

*Detailed Item Specification*

Item No:- 01

**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. CLEARING AND GRUBING**

**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 300 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 Equipments**

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 tire 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., failing within excavation and fill lines shall be cut to such depth below ground level that in no case these fall within 500 mm of the sub grade. Also, all vegetation such as roots, under-growth, grass and other deleterious matter unsuitable for incorporation in the embankment/sub grade 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 roadway shall be 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 meters 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 stumps, boulders, stones etc., shall be done at specified spots with all lifts and up to a lead of 1000 m.

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 **Hectare**. 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 300 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 clearing 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.

Cutting, including removal of stumps and roots of trees of girth above 300 mm and backfilling to required compaction shall be measured in terms of number according to the sizes given below: -

- i) Above 300 mm to 600 mm
- ii) Above 600 mm to 900 mm
- iii) Above 900 mm to 1800 mm
- iv) Above 1800 mm

For this purpose, the girth shall be measured at a height of 1 meter above ground or at the top of the stump if the height of the stump is less than one meter from the ground.

#### **201.6. Rates**

206.6.1 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 300 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 lifts and up to a lead of 1000 m.

201.6.2 The Contract unit rate for cutting (including removal of stumps and roots) of trees of girth above 300 mm shall include excavation and backfilling to required compaction, handling, salvaging piling and disposing of the cleared materials with all lifts and up to a lead of 1000 m.

201.6.3. Where a Contract does not include separate items of clearing and grubbing, the same shall be considered incidental to the earth work items and the Contract unit prices for the same shall be considered including clearing and grubbing operations.

The contract rate shall be for a unit of **One Hectare** for completed item as directed.

**Item No:- 07**

**Applying general insecticide pest control treatment to floors, cupboards etc including labour 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.**

**□ Scope of Work:**

The work includes the supply and application of an approved chemical insecticide for pest control treatment to all designated areas such as floors, walls, cupboards, storage spaces, wooden furniture, and other specified locations within the premises.

**□ Chemical to be Used:**

- **Type:** Imidacloprid 30.5% SC (Suspension Concentrate)
- **Standard:** As per **IS: 6313 (Part-II)** – Code of Practice for Anti-Termite Measures in Buildings.
- **Concentration:** 0.075% (by mass) solution.
- **Preparation:** 10.5 ml of Imidacloprid 30.5% SC shall be diluted with **5 litres of clean water** to achieve the required concentration.

**□ Application Rate:**

- The prepared solution shall be applied at the rate of **0.5 litres per square metre** of surface area.
- The application shall ensure uniform spreading without runoff or ponding of the solution.

**□ Method of Application:**

- The surface to be treated (floors, walls, cupboards, etc.) shall be cleaned and free from dust, grease, or any loose materials before application.
- The chemical solution shall be sprayed uniformly using a **hand compression sprayer or pressure spray pump** equipped with a fine nozzle to ensure even coverage.
- Care shall be taken to apply the chemical thoroughly along junctions of walls and floors, corners, cracks, crevices, and concealed areas likely to harbor insects.

**□ Safety Precautions:**

- All operations shall be carried out by trained personnel wearing protective gear (gloves, masks, goggles, etc.).
- Adequate ventilation shall be ensured during and after application.
- The treated area shall not be occupied for a minimum period of **2 to 3 hours** post-application or as directed by the manufacturer.

**□ Material Handling and Storage:**

- The insecticide shall be stored in tightly closed containers in a cool, dry place away from direct sunlight and foodstuffs.
- Only freshly prepared solutions shall be used; leftover diluted solutions shall not be stored.

**□ Measurement:**

- The treated area shall be measured in **square metres (Sqm)** of surface actually treated.

**□ Rate to Include:**

The quoted rate shall be inclusive of:

- Supply of chemical Imidacloprid 30.5% SC of approved make,
- All labour, tools, and plant required for application,
- Transportation, handling, mixing, and application,
- Safety measures and compliance with relevant IS specifications,
- Complete work in all respects as directed by the Engineer-in-Charge.

### Item No:- 23

**Providing and laying controlled cement concrete M-200 and curing complete including the cost of form work but excluding the cost of reinforcement for reinforced concrete work in FLOORING SLABS and curing including cost of form work. Compaction and finishing of cement concrete road by trimix process inclusive of labour charges for the trimix vacuum dewatering process on cement concrete road surface by using vacuum dewatering pump, surface floater, surface vibrator including Channelling & making grooves and rough finish to surface by providing expansion Joints, Contraction joints & construction joints with filling of joints with asphalt filler as directed by Engineer In charge & as per specification.**

### MATERIALS

Cement shall be Ordinary Portland Cement (OPC) conforming to IS:269/IS:8112 as approved by the Engineer-in-Charge.

Coarse aggregates shall consist of hard, durable, crushed stone conforming to IS:383, clean and free from dust, clay, organic matter or other deleterious substances.

Fine aggregate shall consist of clean coarse sand conforming to IS:383 and shall be free from silt, clay and organic impurities.

Water used for mixing and curing shall be clean and free from harmful quantities of oils, acids, alkalis, salts and organic matter and shall conform to IS:456.

### CONCRETE

Concrete shall be Design Mix M-20 having characteristic compressive strength of 20 MPa at 28 days. The mix design shall be approved by the Engineer-in-Charge before commencement of work.

Batching of materials shall be carried out by weight. Mixing shall be done in a mechanical concrete mixer or batching plant of approved capacity to obtain uniform consistency.

### LAYING

The surface on which concrete is to be laid shall be properly prepared, compacted, cleaned and brought to the required line, level and grade.

Concrete shall be transported and placed in position without segregation. It shall be laid to the specified thickness, camber, alignment and cross-fall as shown on drawings or directed by the Engineer-in-Charge.

The concrete shall be placed continuously between joints and compacted immediately after placing.

### COMPACTION AND FINISHING BY TRIMIX PROCESS

Compaction and finishing shall be carried out by Trimix Vacuum Dewatering Process.

The process shall include:

- a) Compaction of concrete using surface vibrators or screed vibrators.
- b) Vacuum dewatering of freshly laid concrete using approved vacuum pump and filter pads to remove excess water and improve density and strength.
- c) Surface levelling and finishing using power floater and trowelling equipment.
- d) Achieving a dense, smooth and durable surface free from honeycombing, cracks, depressions and surface defects.
- e) Providing rough broom finish/skid resistant finish wherever specified.

### JOINTS

Expansion Joints, Contraction Joints and Construction Joints shall be provided at locations and spacing shown on drawings or as directed by the Engineer-in-Charge.

Expansion joints shall be formed using approved joint filler material of required thickness.

Contraction joints shall be formed by groove cutting or insertion of approved formers to the required depth.

Construction joints shall be formed where concreting operations are discontinued and shall be treated as per specifications.

All joints shall be true to line and level and shall be finished neatly.

### **JOINT FILLING**

After completion of curing and cleaning of joints, the joints shall be filled with approved asphalt filler/bituminous joint sealing compound complete as directed by the Engineer-in-Charge.

The filler shall completely fill the joint depth and provide a watertight and flexible seal.

### **CHANNELING AND GROOVING**

The finished surface shall be provided with channels, grooves and texture markings as specified or directed by the Engineer-in-Charge to improve drainage and skid resistance.

Grooves shall be formed uniformly without damaging adjacent concrete.

### **FORMWORK**

Formwork shall be of steel or approved material, rigid, watertight and capable of maintaining the required line, level, shape and dimensions.

Forms shall be properly aligned, cleaned and oiled before concreting.

Removal of formwork shall be carried out only after the concrete has attained sufficient strength.

The cost of formwork, erection, maintenance and removal shall be included in the item rate.

### **CURING**

Concrete shall be protected from drying immediately after finishing and shall be cured continuously for a minimum period of 14 days by ponding, wet covering, spraying or other approved methods.

Adequate arrangements shall be made to ensure uninterrupted curing throughout the specified period.

### **QUALITY CONTROL**

Concrete cubes shall be cast, cured and tested as directed by the Engineer-in-Charge.

The contractor shall maintain all records of batching, laying, curing and testing.

Any defective work failing to satisfy specified requirements shall be removed and replaced at the contractor's cost.

### **RATE**

The rate shall include the cost of all materials, labour, machinery, equipment, batching, mixing, transportation, laying, compacting, vacuum dewatering, power floating, finishing, channelling, grooving, rough finish, providing expansion joints, contraction joints, construction joints, asphalt joint filler, curing, formwork, testing and all incidental charges necessary to complete the work.

The rate shall exclude only the cost of reinforcement steel, if any.

### **MODE OF MEASUREMENT**

The work shall be measured in Cubic Metres (Cum) based on the actual volume of finished concrete laid in position as per approved drawings and specifications.

#### **Item No:- 24**

### **Providing TMT Bar FE 500D reinforcement for R.C.C. work including bending, binding and placing in position complete up to floor two level**

#### **1601. Description:**

This work shall consist of furnishing and placing coated or uncoated mild steel or high strength deformed reinforcement bars of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer.

#### **1602. General:**

Steel for reinforcement shall meet the requirements of Section 1000 of these specifications.

Reinforcements may be either mild steel or high strength deformed bars. They may be uncoated or coated with epoxy.

#### **1603. Protection of Reinforcement:**

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 blocks, racks or platforms and above the ground in a clean and dry condition and shall be suitably marked to facilitate inspection and identification.

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.

In case of fusion bonded epoxy coated reinforcement or hot dipped galvanized bars used, reference shall be made Clause 1010.3.2 of Section 1000 of these specifications.

#### **1604. Bending of Reinforcement:**

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

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

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

Bars shall not be bent or straightened in a manner that will damage the parent material or the coating.

Bars bent during transport or handling shall be straightened before being used on work. They shall not be heated to facilitate straightening.

#### **1605. Placing of Reinforcement:**

- a) 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 the 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.
- b) 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.
- c) Bars shall be kept in position usually by the following methods:

- i) 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.
- ii) In case of dowels for columns and walls, the vertical reinforcement shall be kept in position by means of timber templates with slots cut 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.
- iii) 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.
- iv) Necessary stays, blocks, metal chain, spacers, metal hangers, supporting wires etc. or other subsidiary reinforcement shall be provided to fix the reinforcements firmly in its correct position.
- v) Use of pebbles broken stone, metal pipe, brick, mortar or wooden blocks etc., as devices for positioning reinforcement shall not be permitted.
- d) Bars coated with epoxy shall be placed on supports that do not damage the coating. Supports shall be installed in a manner such that point of weakness is 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. Refer Section 1000 of these specifications for other requirements.
- e) Placing and fixing of reinforcement shall be inspected and approved by the Engineer before concreting is commenced.

## **1606. Bar Splices:**

### **1606.1. Lapping**

All reinforcement shall be furnished in full lengths as indicated on the drawing. No splicing of bars, except where shown on the drawing, shall 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 1.25 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.

### **1606.2. Welding**

**1606.2.1.** 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.

**1606.2.2.** While welding may be permitted for mild steel 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 Fe 240 grade including special welding grade of Fe 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

**1606.2.3.** The method of welding shall conform to IS: 2751 and IS: 9417, any supplemental specifications and clause 1904.8 of these Specifications to the satisfaction of the Engineer.

Welding may be carried out by metal arc welding process. Oxy-acetylene welding shall not be permissible. Any other process may be used subject to the approval of the Engineer and necessary additional requirements to ensure satisfactory joint performance. Precautions on overheating, choice of electrode, selection of correct current in arc welding etc., should be strictly observed.

All bars shall be butt welded except for smaller diameter bars (diameter of less than 20 mm) which may be lap welded. Single-V or Double-V butt joints may generally be used. For vertical bars single bevel or double bevel joints may be used.

Welded joints shall be located well away from bends and shall be not less than twice the bar diameter away from a bend.

Generally, shop welding in controlled conditions is to be preferred, where feasible. Site welding where necessary shall, however, be permitted when the facilities, equipment, process, consumables, operators and welding procedure, are adequate to produce and maintain uniform quality at par with that attainable in shop welding to the satisfaction of the Engineer.

Joint welding procedures which are to be employed shall invariably be established by a procedure specification. All welders and welding operators to be employed shall be qualified by tests prescribed in IS: 2751. Inspection of welds shall conform to IS: 822 and destructive or non-destructive testing may be undertaken when deemed necessary. Joints with weld defects detected by visual inspection or dimensional check inspection shall not be accepted.

Suitable means shall be provided for holding the bars securely in position during welding. It must be ensured that no voids are left in welding. When welding is done in two or three stages, the surface shall be cleaned properly after each stage. Bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before carrying out welding. Oily competent and experienced welders shall be employed on the work with the approval of the Engineer. No welding shall be done on coated bars.

M.S. electrodes used for welding shall conform to IS: 814.

**1606.2.4.** Welded joints shall preferably be located at points where steel will not be subject to more than 75 percent of the maximum permissible stresses and welds so staggered that at any one section, not more than 20 percent of the bars are welded.

**1606.2.5.** Specimens of Welded pieces of reinforcement taken from the site shall be tested. The number and frequency of tests shall be as directed by the Engineer.

### **1606.3. Mechanical Couplers and Anchorages:**

#### **1606.3.1 Mechanical Couplers:**

Bars may be joined with approved patented mechanical devices as indicated on the drawing or as approved by the Engineer e.g. by special grade steel sleeves swaged on to bars in end-to-end contact or by screwed couplers. In case such devices are permitted by the Engineer, they shall develop at least 125 percent of the characteristic strength of the reinforcement bar.

#### **1606.3.2 Anchorages:**

Bars may be anchored with approved patented mechanical anchorages as indicated on the drawing or as approved by the Engineer. The anchorages shall be connected to the reinforcing bar by the use of taper thread system. The anchorage shall be capable of developing the characteristic strength of reinforcement without damage to concrete and shall have sufficient diameter and width to develop adequate shear cone strength. The connection shall develop 125% of the characteristic strength of reinforcement bar.

### **1607. Testing and Acceptance:**

The material shall be tested in accordance with relevant IS specifications and necessary test certificates shall be furnished. Additional tests, if required, will be got carried out by the Contractor at his own cost.

The supply, fabrication and placing of reinforcement shall be in accordance with these specifications and shall be as checked and accepted, by the Engineer.

Manufacturer's test certificate regarding compliance with Indian Standards for each lot of steel, shall be obtained and submitted to the Engineer. If required by the Engineer, the Contractor shall carry out confirmatory tests in the presence of a person authorized by the Engineer. Cost of these tests shall be borne by the Contractor. The sampling and testing procedure shall be as laid down in IS: 1786. If any test piece selected from a lot fails, no re-testing shall be done and the lot shall be rejected.

### **1608. Measurements for Payment:**

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.

#### 1609. Rate:

The contract unit rate for coated / uncoated reinforcement shall cover the cost of material, royalty, fabricating, transporting, storing, bending, placing, binding and fixing in position as shown on the drawings and 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 coating work as well as sampling, testing and supervision required for the work.

IS: 1732: 1989

**Table 1 Dimensions, Sectional Areas and Mass of Hot-Rolled Round Steel Bars (Clauses 3.1, 4.1 and 4.1.1)**

Designation	Diameter mm	Sectional Area cm <sup>2</sup>	Mass Per Meter Kg
(1)	(2)	(3)	(4)
ISRO 5	5.0	0.196	0.154
ISRO 6	6.0	0.283	0.222
ISRO 8	8.0	0.503	0.395
ISRO 10	10.0	0.785	0.617
ISRO 14	14.0	1.54	1.21
ISRO 16	16.0	2.01	1.58
ISRO 18	18.0	2.54	2.00
ISRO 20	20.0	3.14	2.47
ISRO 22	22.0	3.80	2.98
ISRO 25	25.0	4.91	3.85
ISRO 28	28.0	6.16	4.83
ISRO 30	30.0	7.07	5.55
ISRO 32	32.0	8.04	6.31
ISRO 35	35.0	9.62	7.55
ISRO 40	40.0	12.6	9.85
ISRO 45	45.0	15.9	12.5
ISRO 50	50.0	19.6	15.4
ISRO 55	55.0	23.8	18.7
ISRO 60	60.0	28.3	22.2
ISRO 65	65.0	33.2	26.0
ISRO 70	70.0	38.5	30.2
ISRO 75	75.0	44.2	34.7
ISRO 80	80.0	50.3	39.5
ISRO 90	90.0	63.6	49.9
ISRO 100	100.0	78.5	61.7
ISRO 110	110.0	95.0	74.6
ISRO 120	120.0	113	88.8
ISRO 140	140.0	154	121
ISRO 160	160.0	201	158
ISRO 180	180.0	254	200
ISRO 200	200.0	314	247

**Table 2 Dimensions, Sectional Areas and Mass of Hot-Rolled Round Steel Bars (Clauses 3.1, 4.1 and 4.1.1)**

Designation	Side Width mm	Sectional Area cm <sup>2</sup>	Mass Per Meter Kg
(1)	(2)	(3)	(4)
ISSQ 5	5.0	0.25	0.196
ISSQ 6	6.0	0.36	0.283
ISSQ 8	8.0	0.64	0.502
ISSQ 10	10.0	1.00	0.785
ISSQ 14	14.0	1.96	1.54
ISSQ 16	16.0	2.56	2.01
ISSQ 18	18.0	3.24	2.54
ISSQ 20	20.0	4.00	3.14
ISSQ 22	22.0	4.84	3.80
ISSQ 25	25.0	6.25	4.91
ISSQ 30	30.0	9.00	7.06
ISSQ 35	35.0	12.2	9.58
ISSQ 40	40.0	16.0	12.6
ISSQ 50	50.0	25.0	19.6
ISSQ 60	60.0	36.0	28.3
ISSQ 70	70.0	49.0	38.5
ISSQ 80	80.0	64.0	50.2
ISSQ 100	100.0	100	78.5
ISSQ 120	120.0	144	113

**4.1.1** The cross-sectional area of round and square steel bars is given in Tables 1 and 2 respectively for information. The values have been rounded off to three significant figures.

#### 5 TOLERANCES

**5.1** The rolling and cutting tolerances for the steel bars shall be in accordance with IS:1852:1985

11.4 The contract rate shall be for a unit of one Kilogram for completed item of work as above

Providing & fixing rolling shutters of approved make made of 80 mm. Wide M.S. Laths inter-locked together through their entire length / Flexible Grill Type and jointed together at the end locks mounted on specially designed pipe shaft with bracket plates, guide channels and out side locking with push-pull operation including the cost of Hood cover and spring etc. complete. (A) Shutters having width below 3.5 M.

#### Materials

- **Shutter Curtain:**
  - Fabricated from **80 mm wide machine-rolled M.S. laths** of approved gauge and quality.
  - Laths shall be interlocked throughout their entire length and secured at ends with end locks.
  - Alternatively, flexible grill type shutter may be provided where specified.
- **Bottom Rail:**
  - Heavy-duty M.S. bottom section of approved size and thickness.
  - Provided with suitable locking arrangement and stopper.

#### Pipe Shaft Assembly

- Shutter shall be mounted on a **specially designed M.S. pipe shaft** of adequate diameter and thickness.
- Shaft shall be supported on heavy-duty **M.S. bracket plates** with suitable bearings for smooth operation.
- Necessary springs shall be provided to ensure balanced and effortless operation.

#### Guide Channels

- Guide channels shall be fabricated from heavy-duty M.S. sections of approved size.
- Channels shall be securely fixed to jambs and properly aligned to ensure smooth movement of shutter.

#### Hood Cover

- Providing and fixing **M.S. hood cover** fabricated from approved gauge M.S. sheet.
- Hood shall completely cover the rolled shutter assembly and spring mechanism.

#### Locking Arrangement

- Shutter shall be provided with approved **outside locking arrangement** suitable for push-pull operation.
- Necessary handles, locking plates, bolts, and accessories shall be included.

#### Surface Preparation & Finishing

- All steel components shall be thoroughly cleaned of rust, oil, and mill scale.
- One coat of approved **metal primer** shall be applied before installation.
- Two coats of approved **synthetic enamel paint** of selected shade shall be applied after erection, unless otherwise specified.

#### Fixing & Installation

- Guide channels, brackets, shaft, springs, hood cover, and shutter curtain shall be erected complete in position.
- Shutter shall operate smoothly without binding, jamming, excessive noise, or vibration.
- Proper alignment, plumb, and level shall be maintained throughout installation.

#### Workmanship Requirements

- All components shall be accurately fabricated and assembled.
- Welds shall be continuous, smooth, and properly finished.
- Shutter shall be capable of smooth manual operation with minimum effort.
- Entire work shall conform to approved drawings, specifications, and manufacturer's recommendations.

#### **Scope Includes**

The item includes cost of **M.S. laths, pipe shaft, springs, bracket plates, guide channels, hood cover, locking arrangements, handles, bearings, welding, fabrication, primer, painting, fixing, labour, tools and plants, transportation, loading, unloading, handling, leads, lifts, and all incidental charges** necessary for complete installation.

#### **Mode of Measurement**

Measurement shall be made in **Square Metres (Sqm)** of clear shutter opening area.

Payment shall be made for the **fully fabricated, supplied, painted, and installed rolling shutter complete with all fittings and accessories**. No separate payment shall be made for shaft, springs, hood cover, guide channels, locking arrangements, or incidental components.

**All final decisions regarding selection of brand and quality of materials shall be as finalized by the Engineer-in-Charge.**

### Item No:- 30

**Providing & fixing M.S. Grill using 16 mm dia M.S. Bars @ 15 cm C/C fixed in frame using angle 35 mm x 6 mm, 35 x 6 mm flat in center, and Galvanized wiremesh jali 20mm x 20 mm spacing, including red lead primer coat and two coats of oil painting etc. complete.**

#### **Materials**

##### **M.S. Bars**

- Vertical members shall be made from **16 mm diameter mild steel round bars**.
- Bars shall be placed at **150 mm c/c spacing** or as shown in approved drawings.

##### **Frame**

- Outer frame shall be fabricated from **M.S. angle 35 mm × 35 mm × 6 mm**.
- Frame shall be true to line, level, and dimensions.

##### **Intermediate Flat**

- Providing **35 mm × 6 mm M.S. flat** at centre or as required for additional rigidity and support.

##### **Wire Mesh**

- Providing and fixing **galvanized wire mesh (Jali)** having **20 mm × 20 mm spacing**.
- Mesh shall be securely fixed to the grill frame using approved clips, binding wire, welding, or fastening arrangement.
- Wire mesh shall be taut, properly stretched, and free from sagging.

##### **Fabrication**

- Grill shall be fabricated to the required size and pattern as approved.
- All joints shall be properly welded and ground smooth.
- Burrs, sharp edges, and welding projections shall be removed.
- Fabrication shall ensure adequate rigidity and structural stability.

##### **Surface Preparation**

- All steel surfaces shall be thoroughly cleaned of rust, oil, grease, mill scale, and foreign matter.
- Welded joints shall be cleaned and dressed properly before painting.

##### **Painting**

- One coat of **approved red oxide/red lead primer** shall be applied on all steel surfaces.
- After primer, **two coats of approved synthetic enamel/oil paint** of selected shade shall be applied to achieve a smooth, uniform, and durable finish.

##### **Fixing**

- Grill shall be fixed in position using approved holdfasts, anchor fasteners, rag bolts, screws, or welding to embedded inserts as required.
- The grill shall be properly aligned, plumb, and securely anchored to the surrounding structure.
- Necessary cutting, drilling, grouting, and making good the disturbed surfaces shall be included.

##### **Workmanship Requirements**

- Grill shall be rigid, free from distortion, and capable of withstanding normal service loads.
- Welds shall be continuous, sound, and neatly finished.

- Wire mesh shall be firmly secured throughout.
- Finished surface shall be smooth, properly painted, and free from visible defects.
- Entire work shall conform to approved drawings and specifications.

#### **Scope Includes**

The item includes cost of **16 mm dia M.S. bars, M.S. angle frame, M.S. flat stiffeners, galvanized wire mesh, welding, cutting, drilling, holdfasts, primer, painting, fixing, labour, tools and plants, transportation, loading, unloading, handling, leads, lifts, scaffolding (if required), and all incidental charges** necessary to complete the work.

#### **Mode of Measurement**

Measurement shall be made in **Square Metres (Sqm)** of the finished grill area measured overall, including frame and wire mesh.

Payment shall be made for the **completed grill work including frame, bars, wire mesh, fabrication, primer, painting, and fixing**. No separate payment shall be made for welding, holdfasts, fasteners, painting, or incidental operations.

**All final decisions regarding dimensions, fabrication details, quality of materials, and workmanship shall be as finalized by the Engineer-in-Charge.**

### Item No:- 31

**Providing and fixing Glass bricks Partition using glass brick of required design ,type size of glass brick 19 x 19 Cm and fixing the same with 4 mm dia aluminium bar at every 3rd layer with white cement etc complete.**

#### **Glass Bricks**

- Glass bricks shall be of approved make, quality, design, and pattern.
- Size of glass brick shall be **190 mm × 190 mm** (nominal).
- Bricks shall be uniform in size, colour, texture, and finish.
- Glass blocks shall be free from cracks, chips, bubbles, distortions, or other manufacturing defects.

#### **Jointing Material**

- White cement mortar/grout of approved quality for fixing and jointing of glass bricks.
- Pigments, if required, shall be of approved shade and quality.

#### **Reinforcement**

- **4 mm diameter aluminium bars** shall be provided as reinforcement at every third horizontal course/layer.
- Aluminium bars shall be continuous throughout the partition length and properly embedded in joints.

#### **Construction**

- Glass bricks shall be laid true to line, level, and plumb in the approved pattern.
- Joints shall be uniform in thickness and neatly finished.
- Reinforcement bars shall be fixed at every third layer to provide stability and rigidity to the partition.
- Expansion and movement joints shall be provided wherever required as directed by the Engineer-in-Charge.
- Necessary spacers, supports, and alignment devices shall be used during construction.

#### **Jointing & Finishing**

- Joints shall be completely filled with white cement mortar and neatly pointed.
- Exposed surfaces shall be cleaned immediately after fixing to remove mortar stains.
- Finished partition shall present a smooth, uniform, and aesthetically pleasing appearance.
- Glass surfaces shall be cleaned thoroughly upon completion.

#### **Fixing**

- Partition shall be securely anchored to adjoining walls, columns, beams, or structural members using approved fixing arrangements.
- Necessary cutting, fitting, drilling, and making good of adjoining surfaces shall be included.

#### **Workmanship Requirements**

- Partition shall be perfectly vertical, rigid, and stable.
- Glass bricks shall be aligned uniformly with consistent joint widths.
- No cracked, chipped, or damaged glass blocks shall be permitted.
- Finished work shall be free from waviness, misalignment, stains, or visible defects.
- Entire work shall conform to approved drawings and specifications.

#### **Scope Includes**

The item includes cost of **glass bricks, white cement mortar, 4 mm dia aluminium reinforcement bars, spacers, anchors, supports, fixing accessories, cutting, fitting, jointing, pointing, cleaning, labour, tools**

**and plants, transportation, loading, unloading, handling, leads, lifts, scaffolding (if required), and all incidental charges** necessary to complete the work.

#### **Mode of Measurement**

Measurement shall be made in **Square Metres (Sqm)** of completed glass brick partition measured in place.

Payment shall be made for the **finished partition area**, including glass bricks, reinforcement, jointing, fixing, and finishing complete. No separate payment shall be made for aluminium bars, anchors, spacers, pointing, or incidental operations.

**All final decisions regarding design, pattern, quality of materials, and workmanship shall be as finalized by the Engineer-in-Charge.**

#### Item No:- 34

Providing and fixing pre-cast Rubber Dye / steel Dye inter locking concrete block 60mm thick with grade of concrete M300 pneumatic compressed / vibrated mechanically and as per approved design Confirming to IS 15658 : 2006 including 35 mm Sand layer for levelling and filling the joint with sand in proper line and level as per guidelines of IRC : SP 63-2018 etc. Complete.

#### Materials

- **Paver Blocks:**
  - Pre-cast concrete paver blocks manufactured using **rubber/steel dies**
  - Thickness: **60 mm**
  - Grade of concrete: **M-300**
  - Manufactured by **pneumatic compression/vibration process**
  - Shape, size, and colour as per **approved design**
  - Conforming to **IS 15658:2006**
- **Bedding Material:**
  - **35 mm thick sand layer** of clean, coarse sand for leveling
- **Joint Filling Material:**
  - Fine sand for filling joints

#### Sub-base Preparation

- Subgrade shall be **properly prepared, compacted, and leveled**
- Surface shall be brought to required **line, level, and camber** before laying bedding layer

#### Laying of Bedding Layer

- **35 mm thick sand layer** shall be spread evenly
- Surface shall be **leveled and lightly compacted** to receive paver blocks

#### Laying of Paver Blocks

- Paver blocks shall be **laid manually in required pattern and design**
- Proper **alignment, spacing, and level** shall be maintained
- Blocks shall be placed **closely with uniform joints**

#### Joint Filling & Compaction

- Joints shall be filled with **fine sand**
- Surface shall be **compacted using plate compactor** to achieve proper interlocking
- Additional sand shall be spread and brushed to fill all joints completely

#### Finishing

- Finished surface shall be **even, level, and true to required gradient and camber**
- No loose or rocking blocks shall be permitted

#### Workmanship Requirements

- Blocks shall be **uniform in size, shape, and colour**
- Surface shall be **properly compacted and free from undulations**
- Entire work shall conform to **IS 15658:2006 and IRC:SP 63-2018 guidelines**

**Scope Includes**

The item includes cost of **paver blocks, sand bedding, joint filling sand, laying, compaction, labour, tools & plants, machinery, transportation, loading, unloading, handling, leads, lifts, and all incidental charges** required to complete the work.

**Mode of Measurement**

Measurement shall be made in **square metres (Sqm)** of paved area.

Payment shall be made for **fully completed and accepted work** as per approved specifications. No separate payment shall be made for sand layer, joint filling, or compaction.

**All final decisions regarding selection of brand and quality of materials shall be as finalized by the Engineer-in-Charge.**

#### Item No:- 35

Providing and fixing pre-cast concrete kerb stone of gray cement based concrete block 30cm length, 30cm height and 15cm thick of M250 grade concrete as per approved design and including excavation for fixing in proper line and level, filling the joint with C:M 1:3 (1cement:3fine sand) etc complete.

#### **General:**

This work shall consist of providing and laying **homogeneous gray cement-based concrete kerbing** of size 30 cm × 30 cm × 15 cm, as per detailed drawings, with **M25 grade concrete**, of the shape and dimensions shown, conforming to these specifications or as approved by the Engineer-in-Charge.

#### **Materials:**

- **Pre-cast Concrete Kerb Stone:** Gray cement-based concrete block of size 30 cm × 30 cm × 15 cm, M25 grade concrete, as per approved design.
- **Cement:** Shall conform to **Specification No. M-3** from the Booklet of Specifications for Building Works.
- **Water:** Shall conform to **Specification No. M-1** from the Booklet of Specifications for Building Works.
- **Sand:** Shall conform to **Specification No. M-6** from the Booklet of Specifications for Building Works.
- **Mortar for Joint Filling:** Cement and sand for base and joint shall be mixed in **1:3 ratio (1 cement : 3 fine sand by volume)**. Proportions shall be measured by volume with due allowance for bulking. Water shall be added to produce workable consistency. The mixing platform shall be thoroughly cleaned before changing cement type.

#### **Finishing:**

- Painting on the concrete kerb, if required, shall be carried out as per instructions and to the satisfaction of the Engineer-in-Charge.

#### **Mode of Measurement & Payment:**

- The item shall be measured by its **running length (Rmt)** as laid in position according to specified dimensions on plan or as directed.

Payment shall be made on **Rmt basis**, inclusive of excavation, fixing, joint filling, and finishing.

#### Item No:- 42

Providing and laying water proofing treatment with china mosaic tiles flooring over avg 40 mm C.C. 1:2:4 {1 Cement : 2 sand : 4 Kapachi / Gritt 6 to 12 mm size} bedding for maintaining slope for plain and curve surface & 12 mm to 20 mm of broken piece of seramic / glazed tiles ( one for more color as directed ) to be laid over cement mortar bedding of C M 1:3 (1 cement : 3 sand ) containg one Kg of water profing materials per bag of O P C at plain or / and slops and to be tempered to bring mortar ceramic up to surface with using white cement and colour pigment including rounding of junctions and extending them up to 15 cm along the wall and curing with bends any pattens or design as per drawing and cleaning by using oxalic acid etc complete.

#### **Materials**

##### **Cement Concrete Bedding**

- Providing average **40 mm thick cement concrete in proportion 1:2:4** (1 Cement : 2 Sand : 4 Kapchi/Grit of 6 mm to 12 mm size).
- Concrete shall be laid to the required slopes and levels to ensure proper drainage.

##### **Waterproofing Admixture**

- Approved integral waterproofing compound shall be added at the rate of **1 kg per bag of Ordinary Portland Cement (OPC)** or as per manufacturer's recommendations.

##### **China Mosaic Finish**

- Broken pieces of ceramic/glazed tiles of approved quality and colour.
- Mosaic pieces shall be of **12 mm to 20 mm size**.
- Single colour or multi-colour pattern shall be provided as shown in drawings or as directed by the Engineer-in-Charge.

##### **Bedding Mortar**

- Cement mortar **1:3** (1 Cement : 3 Fine Sand) mixed with waterproofing compound.

##### **White Cement & Pigments**

- White cement and approved colour pigments for joint filling and finishing.

##### **Surface Preparation**

- Existing surface shall be thoroughly cleaned and prepared.
- Loose materials, dust, laitance, and foreign matter shall be removed.
- Surface shall be wetted before laying the waterproofing treatment.

##### **Laying of Slope Concrete**

- Average **40 mm thick C.C. 1:2:4** shall be laid to the required slopes and contours.
- Concrete shall be compacted and finished properly.
- Suitable slope towards rainwater outlets shall be maintained to prevent water stagnation.

##### **China Mosaic Flooring**

- Broken ceramic/glazed tile pieces shall be laid over a bed of **cement mortar 1:3** containing waterproofing compound.
- Mosaic pieces shall be uniformly distributed and embedded in the mortar.
- Surface shall be beaten and tamped to bring the mortar and ceramic pieces into a compact, homogeneous layer.
- Required patterns, bands, designs, motifs, or colour combinations shall be formed as shown in drawings.

##### **Junction Treatment**

- Junctions between floor and parapet wall shall be rounded with cement mortar fillets.

- Waterproof treatment shall be extended **minimum 150 mm height** along parapet walls, upstands, and vertical surfaces.
- All corners and junctions shall be treated to eliminate sharp angles and leakage-prone areas.

#### **Finishing**

- Joints shall be filled with white cement paste mixed with approved colour pigments.
- Surface shall be rubbed and finished to achieve a smooth, dense, and uniform appearance.
- After curing, the surface shall be cleaned using **oxalic acid solution** and washed thoroughly to obtain a clean and attractive finish.

#### **Curing**

- Proper curing shall be carried out for a minimum period of **14 days** or as directed by the Engineer-in-Charge.
- The surface shall be protected against damage during the curing period.

#### **Performance Requirement**

- Finished surface shall be completely waterproof, durable, crack-free, and capable of resisting weathering effects.
- No water stagnation, seepage, or leakage shall be permitted.
- Necessary ponding test shall be conducted if directed by the Engineer-in-Charge.

#### **Workmanship Requirements**

- Surface shall be true to line, level, and slope.
- Mosaic finish shall be uniform in appearance and free from cracks, hollowness, or loose pieces.
- Junctions, bends, and parapet treatments shall be neatly executed.
- Entire work shall conform to approved drawings, specifications, and standard engineering practices.

#### **Scope Includes**

The item includes cost of **cement concrete bedding, waterproofing compound, cement mortar, China mosaic tiles, white cement, pigments, slope formation, junction treatment, parapet upturns, laying, tamping, rubbing, curing, oxalic acid cleaning, labour, tools and plants, scaffolding, transportation, loading, unloading, handling, leads, lifts, and all incidental charges** necessary to complete the work.

#### **Mode of Measurement**

Measurement shall be made in **Square Metres (Sqm)** of finished waterproofed China Mosaic surface measured horizontally.

Payment shall be made for the **completed waterproofing treatment**, including slope concrete, waterproofing compound, China Mosaic finish, parapet upturns, curing, and cleaning. No separate payment shall be made for junction rounding, bands, patterns, waterproofing admixture, or incidental operations.

#### Item No:- 43

**Wall Painting with applying two coats of putty & three coats of primer of approval brand (three coats) plastic emulsion paint of approved brand and manufacture on undecorated wall surface to give an even shade including thoroughly brushing the surface free from mortar dropping and other foreign matter and sand papered smooth.**

#### **Materials**

##### **Wall Putty**

- Acrylic/polymer-based white cement wall putty of approved brand.
- Suitable for interior/exterior application as specified.
- Free from lumps and capable of providing a smooth and durable surface.

##### **Primer**

- Water-based or alkali-resistant primer of approved brand and manufacture.
- Compatible with the plastic emulsion paint system.

##### **Plastic Emulsion Paint**

- Premium quality plastic emulsion paint of approved brand, manufacture, shade, and colour.
- Paint shall provide a smooth, uniform, washable, and durable finish.

#### **Surface Preparation**

- Surface shall be thoroughly cleaned by removing dust, dirt, mortar droppings, loose particles, grease, efflorescence, and other foreign matter.
- All uneven surfaces, cracks, holes, and minor defects shall be repaired and made good.
- Surface shall be rubbed down and sand-papered smooth to obtain an even base.
- The surface shall be dry and properly prepared before application of putty and primer.

#### **Application of Putty**

- Applying **two coats of approved wall putty** over the prepared surface.
- Each coat shall be allowed to dry properly before applying the subsequent coat.
- Surface shall be rubbed with emery paper after drying to obtain a smooth and even finish free from undulations.

#### **Application of Primer**

- Applying **three coats of approved primer** uniformly over the putty-finished surface.
- Each coat shall be allowed to dry completely before applying the next coat.
- Primer application shall ensure proper adhesion and uniform absorption of paint.

#### **Application of Plastic Emulsion Paint**

- Applying **three coats of plastic emulsion paint** of approved shade and colour.
- Paint shall be applied by brush, roller, or spray as recommended by the manufacturer.
- Each coat shall be applied only after the previous coat has dried completely.
- Finished surface shall be uniform in colour, texture, and appearance without brush marks, streaks, lap marks, patches, or visible defects.

#### **Finishing**

- The finished surface shall have a smooth, uniform, and aesthetically pleasing appearance.
- Adjacent surfaces, fixtures, and fittings shall be protected from paint splashes and stains.
- After completion, all paint marks and stains shall be cleaned properly.

#### **Workmanship Requirements**

- Application shall be carried out strictly in accordance with the manufacturer's specifications.
- Surface preparation shall be thorough to ensure proper adhesion and long service life.
- The finished work shall be free from blistering, peeling, cracking, chalking, or colour variation.
- Entire work shall conform to approved specifications and directions of the Engineer-in-Charge.

#### **Scope Includes**

The item includes cost of **surface preparation, repairs to minor surface imperfections, two coats of putty, three coats of primer, three coats of plastic emulsion paint, scaffolding, labour, tools and plants, transportation, loading, unloading, handling, leads, lifts, sand papering, cleaning, and all incidental charges** necessary to complete the work.

### **Mode of Measurement**

Measurement shall be made in **Square Metres (Sqm)** of painted surface area.

Payment shall be made for the **completed painted area**, including surface preparation, putty, primer, paint application, and finishing complete. No separate payment shall be made for sand papering, minor surface repairs, scaffolding, or incidental operations.

### **Item 44:**

**Wall Painting with applying two coats of putty & three coats of primer of approval brand (three coats) plastic emulsion paint of approved brand and manufacture on undecorated ceiling surface to give an even shade including thoroughly brushing the surface free from mortar dropping and other foreign matter and sand papered smooth**

#### **Materials**

##### **Wall Putty**

- Acrylic/polymer-based white cement wall putty of approved brand and quality.
- Suitable for ceiling application and capable of providing a smooth, crack-free surface.

##### **Primer**

- Approved water-based or alkali-resistant primer compatible with the paint system.
- Primer shall be of approved brand and manufacture.

##### **Plastic Emulsion Paint**

- Premium quality plastic emulsion paint of approved brand, manufacture, shade, and colour.
- Paint shall provide a smooth, uniform, durable, and washable finish.

#### **Surface Preparation**

- Ceiling surface shall be thoroughly cleaned by removing dust, dirt, mortar droppings, laitance, grease, loose particles, and other foreign matter.
- Minor cracks, depressions, and surface imperfections shall be repaired and made good.
- Entire surface shall be rubbed with sand paper to obtain a smooth and even finish.
- Surface shall be dry, sound, and ready for painting before commencement of work.

#### **Application of Putty**

- Applying **two coats of approved wall putty** over the prepared ceiling surface.
- Each coat shall be allowed to dry completely before applying the subsequent coat.
- The putty surface shall be sand-papered smooth to obtain a uniform finish free from undulations and defects.

#### **Application of Primer**

- Applying **three coats of approved primer** uniformly over the putty-finished surface.
- Each coat shall be applied only after the previous coat has dried completely.
- Primer shall provide a uniform base and ensure proper adhesion of paint.

#### **Application of Plastic Emulsion Paint**

- Applying **three coats of plastic emulsion paint** of approved shade and colour.
- Paint shall be applied by brush, roller, or spray as recommended by the manufacturer.
- Each coat shall be allowed to dry thoroughly before the next coat is applied.
- The finished surface shall be uniform in colour, texture, and appearance without brush marks, roller marks, streaks, patches, or lap marks.

#### **Finishing**

- Ceiling surface shall be finished smooth, uniform, and aesthetically pleasing.
- Adjacent walls, fixtures, electrical fittings, and other surfaces shall be protected during painting operations.
- All paint splashes and stains shall be cleaned after completion of the work.

### Workmanship Requirements

- Surface preparation and painting operations shall be carried out strictly in accordance with the manufacturer's specifications.
- Finished work shall be free from peeling, blistering, cracking, chalking, sagging, or colour variation.
- Entire work shall conform to approved specifications and directions of the Engineer-in-Charge.

### Scope Includes

The item includes cost of **surface preparation, minor repairs, two coats of putty, three coats of primer, three coats of plastic emulsion paint, scaffolding, labour, tools and plants, sand papering, cleaning, transportation, loading, unloading, handling, leads, lifts, and all incidental charges** necessary to complete the work.

### Mode of Measurement

Measurement shall be made in **Square Metres (Sqm)** of painted ceiling area.

Payment shall be made for the **completed painted ceiling surface**, including surface preparation, putty, primer, paint application, finishing, and cleaning complete. No separate payment shall be made for scaffolding, sand papering, minor repairs, or incidental operations.

### Item 46 :

**Providing and fixing PROFLEX type self Supported Roof {Arch Type} using Cold rolled, Galvalume Steel colour coated sheet 1.5 mm thick conforming to ASTM A 653, A792 DIN, Alu Zinc Coating : AZ150 and Regular Modified Polyester painting with epoxy primer service coat at bottom, including necessary fixtures & fastenings for Lighting arrangement and Turbo Ventilator with Sky light.**

### Materials

#### Galvalume Steel Roofing Sheets

- Roofing shall be constructed using **cold rolled Galvalume steel colour coated sheets**.
- Sheet thickness shall be **1.50 mm**.
- Steel shall conform to **ASTM A653 / ASTM A792 / DIN Standards** or equivalent approved standards.
- Galvalume coating shall be **AZ 150 (150 gm/sqm Alu-Zinc coating)**.
- Yield strength and tensile properties shall conform to manufacturer's standard specifications for self-supported arch roofing systems.

### Protective Coating

- Top surface shall be factory coated with **Regular Modified Polyester Paint System**.
- Bottom surface shall be provided with **Epoxy Primer Service Coat**.
- Coating shall provide protection against corrosion, weathering, and ultraviolet radiation.

### Roof Forming and Fabrication

- Roofing sheets shall be factory roll-formed and site-curved into the required **self-supported arch profile**.
- The roofing system shall be designed to eliminate the requirement of conventional trusses, rafters, and purlins.
- All sheets shall be seamed together using approved mechanical seaming equipment to form a continuous watertight roofing system.

## **Supporting and Fastening Arrangement**

- Roof shall be fixed to RCC/steel supporting structure through approved anchoring system.
- Necessary end connections, anchor plates, bolts, fasteners, clips, brackets, sealants, and accessories shall be provided.
- The entire roofing system shall be capable of safely resisting wind loads, dead loads, and other applicable design loads.

## **Skylights**

- Providing and fixing translucent skylight panels of approved quality and profile matching the roofing system.
- Skylights shall be installed at designated locations to provide natural daylight inside the structure.
- Necessary flashing, sealing, and weatherproofing shall be included.

## **Turbo Ventilators**

- Providing and fixing roof-mounted **turbo ventilators** of approved make, size, and capacity (pay separately).
- Ventilators shall operate without electrical power and provide continuous air circulation and ventilation.
- Necessary base plates, flashing arrangements, and weatherproof fixing shall be included.

## **Lighting Arrangement Provisions**

- Providing necessary supports, brackets, hangers, inserts, and fastening arrangements for installation of lighting fixtures.
- Openings and fixing provisions shall be made as required without affecting the structural integrity of the roofing system.

## **Waterproofing and Weatherproofing**

- All joints, laps, flashings, penetrations, skylight junctions, and ventilator interfaces shall be properly sealed using approved sealants and weatherproofing materials.
- Roofing shall be completely watertight and free from leakage.

## **Workmanship Requirements**

- Roofing shall be erected true to line, level, curvature, and alignment.
- Arch profile shall be smooth and free from distortion, dents, waviness, or deformation.
- Fasteners and connections shall be secure and corrosion resistant.
- Finished roof shall provide a durable, leak-proof, maintenance-friendly roofing system.
- Entire work shall conform to approved drawings, structural design requirements, manufacturer's recommendations, and directions of the Engineer-in-Charge.

## **Scope Includes**

The item includes cost of **Galvalume colour coated sheets, roll forming, arch forming, mechanical seaming, anchoring system, fasteners, clips, bolts, sealants, skylights, lighting fixture supports, fabrication, erection, transportation, loading, unloading, handling, labour, tools and plants, lifting equipment, scaffolding, testing, leads, lifts, and all incidental charges** necessary to complete the work.

## **Mode of Measurement**

Measurement shall be made in **Square Metres (Sqm)** of the actual roof area covered and accepted.

Payment shall be made for the **completed self-supported roofing system**, including skylights, turbo ventilators, anchoring arrangements, fastening systems, and all accessories complete. No separate payment shall be made for seaming, supports, flashings, sealants, brackets, or incidental operations.

**All final decisions regarding design parameters, approved make, coating system, structural stability, workmanship, and quality of materials shall be as finalized by the Engineer-in-Charge.**

#### **Item 47 :**

**Providing and fixing Turbo Ventilator made from Aluminum and stainless steel with Ploy Carbonate Sky light of size 2' x 7', including fixing in roof as and where directed by Engineer in charge etc. complete.**

#### **Materials**

##### **Turbo Ventilator**

- Turbo ventilator shall be manufactured from **high-quality aluminium and stainless steel components**.
- Turbine blades shall be corrosion-resistant, lightweight, and dynamically balanced.
- Ventilator shall operate on wind energy and thermal air movement without electrical power.
- Bearings shall be permanently lubricated and maintenance-free type.
- Capacity and size shall be suitable for effective ventilation of the covered area.

##### **Polycarbonate Skylight**

- Skylight shall be made from **UV-stabilized polycarbonate sheet** of approved quality.
- Size of skylight: **2'-0" × 7'-0" (approximately 600 mm × 2100 mm)**.
- Polycarbonate sheet shall provide high light transmission, impact resistance, and weather resistance.
- Colour shall be clear, milky white, or as approved by the Engineer-in-Charge.

##### **Fixing & Installation**

- Turbo ventilator shall be installed at the designated roof location as shown in drawings or as directed.
- Necessary base plate, curb frame, flashing, brackets, clamps, anchor fasteners, and fixing accessories shall be provided.
- Openings in the roofing shall be made carefully without damaging adjacent sheets or structural members.
- Polycarbonate skylight shall be fixed securely with approved aluminium profiles, fasteners, EPDM/rubber gaskets, and sealing compounds.
- All joints and interfaces shall be made completely watertight.

##### **Weatherproofing**

- Proper flashing and sealing shall be provided around the ventilator and skylight assembly.
- Waterproof sealant shall be applied at all joints, laps, and fixing points to prevent leakage during rain.

##### **Workmanship Requirements**

- Turbo ventilator shall rotate freely and smoothly without vibration or noise.

- Skylight shall be properly aligned and free from scratches, cracks, or distortions.
- Installation shall be rigid, secure, and capable of withstanding wind loads and weather conditions.
- Finished assembly shall be leak-proof and aesthetically acceptable.
- Entire work shall conform to approved drawings, manufacturer's recommendations, and directions of the Engineer-in-Charge.

#### **Scope Includes**

The item includes cost of **aluminium and stainless steel turbo ventilator, polycarbonate skylight, base frame, flashings, brackets, fasteners, gaskets, sealants, cutting of roof openings, fixing, fabrication, erection, labour, tools and plants, lifting equipment, transportation, loading, unloading, handling, leads, lifts, scaffolding, and all incidental charges** necessary to complete the work.

#### **Mode of Measurement**

Measurement shall be made in **Number (Nos.)** of turbo ventilator units complete with polycarbonate skylight installed and accepted.

Payment shall be made for the **fully installed turbo ventilator and skylight assembly**, including all fixing arrangements, flashings, sealants, and accessories. No separate payment shall be made for cutting roof openings, weatherproofing, fasteners, or incidental operations.

**All final decisions regarding make, size, installation details, workmanship, and quality of materials shall be as finalized by the Engineer-in-Charge.**

#### **Item 50 :**

**Providing 12mm wide groove throating / notch in plaster including finishing the same etc. complete for all height.**

#### **Scope of Work**

- Forming **12 mm wide groove/throating/notch** in plastered surfaces at locations shown in drawings or as directed.
- Groove shall be provided for architectural treatment, drip course, decorative bands, cornices, chajjas, sunshades, beams, columns, parapets, or other specified locations.

#### **Execution**

- Groove shall be formed either during plastering or by carefully cutting the plaster after application as approved.
- Groove shall be straight, uniform, and continuous throughout the required length.
- The depth and profile shall be maintained as per approved details and site requirements.

#### **Finishing**

- All edges shall be sharp, true, and neatly finished.
- Groove surfaces shall be smooth and free from cracks, undulations, honeycombing, or tool marks.
- Excess mortar and loose material shall be removed.
- Finished groove shall blend uniformly with adjoining plastered surfaces.

#### **Workmanship Requirements**

- Groove/throating shall be perfectly aligned and uniform in width throughout its length.

- No chipping or damage to adjoining plaster shall be permitted.
- Work shall be executed at all heights with proper scaffolding and safety arrangements.
- Finished work shall conform to approved drawings, specifications, and directions of the Engineer-in-Charge.

### Scope Includes

The item includes cost of **marking, cutting, forming, finishing, dressing edges, labour, tools and plants, scaffolding, transportation, loading, unloading, handling, leads, lifts, and all incidental charges** necessary to complete the work.

### Mode of Measurement

Measurement shall be made in **Running Metres (Rmt)** of groove/throating/notch actually formed and accepted.

Payment shall be made for the **finished length of groove/throating**, complete with all labour, finishing, and incidental operations. No separate payment shall be made for scaffolding, edge dressing, or cleaning.

### Item 51 :

**Box cutting the road surface to proper slope and camber for making a base for road work including removing the excavated stuff and depositing on the road side slope as directed up to 50 m. lead.**

### Scope of Work

- Cutting and excavating the existing road surface to the required depth and profile.
- Forming the road bed to the specified **slope, camber, gradient, line, and level** as shown in drawings or directed by the Engineer-in-Charge.
- Removing all unsuitable material, vegetation, loose soil, and other obstructions encountered during excavation.

### Excavation

- Excavation shall be carried out manually or mechanically using approved equipment.
- The road surface shall be cut neatly without disturbing adjoining pavement or structures.
- Excavated material shall be broken down, if necessary, and handled properly.

### Dressing and Preparation

- The excavated formation shall be dressed true to the required cross-fall, camber, longitudinal gradient, and levels.
- The finished surface shall be free from depressions, humps, loose material, and irregularities.
- Necessary trimming and dressing of edges shall be carried out to obtain the required road profile.

### Disposal of Excavated Material

- Excavated material shall be removed from the cutting area and deposited on the roadside slopes or at locations approved by the Engineer-in-Charge.
- Disposal shall include all handling, loading, unloading, and conveying up to **50 metres lead**.
- Useful excavated material, if directed, shall be stacked separately for reuse.

## Workmanship Requirements

- Finished formation shall conform to the required line, level, grade, and camber.
- No over-excavation shall be permitted. Any excess excavation shall be made good by the contractor at his own cost.
- The prepared surface shall be suitable for laying subsequent pavement layers.
- Work shall be carried out in accordance with relevant MoRTH specifications and the directions of the Engineer-in-Charge.

## Scope Includes

The item includes cost of **surveying, setting out, excavation, box cutting, dressing, trimming, loading, transporting, depositing excavated material up to 50 m lead, labour, machinery, fuel, tools and plants, handling, leads, lifts, and all incidental charges** necessary to complete the work.

## Mode of Measurement

Measurement shall be made in **Cubic Metres (Cum)** of road surface excavated and accepted, calculated from the specified dimensions of cutting.

Payment shall be made for the **actual quantity of box cutting executed**, including excavation, dressing, disposal, and all incidental operations. No separate payment shall be made for trimming, shaping, or depositing excavated material within the specified lead.

## Item No:- 52

**Supplying and stacking of graded stone aggregate of following size (for W. B. M. ) including Spreading the stone aggregate for rolling including filling the interstices to required camber and gradient Machine crushed stone aggregate 45 mm to 63 mm size**

### 1.0 Materials

#### 1.1 Coarse Aggregates (45 mm to 63 mm)

The coarse aggregate shall be sourced from an approved quarry. It must consist of machine-crushed, hard, durable rock such as granite, quartzite, basalt, or other approved stone.

- **Quality:** The aggregate shall be clean, strong, and free from an excess of flat, elongated, soft, or disintegrated particles.<sup>1</sup> It must be devoid of dust, clay, vegetable matter, or other deleterious substances.
- **Grading:** The aggregate must conform to Grading 2 as per standard specifications. The required gradation when tested with IS sieves shall be as follows:

IS Sieve Designation	Percent by Weight Passing
75 mm	100%
63 mm	90 - 100%
45 mm	25 - 60%

IS Sieve Designation	Percent by Weight Passing
22.4 mm	0 - 15%
11.2 mm	0 - 5%

- **Physical Properties:** The crushed stone aggregate must meet the following standard physical requirements:

Property	Test Method	Maximum Permitted Value
<b>Los Angeles Abrasion Value</b>	IS: 2386 (Part 4)	40%
<b>Aggregate Impact Value</b>	IS: 2386 (Part 4)	30%
<b>Flakiness &amp; Elongation Index (Combined)</b>	IS: 2386 (Part 1)	35%
<b>Water Absorption</b>	IS: 2386 (Part 3)	2%

*Note: While not part of this specific supply item, the construction of a W.B.M. layer will also require **Screenings** (e.g., 13.2 mm aggregate) and **Blinding Material** (e.g., stone dust/moorum) to fill the interstices, which are typically specified under separate items.<sup>2</sup>*

## 2.0 Construction Operations & Methodology

### 2.1 Preparation of Sub-grade / Sub-base

Before spreading the aggregate, the underlying layer (sub-grade or sub-base) shall be prepared to the required grade and camber.<sup>3</sup> All ruts, soft spots, and depressions shall be corrected and the surface cleaned of all foreign material.

### 2.2 Stacking and Measurement

The approved aggregate shall be supplied to the site and stacked on clean, hard ground in regular, uniform stacks. The stacks shall be measured to determine the quantity of material supplied.

### 2.3 Spreading of Aggregates

The coarse aggregates shall be spread uniformly and evenly upon the prepared base in the specified quantities. The thickness of the loose layer shall be checked using templates placed across the road to ensure the correct final compacted thickness is achieved. All segregation of aggregates must be rectified.

### 2.4 Dry Rolling

Immediately after spreading, the aggregate shall be compacted using a smooth-wheeled roller of **8 to 10 tonnes** capacity. Rolling shall commence from the lower edge and proceed towards the center, overlapping by at least one-half the width of the roller on successive passes.<sup>4</sup> Rolling shall continue until the aggregates are thoroughly interlocked and there is no perceptible movement under the roller. The surface must be checked for the required camber and grade during this process.

## 2.5 Filling Interstices (Voids)

The process of filling the voids is critical for a stable W.B.M. layer and shall be performed as follows:

1. **Application of Screenings:** After dry rolling, approved dry screenings shall be applied uniformly over the surface to completely fill the interstices. This is often done in three or more successive applications.
2. **Vibration and Rolling:** The surface shall then be vibrated or rolled dry to cause the screenings to settle into the voids of the coarse aggregate.
3. **Watering and Grouting:** The surface shall then be sprinkled with water, swept, and rolled again. This process is repeated, with more screenings applied as necessary, until the slurry of water and screenings fills all voids and forms a wave ahead of the roller wheels.

## 2.6 Application of Blinding Material

A suitable, approved binding material (e.g., stone dust with a Plasticity Index less than 6) shall be applied at a uniform rate. It shall be lightly sprinkled with water and the resulting slurry swept into the voids.

## 2.7 Final Compaction and Finishing

The surface shall be rolled again until it is fully compacted, bonded, and firm. The layer must be allowed to set and dry for at least 24 hours before opening to traffic or laying the subsequent pavement course.

## 3.0 Quality Control & Tolerances

- **Material Testing:** All materials shall be tested and approved by the Engineer-in-Charge before use.
- **Surface Evenness:** The finished surface shall be checked with a 3-meter straightedge. The maximum permissible undulation shall not exceed **12 mm**.
- **Thickness:** The compacted thickness of the layer shall be within the tolerance of **±10 mm** of the specified thickness.

## 4.0 Measurement for Payment

The contract unit rate for this item shall be for the finished work in place.

- **Unit of Measurement: Cubic Meter**
- **Basis of Payment:** The quantity for payment shall be the **compacted volume** of the completed W.B.M. layer, calculated based on the authorized length, width, and thickness as per the approved drawings. The rate shall be inclusive of all costs for materials, labor, tools, equipment, transport, stacking, spreading, rolling, watering, quality control tests, and all incidental operations required to complete the work as per this specification.

#### Item No:- 53

**Supplying and stacking of Soft murrum / Binding materials including spreading road crust filling the gaps in metal and leveling to camber and gradient as directed.**

**1. Materials:**

a) **Soft Murrum / Binding Material:** Soft murrum or binding material of approved quality, free from organic matter, clay lumps, and other deleterious substances. The material shall be suitably graded to fill interstices in the road metal and provide a stable surface.

**2. Preparation and Stacking:**

The murrum shall be transported to site and stacked properly to prevent segregation and contamination.

**3. Spreading:**

The material shall be evenly spread over the road crust and interstices of the metal layer to fill voids and ensure a uniform surface. Mechanical or manual spreading shall be done as approved.

**4. Leveling and Compaction:**

After spreading, the surface shall be leveled to achieve the required camber and gradient. The material shall be compacted adequately using rollers or rammers to provide a stable, even, and durable surface.

**5. Workmanship:**

Workmanship shall ensure uniform spreading, proper filling of gaps, and correct camber/gradient. The road crust shall be free from loose patches, depressions, or segregation.

**6. Measurement:**

Measurement shall be taken in cubic metres (m<sup>3</sup>) of soft murrum/binding material supplied, spread, and compacted in place, including all wastage.

#### Item No:- 55

**Providing and laying cement concrete Road of 15 Cm thick using ordinary cement concrete M-200 by Tremix method, placing temperature steel reinforcement at 5.5 Kg. / 10 Sq.m., (excluding cost of reinforcement), including providing 125 micron polyethylene below the concrete and pre-moulded asphalt filler joint at each pannel joint, including cutting the grooves in the concrete, including all material, labour and fuel - oil etc. complete.**

**Materials**

**Cement Concrete**

- Concrete shall be **M-200 grade** conforming to relevant IS specifications.
- Materials including cement, fine aggregate, coarse aggregate, and water shall be of approved quality.
- Concrete shall be machine mixed and transported without segregation.

**Polyethylene Membrane**

- Providing and laying **125 micron thick polyethylene sheet** below the concrete slab as a separation membrane.
- Joints in polyethylene sheet shall be lapped by at least 150 mm and properly secured.

**Temperature Steel Reinforcement**

- Temperature reinforcement shall be provided at the rate of **5.5 kg per 10 Sq.m.**
- Reinforcement shall be placed accurately as per approved drawings.
- **Cost of reinforcement shall be paid separately** and is excluded from this item.

### **Expansion/Contraction Joint Filler**

- Providing approved **pre-moulded asphalt filler board** at panel joints of specified thickness.
- Filler shall be durable, compressible, and suitable for concrete pavement applications.

### **Preparation of Subgrade**

- Formation surface shall be prepared to the required line, level, grade, and camber.
- Surface shall be properly compacted and approved before laying polyethylene membrane and concrete.

### **Laying of Concrete**

- Concrete shall be laid to a uniform thickness of **150 mm**.
- Concrete shall be spread, compacted, and leveled using suitable mechanical equipment.
- Necessary side forms/shuttering shall be erected true to line and level.

### **Tremix (Vacuum Dewatering) Process**

- Vacuum dewatering shall be carried out using approved Tremix equipment.
- Excess water shall be removed to improve density, strength, abrasion resistance, and durability of concrete.
- Concrete surface shall be finished immediately after vacuum treatment.

### **Joint Formation**

- Expansion, contraction, construction, and dummy joints shall be provided as per approved pavement layout.
- Pre-moulded asphalt filler board shall be fixed at panel joints.
- Grooves shall be cut in green concrete or by approved mechanical cutters to the required dimensions and spacing.

### **Finishing**

- Surface shall be finished smooth and uniform using approved Tremix finishing equipment.
- Finished pavement shall be true to line, level, grade, and camber.
- Surface texture shall provide adequate skid resistance and riding quality.

### **Curing**

- Concrete pavement shall be cured continuously for a minimum period of **14 days** by ponding, wet coverings, curing compound, or other approved methods.
- Adequate protection shall be provided against traffic and damage during curing.

### **Workmanship Requirements**

- Concrete shall be free from honeycombing, segregation, cracks, depressions, or surface defects.
- Finished pavement shall maintain the specified thickness throughout.
- Joints shall be straight, properly aligned, and effectively sealed where required.
- Work shall conform to relevant IRC, MoRTH, and IS specifications.

### **Scope Includes**

The item includes cost of **cement concrete M-200, batching, mixing, transportation, laying, compaction, Tremix vacuum dewatering, 125 micron polyethylene membrane, pre-moulded asphalt filler board, groove cutting, finishing, curing, labour, fuel, machinery, tools and plants, shuttering, transportation, loading, unloading, handling, leads, lifts, and all incidental charges** necessary to complete the work.

**Note:** Cost of temperature steel reinforcement shall be measured and paid separately.

### **Mode of Measurement**

Measurement shall be made in **Cubic Metres (Cum)** of finished concrete road surface of specified thickness.

Payment shall be made for the **completed area of concrete pavement**, including polyethylene sheet, Tremix finishing, filler joints, groove cutting, curing, and all incidental operations. No separate payment shall be made for joint cutting, polyethylene membrane, or finishing operations.

#### **Item 56 :**

**Supplying, Installation, Testing and commissioning of ABC type 6 Kg Fire Extinguisher Mono Ammonium Phosphate Powder 50, Stored Pressure Type, Pressure Gauge, Controllable discharge mechanism Class A, Rating 3A & Class B rating 21B as per IS 15683 ISI MARK (ABC Dry Chemical Powder - MAP 50%).**

#### **General**

This work shall consist of supplying and installing of **6 Kg ABC store pressure type Filled Fire extinguisher** of the shape and dimensions shown on the drawings and conforming to these specifications or as approved by Engineer in charge.

#### **1.0 Material**

**1.0 6 Kg ABC store pressure type Filled Fire extinguisher including all required accessories like hose pipe, Valve, Pressure Meter, horn etc.. Including all labour, material & carting etc complete**

**1.1 6 Kg ABC store pressure type Filled Fire extinguisher** nominal bore shall conform to I.S. 2171. The **6 Kg ABC store pressure type Filled Fire extinguisher** shall be best Indian make and quality.

**1.2 6 Kg ABC store pressure type Filled Fire extinguisher** shall be chromium polished of best quality and shall be ISI marked.

**1.3** It shall be as per standard specification of Fire Safety work.

#### **2.0 Mode of Measurement & Payment**

**2.1** The unit rate of **6 Kg ABC store pressure type Filled Fire extinguisher** 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 **6 Kg ABC store pressure type Filled Fire extinguisher** 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 **6 Kg ABC store pressure type Filled Fire extinguisher** 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.

**4.2** The **6 Kg ABC store pressure type Filled Fire extinguisher** 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**.

**4.3** The payment shall be made on **Number** basis of the finished work.

#### Item 57 :

**Providing & fixing of CO2 type Fire Extinguisher of capacity 4.5 kg filled with Co2 Gas as per IS 15222 with controll discharge mechanis, fitted with Hose & Horn applicable on Class B fire rating 21B confirms to IS 15683 bearing ISI mark. Co2 cylinder as per IS 7285.**

#### **General**

This work shall consist of supplying and installing of **4.5 Kg CO2 Fire Extinguisher store pressure typeFilled Fire extinguisher** of the shape and dimensions shown on the drawings and conforming to these specifications or as approved by Engineer in charge.

#### **1.0 Material**

**1.0 4.5 Kg CO2 Fire Extinguisher store pressure typeFilled Fire extinguisher including all required accessories like hose pipe ,Valve, Pressure Meter, horn etc.. Including all labour, material & carting etc complete**

**1.1 4.5 Kg CO2 Fire Extinguisher store pressure typeFilled Fire extinguisher** nominal bore shall conform to I.S. 2171. The **4.5 Kg CO2 Fire Extinguisher store pressure typeFilled Fire extinguisher** shall be best Indian make and quality.

**1.2 4.5 Kg CO2 Fire Extinguisher store pressure typeFilled Fire extinguisher** shall be chromium polished of best quality and shall be ISI marked.

**1.3** It shall be as per standard specification of Fire Safety work.

#### **2.0 Mode of Measurement & Payment**

**2.1** The unit rate of **4.5 Kg CO2 Fire Extinguisher store pressure typeFilled Fire extinguisher** 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 **4.5 Kg CO2 Fire Extinguisher store pressure typeFilled Fire extinguisher** 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 **4.5 Kg CO2 Fire Extinguisher store pressure typeFilled Fire extinguisher** 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.

**4.2** The **4.5 Kg CO2 Fire Extinguisher store pressure typeFilled Fire extinguisher** 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**.

**4.3** The payment shall be made on **Number** basis of the finished work.

#### Item 60 :

**Providing corrugated PPGL Sheets roofing fixed with Galvanized iron 'J' or 'L' hooks bolts and nuts 8 m. diameter with bitumen and G.I. Limpet washers filled with white lead complete including ridges, gutters etc. excluding the cost of purlins, rafters and trusses. (1) 0.60 mm. Thick sheet**

#### **Materials**

##### **PPGL Roofing Sheets**

- Roofing sheets shall be **corrugated Pre-Painted Galvalume Steel (PPGL)** of approved make and quality.
- Thickness of sheet shall be **0.60 mm (TCT/BMT as specified)**.
- Sheets shall be manufactured from high tensile Galvalume steel with protective metallic coating and factory-applied colour coating.
- Colour, profile, and finish shall be as approved by the Engineer-in-Charge.
- Sheets shall be free from dents, cracks, waviness, coating defects, and other imperfections.

##### **Fasteners**

- Galvanized Iron '**J**' or '**L**' **hooks**, bolts, and nuts of **8 mm diameter**.
- Fasteners shall be of adequate length suitable for fixing to the supporting framework.

##### **Washers and Sealing**

- **G.I. Limpet Washers** and bitumen washers shall be provided at all fixing points.
- White lead paste shall be applied to ensure watertight sealing around fasteners.

##### **Accessories**

- Ridges, hips, valleys, gutters, flashings, aprons, corner pieces, and other accessories required for a complete roofing system.
- Accessories shall be fabricated from matching PPGL material of approved thickness and finish.

##### **Laying and Fixing**

- Roofing sheets shall be laid to the required line, level, slope, and alignment.
- Sheets shall be fixed securely to the supporting purlins using G.I. hooks, bolts, nuts, and washers.
- Side laps and end laps shall be provided as per manufacturer's recommendations and approved drawings.
- Sheets shall be installed in such a manner as to prevent water leakage and uplift due to wind pressure.

##### **Ridges and Gutters**

- Matching ridge pieces and gutters shall be fixed neatly and securely.
- Necessary overlaps, joints, and flashings shall be provided to ensure complete weatherproofing.
- Gutters shall be aligned properly to facilitate smooth drainage of rainwater.

##### **Finishing**

- Roof surface shall be uniform, properly aligned, and free from distortion.
- All exposed fasteners and joints shall be made watertight.
- Damaged coating, if any, caused during erection shall be touched up with approved paint.

##### **Workmanship Requirements**

- Roofing shall be installed by skilled workmen using proper tools and equipment.

- Sheets shall not be damaged during transportation, handling, or installation.
- Completed roofing shall be leak-proof, structurally stable, and aesthetically finished.
- Work shall conform to approved drawings, manufacturer's specifications, and directions of the Engineer-in-Charge.

#### **Scope Includes**

The item includes cost of **0.60 mm thick PPGL sheets, ridges, gutters, flashings, G.I. hooks, bolts, nuts, limpet washers, bitumen washers, white lead, cutting, drilling, fixing, labour, tools and plants, scaffolding, transportation, loading, unloading, handling, leads, lifts, and all incidental charges** necessary to complete the work.

**Note:** Cost of purlins, rafters, trusses, and primary supporting steel framework shall be paid separately and is not included in this item.

#### **Mode of Measurement**

Measurement shall be made in **Square Metres (Sqm)** of actual roof area covered, measured on the slope of the roof.

Payment shall be made for the **completed roofing area**, including ridges, gutters, overlaps, fasteners, washers, and all incidental operations. No separate payment shall be made for cutting, laps, sealing materials, or fixing accessories.

**All final decisions regarding profile, colour, workmanship, quality of materials, and method of installation shall be as finalized by the Engineer-in-Charge.**

**Dated Signature of  
the Contractor.**

**Deputy Executive Engineer,  
R&B Sub-Division,  
Kapadwanj**

**Executive Engineer  
R&B Division,  
Nadiad.**