflective sheeting

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

Providing, fabricating, supplying and erecting Direction (Junction) Sign Boards of size 244 cm × 122 cm (rectangular) conforming to IRC:67-2012 specifications, complete in all respects including supporting structure, foundation, painting, reflectorisation and installation at site as directed by the Engineer-in-Charge.

The work includes:

- Fabrication of sign board using 2 mm thick Aluminium Sheet or 4 mm thick ACP (Aluminium Composite Panel) of approved make.
- Surface preparation by phosphating and acid etching process.
- Application of one coat epoxy primer and two coats best quality epoxy paint on the non-reflective surfaces.
- Reflectorisation with High Intensity Prismatic Grade (HIP) Type-4 Retro Reflective Sheeting (Class-B) conforming to ASTM D-4956 and latest MORTH (Ministry of Road Transport & Highways) Specifications.
- Fabrication of frame using 50 × 50 × 5 mm MS Angle.
- Provision of two numbers, 4.0 m long supporting posts made of either:
  - 75 × 75 × 6 mm MS Iron Angle, or
  - 65 NB Circular MS Pipe, as approved.
- Painting of posts and frame with approved epoxy coating in black and white bands.
- Display of symbols, legends, arrows, and border details strictly as per IRC:67-2012 and as directed by Engineer-in-Charge.
- Installation in 1:2:4 Cement Concrete foundation block of size 45 × 45 × 60 cm for each leg, including:
  - Excavation
  - Centering and alignment
  - Concrete casting
  - Backfilling and compaction
  - Curing

## **2. Materials & Specifications**

- Aluminium Sheet: Minimum 2 mm thick, corrosion resistant.  
OR
- ACP Sheet: 4 mm thick exterior grade.
- Retro Reflective Sheeting:
  - High Intensity Prismatic (HIP) Grade
  - Type-4, Class-B
  - Conforming to ASTM D-4956
  - Suitable for 7-year outdoor durability
- MS Sections: Confirming to relevant IS standards.
- Concrete: Mix 1:2:4 (M15 grade minimum).
- Paint: Epoxy primer and epoxy paint of approved brand.

### **3. Workmanship**

- Cutting, bending and fabrication shall be done with precision ensuring smooth edges and proper finishing.
- Sheeting shall be machine-applied using recommended pressure and temperature to avoid air bubbles and wrinkles.
- All joints shall be properly welded and ground smooth.
- Structure shall be true to line, level and plumb.
- Installation shall ensure correct orientation, height and lateral clearance as per IRC standards.
- No damage to reflective surface during transport and erection.
- All works shall be executed under supervision of Engineer-in-Charge.

### **4. Warranty & Testing**

- 7-year manufacturer warranty certificate for Retro Reflective Sheeting.
  - Certified copy of 3-year outdoor exposure test report from an approved third-party laboratory for the offered product.
  - All documents shall be submitted before approval.
5. Mode of measurement and payment
- As per Bill Of Quantities

### **ITEM NO.76**

**Providing and Constructing coffer dam (Assume Size 4.50 x 4.50) in River basin including excavation, filling, middle portion with B.C. soil (in empty cement / Gunny Bags) to the entire satisfaction of E.I.C. Till completion of work. Sand brought from outside with Dismantling of coffer dam (Sand Bags) after completion of the work with Earthwork for embankment including breaking clods dressing with all lead and lift for Approach Portion (excluding watering and consolidation). Borrow From Any Lead including Dewatering by pumping set of required capacity including temporary platform, carting, pumping at site and fixing the same in position including all accessories and fuel and labour etc. complete**

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

Providing and constructing a temporary Cofferdam of approximate size 4.50 m × 4.50 m in river basin for execution of foundation/structure work, including all materials, labour, equipment, dewatering and dismantling after completion of work, as directed by the Engineer-in-Charge (E.I.C.).

The work shall include:

- Setting out and layout marking at site.
- Excavation in river bed for formation and seating of coffer dam.
- Construction of bund using sand-filled cement/gunny bags.

- Filling of middle portion with suitable B.C. soil (Black Cotton Soil) filled in empty cement/gunny bags, properly stacked and compacted.
- Supplying sand brought from outside source including all leads and lifts.
- Formation of approach embankment including earthwork, breaking clods and dressing.
- Borrow earth from any approved lead.
- Dewatering of enclosed area by pumping sets of required capacity.
- Providing temporary working platform for pumps.
- Carting, placing, fixing and operating pumps including fuel, accessories and labour.
- Maintenance of coffer dam till completion of permanent work.
- Dismantling and removal of sand bags after completion of work and disposal as directed.

## **2. Materials**

- Empty Cement/Gunny Bags in good condition.
- Sand free from organic impurities.
- Approved B.C. soil for inner core filling.
- Borrow earth for embankment formation.
- Pumping sets (diesel/electric operated) of adequate discharge capacity.

## **3. Workmanship**

- Bags shall be properly filled (not overfilled), tied and stacked in interlocking manner to ensure stability.
- Coffor dam shall be constructed to required height above water level to prevent seepage.
- Proper slope and stability of bund shall be maintained.
- Continuous pumping shall be carried out to keep the enclosed area dry.
- Leakage points shall be immediately sealed by additional sand bags.
- Approach embankment shall be properly dressed and leveled.
- Dewatering operations shall continue uninterrupted till completion of structural work.
- Entire work shall be executed to the satisfaction of E.I.C.

## **4. Dismantling**

- After completion of permanent work, sand/gunny bags shall be dismantled carefully.
- Material shall be removed from river bed without causing obstruction to flow.
- Site shall be cleared and restored to original condition as far as practicable.

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

As per Bill Of Quantities

**ITEM NO.77**

Point wiring for Light / Bell with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires up to 10 mtr length , in below type of pipe erected with 6A Modular type switch / bell push & accessories and earth continuity of following type, erected on PVC / Metallic/Wooden box, single mounting base frame covered with textured/metallic/white front plate modules erected on / in wall / ceiling as per pipe erected, with necessary Lamp holder/ceiling rose / H.D.Connector as directed. (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete Cat. III

As per Electrical Specification Booklet attached.

#### ITEM NO.78

Point wiring for Tissino / Modular secondary light point with 2-1.5 sq.mm & earth wire of 1.5 sq.mm (green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires, in below type of pipe to be erected complete with earth continuity and necessary connection with primary light with accessories erected on Metal / PVC / wooden box covered with 3 mm thick PC(Polycarbonate) / Acrylic sheet for open / concealed wiring. with necessary Lamp holder / ceiling rose / H.D.Connector as directed. Note:- Maximum up to 6 mtrs length, excess will be considered as Mains for Secondary Point. (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete

As per Electrical Specification Booklet attached.

#### ITEM NO.79

Point wiring for Individual Plug with & earth wire of 1.5 sq.mm (Green) both are of ISI marked 1.1 KV grade FRLS PVC insulated multi strand copper wires up to 10 mtr length, in below type of pipe erected complete with Modular type switch & 5 pin Plug erected on PVC / Metallic/Wooden box covered with appropriate front plate modules erected on / in wall / ceiling as per pipe erected with following type of accessories [I] For 6A Plug and 6 a switch with 2-1.5 sq.mm Cu. Wire from nearby switchboard/mcb db board (f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete

As per Electrical Specification Booklet attached.

#### ITEM NO.80

[II] For 16A Plug and 16 amp switch with 2-2.5 sq.mm Cu. Wire from mcb db board.

(f) with medium class Rigid PVC pipe and accessories erected concealed in wall/ceiling complete Cat. III

As per Electrical Specification Booklet attached.

#### ITEM NO.81

Point wiring for on board Looped Plug with 6A Modular type switch & 5 pin socket erected on PVC / Metallic/Wooden box, single mounting base frame covered with



textured / metallic/white front plate modules erected on / in wall / ceiling with following type accessories Cat. III

**As per Electrical Specification Booklet attached.**

**ITEM NO.82**

Providing following type of Modular Type Accessories mounted with PVC / metallic/Wooden box, single mounting base frame covered with textured / metallic/white front plate , modules erected with necessary connections as per site situation directed by Engineer In charge.

- 82.1 One No. SP 6 Amp. Cat.III
- 82.2 One No 5 pin plug Cat.III
- 82.3 16 Amp. SP one way switch Cat.III
- 82.4 6/16Amp. Universal socket Cat.III

**As per Electrical Specification Booklet attached.**

**ITEM NO.83**

Providing and erecting ISI mark Medium class RIGID PVC PIPES of following size complete to be erected on/in wall or ceiling erected with necessary PVC fittings & Junction boxes fixed with adhesive solution & Clamps with following dia of pipes, in approved manner as directed (b) 25 mm

**As per Electrical Specification Booklet attached.**

**ITEM NO.84**

Providing and erecting Mains with 1.1 KV grade FRLS PVC insulated ISI marked stranded Copper conductor wire in following type of pipe to be erected concealed in /flushed on wall/ceiling, with 1.5 sq. mm copper conductor FRLS PVC insulated stranded wire of green colour for earth continuity of following size (A) With medium class Rigid PVC pipe and accessories

- a 2 wire 1.5 sq. mm
- b 2 wire 2.5 sq. mm

**As per Electrical Specification Booklet attached.**

**ITEM NO.88**

Supplying & erecting M.S. Box having 16 Gauge painted with red oxide or Heavy duty PVC box erected flushed on wall or concealed in wall with necessary plastering & finishing as directed of following size. (b) 175 mm x 100 mm x 75 mm(d)

**As per Electrical Specification Booklet attached.**

**ITEM NO.86**

Providing and erecting Sheet Steel powder coated MCB distribution board - flush / surface mounted fitted with busbar, neutral link, earth bar and DIN rail, Conforms to IS 8623-1 & 3, IEC 61439-1 & 3 without MCB to house appropriate nos. of

MCBs.(The DBs should be used of same company of MCB to be used) suitable for (B) three phase incoming and single phase horizontal type outgoing Per phase isolation type (PPI) (b) sheet steel double door

(iv)12 way

(iii)8 way

As per Electrical Specification Booklet attached.

#### ITEM NO.87

providing and erecting Miniature circuit breaker single pole 6A to 25A suitable to operate on 240 V A.C. system and having breaking capacity 10 KA to be erected in existing box. confirming to IS 8828/1996 with ISI Mark

As per Electrical Specification Booklet attached.

#### ITEM NO.88

Providing & erecting 415 V MCB Four Pole for Motor & Inductive Load (C Curve) having 10KA breaking capacity & confirms to IS :8828 in existing box having following capacity

a 6 to 32 Amp. Cat.III

b 40 Amp. Cat.III

c 63 Amp. Cat.III

As per Electrical Specification Booklet attached.

#### ITEM NO.89

providing and erecting Approved make RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 10 KA and suitable for operation on single phase 240 V,50Hz. having characteristic of quick action & tripping with all advance feature & do not incorporate any electronic component. for following Max. rating erected as directed

(i) 25 Amps.DP Cat. III

(ii) 40Amps. DP Cat. III

As per Electrical Specification Booklet attached.

#### ITEM NO.90

Supplying & fixing box for housing RCCB + MCB combination made of 18 SWG sheet steel duly powder coated with gasket, dust & vermin proof bakelite shield two earthing terminals for following type of RCCB, RCCB + MCB [b] For 4 Pole

As per Electrical Specification Booklet attached.

#### ITEM NO.91

Providing and erecting Approved make RCCBs conforming to IS: 12640 and having sensitivity of 30 mA and Short Circuit withstand capacity of 10 KA and suitable for operation on 3 phase and neutral 415V,50Hz. having characteristic of quick action & tripping with all advance feature & do not incorporate any electronic component for following Max. rating erected as directed. [f] 63A, 4 pole Three Phase Cat. II

As per Electrical Specification Booklet attached.

#### **ITEM NO.92**

Supplying and erecting triple pole & neutral 440V/ 500V panel mounting Aluminium Busbars with four equal Nos. of bus having current density not more than 0.8 Amp. / sq.mm (Rated current / cross section area) duly wrapped with colour insulating tape for phase sequence of following current carrying capacity, erected with necessary bus bar supports /insulators, main cable socket to each busbar,erected in existing cubical panel with necessary connections. (D) Suitable for 400 Amp. Capacity

**As per Electrical Specification Booklet attached.**

#### **ITEM NO.93**

Providing and erecting required size Aluminium strip for earthing of H.T. , OCB / ACB / Transformer, LT panel board, Motors etc. using copper clamp.

**As per Electrical Specification Booklet attached.**

#### **ITEM NO.94**

Supplying & erecting earth pit of minimum bore dia.150mm size approved make Earthing Electrode consisting Pipe-in-Pipe Technology as per IS 3043-1987 made of corrosion free hot dipped G.I.Pipes having Outer pipe dia of 50mm having 80-200 Micron galvanising, Inner pipe dia of 25 mm having 200-250 Micron galvanising, connection terminal dia of 12mm with constant ohmic value surrounded by highly conductive compound with high charge dissipation suitable for following type of applications with chamber and heavy duty cover. (A)(approved make OEM has to submit test certificate including value of earth resistance of installation duly stamped and signed by agency and officer Incharge has to ensure the value of earthing resistane mentioned in test Certificate) & having back filling compound of (B) Inner chemical (CCM Compound)- Resistivity:- 0.2 ohm / meter testing as per IEC 62561-2017, Voltage drop:- < 1 volt at no load & dry form, Sulphar content:- <2%(C) Back fill Compound :- Earthing compound should be capable to retain moisture for long time Necessary test report must be submitted by Agency.

(c) For Electrical Installation covering Transformer Neutrals, Lightning arrester Earthing, A.C.Plant & Sensitive Computer System(like Automation, SCADA) i.e independent Earthing in normal soil.

Length of Pipe : 3.00 mtrs

Back filling Compound :2 nos Bags of 25 Kg.

**As per Electrical Specification Booklet attached.**

#### **ITEM NO.95**

Providing & erecting 415 V MCB three Pole for Motor & Inductive Load (C Curve) having 10KA breaking capacity & confirms to IS :8828 in existing box having following capacity (b)40 Amp. Cat.III

**As per Electrical Specification Booklet attached.**

#### **ITEM NO.96**

Providing and erecting XLPE(IS:7098)(I)-88 ISI armoured cable multistrand Aluminium conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe of following size of cables

c 3 1/2 core 50 Sq. mm ( 25 Sq. 1/2 mm core)

d 3 1/2 core 70 Sq. mm ( 35 Sq. mm 1/2 core)

As per Electrical Specification Booklet attached.

#### ITEM NO.97

Providing and erecting XLPE(IS:7098)(I)-88 ISI armoured cable multistrand / Solid Copper conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe at road crossing or floor of following size of cables. (C) 4 core 6 Sq. mm

As per Electrical Specification Booklet attached.

#### ITEM NO.98

Providing and erecting XLPE(IS:7098)(I)-88 ISI armoured cable multistrand Copper conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe at road crossing or floor of following size of cables. (A) 4 core 10 Sq. mm

As per Electrical Specification Booklet attached.

#### ITEM NO.99

Providing and erecting XLPE (IS:7098)(I)-88 ISI armoured cable multistrand / Solid Aluminium conductor for 1.1 KV. to be laid on wall with necessary clamps or in existing trench / pipe of following size of cables (B) 4 core 6 Sq. mm

As per Electrical Specification Booklet attached.

#### ITEM NO.100

Providing & laying approved make Double walled corrugated pipes (DWC) of polyethylene(conforming to IS 14930 II )with necessary connecting accessories of same material at required depth in existing trench for laying of cable. below ground / road surface for enclosing cable (A)50 mm outer dia

As per Electrical Specification Booklet attached.

#### ITEM NO.101

Supplying & erecting single phase approved make industrial exhaust fan suitable for medium duty ring mounted low noise operation suitable for medium duty having following dia size and maximum speed in RPM [A] 305 mm dia 900 RPM

As per Electrical Specification Booklet attached.

#### ITEM NO.102

Providing suitable M.S. louver shutter of the Exhaust fan.

**As per Electrical Specification Booklet attached.**

**ITEM NO.103**

Supplying and erecting LED indoor fittings with LEDs of wattage 0.2 Watt to 0.5 Watt assembled on single MCPCB, with housing used as a heat sink shall be made of thick sheet Steel conforming to IS: 513/CRCA/aluminium pressure die cast powder coated and high U.V. & corrosion resistance with diffuser housed in aluminium casted body with company mark/name

160V to 270V, Power Factor more than 0.95, THD < 15 %,

CCT 3000 K to 6500K,

Luminaire efficacy > 85 lumens/watt ,

LED driver efficiency > 85 %

( fitting required LM-79 & LM-80 Certificates)(NOTE: Below description have shown ranges of Wattage capacity of LED fittings.The Engineer incharge may select any wattage capacity between the ranges shown.)

(A) Square/ Circular shaped Surface/Recessed Mount Downlight with provision for spring loaded mounting clips complete.IP20

(ii) 11-15 watts, Surge-2 KV Cat-III

(i) 5-9 watts,Surge-2 KV Cat-III

**As per Electrical Specification Booklet attached.**

## **ELECTRIFICATION SPECIFICATION FROM ITEM NO.78 TO 104**

### **GENERAL ELECTRIFICATION WORK**

#### **1. Wiring Rules:**

The installation generally shall be carried out in conformity with relevant Indian Standard Specifications and code of practices prevalent. Indian Electricity Rules 1956 and Indian Electricity Act. 1910 as amended from time to time.

#### **2. Definition:**

The definition of terms shall be in accordance with Indian Standard code of Practice for Electrical wiring Installation IS-732-1982 except for the definition of point in case of Internal Electrical Installation. For definition of point wiring and measurement of Electrical works IS-59008-1970 shall be referred to.

#### **3. Voltage and Frequency of Supply :**

All current consuming devices shall be suitable for frequency of 50 C/s and system of voltage meant for unless otherwise specified.

#### **4. Layout of wiring and its description:**

(i) The wiring shall be carried out as per Schedule "power" wiring must be in screwed conduit and shall be kept separate and distinct from lighting wiring. All wiring must be done on the distribution system with main and branch distribution boards at convenient centers and without isolated fuses. All conductors shall be run as far as possible along the walls and ceiling as to be easily accessible and capable of being thoroughly inspected. The balancing of circuits will be arranged before hand by the Executive Engineer Electrical Division.

(ii) Within one month of the taking over the installation, the Contractor shall supply to the Executive Engineer, Elect. Division a complete set of wiring diagrams of the same on drawings to be supplied when available by the Executive Engineer, Electrical Division, and to the satisfaction of the Executive

Engineer, Elect. Dn, and these wiring plans shall be "Drawings" within the meaning of the term as used in the General Conditions of contract.

## **5. Conductors :**

All conductors unless otherwise specified shall not be less than 1.5 Sq. mm. for point wiring and 2.5 Sq. mm. for mains. Conductors for power and lighting circuits shall be of adequate size to carry the designed circuit load without exceeding the permissible thermal limits for the installation, and such sizes will be stipulated in specifications and or drawings.

## **6. Cables :**

6.1 All cables shall conform to relevant Indian Standards.

6.2 Conductors of all cable except the flexible cable shall be of aluminum. The smallest aluminum conductors for the final circuit shall have nominal cross sectional area of not less than 1.5 Sq. mm. The minimum size of the aluminum conductors for power wiring shall be 4 Sq. mm.

6.3.1 Conductors of flexible cables shall be of copper. The minimum cross sectional area of such a cables shall be 14.0193 mm. The flexible cable shall have uniform and adequate insulation.

6.3.2 Unless the flexible cables and conductors are protected by armor or though rubber or PVC Sheath, these shall not be used in workshops and other places where they are liable to mechanical damage.

6.3.3 Core flexible cables shall be used for connecting single phase Appliances for phase, neutral & earth connections.

## **7. Fall of Potential :**

The cross sectional area of all conductors inside buildings shall be so proportioned to their lengths that the drop in voltage between main fuses and the farthest point of any lump shall not exceed three percent of the voltage of the consumer's with all the consuming devices in use.

7.1 If the CABLE SIZE is increased to avoid the voltage drop in circuit current rating of the cable shall be more than that for which the circuit is designed. In each circuit or sub circuit every cable shall have a current rating not less than that of the fuse which protects the circuit or sub circuit respectively for current higher than the full load current.

## **8. Ratings of lamps and fans socket outlets : Points and exhaust fans**

8.1 Incandescent lamps installed in residential and non-residential buildings shall be rated at 60 watts & 100 watts respectively.

8.2 Table fans and ceiling fans shall be rated at 60 watts, exhaust fan shall be rated according to their capacity.

8.3 5 Amp. socket outlet points and 15 Amp. socket outlet points shall be rated at 100 watts and 1000 watts respectively for the purpose of load assessment unless values of the load are known or specified.

## **9. Tests :**

9.1 Before the installation is commissioned following tests shall be carried out :

- (1) Insulation Resistance test
- (2) Polarity Tests of Switches
- (3) Earth Continuity tests
- (4) Earth Electrodes Resistance test

9.2.1.1 The insulation resistance shall be measured between earth and the whole system of conductors or any section thereof with all fuses in place and all switches closed, and except in earthed concentric

wiring all lamps in position or both poles of the installation otherwise electrically connected together direct current pressure of not less than twice the working pressure provided that it need not exceed. 500 volts for medium voltage circuits where the supply is derived that it need not exceed. 500 volts for medium voltage circuits where the supply is derived from the three wire D.C. or a poly phase. A.C. System, the neutral pole of which is connected to earth either direct or through added resistance, the working pressure shall be deemed to be that which is maintained between the phase conductor and the neutral.

9.2.1.2 The insulation resistance shall also be measured between all conductors to one pole or phase conductor of the supply and all the conductors connected to the neutral or to the other pole or phase conductors of the supply with all lamps in position and switches in 'OFF' position and its value shall be not less than in that specified in Sub-Clause 9.2.1.3.

9.2.1.3 The insulation resistance in Megohms measured as above shall not be less than 50 Megohms divided by the number of outlet or when PVC insulated cables are used for wiring 12.5 Megohms divided by number of outlets.

9.2.1.4 Where a whole installation is being tested, a lower value than that given by the formula, subject to a minimum of 1 Megohm is acceptable.

9.2.1.5 A preliminary and similar test be made before lamps, etc. are installed and in this event the insulation resistance to earth should be not less than 100 Megohms divided by the number of outlet or when PVC insulated cables are used for wiring 25 Megohms divided by number of outlets.

9.2.1.6 The term "Outlet" includes every switch except that a switch combined with a socket outlet, appliance or lighting fitting is regarded as one outlet.

9.2.1.7 Control rheostat heating and power appliance and electric sign may, if required, be disconnected from the circuit during the test, but in that event the insulation resistance between the case or frame work, and all live parts of each rheostat, appliance and sign, shall be not less than that specified in the relevant Indian Standard Specification or where there is no such specification shall be not less than half a Megohm.

#### 9.2.2 Polarity Test :

9.2.2.1 In a two wire installation a test shall be made to verify that all switches in every circuit have been fitted in the same conductor throughout & such conductor shall be labeled or marked for connection to the phase conductor or to the non-earthed conductor of the supply.

9.2.2.2 In a three wire or a four wire installation a test shall be made to verify that every non-linked single pole switch is fitted in a conductor which is labeled or marked for connection to one of the phase conductor of the supply.

9.2.2.3 The installation shall be connected to the supply for testing. The terminals of all switches shall be tested by a test lamp one lead of which is connected to the earth. Glowing of test lamp to its full brilliance, when the switch is in 'on' position irrespective of appliance in position or not shall indicate that the switch is connected to the right polarity.

#### 9.2.3 Earth Continuity Test :

The earth continuity conductor including metal conduits and metallic envelopes of cables in all cases shall be tested for electric continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or earth leakage circuit breaker measured from the connection with the

earth electrode to any point in the earth continuity conductor in the completed installation shall not exceed one ohm.

#### 9.2.3.1 Earth Electrode Resistance Test :

Earth electrode Resistance test may be carried out by Megger Earth Testers containing a direct reading ohm-meter, a hand driven generator and auxiliary electrodes.

9.3 On completion an electric installation (addition and alteration) a certificate shall be furnished by the Contractor countersigned by the certified Supervisor under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as given in Appendix-'B' in addition to the test certificate required by Local Electrical Supply Authorities.

### 10. Joint and looping back :

Unless with the sanction of Executive Engineer Divisions all joints in conductor shall be means of approved mechanical connectors in suitable and approved junction boxes but looping back system shall be preferable. In wiring unless otherwise specified Phase and live conduct shall be looped at the switch box where as a neutral conductor can be looped from light, fan or socket. In non-residential buildings, neutral and earth continuity wire shall be brought to each of the switch boards should be of adequate size to accommodate at least one number of 5 Amps. socket outlet and control switch in future.

### 11. Switches :

Main Switchgears, Switch Board and their location :

11.1 All main switches (other than those of iron clad pattern) carrying current of 10 Amp. and above shall be fitted for back connections and shall be suitably protected.

11.2 All switches and circuit breakers shall be constructed in accordance with the I. S. 4237-1967. General requirement for switchgear and control gear for voltage not exceeding 1000 volts and other relevant I.S. provided also that spring shall be either of phosphor bronze or if steel shall be copper or Nickel plated and that handle shall be so fastened that they do not tend to unscrew or become loose.

11.3 All main switches shall be either of metal clad enclosed pattern or of any insulated enclosed pattern which shall be fixed at close proximity to the point of entry of supply.

11.4 Switch boards shall not be erected above gas, stoves, or sinks or within 2.5 m. of any washing unit in the washing rooms of laundries or in the bath rooms, lavatories, toilets or kitchens.

11.5 Switch boards, if unavoidably fixed in places likely to be exposed to weather, to drip or to abnormal moist temperature the outlet casing shall be weather proof and shall be provided with glands or bushing of adopted to receive screwed conduit according to the manner in which cables are run PVC and double flanged bushes shall be fitted in the holes of the switches for entry and exit of wires.

11.6 A switch board not be installed so that its bottom is within 1.25 m. above the floor unless the front of the switch board is completely enclosed by a door or the switch board is located in a position to which only authorized persons have access.

11.7 Switch boards shall be recessed in the wall if so specified in the schedule of work or in the special specification. The front shall be fitted with hinged panel of other suitable material such as Bakelite in wood frame with locking arrangement, the outer surface of door being flush with the walls. Ample room shall be provided at the back for connections and at the front between the switchgear mountings and the door.



11.8 Equipments which are on the front of a switch board shall be so arranged that inadvertently personal contact with live parts is unlikely during the manipulation of switch gears, changing of fuses or like operations.

11.9 No holes other than the holes by means of which the panel is fixed shall be drilled closer than 1.3 cms. from any edge of the panel.

11.10 The various live parts, unless they are effectively screened by substantial barriers of non-hydroscopic, non-inflammable insulating material, shall be so spaced that space shall not be maintained between such parts and earth.

11.11 The arrangement of gear shall be such that they shall be readily accessible and their connections to all instruments and apparatus shall also be traceable.

11.12 In every case in which switches and fuses are fitted on the same pole, these fuses shall be so arranged that the fuses are not alive when their respective switches are in the off position.

11.13 No fuses other than fuses in instrument circuit shall be fixed on the back of or behind a switch board panel or frame.

11.14 All the metal switchgears and switch boards shall be painted, prior to erection with one coat of antirust primer. After erection they shall be painted with two coats of approved enamel or aluminum paint as required on all sides whenever accessible.

11.15 All switch board connected to medium voltage and above shall be provided with 'Danger Notice Plate' conforming to relevant Indian Standards.

## **12. Control at Point of Commencement of Supply :**

12.1 There shall be a linked main switchgear with fuse on each live conductor of the supply mains at the point of entry. The wiring throughout the installation shall be such that there is no break in the neutral wire except in the form of a linked switchgear. The neutral shall also be distinctly marked. In this connection Rule 32 (2) of the Indian Electricity Rules, 1966 (See Appendix - 'A') shall also be referred.

12.2 The main switchgear shall be situated as near as practicable to the termination of service line and shall be easily accessible without the use of any external aid.

12.3 On the main switchgear, where the conductor of a two wire system or an earthen neutral conductor of a multi-wire system or a conductor which is to be connected thereto, an indication of a permanent nature shall be provided to identify the earthen neutral conductor. In this connection Rule 32 (1) of Indian Electricity Rules, 1956 (See Appendix 'S') shall be referred.

13.0 Switch Board & Distribution Boards : Metal clad switch gear shall preferably be mounted on any of the following types of Board.

13.1 Hinged type Metal Boards : These shall consist of a box made of sheet metal not less than 2 mm. thick and shall be provided with a hinged cover to enable the board to swing open for examination of the wiring at the back. The joints shall be welded. A teak wood board, thoroughly protected both inside and outside with good insulating conforming to IS-347-1952 specification for varnish shellac for general purpose, and of not less than 6.5 mm. thickness, shall be provided at the back for attachment of incoming and outgoing cables. There shall be a clear distance of not less than 2.9 cm. between the teak wood board and the cover, the teak wood board and the cover, the distance being increased for larger boards in order that on closing of the cover, the insulation of the cables is not subjected to damage and

no short length of cables is subjected to excessive twisting or bending in any case. The board shall be security fixed to the wall by means of rag bolts, plugs of wooden Gutties and shall be provided with a locking arrangement and earthing stud. All wires passing through the metal board shall be bunched. Alternatively, hinged type metal boards shall be made of sheet munted on channel or angle iron frame.

Note :Sub type of boards are particularly suitable for small switch-boards for mounting metal-clad switchgear connected to supply at low voltages.

13.2 Fixed type Metal Boards : These shall consist of an angle of channel of iron frame fixed on the wall or on floor and supported on the wall at the top if necessary. There shall be a clear distance of one meter in front of the switch board. If there are attachments of base connections at the back of the switch board Rules 51 (1) (c) of Indian Electricity Rules, 1956 shall apply.

NOTE :Such type of boards are particularly suitable for large switchboard for mounting large number or switchgears of higher capacity metal clad switchgears or both.

13.3 Teakwood Boards : for small installations connected to a single phase 230 volts supply teak wood boards may be caused as main boards or sub-board. These shall be of seasoned teak or other durable wood with solid back impregnated with varnish of approved quality with all joints dovetailed.

13.4 In large size medium voltage installations, before proceeding with actual construction of the boards, a proper drawing showing the detailed dimensions and design including the disposition of the mountings, which shall be symmetrically and neatly arranged for arriving at the overall dimensions, shall be prepared and approved by the Engineer-in-charge.

13.5 Recessing of Boards : Where so specified the switch boards shall be recessed in the wall. The front shall be fitted with hinged panel of teak wood or other suitable materials such as baleelite, or with unbreakable glass doors in teak wood frame with locking arrangement, the other surface of the door being flush with the walls. Ample room shall be provided at the back for connection and at the front between the switchgear mountings.

13.6 Arrangement of Apparatus :

(a) Equipment which is on the front of switch board shall be so arranged that inadvertently personal contact with live parts is unlikely during the manipulation of switches, changing of fuses or like operation.

(b) No apparatus shall project beyond any edge of panel. No fuse body shall be mounted within 2.5 cm. of any edge of the panel and no hole other than holes by means of which the panel is fixed shall be drilled closer than 1.3 cms from any edge of the panel.

(c) The various live parts, unless they are effectively screened by substantial barriers of non-hydroscopic, non-inflammable isolating material, shall be so spaced that an arc cannot maintain between such parts and earth.

(d) The arrangement of the gear shall be such that they shall be readily accessible and their connections to all instruments and apparatus shall also be easily traceable.

(e) In every case in which switches and fuses are fitted on the same pole, these fuses shall be so arranged that the fuses are not alive when their respective switches are in the 'OFF' position.

(f) No fuses other than fuses instrument circuit shall be fixed on the back of or behind a switch board panel or flame.

### 13.7 Marking of Apparatus :

(a) Where a board is connected to voltage higher than 250 volts, all the apparatus mounted on it shall be marked in the following colors to indicate the different poles or phases to which the apparatus of its different terminals may have been connected.

Alternating Current	Direct Current
Three-phase-red	Three wire system-2 outer wires
Yellow & Blue	Positive red & Negative Blue
Natural-Black	Natural -Black

Where fuse-wire three phase wiring is done, the neutral shall be in on colour and the other three wires in another colour.

(b) Where a board has more than one switch, each such switch shall be marked to indicate which section of the installation it controls.

(c) All markings required under the rule shall be clear permanent.

### 13.8 Main& Branch Distribution Board :

13.8.1 Main and branch distribution boards shall be of any type mentioned in 13.1

13.8.2 Main distribution boards shall be provided with a switch or air circuit breaker on each pole of each circuit a fuse on the phase or live conductor and a link on the neutral or earthed conductor of each circuit. The switches shall always be linked.

#### 13.8.3 Branch Distribution Board :

13.8.3.1 Branch distribution boards shall be provided with a fuse or a miniature circuit breaker or both the adequate rating setting chosen on the live conductor of each circuit and the earthed neutral conductor shall be connected to a common link and be capable of being disconnected individually for testing purposes. At least one spare circuit of the same capacity shall be provided on each branch distribution board.

13.8.3.2 In residential installations, lights and fans Amy be wired on a common circuit, such sub, circuit shall not have more than total of ten points of lights, fans and socket outlets. The load of such circuit shall be restricted to 800 watts. If a separate fan circuit is provided, the number of fans in the circuit shall not exceed ten. Power sub-circuits shall be designed according to the load but in no case shall there be more than two outlets on each sub-circuits.

13.8.3.3 In industrial and other similar installations requiring the use of group control of switching operation, circuits, for socket outlets amy be kept separate form fans and lights. Normally fans and lights may be wired on a common circuit, however, if need sub-circuit shall not exceed 3000 Watts. In case of new installation, all circuits and sub-circuits shall be designed by making provision of 20 percent increase in load due to any future modification. Power sub-circuits shall be designed according to the due to any future modification Power sub-circuits shall be designed according to the load but in no case shall there be more than four outlets in each sub-circuits.

### 13.9 Installation of Distribution Boards :

13.9.1 The distribution fuse-boards shall be located as near as possible to toe centre of the load they are intended to control.

13.9.2 These shall be of either metal-clad type, or all insulated type. But, if exposed to weather or damp situations, they shall be of the weather proof type and, if installed where exposed to exploded to explosive dust, vapor or gas, they shall be of flame proof type.

13.9.4 Where two or more distribution fuse boards feed low voltage these distribution boards shall be :

- (1) Fixed not less than 2 m. apart, or
- (2) Arranged so that it is not possible to open two at a time, namely they are interlocked and the metal case is marked 'Danger 415 Volts', or
- (3) Installed in a room or enclosure accessible to only authorized persons.

13.9.5 All distribution boards shall be marked 'Lighting', 'Power', as the case may be and also marked with the voltage and number of phases of the supply. each shall be provided with a circuit list giving details of each circuit which it controls and the current rating of the circuit and size of fuse-element.

13.9.6 Triple pole distribution boards shall not be generally used for final circuit distribution unless specific approval of Engineer-in-charge is obtained. In special cases where use of Triple pole distribution boards are inevitable they shall be of H.R.C. fuse type only.

#### 13.10 Wiring and Distribution Board :

13.10.1 In wiring a branch board, total load of the consuming devices shall be divided, as far as possible, evenly between the number of ways of the boards leaving the spare circuit for future extension.

13.10.2 All connection between pieces of apparatus or between apparatus and terminals on a board shall be neatly arranged in a definite sequence following the arrangement of the apparatus mounted thereon, avoiding unnecessary crossing.

13.10.3 Cables shall be connected to a terminal only be soldered or welded or crimped lugs using suitable sleeve, lugs or ferrules unless the terminal is of such a form that it is possible to securely clamp them without the cutting away of cable strands.

13.10.4 All bare conductor shall be rigidly fixed in such a manner that clearance of At least 2.5 cms. is maintained between conductor of opposite polarity or phase and between the conductors and any material other than insulating material.

13.10.5 If required a pilot lamp shall be fixed and connected through on independent single pole switch and fuse to the bus-bars of the board.

13.10.6 In a hinged type board, the incoming and outgoing cables shall be fixed at one or more points according to the number of cables on the back of the board leaving suitable space in between cables and shall also, if possible be fixed at the corresponding points on the switch board panel. The cables between these points shall be arranged to on the switch board panel. The cables between these points shall be arranged to form a "U" or "S" shaped loop which shall be of such length as to allow the switchboard panel to swing through an angle of not less than 90°.

#### 14.0 Capacity of Circuits :

14.1 Lights and fans may be issued on a common circuits and such a circuit shall not have more than a total of ten points of lights, fan and socket outlets, or a load of 800 watts whichever is less. The power circuits shall be designed with a maximum of two outlets per circuits generally when load is not known or specified. In non-residential buildings at important District centers however one outlet per circuit may be preferred. The circuit shall be designed based on the loading of the circuit where not specified, the load shall be taken as 1 KW per outlet, Where the load is more than 1 KW it should be controlled by a isolator switch or miniature circuit breaker.

#### 15.0 Passing Through Walls and Floors:

15.1 Where conductors pass through walls one of the following methods shall be employed. Care shall be taken to see that wires pass very freely through protective pipe or box and that the wires pass through in a straight line without any twist or cross in wires, on either ends of such holes.

(a) A teak wood box intending through the whole thickness of the wall shall be buried in the wall and casings or conductors shall be carried so as to allow 1.3 cms. air space on three sides, of the casing conductor.

(b) The conductor shall be carried either in a rigid steel conduit conforming to "IS : 1653-1964 specification for Rigid Steel conduits of Electrical wiring (Revised) or a rigid non-metallic conduit conforming to \*IS : 2509-1963 specification for Rigid Non Metallic conduits for Electrical Installations, or in a porcelain tube of such size which permits easy drawing in. The end of conduit shall be neatly bushed with porcelain, wood or other approved material.

(c) Insulated conductors while passing through floors shall be protected from mechanical injury by means of rigid steel conduit (see \* IS 1653-1964) to height not less than 1.5 m. above the floors and flush with the ceiling below. This steel conduit shall be earthed and securely bushed.

15.2 Where a wall tube passes outside a building so as to be exposed to weather, the outer end shall be belt mounted and turned down wards, and properly bushed on the open end.

#### **16.0 Fixing to Walls and Ceilings:**

Plugs for ordinary walls or ceilings shall be of well-seasoned teak or other approved hardwood not less than 5 cm long 2.5 c. square on the inner end and 2 cm. square on the outer end. They shall be cemented into walls to within 7.5 mm of the surface, the remaining being finished according to the nature of the surface plaster or lime punning.

16.1 Where owing to irregular crossing or other reasons the plugging of the walls or ceiling with wood plugs presents difficulties, the wood casing, wood batten, metal conduit or cleat (as the case may be) shall be attached to the wall or ceiling in an approved in the walls before they are plastered.

16.2 To achieve neatness, plugging of walls or ceiling may be done by an approved type of asbestos, metallic or a fiber fixing plug.

#### **17.0 Branch Switches :**

Where the supply is derived from a three-wire or four-wire source, and distribution is done on the two wire system, all branch switches shall be placed in the outer or live conductor of the circuit and no single-phase switch or fuse shall be inserted in the middle wire, earth or earthed neutral conductor of the circuit, Single-pole switches (other than for multiple control) caring not more than 15 amperes may be of tumbler type which shall be 'ON' when the handle known is down.

#### **18.0 Fittings :**

Where conductors are required to be threaded through tubes or channels formed in the metal work of fittings these must be free from sharp angles or projecting edges and such size that will enable them to be weired the conductors used for the final sub Circuits without removing the boarding, taping or outer covering. As far as possible, all tubes and channels should be of sufficient size to permit 'Looping back' of wires cables and flexible cords other than those designed for high temperature shall not be used for wiring fittings except for portable fittings. All fittings must have not less than a half inch male nipple. Fittings and lamp holders for gas filled lamps shall be adequately ventilated.

18.1 Where light fitting is supported by one or more flexible cords, the maximum weight to which the twin flexible cords may be subjected shall be as follows :

Nominal cross sectional Area cord.	No. & Dia in mm of wires.	Max Permissible Wight Kg. mm2
0.5	16/0.2	1.7
0.75	24/0.2	2.6
1.0	32/0.2	3.5
2.5	48/0.2	5.3
3.5	80/0.2	8.8
4 1	28/0.2	14.0

8.2 No inflammable shade shall form a part of light unless such shade is well protected against all risks of fire. Celluloid shade or light fitting shall not be used under any circumstances.

### 8.3 Fitting of Wire :

The use of fitting wire shall be restricted to the internal wiring and the lighting fittings. Where fitting wire is used for wiring, the sub-circuit loads shall be terminated in a ceiling zone or connector from which they shall be carried into the fitting.

### 9.0 Lamp Holders :

Lamp holders for use on brackets and the like shall be in accordance with "IS : 1258-1967, specification for Bayonet lamp holder and all those for use flexible panants shall be provided with cord grips. All lamp holders shall be provided with shade carriers. Where centre contact Edison screw lamp holders are used, the outer or screw contacts shall be connected to the middle wire, the natural, and the earthed conductor of the circuit.

### 20. Outdoor Lamps :

External and road lamps shall have weather proof fittings of approved design so as to effectively prevent the admission of moisture. An insulating distance piece of moisture proof materials shall be inserted in the fittings. Flexible cord and cord grip lamp holders shall not be used where exposed to weather. In verandahs and similar exposed situations where pendants are used, they shall be of fixed road type.

### 21.0 Lamps :

All incandescent lamps, unless otherwise required and suitably protected, shall be hung at a height of not less than 2.5 m above the floor level, They shall be in accordance with IS : 418 : 1957 specification for Tungsten Filament General service electric lamps

### .22.0 Fans, Regulators and Clamps :

#### 22.1.0 Ceiling fans :

Ceiling fans including their suspension shall conform to \* IS 374-1960 specification for electric ceiling fans and regulators (Revised) & to the following requirements :

(a) All ceiling fans shall be wired to ceiling roses or to special connector boxes, to which fans rod wires shall be connected and suspended from hooks or shackles with insulators between hooks and suspension rods. There shall be no joint in the suspension rod, but if joints be unavoidable then such joints shall be screwed to special couplers of 5 cm minimum length and both ends of pipes shall touch together within couplers, and shall in addition be secured by means of split pins; alternatively, the two pipes amy be welded.

(b) Fans clamps shall be of suitable design according to the nature of construction of ceiling on which these clamps are fitted. In all cases fan clamps shall be fabricated from tested new metal of suitable sizes and they shall be as close fitting as possible. Fan clamps for reinforced concrete roots shall be buried with the casting end due care shall be taken that they shall serve the purpose. Fan clamps for wood beams shall be of suitable flat iron fixed on two sides of the beam and according to the size and section of the beam one or two mild steel bolts passing through the beam shall hold both flat irons together. Fan clamps for steel joint shall be fabricated from tested flat iron to fit in rigidly to the bottom flange of the beam. Care shall be taken during fabrication that the metal does not crack while hammering to shape. Other fan clamps shall be made to suit the position, but in all cases care shall be taken to see that they are rigid and safe.

NOTE :All fan clamps shall be so fabricated that fans revolve steadily.

(c) Canopies on top and bottom of suspension rod shall effectively hide suspensions and connections to fan motors, respectively.

(d) The lead-in-wire shall be nominal cross-sectional area not less than 1.0 mm<sup>2</sup> with copper and 1.5 mm<sup>2</sup> with aluminum and shall be protected from abrasion.

(e) Unless otherwise specified, the clear distance between the ceiling find and the floor shall not beless than 2.75 m.

#### 22.2.0 Exhaust Fans :

For fixing of an exhaust fan, a circular hole shall be provided in the wall to suit the size of the frame which shall be fixed by means of rag-bolts embedded in the wall. The hole shall be neatly plastered with cement and brought to the original finish of the wall. The exhaust fan shall be connected to exhaust fan

point which shall be wired as neat to the holes as possible by means of a flexible cord, care being taken that the blades rotate in the proper direction.

#### 23.0 Attachment of fittings and accessories :

23.1 In other than conduit wiring, all ceiling crosses, brackets, pendants and accessories attached to walls or ceilings shall be mounted on substantial teak wood block twice varnished after all fixing holes are made in them. Blocks shall be not less than 4 cms. deep. Brass screws only shall be used only shall be used for attaching fittings and accessories to their base blocks.

#### 24.0 Interchangeability :

Similar part of all switches, lamp holders, distribution fuse-boards ceiling roses, brackets, pendants, fans and all other fittings of the same type shall be interchangeable in each installation.

#### 25.0 Conduit Wiring System :

25.1.1 Type and size of conduit - All conduit pipes shall be conforming to \*Is : 1653- 1964, furnished with galvanized or stove enameled surface. All conduit accessories shall be of threaded type and under no circumstances pin grip type or clamp type accessories be used. No steel conduit less than 16 mm. in diameter shall be used. The number of insulated conductors that can be drawn into rigid steel conduit are given in Table II

25.1.2 Bunching of cables - Unless otherwise specified, insulated conductors of AC supply and DC supply shall be bunched in separate conduits.

25.1.3 Conduit - joints : conduit pipes shall be joined by means of screwed couplers accessories only (\*IS L 2667-1964).

Specification for Fittings for Rigid Steel Conduits for Electrical Wiring)

: In long distance stance straight runs of conduit, inspection type couplers at reasonable intervals shall be provided or running threads with couplers and jam-puts (in the latter case the bare threaded portion shall be treated with anti-corrosive preservative) shall be provided. Thread on conduit pipes in all cases shall be between 11 mm to 27 mm long sufficient to accommodate pipes of full threaded portion of couplers or accessories Cut ends of conduit pipes shall have no sharp edges nor any of buries left to avoid damage to the insulation of conductors while puiling them through such pipes :

**TABLE - II**  
**MAXIMUM PERMISSIBLE NUMBER OF 250-V**  
**GRADE SINGLE CORE CABLES THAT CAN BE DRAWN INTO RIGID STEEL**  
**CONDUIT**

(CLAUSE 6.5.1.1)

Size of cable Size of conduit (mm.)

Nominal No. and

16	20	25	32	40	50	63									
Crossest-	Dia. In														
ional area.	mm of wires														
S	B	S	B	S	B	S	B	S	B	S	B	S	B		
1.0	1/1.12	5	4	7	5	13	10	20	14	-	-	-	-	-	-
1.5	1/1.40	4	3	7	5	12	10	20	14	-	-	-	-	-	-
2.5	1/1.80	3	2	6	5	10	8	18	12	-	-	-	-	-	-
4	1/2.24	3	2	4	3	7	6	12	10	-	-	-	-	-	-

(3/1.06\*)

6	(7/0.85) 1/2.80 2	-	3	2	6	5	10	8						
10	(7/1.06*) 1/3.55+	-	-	2	5	4	8	7	-	-	-	-	-	-
-														
-	7/1.40*	-	-	2	-	4	3	6	5	8	6	-	-	-
16	7/1.70	-	-	-	-	2	-	4	3	7	6	-	-	-
-														
25	7/2.24	-	-	-	-	-	3	2	5	4	7	6	9	
7														
35	7/2.50	-	-	-	-	-	2	-	4	3	7	5	8	
6														
50	7/3.00+	-	-	-	-	-	-	-	-	2	-	5	4	
6														
6	19/1.80	-	-	-	-	-	-	-	-	2	-	5	4	

For Cu. Conductors only. + For Al. conductor only.

NOTE 1 The cable shows the maximum capacity of conditions for the simultaneous drawing-in of cables. The table applies to 250 volts grade cable. The columns headed 'S' apply to runs of conduit which have distance not exceeding 4.25 M between draw in boxes, and which do not deflect from the straight by angle of more than 150 The columns headed 'B' apply to runs of conduit which deflect from the straight by an angle of more than 150.

NOTE 2 In case of inspection type draw-in box has been provided and if the cables is first drawn through one straight conduit, then through the drawn box, and then through the second straight conduit, such systems may be considered as that of a straight conduit even if the conduit deflects through the straight by more than 150.

25.1.4 Protection against dampness - In order to minimize condensation or sweating inside the tube, all outlets of conduit system shall be property drained and ventilated, but in such a manner as to prevent the entry of insects as far as possible.

25.1.5 Protection of conduit against rust : The outer surface of the conduit pipes, including all bends, unions, tees junction boxes, etc., forming part of the conduit system shall be adequately protected against rust particularly when such system is exposed to weather. In all cases, no bare threaded portion of conduit pipe shall be allowed unless such bare threaded portion is treated with anti-corrosive preservative or covered with approved plastic compound.

25.1.6 Fixing of conduit - Conduit pipes shall be fixed by heavy gauge saddles, secured to suitable wood plugs or any other approved plug with screws in an approved manner at an interval of not more than one meter but on either side of couplers bends or similar fittings. Saddles shall be fixed at a distance of 30 cm. from the centre fo such fittings.

25.1.7 Bends in conduit - All necessary bends in the system including diversion shall be done by bending pipes. or insuring suitable solid or inspection type normal bends, elbows or similar fittings; or by fixing cast iron inspection boxes whichever is more suitable. Conduit fitting shall be avoided as far as



possible. On conduit system exposed to weather, where necessary, solid type fitting shall be used. Radius of such bends in conduit pipes shall be not less than 7.5 cm. No length of conduit shall have more than the equivalent of four quarter bends from outlet, the bends at the outlets not being counted.

25.1.8 outlets - All outlets for fitting switches etc. shall be boxes of suitable metal or any other approved outlet boxes for other surface mounting or flush mounting system.

25.1.9 Conductor - All conductor used in conduits wiring shall preferably be stranded. No single-core cable or nominal Cross-sectional area greater than 130 mm<sup>2</sup> shall be enclosed in a conduit and used for alternating current.

25.1.10 Erection and earthing of conduit - The conduit of each circuit or section shall be completed before conductors are drawn in. The entire system of conduit after erection shall be tested for mechanical and electrical continuity throughout and permanently connected to earth conforming to the requirements specified under 7 by means of special approved type earthing clamp efficiently fastened to conduit pipe in a workman like manner for a perfect continuity between each wire and conduit Gas or water pipes shall not be used as earth medium. If conduit pipes are liable to mechanical damage they shall be adequately protected.

25.2 Recessed Conduit wiring system with Rigid Steel conduits -

Recessed conduit wiring system shall comply with all the requirements for surface conduit wiring system specified in 6.5.1.1 to 6.5.1.10 and addition, conform to the requirements specified in 6.5.2.1 to 6.5.2.4.

25.2.1 Making of chase - The chase in the wall shall be neatly made and be of ample dimensions to permit the conduit to be fixed in the manner desired. In the case of buildings under construction, chases shall be provided in the wall, ceiling etc., at the time of their construction and shall be filled up neatly after erection of conduit and brought to the original finish or the wall.

25.2.2 Fixing of conduit in chase - The conduit pipe shall be fixed by means of staples or by means of saddles not more than 60 cm. apart. Fixing of standard bends or elbows shall be avoided as far as practicable and all curves maintained by bending the conduit pipe itself with a long radius which will permit easy drawing in of conductors. All threaded joints of rigid steel conduit shall be treated with some approved preservative compound to secure protection against rust.

25.2.3 Inspection boxes - Suitable inspection boxes shall be provided to permit periodical inspection and to facilitate removal of wires, if necessary. These shall be mounted flush with the wall. Suitable ventilating holes shall be provided in the inspection box covers.

25.2.4 Type of accessories to be used - All outlets such as switches and wall sockets, may be either or flush mounting type or surface mounting type.

(a) Flush mounting type : All flush mounting outlets shall be of cast iron mild steel boxes with a cover of approved insulating material or shall be a box made of suitable insulating material. The switches and other outlets shall be mounted on such boxes as would be approved. The metal box shall be efficiently earthed with conduit by an approved means of earth attachment.

(b) Surface mounting type - If surface mounting type outlet box is specified, it shall be of any approved insulating material and outlet mounted in an approved manner.

25.2.5 When crossing through expansion joints in buildings, the conduit sections across the joint may be through flexible conduits of the same size as the rigid conduit.

25.3 Conduit Wiring system with Rigid Non-Metallic Conduits : Rigid Non- Metallic conduits are used for surface, recessed and concealed conduit wiring.

25.3.1 Type and size - All non metallic conduits used shall conform to IS : 2509- 1963-The conduit may be either threaded type or plain type as specified in IS : 2509-6913\* and shall be used with the corresponding accessories (See IS : 3419-1965) specification for Fittings for Rigid Non-Metallic Conduits).

25.3.2 Bunching off cables - Conductors of AC supply and DC supply shall be bunched in separate conduits. The number of insulated cables that may be drawn into the conduits are given in Table III. In this table space factor does not exceed 40 percent.

**TABLE – III**

**MAXIMUM PERMISSIBLE NUMBER OF 250 VOLTS GRADE SINGLE -  
CORE CABLE THAT MAY BE DRAWN INTO RIGID NON-METALLIC CONDUITS**

Size of cable Nominal Cross Sectional Area mm <sup>2</sup>	No. & 16 Diameter in mm. of wires	Size of conduit (mm.)					
		20	25	32	40	50	
		(Number of Cables, Max)					
1.0	1/1.12*	5	7	13	20	-	-
1.5	1/1.40	4	6	10	14	-	-
2.5	1/1.80	3	5	10	14	-	-
	3.1.06*						
4	1/2.24	2	3	6	10	14	-
	7/0.85*						
6	1/2.80	-	2	5	8	11	-
	7/1.06*						
10	1/3.55+	-	-	4	7	9	-
	7/1.40*						
16	7/1.70*	-	-	2	4	5	15
25	7/2.24	-	-	-	2	2	6
35	7/2.50	-	-	-	-	2	5
50	7/300+	-	-	-	-	2	3
	19/1.80						

\* For copper conductors only.

+ For aluminum conductors only.

25.3.3 Conduit joints - Conduit joints shall be joined by means of screwed or plain couplers depending on whether the conduits are screwed or plain. Where there are long runs of straight conduit. Inspection type couplers shall be provided at intervals. For conduit fittings and accessories reference may be made to IS : 3419-1965.

25.3.4 Fixing of conduits - The provision of 25.1.6 shall apply except that the spacing between saddles or supports is recommended to be 60 cms. For rigid non-metallic conduits.

25.3.5 Bends in conduit - Wherever necessary, bends or diversions may be achieved by bending the conduits (See 6.5.3.9) or by employing normal bends, inspection bends, inspection boxes, elbows or similar fittings.

25.3.6. Conduit fittings shall be avoided, as far as possible on outdoor system.

25.3.7 Outlets - All the outlets for fittings. Switches, etc., shall be boxes of substantial construction. In order to minim use condensation or sweating inside the conduit, all outlets of conduit system shall be properly drained and ventilated, but in such a manner as to prevent the entry of insects, etc. as far as possible.

25.3.8 For use with recessed conduit wiring system the provisions of 6.5.2.1 to 6.5.2.4 shall apply.

25.3.9 Heat may be used to soften conduit for bending and forming joints in case of plastic conduits. As the material softens when heated, fitting of conduit in close proximity of hot surfaces should be avoided. Caution should be exercised in the use of the conduit in locations where the ambient temperature is 50°C or above. Use of such conduits in place where ambient temperature is 60°C or above is prohibited.

## PVC INSULATED P.V.C. SHEATHED OR T.R.S. WIRING SYSTEM

### 26.0 GENERAL :

This system of wiring, is suitable for low pressure installation, and shall not be used in places exposed to sun and rain nor in damp places, provided they are sheathed in the special approved protective covering and well protected to withstand dampness.

### 26.1 Attachment to walls and ceiling :

26.1.1 All cables on brick walls, stone or plastered walls ceiling shall be run on well seasoned, perfectly straight and well varnished on four sides, teak wood or any approved hardwood battens not less than 10 mm finished thick, width of which shall be such as to suit total width of cables laid on the batten, prior correction, these shall be painted with one coat of varnish or approved paint of colour to match with surrounding. These battens shall be secured to wall and ceilings by flat head wood screws to raws plug or phill plug at an interval not exceeding 75 cm. Wood plug can be used only with special approval of the Engineer-in-charge. The flat head wood screws shall be counter within wood batten and smoothed down with file. 26.1.2 Where wiring is to be carried out along the face of the rolled steel joints, a wooden batten of adequate width shall first be laid on the same and dipped to it as inconspicuously as possible. The wiring should then be fixed to this backing in the ordinary way. Where wiring passes through structural steel work, the hole shall be suitably bushed to prevent the abrasion of the cables.

26.1.3 Attachment to false ceiling : In no case, the open wiring shall be run above the false ceiling without the approval of Engineer-in-charge

26.2.0 Link clips: Only aluminum alloy clips/joint clips shall be used. The thickness shall be 0.32 mm (30 SWG) for lengths of 25 mm to 40 mm and 40 mm (28 SWG) for lengths of 50 mm to 80 mm. The width shall not be less than 8 mm in all these cases. Link clips/joint clips shall be so arranged that one single clip shall not hold more than two core or three single core TRS of PVC insulated and PVC sheathed up to 2.5 sw. mm. above while a single clip shall hold a single twin core or two single core cables. The clips shall be fixed on varnished wood batten with iron pins and spaced at interval of 15 cm both in the case of horizontal and vertical runs.

26.3.0 Bends in wiring : The wiring shall not in any circumstances be bent so as to form an abrupt right angle but must be rounded off at the corners to radius not less than six times the overall diameter of the cable.

### 26.4.0 Protection of wiring from Mechanical Damage:

26.4.1 In cases where there are chances of any damage to wiring, such wiring shall be drawn complying with the all the requirements of conduit wiring system.

26.4.2 Such protective covering shall in all cases be fitted on all down drops within 1.5 m. from the floor or from floor level up to the switch board whichever is less.

26.5.0 Passing through floors: All cables taken through floor shall be enclosed in heavy gauge steel conduit extending 1.5 m. above the floor or up to the switch board, whichever is less and flush with the ceiling below or by means of any approved type of metallic covering. The ends of all conduits or pipes shall be neatly bushed with porcelain wood or other approved material. The conduit pipes, shall be security earthed.

26.6.0 Passing through walls: When conductors pass through walls, any one of the following methods shall be employed. Care should be taken to see that wires pass very freely through protective pipe or box and that wires pass through in a straight line without any twist or cross in wires on either ends of such holes.

(a) A box of teak wood or approved hard wood extending through the hole thickness of the wall shall be buried in the wall and casings or conductors shall be carried so as to allow 1.3 cm air space on the three sides of the casing or conductor.

(b) The conductors shall be carried in an approved heavy gauge solid drawn or lap weld conduit or in a porcelain tube of such a size that it permits easy drawing in, the ends conduit shall be neatly bushed with porcelain, wood or other approved material.

26.6.1 Where a wall tube passes outside a building so as to be exposed to weather, the outer end shall be mounted and turned downwards and properly bushed on the open end. The conduit shall be neatly arranged so that the cables enter them without bending.

26.7.0 Buried cables: The TRS or PVC sheathed cable shall not normally be buried directly in plaster. Where so specific in the special specification they may be taken in teak wood channeling of ample capacity or conduit pipe buried in the wall.

26.8.0 Stripping of outer covering - While cutting and stripping of the outer covering of the cable care shall be taken that the sharp edge of the cutting instrument does not touch the inner insulation of the conductors. The protective outer covering of the cables shall be stripped off near connecting terminal and this protective covering shall be maintained up to the close proximity of connecting terminals as far as practicable. Care shall be taken to avoid hammering on link clips with any metal instrument after the cables are laid. Where junction boxes are provided they shall be made moisture proof with a plastic compound.

## **27.0 PAINTING WORK IN GENERAL:**

27.1 Paints : Paints, oils varnishes, etc., of approved make in original to the satisfaction of the Engineer-in-charge shall only be used.

27.2 Preparation of surface: The surface shall be thoroughly cleaned and dusted before painting is started. The proposed surface shall be inspected by Engineer-in-charge or his authorized agent and shall have received the approval before painting is commenced.

27.3 Application: Paint shall be applied with brush. The paint shall be spread as smooth & even as possible. Particular care shall be paid to rivets, nuts, bolts and cover lapping Before drawing cut, it shall be continuously stirred in the smaller containers with a smooth stick while it is being applied. Each coat shall be allowed to dry out sufficiently before a subsequent coat is applied.

27.4 Scope : Painting on old surface in indoor situations will not include primer coat except where specially mentioned in the schedule of work or special specification. However, where rust has formed on iron and steel surfaces the spots will be painted with one anti-rust primer coat.

27.5 Precautions : All furniture fixtures glazing floors, etc., shall be protected by covering. All stains, smears, splashes, dropping of every kind shall be removed. While painting of wiring etc. it shall be ensured that painting of wall ceiling etc., is not spoiled in any way.

27.6 Painting of conduit and accessories: After installation surface of conduit pipes, fittings switch and regulator boxes, etc. shall be painted with two coats of approved enamel paint or aluminum paint as required to match the finish of surrounding wall trussed, etc.

28 Link clip :

The clip for batten wiring shall be of Aluminum conforming to I. S. specification No.2415-1975.

## **APPENDIX - 'A'**

Important Clauses Of Indian Electricity Rules, 1956 Following Clauses Of Indian Electricity Rules, 1956 Shall In Particular Be Taken Care Of In The Execution Of Electrical Works

Clause No 3.	Subject	Authorization.
29.	Construction, installation, protection, operation and maintenance	

- of electric supply lines and apparatuses.
31. Cut-out on consumer's premises.
  32. Identification of earthed and earthed neutral conductors and position of switches and cut-out therein.
  33. Earthed terminal on consumer's premises.
  36. Handling of electric supply lines and apparatus.
  41. Distinction of circuits of different voltages.
  42. Accidental charge.
  43. Provisions applicable to protective equipment.
  44. Instructions for restoration of persons suffering from electric Shock.
  45. Precautions to be adopted by consumers, owners, electrical Contractors, Electrical workmen and suppliers.
  46. Periodical inspection and testing of consumer's installation.
  48. Precautions against leakage before connection.
  50. Supply to consumers.
  51. Provisions applicable to medium, high voltage installations.
  58. Point of commencement of supply.
  59. Precautions against failure of supply; Notice of failures.
  61. Connection with earth, (Low and Medium Voltage system).
  64. Use of energy of high and extra-high voltage system.
  67. Connection with earth. (High & Extra-high voltage system).
  68. General conditions as to transformation and control of energy.

All Clauses under Chapter VIII on Overhead Lines.

137. Mode of entry.
138. Penalty for braking seal.
139. Penalty for breach of rule 45.
140. Penalty for breach of rule 82.
141. Penalty for breach of rules.

## **APPENDIX - 'B'**

### **Form of Completion Certificate**

I/We certify that the installation detailed below has been installed by me/us and tested and that to the best of my/our knowledge and belief, it complies with Indian Electricity Rules 1956 as well as the C.P.W.D. General Specification for Electrical Works 1972.

Electrical Installation at \_\_\_\_\_ Voltage.

(1) Particulars of Works:

(a) Internal Electrical Installation System of Wiring.	No. Total Load	Type of
(i) Light point		
(ii) Fan point		
(iii) Plug point		
(a) 3 pin 5 Amp.		
(b) 3 pin 15 Amp.		

(b) Others:

Description	HO/KW	Type of starting
(a) Motor: (i)		
(ii)		
(iii)		

(c) Other Plants:

(d) if the work involves installation of overhead line/or underground cable :

- (a) (i) Type & Description of overhead line.  
(ii) Total length & No. of spans.  
(iii) No. of street light & its description  
(b) (i) Total length of underground cable & its size.  
(ii) No. of joint.  
End joint:  
Tee joint:  
St. through joint:

(2) Earthing :

- (i) Description of earthing electrode :  
(ii) No. of earth electrodes :  
(iii) Size of main earth lead :

(3) Test Results :

(a) Insulation Resistance :	
(i) Insulation resistance of the whole system of conductors to earth	Megohms
(ii) Insulation resistance between the phase conductors and neutral	Megohms
Between phase R and neutral	Megohms
Between phase Y and neutral	Megohms
Between phase B and neutral	Megohms
(iii) Insulation resistance between the phase conductors in case of polyphase supply.	
Between phase R & phase Y	Megohms
Between phase Y & phase B	Megohms
Between phase B & phase R	Megohms

(b) Polarity Test:

Polarity of non-linked single pole branch switches.

(c) Earth continuity Test:

Maximum resistance between any point in the earth continuity conductor including metal conduits & main earthing lead. Ohms

(d) Earth Electrode Resistance:

Resistance of each electrode.

(i) ohms

(ii) ohms

(iii) ohms

(iv) ohms

(e) Lighting Protective System:

Resistance of the whole of lighting-protective system to earth before any bonding is effected with electrode and metal in/on the structure.

Signature of Supervisor

Name & Address

Signature of Contractor

Name & Address

## **SPECIFICATION**

All Specification, standard, publication etc. specified mean the latest standards, publication etc. pertaining to Electrical Installation and should conform to the following wherever applicable.

- (1) Indian Electricity Act. 1910 with its amendments.
- (2) Indian Electricity Rules, 1956 and its amendments.
- (3) Indian Electricity supply Act. 19948.



- (4) Regulation for Electrical Equipment in building by I.E.F. London.
- (5) The Factory Act, 1948 and its amendments.
- (6) I. S.-732-1982 Part-I, II & III code of practice for Electrical wiring and fittings in buildings for low and medium voltages.
- (7) I. S. 4064-1967 H. D. Air break switches and fuses for Voltages not exceeding 1100 volts.
- (8) I.S. 3043 - Earthing code of practice for
- (9) I.S. - 1554 Part-I 1970 PVC insulated (Heavy duty) Electrical Cables for working voltages up to and including 1100 volts.
- (10) I.S. : 694 - 1964 Part - II - PVC insulated cable with Aluminum conduits (revised) for voltages up to 1100 volts.
- (11) I.S. : 5908-1970 Electrical installations in buildings method of measurements of.
- (12) I.S. : 4237-1967 General requirement for switchgear and control for voltage not exceeding 1000 volts.
- (13) I.S. 1653-1964 - Rigid steel conduits for electrical wiring (revised)
- (14) I.S. : 2509-1973 - Rigid steel conduits for electrical installation. (First revision)
- (15) I.S. : 1258 - 1967 - Bayonet lamp holders (First revision)
- (16) I.S. : 418-1957 - Tungsten-Filament General service electric lamps (Third revision)
- (17) I.S. : 374-1966 - Fans and Regulators, ceiling type, electric (second revision)
- (18) I.S. : 2667-1964 Fittings for rigid steel conduits for electrical wiring.
- (19) I.S. : 3419-1976 - Fitting for rigid non-metallic conduits (First revision)
- (20) National Electric Code, 1986

## **ANNEXURE - I**

Abstract of the Wiring Rules of the Institution of Electrical Engineer

(Referred to in the specification)

DEFINITIONS (See Clause 2 of the Specification)

Systems :

All electrical system in which all the conductor and apparatus are electrically connected to a common source of supply.

(1) Earthed: Effectually connected to the general mass of the earth, Solidly earthed means earthed without the intervention of a fuse, switch, circuit breaker, resistor reactor or solenoid.

(2) Uninsulated Conductor: A conductor without provision, by the interposition of a dielectric or otherwise, for its insulation from earth.

(3) Bare: Not covered with insulating material.

(4) Dielectric: Any material which offers high resistance to the passage of the an electric current.

(5) Bunch Conducted: When more than one conductor is contained within a single duct or groove or when they are run enclosed and not spaced apart from each other.

(6) Points: In wiring as per I.S.: 5908-1970-Method of measurements of electrical installation in buildings.

(7) Switch Board: An assemblage of switchgear with or without instruments, but the term does not apply to a group of local switches in a final sub-circuit where each switch has its own insulating base.

NOTE: In the Electricity (Factories Act) special regulations, 1908 and 1944 the term "Switchboard" includes "Distribution board".

(8) Single pole switch: A switch suitable for closing and or opening a circuit on one phase or pole only.

(9) Linked switches: A switch the blades of which are so linked mechanically as to make or break all poles simultaneously or in a definite sequence.

(10) Fuse Switch: A switch the moving part of which carries one or more fuses.

(11) Three Wire System:

(a) Outer Conductor: Those between which there is the greatest difference of potential. This use of the word outer must not be confused with the use of the work when applied to the external conductor of a concentric main.

(b) Neutral Conductors: The term includes the neutral conductor of a 3 phase 4 wire system, the conductor of a single phase or d. c. installation which is earthed by the supply undertaking (or otherwise at the source of the supply) and the middle wire of common return conductor of a 3 wire D. C. or single phase A.C. system.

(12) Semi enclosed machine: One in which the ventilating openings in the frame are covered with -

(a) Grids expanded metal or wire gauge, with openings of less than 1/4 inch so as to obstruct free ventilation.

(b) Wire gauge, in which the opening are less than 1/4 inch but not less than 3/32 inch (diameter or width) :

(c) Screens with smaller openings than the above.

(13) Totally - enclosed Machine: One in which the enclosing case and bearings are dust proof and which does not allow circulation of air between the inside and outside of the case.

(14) Pipe Ventilated Machine: An enclosed machine in which the frame is so arranged that the ventilating air may be conveyed to it through a pipe attached to the frame, the ventilation opening maintained by the fanning action produced by the machine - itself.

(15) Forced draught Machine: An enclosed machine in which the ventilating air supply is maintained by an independent fan external to the machine itself.

(16) Protected Machine: One having end shield bearings and in which there is free access to the interior without opening doors or removing covers.

#### **SWITCHES AND CIRCUIT BREAKERS** **(See clause II of Specifications)**

(17) Switches and Circuit Breakers:

Switches and circuit breakers (rules 2b.36 and 37) whether fixed separately or combined with lamps, holders or fittings, must comply with the following requirements :

- (a) Overt heading must not take place at the point of contact or elsewhere, when the full current flows continuously.
- (b) They must be so constructed or arranged that the contacts cannot accidentally close when left open.
- (c) The basis must be of incombustible, non-conducting and moisture proof material.
- (d) Circuit breaker must be so arranged and placed that no combustible material is endangered by their action.
- (e) Unless placed in an engine room or in a compartment especially arranged for the purpose, they must have their live parts covered. The covers must be of incombustible material and must be either non-conduction or of rigid metal and clear of all internal mechanism. For more than 6 amperes, at pressures exceeding 125 Volts metal covers must be lined with insulating material.
- (f) In positions where they are liable to injury or come into contract with goods, they must be further protected by an open fronted box or other suitable guard.
- (g) Handles must be insulated and so arranged that the hand cannot touch live metal, or be injured through and adjacent fuse blowing.
- (h) Switches having a handle projecting through an open slot in the cover, must not be used.

Signature of Contractor

**Gujarat Pavitra Yatradham**

**Chief Engineer**

**Vikas Board, Gandhinagar**

**SECTION - D**  
**SECTION F-1A**  
**GENERAL REQUIREMENTS**

#### 1.1 Scope of works:

The work covered by electrical specification consists supplying and installing, electrical wiring system complete in strict accordance with this specification and the applicable drawing and subject to the terms and conditions of the contract. It includes.

- (a) Conduit and wiring system for fans, lighting points, clocks, sockets, etc., including fixing of lighting fixtures and fans etc., and miscellaneous points.
- (b) Conduit and wiring system for exhaust fans sockets etc.
- (c) Panel boards, distribution boards.
- (d) Complete power and lighting
- (e) Grounding system.
- (f) Conduits system.
- (g) Street lighting system
- (h) Other miscellaneous electrical

#### 1.2 Completeness of Contract:

Any work fittings accessories or apparatus which may not have been specifically mentioned in the specification but which are necessary in the equipment for efficient working of the plant should be deemed to be included in the contract and should be executed and provided by the Contractors. All plant and apparatus should be complete in all the details, whether such details, are mentioned in the specifications or not. Three prints and one permanent negative of each of the finally approved drawings incorporating all the modifications proposed by the Department should be submitted. No modifications should be made in a drawing already approved by the Engineer-in-charge without his prior consent. Approval of the Contractor's drawing will not relieve the Contractor of any part of his obligation to meet all the requirements of the contract

#### 1.3 Guarantee :

The performance of all the equipment's and the installations should be guaranteed at least for a minimum period of one year from the date of taking over the installation by the Department. All equipments must comply with the relevant IS-BS specifications.

#### 1.4 Interchangeability:

All corresponding parts of similar plant and equipment should be interchangeable in every way.

#### 1.5 Tools:

All special tools required for dismantling and assembly of the equipment covered by the contract shall be supplied as obligation under the contract. A list of items to be supplied by the Contractor should be submitted along with the tender.

## **SECTION - E** **SECTION F-2A** **Specifications for Electrical Installation in Buildings**

### 1 GENERAL :

1.1 These specifications relate to the electrical installations in the buildings of P.W.D. Electrical. The specifications cover general requirements to be fulfilled. These general specifications are supplemented by the specifications for the particular buildings separately attached.

1.2 These specifications are governed by the General conditions of the contract attached hereto.

### 1.3 APPLICABLE RULES AND REGULATIONS :

1.3.1 Installation shall be carried out in conformity with the regulations for electrical equipment's of buildings, published by the institute of Electrical Engineers London (14th Edition 1966 and as amended up to date) hereinafter referred to as the I.E.E. wiring regulations. Where these specifications or the special specifications for the particular building attached hereto are at variance with the I.E.E. regulations these specifications or special specifications as the case may be, shall be followed. The installation shall also comply with the requirements of the Indian Electricity Act. 1910 as amended up to date and rules issued there under and also the regulations for the electrical equipments of buildings issued by the Bombay Regional Council of Engineer Association of India. Where not specified otherwise, the installation should generally follow the Indian standard codes of practice and in their absence the relevant British Standard of practices. All the materials shall comply with the relevant Indian Standard or British Standard specifications.

### 1.4 DEFINITIONS :

1.4.1 The definitions of terms in the I.E.E. Regulations shall apply in general.

### 1.5 DRAWINGS:

1.5.1 The preliminary drawings only indicate the general scheme of requirement. The exact position of all points, control switch boxes, runs of wiring and/or conduits joint boxes, inspection boxes, mains, and sub-distribution boards, mains etc., shall be got approved by the Engineer-in-charge. All circuits shall be clearly numbered in wiring diagrams and building plans. The detailed design of a switch-board, special fixture or any other part of the electrical installation as may be called for by the engineer-in-charge shall also be supplied by the Contractor and should be got approved by the Engineer-in-charge. Three sets of completion drawings and wiring diagrams showing the installations as executed shall be supplied by the Contractor along with the completion certificate.

### 1.6 MATERIALS :

All Materials shall be new and of the best quality conforming to the relevant I.S.B.S. specifications. They must be the products of reliable manufacturers of many years of standings. All like parts of materials shall be interchangeable. In case of equipments such as circuit breakers, switch fuses etc., a descriptive and illustrated literature shall accompany the tender. The names of manufacturers of various materials shall be furnished in proforma in Appendix-I Sample of materials wherever required should be approved by the application of suitable paints. The supply of all equipments, switchgears etc. shall be complete with accessories, fittings and mountings as may be required for their proper performance, and as specified in the relevant IS-BS Code of Practice and Standards.

### 1.7 WORKMANSHIP :

1.7.1 Good workmanship and neat finished appearance are the prerequisites for complying with the clauses of these specifications. With a view to ensure fine workmanship the tenderers shall employ licensed wiremen with an experience of not less than 5 years in the type of work they are engaged. The work should be done under supervision of licensed Electrical Supervisors with good educational qualifications and considerable experience.

1.7.2 Tenderers shall furnish the names of Supervisor and their wiremen who will be engaged in this work with details of their experience.

## 1.8 CO-OPERATION WITH CIVIL AND OTHER WORKS CONTRACTORS :

1.8.1 The tenderer, after the award of the contract, shall co-operate with the civil and other Contractors and shall co-ordinate his work with the work of other Contractors with the least amount of dislocation and in reference to the other works Tenderers shall go through the drawings carefully and shall furnish the Engineer-in charge with all the details of openings in the walls etc. they may be required for concealing any of the electrical equipments or accessories. Where the Contractor fails to furnish such information as may be required for the purpose of concealing the equipments etc., they shall be made at his (Contractor) cost and expense. Any alteration to parts of the building shall be carried out with prior permission of the competent authority. All chases of the structural work shall be made good at the contractor's expense and brought to the original shape finish and colour.

## 1.9 TESTING :

The electrical Contractor shall be completely responsible for the testing and commissioning of those installations covered by these specifications in compliance with the standard procedure, in obtaining permission of the Government Electrical Inspector. Any modification which is demanded by Government Electrical Inspector shall have to be carried out within the scope of the contract. The contractor shall submit four copies of drawings of installations as per regulations for shall be provided by the Contractor for carrying out the installation work. All tests shall be carried out in the presence of the Engineer-in-charge or his authorized representative and his approval obtained for the test results.

## 1.10 COMPLETION CERTIFICATE AND MAINTENANCE GUARANTEE :

1.10.1 After the completion of the installation and testing, the Contractor should furnish a certificate in the proforma in Appendix-III, at the time of taking over the installation by the Department. The installation shall be guaranteed for period of 12 months from the date of taking over by the Department. During the period of guarantee all defects in material or in workmanship shall be rectified or replaced free of cost to the Department.

## 1.11 TENDERER'S ABILITY:

1.11.1 In order to enable the Department to assess the ability of the tenderer to execute the work, the tenderer shall furnish evidence of his experience and capacity to carry out the work of the magnitude and nature.

## 1.12 RATES :

1.12.1 The rates of items shall include all taxes, transport, loading and unloading charge and all such charges that may be required to be incurred for the supply and installation of the materials at site. The rates shall be firm and variations in the market are not entertained. Break up figures as required in the schedule of work shall also be furnished. As far as possible indigenous materials only shall be included for supply. Where it is unavoidable, imported items may be included and tenderer should clearly indicate materials, quantity, rate and amount of these items.

## 1.13 STORAGE SPACE :

No covered storage space will be provided by the Department. The Contractor has to make his own arrangement. However, the Department may give an open space near the place of execution where the Contractor can build his own stores for executing the work.

## 1.14 DEPARTURE FROM SPECIFICATIONS :

The tenderer should clearly indicate departure, if any, from the specifications with reasons for the same.

## 1.15 EXTRA ITEMS:

Rates for extra items shall generally be derived from the rates already available in the schedule. Where it is not possible, the rates shall be mutually agreed upon and the Contractor shall furnish a detailed analysis of the rates claimed by him.

## 2. TECHNICAL SPECIFICATIONS :

### 2.1 Supply System :

The wiring installing shall be suitable for 3 phase 4 wire, 400-400 v 50 cycles system of supply. Colour code of different phase shall be followed as per standard.

### 2.2 Wring for Lights and Fans :

2.2.1 Looping system of wiring shall be adopted. No joints shall be made at intermediate runs of cables and where they are unavoidable, such joints shall be through approved mechanical connections.

#### 2.2.2 Point Wiring :

Point wiring shall consist of the branch wiring form the switch board together with the controlling switch or push as far as and including the ceiling rose or any other approved connector or socket, outlets. In case of more than one light being controlled by one switch the wiring up to the ceiling rose of the first light including the switch shall be considered as primary, point, Loop wiring from light shall be considered as a 'Secondary' point and rates shall be quoted separately, including final connections to fixtures and plugs.

#### 2.2.3 Conductors :

No conductor for final sub circuit wiring for light and socket outlets shall have a cross section less than that of 2.5 sq. m (aluminium).

#### 2.2.4 Loading :

No final sub-circuit radiating from the fuse board of a sub-distribution board and wires with 25 sq. m. (At.) cable shall carry more than 10 lights. fans or socket outlets or a connected load of 800 wats whichever is greater. The following wattages may be assumed for estimating the load on each sub-circuit unless otherwise know or specified.

Incandescent Lamps	100 watts
Ceiling fans	60 watts
5-A Socket Outlets (lighting)	100 watts
4. ft. fluorescent tube	50 watts
5. ft. fluorescent tubes	100 watts

In each sub-distribution board at least one way preferably two ways shall be left pare for future requirement. A wiring diagram giving the details of the exact utilization of the ways shall be prepared and fixed in the sub-distribution board itself or any other easily accessible place. The ways of sub-distribution board shall accordingly numbered.

#### 2.2.5 Local Control Switches (General) :

Local control switches for circuit carrying not less than 5-A shall be piano type and shall conform to relevant I.S. Standards. The switch shall be 'ON' when the knob is in the down position. All local control switches shall be connected in the phase or live conductor only and not in the neutral conductor, switch box is 1.3 mtr. from the finished floor level unless otherwise stated. All switch boxes shall be provided with 1/8" thick Perspex cover fixed to the switch box with chromium plated counter sunk screws (brass).

#### 2.2.5A Switches (Two way) :

(a) Two way switches shall be piano type single pole, double throw, 250V, suitable for flush mounting and of 5A capacity as per the drawings. All switches shall be recessed in an embedded metal box.

(b) Each box shall have suitable outlet for fixing conduits directly.

(c) Each box shall have Perspex cover painted inside with the wall colour, if required.



(d) Each switch shall be suitable for the position in a corridor stairway wiring.

#### 2.2.5.B Switch Boxes (General) :

Electrical circuits shall be written suitably on the cover of all switch boxes, as approved by the Engineer-in-charge (Elect). Whenever different phase are terminated in a switch box a metal partition shall be provided. Each case shall be provided with a G. I. Earth stud nut and washers for earth connectors.

#### 2.2.6 Ceiling Rose :

Ceiling rose shall be used on circuits having a voltage normally exceeding 200V. Only one flexible cord shall be attached to a ceiling rose. Only 3-pin 5A socket outlet shall be provided in lighting circuits. All socket outlets shall be provided with control switch and they shall be mounted in switch boxes in an approved manner.

#### 2.2.7 Fittings :

These shall be of approved type as specified in the tender schedule. The sub circuits leads should terminate in a ceiling rose or conductor in the fitting and internal connection made their form. Wherever these fitting are suspended they shall be done so through the conduits and ball and socket joints. All fittings shall be grounded by a G. I. conductor not less than 16 S. W. G.

#### 2.2.8 Flexible wiring :

Flexible cords of not less than 23/0076 size shall be used. The weight of suspension shall be governed by I.E.E. Regulations.

#### 2.2.9 Ceiling Fans :

All ceiling fans shall be wired to ceiling rose and suspended from a hook shackle or clamp and isolated from the same. All joints in the suspension rod shall be screwed and secured by means of split pins. The fan clamps supplied by the Contractor shall be suitable for the ceiling or roof member as the case may be. For concrete roofs, fan hooks shall be buried in concrete during construction in an approved manner and securely bound to the reinforcement.

#### 2.2.10 Conduits and Earthing :

All conduits feeding lighting and fan circuits shall be provided with earth continuity G.I. conductor as specified for power wiring. All conduits shall be as specified for power wiring.

#### 2.3.1 Point wiring :

Point wiring for power shall be as defined under section 2.2.2 and shall include the switches and sockets.

#### 2.3.2 Loading :

All distribution board for power wiring shall be not less than 15A per way. Loading per way shall not exceed normally 100 watts. The following loads may be assumed if exact figures are not known :

3-Pin 15A Outlets	1000 Watts
3-Pin 5A Outlets	100 Watts

#### 2.3.3 Wiring for Motors:

2.3.3.1 Final sub-circuits loop in motors shall be connected to separate ways of the Distribution board even if the current in the sub-circuit is less than 15A. No looping is permissible.

2.3.3.2 All wiring shall be carried in H. G. conduit as specified in I. S. specification for gauge for different sizes of conduits. When the motor is resiliently mounted flexible conduit with approved adopters shall be used for the last few feet. Where cables are used sufficient loop shall be left.

2.3.3.3 All switch fuse units controlling circuits feeding motor shall be provided with H.R.C. fuses or as specified.

2.3.3.4 The frame of every motor and its association control gear shall be earthed by two separate and distinct connections to earth. Connector shall be capable of carrying 3 times the rating of fuse or 1.1/2 time the setting of the circuit breakers but in no case less than No. 8 S.W.G. or 7064 or equivalent cross section of copper. Where practicable, the earth connection shall be visible for periodical inspection. Gas or water pipes shall not be used for earth connections.

2.3.3.5 Socket Outlets and Control Switches 5A and 15A :

All socket outlets shall be of 3 pin type, the third pin being connected to the earth stud of nearest distribution board by separate earthing wire. The socket shall conform to I. S. : 1293/1938. single pole, piano type. Each socket outlets shall be provided with a control switch of appropriate rating and as specified. The switch and socket shall be mounted inside the iron clad box provided with 1/8" Perspex cover as directed by the Engineer-in-charge or as specified in schedule of quantities. Inside switch box ample space shall be available around switches for connecting wires to switches. All socket outlets for power shall be mounted at the skirting level unless otherwise specified or as directed by the Engineer-in-charge.

The three phase plug receptacles shall have their earth terminals connected by independent earth wires to ring main earth strips on the building. In building where explosion proof fixtures are installed single phase plug receptacles as well as light points shall be connected to ring main ground bus installed in the building by separate earth wires of approved size.

Socket outlet shall have some provision not to receive the matching plug unless the grounding pin is in correct position. The grounding pin of the plug shall make the contact first and break the contact last at the time of inserting or removing the plug respectively.

The grounding terminal shall be connected to the enclosed metal body by providing G.I. stud. nut washers weld to the box Each unit shall be suitable for flush mounting as required and indicated in the applicable drawings.

Combination unit of socket outlet and switch shall be complete with necessary internal wiring. The switch/socket shall be mounted on M. S. bracket enclosed in a box.

## 2.4 Conduit Wiring :

2.4.1 Where conduit wiring is adopted the type and size of the conduit shall be as indicated in the drawing. The minimum of the conduit shall be 19 mm.

2.4.2 The Contractor shall thoroughly study the structural arrangements of the buildings and wherever necessary, shall in consultation with Department's representatives at site, make suitable adjustments in the cable routings, earthing arrangements, and location boxes, fitting etc. with a view to avoid interference with any part of the building, structure, equipment or any other work in the building or to effect any improvement in the arrangement.

2.4.3 Protection of conduit against rust :

Conduit shall be given two coats of oxide paint before they are placed in position. All exposed conduit shall be painted after installation with the colour as approved by the Engineer-in-charge. This do not apply to galvanized conduit.

#### 2.4.3 A Protection against insects and damp :

In order to minimize condensation or sweating inside the conduit, system shall be properly drained and ventilated in such a manner as to prevent the entry of insects.

2.4.4 Conduit shall first be installed as a complete system without cables and shall be continuous from outlet to outlet from fitting to fitting and mechanically and electrically connected to all boxes and fittings.

### 2.5 SPECIFICATION FOR POWER CONTROL AND TELEPHONE CABLES :

#### 1. SCOPE :

i. The specifications cover the supply and installation of medium voltage power and control cables either in ground or trench depending on the conditions at site including accessories for the same. The work in general, consists of supplying, laying terminating and connecting all. 1.1 KV APLSTS PVC power and control cables.

ii. The Contractor shall supply all accessories including jointing and terminating materials, compound, tapes supporting materials, cleats cable lugs, concrete stabs, bricks sand, cables markers etc., as required to make the installation work including digging and back filling of the trenches as required.

#### II. SPECIFICATIONS :

i. All power cables to be supplied mentioned as 'APLSTS' in the Schedule should be mass impregnated non-draining, paper insulated lead sheathed, double steel tape armored and must comply with the latest IS BS specifications.

ii. All cabling materials such as cable compound, cable lugs, tapes shall be of approved quality acceptable to the type recommended by the manufacturer of the cable for which it is used and approved by the Department.

iii. Installation of all equipment shall also conform to the applicable Codes and practice as per the IS and shall be executed to comply with the latest Indian Electricity rules as regards the safety, earthing of equipments and other essential provision specified therein.

iv. Only approved make of cable be used. ICC and CCI will be preferred.

v. The cables shall generally be laid as per IS Code of Practice.

#### III. GENERAL RULES FOR CABLE LAYING:

i. Installation shall be carried out in a neat, workman like manner by skilled experienced and competent workmen in accordance with the standard practices.

ii. Cables shall be laid preferably in one piece length to avoid joints. If straight joint are found necessary, these can be introduced with prior approval of the Engineer-in charge.

The cost of the straight joint however, shall not be borne by the Department. But in no case joint shall be within the conduit G.I. pipe and duct.

iii. proper care should be exercised in handling the cable to avoid formation of kink etc. and should it become necessary a cable be bent to a radius not less than 20 times the overall diameter of the cable.

iv. Method of installation, routing of cable etc., shall in every case be subject to the Department's approval and the Contractor shall modify and or certify at no extra cost to the Department any portions of the installation which do not meet with the Department's approval. All damages to the civil or other works

on this account shall be made good by the Contractor at no extra cost to the Department. The electrical Contractor while notifying the building Contractor for such work shall furnish the proper drawings, fully explaining the work involved or indicate at site actual work to be carried out as may be required by the building Contractor. The electrical Contractor shall also notify the building contractor in writing, for finishing up as required, of any such work as soon as the electrical work with respect to the same has been completed.

v. Where cables pass through hume pipes, Contractor shall fix hard wood bushed round the cables at the ends of hume pipes. Where the cables pass through the floors or chambers and in such other situations as the Engineer shall require, the Contractor shall seal cable holes in a manner approved by Engineer-in-charge. Where cables pass through roads nallahs, etc., cables must be protected by Class 'A' Hume pipe of diameter not less than 6" (15 cm)

vi. The cable route shall be the shortest and there shall be minimum interference with built up areas, lawns etc.

vii. Care shall be exercised for providing suitable props for supporting other service lines on earth at the time of excavation. Where cutting of a lawn become inevitable it should be with the approval of the Engineer-in-charge.

viii. Excavation of the trenches shall be executed with vertical sides and the trenches shall be kept as straight as possible. The exact location of each trench shall be settled by the Engineer-in-charge on the site when the contractor is in a position to commence each portion of the work. The trench shall be not less than 1/2 meter wide and 90 cms deep. If more cables are to be laid, the width should be suitably increased.

ix. After the cables are laid, the trench shall be filled in layers, the earth in each layer being well rammed by spraying water and consolidated and sufficient allowance made for settlement. The extra earth over the trench should be removed from the place of trench to a place as decided by the Engineer-in-charge at site.

x. Ends of cables shall be properly sealed to prevent entry of moisture prior to installation.

xi. Where it is as specified as 1/2 core in multicore cables, the 1/2 core shall be a neutral conductor having reduced section.

xii. For all multicore cables each core and tails shall be brought out, marked and or colored in an approved manner.

xiii. Cables termination shall be done with suitable compression brass glands in the case of PVC cables and cast iron trifurcating boxes in the case APLSTS cables. The armor should be connected to the right main earth in building with duplicate earth wires as per the relevant IS/BS specifications. The core isolation over each conductor shall however be retained throughout the run of the conductor up to the end where lugs shall be fitted thereon for connections. The lugs shall be fitted by means of approved solder and flux as a leap, and Eyre No. 7 liberally used. The joint shall be mechanically strong and pressure tested.

## 2.6 DISTRIBUTION BOARDS AND PANELS:

General Requirements:

2.6.1 All distribution panels shall comply with I.E.E. Rules 60-61. A clear distance of 0.91 meter in front of the switch board shall be kept. Where bare connections or attachments are provided at the back of the switch board the space behind the panel shall be either less than 0.299 meter or more than 0.762 main width. There shall be a passage way from the further outstanding part of any attachment or conductor. If the space behind the switch board exceeds 0.76 main width there shall be a passage way from either end of the switch board clear to height of 1.928 m width 0.299 m. All wiring connection shall be made neatly and securely.

2.6.2 For crocoite's carrying more than 10 Amps. tinned cable sockets shall be used. All connections shall be so made as to form their own diagram. Circuit shall be clearly numbered to correspond to wiring diagram. Names of the distribution boards shall be painted as directed by the Engineer-in-charge. All the switch fuse units and isolators D.Bs. shall be complete with earthing lugs neutral bar link. H.R.C. fuses and of approved make.

2.6.3 Skeleton type panels shall have rigid framework adequately braced and supported. The switch and distribution boards shall be neatly arranged in the frame. The details of the framework and the arrangement of switches shall be got approved by the Engineer-in-charge before the panel is fabricated.

2.6.4 All cubical type panels shall have rigid supporting frames adequately braced over which sheet metal shall be neatly secured. All switches, distribution boards etc. shall be neatly arranged on the panels and all connections made from the back of switches. The panels shall be rendered dust and vermin-proof. The interior of the panels shall not be accessible to unauthorized persons.

2.6.5 The recess type boards shall be embedded in wall in a cupboard with a metal hinged door with locking arrangement. In all recessed conduit work in distribution boards shall be recessed. Where recessing is not possible, free standing panel may be provided as approved by the Engineer-in-charge.

2.6.6 All individual components i.e. switch fuse units D. Bs. etc. shall be connected by earth continuity wire of appropriate size with the main earth bus of the panel D. B. etc. The panel switches or D.Bs. shall be earthed by not less than 2 distinctive paths to earth. Earthing of metallic parts of exposed metal shall not be effected through any structural metal work which houses the installation. Where metallic parts are not required to be earthed and are liable to become alive should the installation of the contractor become defective such metallic parts shall be separated by durable non-conducting material from any structural work.

(a) power panels shall be 3 phase, 4 wire, 400/230 volts for the distribution of 3 phase or single phase power loads. Lighting panels shall be 3 phase, 4 wire 400 230 volts for single phase lighting load distribution on all 3 phase.

(b) All panels shall be done or protected front type with no mechanical or electrical defects.

(c) Bus bars shall be of electrolytic copper or aluminum as specified and the properly tinned sizes as indicated on applicable drawings as required.

(d) All knockouts for branch circuits, conduit entries shall be drilled in and files as required. For lighting panels the top and bottom cover plates shall be removable type.

(e) Main disconnects device for all panel boards shall be of switches of disconnect type and of the size as indicated. It shall be mounted directly below the panel or through a short thread conduit of required size.

(f) The main disconnect for all panel boards shall have an entry suitable for PVC armored cable from bottom.

(g) All panel boards shall be provided with an earthing terminal and plug for connection to the grounding system.

(h) Temperature rise of all electrical parts shall not be more than 3000 C with full load measured at room temperature.

(i) Buses shall be securely supported so that ordinary vibrations will not cause any of the parts to become loose.

(j) All barriers and supports of current carrying parts shall be of moisture resistant insulating material and shall not be adversely affected by arcing.

(k) The locations of panels shown in the drawings are only tentative. Panels may be located at place approved by the Engineer-in-charge.

(l) All civil works connected with fixing such as grouting chasing and making good shall be the tenderer's responsibility.

(m) Wires adequate capacity with proper size of lugs shall be used for interconnections.

(n) Panel should be self-supported on angle channel iron framework. It should be preferably of bolted construction in case of transportation and flexibility. The frame shall be of the required size for the mounting of the equipment on it. It shall be bolted or grouted rigidly after leveling and alignment.

(o) The cupboard and D. B. should be of such size so as to be accommodated in the existing room as per I. S. rules and I. S. codes of practice for installations of medium voltage switchgear.

(p) Fabrication drawing showing the detailed dimensions and panels and its components indicating the frame work earthing positioning of switches, D. Bs. cable boxes, adopter chambers etc. shall be furnished to the Engineer-in charge. Panel should be guaranteed for satisfactory operations for a period of one year after handing over.

(q) The panel should be painted with anticorrosive paint suitable for humid and salty atmosphere on two coats of primer.

Switch Gears, Powers Panels D. B. and S. F. Us.

2.6.8 The main bus bar shall have continuous current rating as specified with neutral bar having half of full load rating of the phase bus bar. The sizes of the bus bars shall be so selected that the current density in bar does not exceed 150 amps. per sq.mm. for copper. The length of bus-bar chamber should be as suitable length to fix all the switches etc. as per prevailing standards. Clear spacing of two adjacent buses shall be 1.1/2" Minimum bar should be taped all along with color coated 11 KV grade PVC tape. The maximum internal support for each unsupported length shall exceed 600 mm.

The bus bar shall be of copper/aluminum and fabricated to the relevant standards specification. In case aluminum bus bar is used special with high conductivity aluminum bus bar alloy E 91 C frame conforming to E. S. S. 2898 shall be used. The current density shall not exceed 800A per sq. inch. Hylam barriers will be provided over the joints to prevent any short circuit.

The bus bar enclosing shall be made out of not less than 16 gauge M. S. sheets construct on with angle iron support. All interconnections between bus bars S. F. Us. and D. Bs. shall be of adequate size and details of such interconnection shall be furnished to the Engineer-in-charge for his approval.

The bus bar shall be air insulated extensible type rectangular one. The bus bars chamber shall be dust tight by providing gaskets secured properly so as to tender it vermin proof. The Combination Fuse-switch unit should comply with IS 4064 BS 861 and BBS 2510 wherever applicable. It should be suitable to accommodate High Reputing Capacity Cartridge Fuse links complying with IS 2208 or BS 88 and having certified returning capacity of not less than 35 MVA at 440 volts (AC5 duly). The switch gear (panels D. Bs. etc.) shall be installed generally as per IS-Part I 3072 and as specified and shown in drawings.

All fuse switch units shall be provided with non-deteriorating HRC fuse links complying with IS 2208-1962 and having rupturing capacity of 35 MVA at 415 volts oars specified.

All switches above 60 amps. rating shall be provided with suitable size adapter boxes. All switches mounted on the top of the bus bars shall be provided with detachable type reverse entry adapter boxes. Suitably engraved labels shall be provided for each circuit as well as for the board.

A meter with sector switches and LMH meter shall be provided where specifically mentioned. Small wiring for the inter-connecting shall be color coded and provided with numbered figures for easy identification of circuits.

(a) The distribution boards should be totally enclosed metal clad complying with B. S. 214. The M. S. sheet steel enclosures for recessed D. Bs. shall be of not less than 14 gauge.

(b) The D. B. shall be with hinged door and the locking arrangements as approved by the Engineer-in-charge.

(c) All the components shall be enclosed in the enclosure. The mounting of D. B. shall be got approved by the Engineer-in-charge before carrying out the installing.

(d) The D. Bs. shall have proper size cut outs for conduits entry or cable entry or cable entry as required and these shall be made on site.

(e) Adequate spacing shall be provided inside the D. Bs. for easy removal of the fuses and carry out the interconnection.

(f) A set of insulating barriers have to be provided between incoming breakers switches and fuses.

#### **Switch fuse Units:**

(a) All the D.P.T.P. and T.P.N. switch fuse units shall be totally enclosed ion clad quick make, quick break type to best Indian make conforming to the I.S. or B.S. 3185 specifications. All the switch fuse units shall have mechanical interlock with a door so that the door cannot be opened when the switches are in 'ON' position. The switches should be of double break isolation type to ensure safely.

(b) Eah T.P. & T.P.N. switch fuse unit shall be earthed with two distinct earth connections.

(c) Suitable insulator shall be provided between phase.

(d) There shall be suitable natural link in the fuse box.

(e) All T. P. & T.P.N. switch fuse units shall be rated for 500 volts and D.P. (required for single phase supply) and S.P.N. switches for 250-volts.

(f) The H.R.C. cartridge fuse shall conform to H. S. 88 (1952).

The O.C. Bs. ACB shall be suitable for 400/440 volts 3 phase 50 cycle supply capable of interrupting a fault MVA. of not less than 31. The circuit breaker shall conform to the BSS-936-1940 BSS 3659 with such tripping arrangements as many as required under special specifications for the building. Efficient and fool-proof mechanical interlocking shall be provided for the safe operation and maintenance. The rate shall be inclusive of the first filling of oil.

#### 2.7 Instrumentation:

The instruments and meters wherever shall be housed in special sheet steel box located between switch fuses units and bus bar chambers. The instruments etc. shall be mounted on the hinged cover with their dial flushed. All instruments shall have protective H. R. C. fuse links. All interconnections and small wiring shall be neatly dressed arranged and duly colored for easy identification of circuits. Meters shall be provided as required in the Schedule. Meters shall be dead head and be suitable for 400/440 volt 3 phase 4 wire 50 cycles (in balanced load) supply. Each selector switch shall be 3 point and of minimum 250 volts grade with silver tipped contacts suitable for metering circuits. Current transformer shall be of 5VA burden and 250V grade. Even unit shall be prewired and interconnected to the system for its required indicating performance. Indicating Lamps shall have independent circuit fuse.

#### 2.8 FIXING OF LIGHTING FIXTURES :

1. Location of fixtures their manner of fixing mounting height etc. indicated in relevant drawing. Actual location and levels shall however be arrived at site in coordination with other services etc. and prior approval of the Engineer-on-charge regarding the actual location, manner of fixing shall be obtained before the work is taken up in hand.
2. In all cases the Contractor shall provide necessary interconnection wiring earthing painting etc. all necessary for complete installation. The Contractor shall also test and commission the fixtures during completion of the work.
3. General arrangement of fixtures layout as indicated in drawings. Care shall be taken to see that all light fixtures are in a row in a room or particular area, are in absolute line and plumb and are symmetrically disposed with respect to finished surfaces of walls columns beams etc.
4. The inter-connections wiring from the light outlet point up to the fixture shall be carried out by means of flexible copper wire of section not less than 1.5 mm<sup>2</sup>.
5. All fixtures suspended by means of conduits shall be done with all and socket joints or as per approved design.

#### 2.9 Telephone System :

1. Empty conduits shall be done, recede or exposed to surface along with pull boxes, junction boxes and telephone outlet boxes, in areas and location as indicated in the relevant drawing as per materials and methods as described in regard to conduits under section "Wiring in Conduits" except the G. I. pull wires of gauge not less than 20 SWG shall be kept pulled through conduits in all sections so that in future telephone wires can be pulled easily.
2. Location shown on the drawing are approximate and final location shall be decided in the field by the Engineer-in-charge.



## **SECTION - F**

### **SPECIFICATION FOR EARTHING**

#### **Installation of Earthing Plates :**

All installation of earthing shall conform to Indian Electricity Rules, IS-3043 latest edition and I.E.E. The copper earth plates should be tinned before installation. The earth plates of copper 60 cm x 60 cm x 3.515 mm thick size as mentioned in the schedule should be in separate pits at least 150 cms to 300 cms. away from the building at a depth necessary to reach moist earth surface but with a minimum depth of 2.5 mtr from the finished ground level up to the top vertical edge of earth electrode. The earth plate shall be thoroughly cleaned to remove all dirt from the surface and be tinned properly for electrical contact with the main ground. Each earth pit should be provided with 38 mm. dia. G.I. pipe 2.5 Mts. long or more depending upon the depth of pit over the vertical edge of earth plate (with top end of pipe provided with a closed to coupler). Alternative layers of salt and coke shall be provided surrounding the plate. The pits shall be filled when the plates are in position and with type approval of Engineer-in-charge.

To facilitate watering the pit, a concrete compartment should be made with funnel with mesh and cover plate as per rules provided in ISI regulations. The masonry enclosures shall be 25 cm x 25 cm (deep) with C. I. lid of 23 cm x 30 cm size. After installation, the earthing resistance of each earth plate should be measured by resistance meggar in the presence of Engineer-in-charge, three days after the completion of earthing work, and the value should conform to regulations.