

The relevant specifications of item No. [18.11] shall be followed except that this work is for extra coat over and above two coats on wall surface.

**Mode of measurements & payment**

The relevant specifications of item No. [18.11] shall be followed except that the payment of subsequent coat shall be made extra over and above the item No. [18.11] for every subsequent coat applied.

- 3[18.13] Colour washing with lime on undecorated wall surfaces (two coats) over and including priming coat of white washing to give even shade including thoroughly brooming the surface to remove all dirt, dust, mortar drops and other foreign matter. The relevant specifications for the materials 18.11 shall be followed except that it shall be for colour wash.**

**Materials**

The relevant specification of item no.[18.11] shall be followed except colour pigment shall be added as specified.

**Workmanship**

Preparation of the colour wash with pigment shall be as under :

**(a) With Yellow and Red Ochre:**

Solid lumps if any in the powder shall be crushed to powder and solution in water prepared and then added to white wash sieving it through a coarse cloth, mixed evenly and thoroughly to white wash in small quantities till the required shade is obtained.

**(b) With Blue Vitriol:**

Fresh crystals of hydrous copper sulphate (i.e. blue vitriol) shall be ground to fine powder and dissolved in small quantity of water. Sufficient quantity of solution enough to produce the colour wash of required shade shall be strained through a clean cloth, the filtrate being mixed evenly and thoroughly to the white wash.

**(c)** Colour wash from other colouring pigment shall be prepared in accordance with the instructions of the manufacturer.

**Mode of measurements and payment :**

The relevant specifications of item No. [18.11.] shall be followed.

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

- 4[18.14] Extra over item No. 18.13 for every subsequent coat of colour wash with lime on wall surfaces.**

**Materials and workmanship**

The relevant specifications of item No. [18.13] shall be followed except that this work is for extra coat of colour wash over and above two coats on wall surface.

**Mode of measurements & payment**

The relevant specifications of item No. [18.13] shall be followed except that the extra payment for every subsequent coat of white wash shall be made over and above the rate of item no. [18.13].

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

- 5[18.15] Distemping with dry (water bound) distemper of approved brand and manufacture (two coats) and of required shade on undecorated wall surfaces to give an even shade, over and including a priming coat of white washing after thoroughly brooming the surface free from mortar droppings and other foreign matters.**

**Materials**

The dry distemper and primer shall be of approved brand and manufacture. The dry distemper shall be of required colour and shade and the same conform to I.S. 427-2013 (Reaffirmed 2018) or its relevant and latest edition. Whiting shall conform to I.S. 63-2006 (Reaffirmed 2021) or its relevant and latest edition. The shade shall be got approved from engineer in charge before application of the distemper. Dry distemper colour as required shall be stirred slowly in clean water using 6 decilitres (0.6 litre) of water per Kg of distemper or as specified by the makers. Warm water shall preferably be used. It shall be allowed to stand for at least 30 minutes (or if practicable overnight) before use. The mixture shall be well stirred before and during use to maintain an even consistency. Distemper shall not be mixed in larger quantity than is actually required for one day's work.

### **Preparation of Surface**

Before new work is distempered, the surface shall be thoroughly brushed free from mortar droppings and other foreign matter and sand papered smooth.

New plastered surfaces shall be allowed to dry completely, before applying, distemper.

In the case of old work, all loose pieces and scales shall be removed by sand papering. The surface shall be cleaned of all grease, dirt, etc.

Pitting in plaster shall be made good with plaster of paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of the distemper shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied.

### **Priming Coat**

A priming coat of whiting (see 18.11) shall be applied over the prepared surface in case of new work, if so stipulated in the description of the item. No white washing coat shall be used as a priming coat for distemper.

The treated surface be allowed to dry before distemper coat is given.

### **Application**

In the case of new work, the treatment shall consist of a priming coat of whiting (As per 18.11) followed by the application of two or more coats of distemper till the surface shows an even colour.

For old work, the surface prepared as described in para 18.11 shall be applied one or more coats of distemper till the surface attains an even colour.

The application of each coat shall be as follows:

The entire surface shall be coated with the mixture uniformly, with proper distemper brushes (ordinary white wash brushed shall not be allowed) in horizontal strokes followed immediately by vertical ones which together shall constitute one coat.

The subsequent coats shall be applied only after the previous coat has dried.

The finished surface shall be even and uniform and shall show no brush marks.

Enough distemper shall be mixed to finish one room at a time. The application of a coat in each room shall be finished in one operation and no work shall be started in any room, which cannot be completed the same day.

After each day's work, the brushes shall be washed in hot water and hung down to dry. Old brushes which are dirty or caked with distemper shall not be used.

The specifications in respect of scaffolding, protective measures, measurements and rate shall be as described under 18.11.

### **Mode of measurements and payment**

Priming coat of distemper primer, scraping of surface spoiled by smoke soot, removal of oil and grease spots, treatment for infection of efflorescences, mouldmoss, fungi, algee and lichens and patch repairs to plaster shall be included in this item for which nothing extra shall be paid.

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

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

(b) Area in individual items shall be worked out to the nearest 0.01 sq. m. All work shall be measured in sq. metre. No deductions shall be made for ends of joints, beams, posts etc., and openings not exceeding 0.5 sq. mt. each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings nor for finish around the ends of joints, beams, posts etc.

Deductions or openings exceeding 0.5 Sq. m. but not exceeding 3 sq. m. each shall be made as follows and no addition shall be made for reveals, jambs, soffits etc. of these openings :

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

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

(c) When only one face of wall is treated and the other face is not treated, full deductions shall be made if the width of the reveal on treated side is less than that on untreated side but if the width of the reveals is equal or

more than that of untreated side neither deductions nor additions to be made for reveals, jambs, soffits, sills etc.

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

No deduction shall be made for attachments such as casing, conduits, pipes, electric wiring and the like.

Item includes removing nails, making good holes, cracks, patches with materials similar in composition to the distemper.

The rate includes cost of all materials, labour, scaffolding, protective measures etc. involved in all the operations described above. This shall also include conveyance, delivery, handling, unloading, storing etc. & also include for any height & floor.

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

**6[18.16] Extra over item 18.15 for every subsequent coat of distemper with dry distemper of approved brand and manufacture.**

**Materials & workmanship**

The relevant specifications of item No. [18.15] shall be followed except that the extra work for applying subsequent coat of dry distemper is to be carried out over and above the work of item No. [18.15]

**Mode of measurements and payment**

The relevant specifications of item No. [18.15] shall be followed except that extra rate shall be paid for every subsequent coat applied over and above the rate of item No. [18.15].

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

**7[18.17] Extra over item 18.15 for distemping with dry distemper on ceiling and sloping roofs.**

**Materials & workmanship**

The relevant specifications of item No. [18.15] shall be followed except that extra rate shall be paid for carrying out work on ceiling / sloping roofs of undecorated surface.

**Mode of measurements and payment**

The relevant specifications of item No. [18.15] shall be followed except that extra rate shall be paid for carrying out work on ceiling / sloping roof on undecorated surface over and above the rate of item no. [18.15].

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

**8[18.18] Distemping (two coats) with oil bound distemper of approved brand and manufacture and of required shade on undecorated wall surfaces to give an even shade, over and including a priming coat with distemper primer of approved brand and manufacture after thoroughly brushing the surface free from mortar droppings and other foreign matter and also including preparing the surface even and sand papered smooth.**

**Materials**

Oil bound washable distemper and primer shall be approved brand and manufacture. The distemper shall be required colour and shade and the same shall conform to I.S. : 428-2013(Reaffirmed 2018) or its relevant and latest edition.

Oil emulsion (Oil Bound) washable distemper (IS 428-2013(Reaffirmed 2018)) of approved brand and manufacture shall be used. The primer where used as on new work shall be cement primer or distemper primer as described in the item. These shall be of the same manufacture as distemper. The distemper shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer. Only sufficient quantity of distemper required for day's work shall be prepared.

The distemper and primer shall be brought by the contractor in sealed tins in sufficient quantities at a time to suffice for a fortnight's work, and the same shall be kept in the joint custody of the contractor and the Engineer-in-Charge. The empty tins shall not be removed from the site of work, till this item of work has been completed and passed by the Engineer-in-Charge.

**Preparation of the Surface**

For new work the surface shall be thoroughly cleaned of dust, old white or colour wash by washing and scrubbing. The surface shall then be allowed to dry for at least 48 hours. It shall then be sand papered to give a smooth and even surface. Any unevenness shall be made good by applying putty, made

of plaster of paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry.

In the case of old work, all loose pieces and scales shall be removed by sand papering. The surface shall be cleaned of all grease, dirt etc.

Pitting in plaster shall be made good with plaster of paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of the distemper shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied.

### **Application**

**Priming Coat:** The priming coat shall be with distemper primer or cement primer, as required in the description of the item. The application of the distemper primer shall be as described in [18.15]

**Note:** If the wall surface plaster has not dried completely, cement primer shall be applied before distemping the walls. But if distemping is done after the wall surface is dried completely, distemper primer shall be applied.

Oil bound distemper is not recommended to be applied, within six months of the completion of wall plaster. However, newly plastered surfaces if required to be distempered before a period of six months shall be given a coat of alkali resistant priming Paint conforming to IS 109: 2017 and allowed to dry for at least 48 hours before distemping is commenced.

For old work no primer coat is necessary.

**Distemper Coat:** For new work, after the primer coat has dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the distemper, taking care not to rub out the priming coat. All loose particles shall be dusted off after rubbing. One coat of distemper properly diluted with thinner (water or other liquid as stipulated by the manufacturer) shall be applied with brushes in horizontal strokes followed immediately by vertical ones which together constitutes one coat.

The subsequent coats shall be applied in the same way. Two or more coats of distemper as are found necessary shall be applied over the primer coat to obtain an even shade.

A time interval of at least 24 hours shall be allowed between successive coats to permit proper drying of the preceding coat.

For old work the distemper shall be applied over the prepared surface in the same manner as in new work. One or more coats of distemper as are found necessary shall be applied to obtain an even and uniform shade.

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

The specifications in respect of scaffolding, protective measures and measurements shall be as described under [18.11].

### **Mode of measurements and payment**

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

All the work shall be measured net in the decimal system as in place subject to the following limits unless otherwise stated here in after :

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

(b) Area in individual item shall be worked out to the nearest 0.01 sq. m. all work shall be measured in sq. metre. No deductions shall be made for ends of joints, beams, posts etc. and openings, not exceeding 0.5 sq. mt. each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings nor for finish around ends of joints, beams, posts etc.

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

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

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

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

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

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

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

The rates includes cost of all materials, labours, scaffolding, protective measures etc. involved in all the operations described above. This shall also include conveyance, delivery, handing, unloading, storing work etc. & also include for any height & floor.

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

**9[18.19] Extra over item [18.18] for every subsequent coat of distempering with oil bound washable distemper of approved brand and manufacture.**

#### **Materials and workmanship**

The relevant specifications of item No. [18.18] shall be followed except that this work is for providing extra coat of oil bound distempering over and above two coats of distempering.

#### **Mode of measurements and payment**

The relevant specification of item No. [18.18] shall be followed except that the extra rate shall be paid over and above the rate for every subsequent coats over two coats of item no. [18.18].

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

**10[18.20] Extra over item no. [18.18] for distempering with oil bound washable distemper on ceiling and sloping roofs.**

#### **Materials and workmanship**

The relevant specifications of item No. [18.18] shall be followed except that the distempering shall be carried out on ceiling / sloping roofs.

#### **Mode of measurement and payment**

The relevant specifications of item No. [18.18] shall be followed except that the extra rate shall be paid for carrying out distempering work on ceiling / sloping roofs over and above the rate of item No. [18.18].

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

**11[18.21] Finishing wall with plastic emulsion paint including applying two coats of lapi, one coat of primer and two coats of plastic emulsion paint of an undecorated wall surfaces to give an approved brand and manufacture and of required shade after thoroughly brushing the surface to remove all dirt, dust, mortar drops and other foreign material.**

#### **Materials**

The water shall conform to M-1. Plastic emulsion paint shall conform to I.S. : 15489-2013 (Reaffirmed 2018) or its relevant and latest edition, Lapi shall conform to I.S. : 63-2006 (Reaffirmed 2021) or its relevant and latest

edition and primer shall confirm to I.S. : 15489-2013 (Reaffirmed 2018) or its relevant and latest edition. Plastic emulsion paint, Primer and Lapi must be of a single or same brand of approved make of GSPHCL. The plastic emulsion paint shall be of required colour and shade.

## **Workmanship**

### **Scaffolding :**

Wherever scaffolding is necessary, it shall be erected on double supports tied together by horizontal pieces, over which scaffolding planks shall be fixed. No ballies, bamboos or planks shall rest on or touch the surface which is being white washed.

For all exposed brick work or tile work, double scaffolding having two sets of vertical supports shall be provided. The supports shall be sound and strong, tied together with horizontal pieces over which scaffolding planks shall be fixed.

**Note:** In case of special type of brick work, scaffolding shall be got approved from Engineer-in- Charge in advance.

Where ladders are used, pieces of old gunny bags shall be tied on their tops and bottom to avoid damage or scratches to wall and flooring.

For Plastic emulsion paint, the ceiling, proper stage scaffolding shall be erected.

Where scaffolding is required, it shall be erected in such a way that as far as possible no part of scaffolding shall rest against the surface to be painted. A properly secured strong and well tied suspended platform (joola) may also be used for painting.

### **Preparation of surface:**

The undecorated surface to be painted shall be thoroughly brushed from dust, dirt, grease, mortar dropping and other foreign matter and sand papered smooth. New plaster surface shall be allowed to dry for at least 15 to 20 days before applications of Lapi (Putty).

All necessary nails shall be removed. Pitting in plaster shall be made good with plaster again with a fine grade sand paper and made smooth. A coat of Lapi (Putty) shall be applied over the patches. The surface shall be allowed to dry thoroughly before the regular coat of Lapi (Putty) is allowed. The surface affected by moulds, moss, fungi, algae lichens, efflorescence etc. shall be treated in accordance with I.S. 2395 (Part-I)-1994 (Reaffirmed 2019) or its relevant & latest edition. Before applying Plastic emulsion paint followed by primer, any unevenness shall be made good by applying Lapi (Putty) mixed with water on entire surface including filling up the undulation and then sand papering the same after it is dry.

### **Lapi (Putty) :**

Lapi (Putty) must be machine mixed and free from all type of lumps. The lapi (Putty) paste must be of uniform consistency. Application of Lapi (Putty) shall be done with the iron float / trowel on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards which together shall constitute one coat. This entire operation will constitute for two coats. Before applying second coat of lapi surface shall be made smooth with a fine grade sand paper. Second coat shall be allowed to dry for at least 24 hours before first coat of primer is applied.

### **Priming coat:**

Application of primer shall be done as under.

Before starting primer lapi (putty) surface must be made smooth with a fine grade sand paper. The surface must be fare finished as uniformly possible leaving no trowel marks (Putty applicator marks). The primer shall be applied with a brush on the clean dry and smooth surface. Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards which together shall constitute one coat. This entire operation will constitute one coat. The surface shall be finished as uniformly possible leaving no brush marks. It shall be allowed to dry for at least 48 hours before plastic emulsion paint is applied.

### **Application of plastic emulsion paint:**

For undecorated surfaces, after the primer coat is dried for at least 48 hours, the surface shall be lightly sand papered to make it smooth for receiving the plastic paint, taking care not to rub out the priming coat.

All loose particles shall be dusted off after rubbing. Minimum two coats of plastic emulsion paint shall be

applied with brushes in horizontal strokes followed immediately by vertical strokes which together shall constitute one coat. The subsequent coats shall be applied after a time interval of at least 48 hours between consecutive coats to permit proper drying of the preceding coat. The finished surface shall be even and uniform without patches, brush marks, paint drops etc.

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

15 cm double bristled plastic emulsion brush shall be used. In the application of final coat a roller must be used to make the painted surface smooth and uniform. After day's work brushes and roller shall be thoroughly washed in hot water with soap solution and hung down to dry. Old brushes & roller which are dirty and caked with plastic emulsion paint shall not be used on the work.

#### **Protective measurements :**

The surfaces of doors, windows, floors, articles of furniture etc. and such other parts of the buildings as are to be protected from being splashed upon.

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

Washing of surface treated with emulsion paints shall not be done within 3 to 4 weeks of application.

In preparation of wall for plastic emulsion paint, no oil base putty shall be used in filling cracks, holes, etc.

#### **Mode of measurements and payment**

Two coats of Lapi (Putty), One coat of primer, scraping of surface spoiled by stuck shoots, removal of oil and grease spots, treatment of infection of effloresces, mould moss, fungi, algae and lichen and patch repairs to plaster shall be included in this item for which nothing extra shall be paid.

All the work shall be measured net in the decimal system as in place subject to the following limits unless otherwise stated herein after :

Dimensions shall be measured to the nearest 0.01 m.

Area in individual item shall be worked out to the nearest 0.01 sq. m. all work shall be measured in sq. metre. No deductions shall be made for ends of joints, beams, posts etc. and openings, not exceeding 0.5 sq. m. each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings nor for finish around ends of joints, beams, posts etc.

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

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

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

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

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

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

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

The rates includes cost of all materials, labours, scaffolding, protective measures etc. involved in all the operations described above. This shall also include conveyance, delivery, handing, unloading, storing work etc. & also include for any height & floor.

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

- 12[18.22]      Finishing wall with Acrylic weather proof exterior emulsion paint (two coats) of approved make of GSPHCL and one coat of primer paint on undecorated wall surface to give of required shade after thoroughly brushing the surface to remove all dirt, dust, mortar drops and other foreign matter etc. to any height.**

#### **Material**

The water shall conform to M-1. Acrylic weather proof exterior paint and Primer must be of a single or same brand of approved brand and manufacture as approved by GSPHCL.

The paint shall be (Textured exterior paint/Acrylic smooth exterior paint/premium acrylic smooth exterior paint/100% premium acrylic emulsion paint) of approved brand and manufacture as approved by GSPHCL.

The material shall be brought in at a time in adequate quantities to suffice for the whole work. The materials shall be kept in the joint custody of the contractor and the Engineer-in-Charge. The empty containers shall not be removed from the site of work till therelevant item of work has been completed and permission obtained from the Engineer-in-Charge.

#### **Workmanship**

##### **Preparation of surface:**

The surface shall be thoroughly cleaned of all dust, dirt, mortar droppings and other foreign matter before Acrylic paint is to be applied.

Oil or grease spots shall be removed by suitable chemical.

All mortar lumps from the surface plaster shall be removed. All unnecessary nails shall be removed, holes, patches etc. shall be made good with material similar in composition to the surface to be prepared. Cracks must be filled with polymer based crack filler material not with cement mortar. The prepared surface shall receive the approval of the engineer in charge after inspection before painting is commenced.

#### **Scaffolding**

Wherever scaffolding is necessary, it shall be erected in such a way that so far as possible no part of scaffolding shall rest on the surface to be colored. A properly secured strong and well-tied suspended platform (Zoola) may be used for color work. Where ladders are used pieces of old gunny bags shall be tied at top and to bottom to prevent scratches to the floors and wall. For color work of ceilings, proper stage scaffolding shall be erected where necessary.

#### **Priming coat :**

Application of primer shall be done as under:

The primer shall be applied with a brush on the clean dry surface. One coat means horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards. This entire operation will constitute one coat. The surface shall be finished as uniformly possible leaving no brush marks. It shall be allowed to dry for at least 48 hours before paint is applied.

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

#### **Application of Acrylic paint :**

For undecorated surfaces, after the primer coat is dried for at least 48 hours. All loose particles shall be dusted off. Minimum two coats of acrylic paint shall be applied with brushes in horizontal strokes followed immediately by vertical strokes which together shall constitute one coat. The subsequent coats shall be applied after a time interval of at least 24 hours between consecutive coats to permit proper drying of the preceding coat. The finished surface shall be even and uniform without patches, brush marks, acrylic paint drops etc.

Water proof cement paint shall not be applied directly on surface already treated with white wash, colour wash, distemper dry or oil bound varnishes, paint etc. Such surface shall be scrapped first and prepared for application of paint as per manufacturers specifications.

Sufficient quantity of acrylic paint shall be mixed to finish in a single day. The application of a coat in each face shall be finished in one operation and no work shall be started in any face of the building which cannot be completed on the same day.

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

**Protective measurements :** The surfaces of doors, windows, floors, articles of furniture etc. and such other

parts of the buildings as are not to be painted shall be protected from being splashed upon. Such surfaces shall be cleaned of acrylic splashes, if any.

**Mode of Measurements & Payment :**

All the work shall be measured in the decimal system as under:

- a) Dimensions shall be measured to nearest 0.01M.
- b) Area in individual items shall be worked out to the nearest 0.01 Sq.mt.

All the works shall be measured in Sq. m. Deductions for jambs, soffits, sills etc. for openings not exceeding 0.5 sq.m. each in area, for ends of joists, posts, beams, girders, steps etc. not exceeding 0.5 sq.m. each in area and for opening exceeding 0.5 sq.m. not exceeding 3.0 sq.m. each in area. Deduction and additions shall be made as under:

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

Deductions for openings exceeding 0.5 sq.m. but not exceeding 3 sq.m. each shall be made as follows and no addition shall be made for reveals, jambs, soffits etc. of these openings.

- a) When both the faces of walls are provided with finish, deduction shall be made for one face only.
- b) When each face of wall is provided with a different finish, deduction shall be made for that side of frame for door, windows etc. on which width of reveals is less than that of the other side.
- c) When widths of reveals on both faces of wall are equal, deduction of 50 % of area of opening on each face shall be made from total area of finish.
- d) When only one face of wall is treated and the other face is not treated, full deduction shall be made if the width of reveal on the treated side is less than that on the untreated side, but if the width of the reveal is equal or more than on the untreated side neither deductions for additions to be made for reveals, jambs, soffits, sills etc.

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

No deduction shall be made for attachment such as casing, conducts, pipe, electric wiring and the like. The Contractor has to provide 05 years warranty card from the manufacturer with the final bill for acrylic paint. At the same time the contractor has also to provide undertaking on Rs.300/- notarized stamp paper in this regard. No payment for acrylic paint and concerned related items shall be made on account of failure to submit 05 years warranty card by contractor.

The rate shall be for unit of one Sq. metre and for any height of the building.

## SECTION – 10

### PAINTINGS & POLISHING

- 1[19.7]      Painting two coats (excluding priming coat) on new steel and other metal surface with enamel paints, brushing, interior to give an even shade including cleaning the surface of alldirt, dust and other foreign matter.**

#### **Materials**

The enamel paint shall conform to M-30

#### **Workmanship**

##### **General :**

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

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

If for any reasons, thinning is necessary, the brand of thinner recommended by the manufacture shall be used.

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

##### **Application of Paint:**

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

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

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

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

##### **Mode of measurement and payment**

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

All the work shall be measured net in the decimal system as executed subject to the following limits unless other wise stated herein after.

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

(b) Areas shall be worked out to the nearest 0.01 Sq. metre.

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

In case of fabricated structural steel and iron work, priming coat of paint shall be included with fabrication.

In case of trusses if measured in sq. m. compound girders, stanchions, lattices, girder and similar work, actual area shall be measured in sq. m. and no extra shall be paid for painting on bolts, heads, nuts, washers, etc. No addition shall be made to the weight calculated for the purpose of measurements of steel and iron works for paint applied on shop or at site.

The different surfaces shall be grouped into one general item, areas of uneven surface being converted into equivalent plain areas in accordance with the table given as per Annexure-A for payment.

The rate shall be for a unit of one sq. meter. For any height & any floor.

- 2[19.8]        Painting one coats (excluding priming coat) on previously painted steel and other metal surface with enamel paints, brushing, interior to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.**

**Materials & Workmanship**

The relevant specification of item no [19.7] shall be followed except that painting shall be carried out in one coat with enamel paint on previously painted steel and metal surface.

**Mode of measurement and payment**

The relevant specification of item No [19.7] shall be followed.

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

**3[19.9] Extra over item No. [19.7] & [19.8] for every subsequent coat of paint**

**Materials and workmanship**

The relevant specifications of item No [19.7] shall be followed except that the work of painting shall be carried out for subsequent coat.

**Mode of measurement and Payment**

The relevant specification of item No [19.7] & [19.8] shall be followed for mode of measurement and payment.

The rate is excluding priming coat.

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

- 4[19.10]       Painting two coats (excluding priming coat) on new steel and other metal surfaces with synthetic enamel paint, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.**

**Materials**

Synthetic enamel paint shall conform to I.S. 2932(Part-1)-2013 (Reaffirmed 2018) or its relevant and latest edition.

**Workmanship**

The relevant specifications of item No. [19.7] shall be followed except that the painting shall be carried out with synthetic enamel paint.

**Mode of measurement & payment**

The relevant specifications of item No. [19.7] shall be followed.

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

- 5[19.11]       Painting one coats (excluding priming coat) on previously painted steel and other metal surfaces with synthetic enamel paint, brushing to give an even shade including cleaning the surface of all dirt, dust and other foreign matter.**

**Material and Workmanship**

The relevant specifications of item No [19.10] shall be followed except that the painting shall be carried out on previously painted steel and other metal surface using synthetic enamel paint in one coat.

**Mode of measurement & payment**

The relevant specifications of item No [19.10] shall be followed.

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

**6[19.12]       Extra over item No [19.10] and [19.11] for every subsequent coat of paint.**

**Material and Workmanship**

The relevant specifications of item No [19.10] shall be followed except that the work shall be carried out for subsequent coat of paint

**Mode of measurement & payment**

The relevant specifications of item No [19.10] shall be followed except that the extra rate shall be paid for applying subsequent coat of oil paint over and above the item No [19.10] and [19.11].

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

- 7[19.13(A)] Applying priming coat over new steel and other metal surfaces after and including preparing the surface by thoroughly cleaning oil, grease, dirt and other foreign matter and secured with brushes, fine steel, wood scrapes and sand paper, with ready mixed priming paint, brushing red lead.**

#### **Materials**

The ready mixed primer, brushing red lead shall conform to M-30 & shall be of approved brand and manufacture as per make list of GSPHCL.

The thinner (linsed oil) shall conform to I.S. 75-1973 (Reaffirmed 2020). If for reason, thinning is necessary in case of ready mix paint, the brand of thinner recommended by manufacturer shall be used.

#### **Workmanship**

##### **Preparation of surfaces :**

The surfaces to be painted shall be cleaned of all rust, scale, dirt and other foreign matter sticking to it with wire brushes, steel wool, scrapers, sand paper etc. This surface shall then be wiped finally with mineral turpentine which shall also removed grease and perspiration of hand marks. The surface shall then be allowed to dry. If the surface is wet, it shall be dry before priming coat in under taken.

##### **Application of primer :**

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

During painting, every time after the priming coat has been worked out of the brush bristles or after the brush has been unloaded of the bristles of the brush shall be opened up by striking the brush against portion of the unpainted surface with the end of the bristles, held at right angles to the surface, so that bristles thereafter will be allowed to dry completely before painting is started.

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

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

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

#### **Mode of measurements & Payment**

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

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

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

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

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

In case of fabricated structural steel and iron work, priming coat of paint shall be included with fabrication.

In case of trusses if measured in sq. m. compound girders, stanchions, lattices, girder and similar work, actual area shall be measured in sq. m. and no extra shall be paid for painting on bolts, heads, nuts, washers, etc. No addition shall be made to the weight calculated for the purpose of measurements of steel and iron works for paint applied on shop or at site.

The different surfaces shall be grouped into one general item, areas of uneven surface being converted into equivalent plain areas in accordance with the table given as per Annexure-A for payment.

The rate shall be for a unit of one sq. meter. For any height & any floor.

- 8[19.13(B)] Applying priming coat over new wood and wood based surface after and including preparing the surface by thoroughly cleaning oil, grease, dirt and other foreign matter, sand paperingand knotting : Ready mixed paint, brushing wood primer pink.**

#### **Materials**

The ready mixed paint, brushing, wood primer pink shall conform to M-30 and shall be as per the approved make list of GSPHCL.

#### **Preparation of Surface:**

All wood work shall be dry and free from any foreign matter incidental to building operations. Nails shall be punched well below the surface to provide a firm key for stopping. Mouldings shall be carefully smoothened with abrasive paper and projection fibres shall be removed. Flat portions shall be smoothened off with abrasive paper used

across the grain prior to painting and with the grain prior to staining or if the wood is to left in its natural colour, wood work which is to be stained may be smoothened by scraping instead of by glass papering if so required. Any knots, resinous, streaks or bluish sap wood that are not large enough to justify cutting out shall be treated with two coats of pure shellac knotting applied thinly and extended about 25mm beyond the actual area required treatment.

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

The relevant specification of item No.[19.13(A)] shall be followed for application or primer.

#### **Mode of measurements & Payment**

The relevant specifications of item No [19.13(A)] shall be followed except that work done on wood and wood based surfaces shall be paid under this item.

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

**9[19.13(C)] Applying priming coat over new wood and wood based surface after and including preparing the surface by thoroughly cleaning oil, grease, dirt and other foreign matter sand papering and knotting : Ready mixed paint brushing priming, for enamel.**

#### **Materials**

The ready mixed paint for brushing priming for enamels wood shall conform to I.S. 106-1962 or its relevant and latest edition.

#### **Workmanship**

The relevant specification of item No. [19.13(B)] shall be followed except that ready mixed paint brushing priming for enamel shall be used instead of ready mixed paint brushing wood primer pink.

#### **Mode of measurement and Payment**

The relevant specification of item No. [19.13(A)] shall be followed.

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

**10[19.14(D)] Extra over item No. [19.13(B)] for every subsequent coat of priming coat. Ready mix paint brushing wood primer pink.**

#### **Materials and workmanship**

The relevant specification of item No. [19.13(B)] shall be followed except that the painting work shall be carried out with ready mix paint, brushing wood pink for subsequent coat.

#### **Mode of measurement and Payment**

The relevant specification of item No. [19.13(B)] shall be followed except that paid for every subsequent coat applied with ready mix paint, brushing wood primer pink over and above the rate of item no. [19.13(B)].

**11[19.15(E)] Extra over item No. [19.13(C)] for every subsequent coat of priming coat ready mix paint brushing priming for enamel.**

#### **Materials & Workmanship**

The relevant specification of item No. [19.13(C)] shall be followed except that the painting work shall be paid for every subsequent coats of priming coat with ready mixed paint, brushing priming for enamel.

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

**12[19.16] Painting two coats (excluding priming coat) on new wood based surface with enamel paint interior to give an even shade including cleaning the surface off all dirt, dust and other foreign matter sand papering and stopping.**

#### **Materials**

The enamel paint shall conform to IS 133(Part-1)-2013 (Reaffirmed Year 2018) or its relevant and latest edition.

#### **Workmanship**

The relevant specifications of [19.7] shall be followed for general and application of paint except that the enamel paint shall be used for painting on new wood/wood based surfaces.

In painting doors and windows, the putty round the glass panes also be painted but care shall be taken to see that no paint, stain etc. are left on the glass. Top of shutters and surface in similar hidden locations shall not be left out in painting.

**Mode of measurements and Payment.**

The relevant specification of item No. [19.7] shall be followed, for mode of measurements and payments. The rate excludes coat of priming coat.

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

- 13[19.17]      Painting one coat (excluding priming coat) on previously painted wood and wood based surface with enamel paint to given even shade including cleaning of all dirt, dust and other foreign matter.**

**Materials and workmanship**

The relevant specification of item [19.16] shall be followed except that the painting work shall be carried out on previously painted wood and wood based surfaces with enamel paint to given even shade in one coat.

**Mode of measurements and payment**

The relevant specifications of item No. [19.16] shall be followed.

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

- 14[19.18]      Extra over item [19.16] and [19.17] for every subsequent coat of paint.**

**Materials and workmanship**

The relevant specifications of item No. [19.16] shall be followed except that painting work shall be for subsequent coat with paint.

**Mode of measurements and payment**

The relevant specifications of item No. [19.16] shall be followed except that the extra rate shall be paid for every subsequent coat applied over and above the item no [19.16] and [19.17]

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

- 15[19.19]      Painting two coats (excluding priming coat) on new wood and wood based surfaces with ready mixed paint brushing, oil gloss, semi-gloss, to give an even shade including cleaning of all dust, dirt and other foreign matter sand papering and stopping,**

**Materials**

The ready mixed paint shall conform to M-30. The ready mixed paint brushing gloss, semi-gloss shall conform to I.S. 129-1962 and I.S. 13607-1992(Reaffirmed 2019).

**Workmanship**

The relevant specification of item [19.16] shall be followed for general and application of paint, except that ready mixed paint brushing, oil gloss and semi-gloss shall be used of approved colour and shade instead of enamel paint.

**Mode of measurements and payment**

The relevant specification of item [19.16] shall be followed for measurements and payment. The rate excludes cost of priming coat.

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

- 16[19.20]      Polishing with French polish on new wood and wood based surface to give an even surface including cleaning the surface of all dirt, dust and sand paper smooth and including a coat of wood filler.**

**Material:**

The French polish of required tint and shade shall be prepared with below mention in gradient and other necessary materials.

Denatured spirit of approved quality

Chadras,

Shellac shall be confirm to IS 16

Pigment

French polish readymade polish confirming to IS 348 can also to be used.

**Workmanship:****Preparation of Surface :**

The surface shall be cleaned. All unevenness shall be rubbed down smooth with sand paper and well dusted. Knots if visible shall be covered with a preparation of red lead and glue size laid on while hot. Holes and indentations on the surface shall be stopped with glazier's putty. The surface shall then be

given a coat of wood filler made by mixing whiting (ground chalk) in methylated spirit at the rate of 1.5 Kg of whiting per litre of spirit. The surface shall again be rubbed down perfectly smooth with glass paper and wiped clean.

**Application :**

The number of coats of polish to be applied shall be as described in the item.

A pad of woolen cloth covered by a fine cloth shall be used to apply the polish. The pad shall be moistened with the polish and rubbed hard on the wood, in a series of overlapping circles applying the mixture sparingly but uniformly over the entire area to give an even level surface. A trace of linseed oil on the face of the pad facilitates this operation. The surface shall be allowed to dry and the remaining coats applied in the same way. To finish off, the pad shall be covered with a fresh piece of clean fine cotton cloth slightly dampened with methylated spirit and rubbed lightly and quickly with circular motions. The finished surface shall have a uniform texture and high gloss.

**Mode of measurements and payment**

The rate includes cost of wood filler etc. completed.

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

**17[19.21] Polishing with French polish on previously polished wood and wood based surface to give an even surface including cleaning the surface of all dirt, dust and sand paper smooth and including a coat of wood filler.**

**Material:**

The relevant specification of item no. 19.20 shall be followed except the French polish will be applied on previously polished wood and wood base surface.

**Mode of measurements and payment**

The rate includes cost of wood filler etc. completed.

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

**18[19.22] Polishing with Melamine polish on new wood and wood based surface to give an even surface including cleaning the surface of all dirt, dust and sand paper smooth and including a coat of wood filler.**

**Material:**

Melamine is an organic compound that is often combined with formaldehyde to produce melamine resin, a synthetic polymer that is fire resistant and heat tolerant. The resin is a versatile material that has a highly stable structure. It is a closed pore polish i.e. it makes the wood non-breathable product that protects wood from mainly hot and cold surfaces placed over it.

**Workmanship:**

**Preparation of Surface :**

The surface shall be thoroughly cleaned. All unevenness shall be rubbed down smooth with sand paper and shall be well dusted. Surface must be dry, free from dust, oil, wax, greases etc.

**Application :**

Mix melamine (matt or gloss) base with the catalyst in the specified ratio as per manufacturer's specification.

Add melamine thinner up to 30% (as specified by the manufacturer) by volume of mixture. Stir it and allow it to mature for 2-3 minutes. The melamine is sprayed, using spray gun pressure of 45-55 psi, from a distance of 7"-10" from substrate.

Precaution : Avoid eye contact, use of mask is mandatory during whole process.

**Mode of measurements and payment:**

The rate includes cost of wood filler etc. completed.

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

## SECTION — 11

### WATER SUPPLY, PLUMBING AND SANITARY FITTINGS

- 1[23.2] Providing and fixing to wall, ceiling and floor galvanized mild steel tube (Medium grade) of the following nominal bore, tube fittings and Z & U clamps including making good the wall ceiling and floor (A) 15 mm. dia. (B) 20 mm. dia. (C) 25 mm. (D) 32 mm. (E) 40 mm. (F) 50 mm. All exposed visible pipes shall be oil painted.**

#### **Materials**

Galvanised mild steel tubes of specified dia. nominal bore shall conform to I.S. 1239-2004 (Reaffirmed 2014) or its relevant and latest edition. Galvanized shall conform to IS 4736-1986 (Reaffirmed 2021).

The galvanised fittings, clamps, etc. required for specified dia. bore pipes shall be of best quality and make as approved by the Engineer-in-Charge.

#### **Workmanship**

##### **Cutting, Laying & Jointing**

When the tubes are to be cut or re-threaded, the ends shall be carefully filed out so that no obstruction to bore is offered. The ends of the tubes shall then be threaded conforming to the requirements of I.S. 554-1999 or its relevant and latest edition with pipe dies and taps carefully in such a manner as will not result in slackness of joints when the two pieces are screwed together.

The taps and dies shall be used only for straightening screw threads which have become bent or damaged and shall not be used for turning of the threads so as to make them slack as the latter procedure may not result in the water tight joint. The screw threads for tube and fitting shall be protected from edge until they are fitted.

In jointing tubes, the inside of the socket and the screwed end of the tubes shall be oiled and smeared with white or red and wrapping around with a few turns of Teflon Tape round the screwed end of the tube. The end shall then be tightly screwed in the socket, tees, etc. with a pipe wrench. Care shall be taken that all pipes and fittings are properly jointed so as to make the joints completely water tight and pipes are kept at all times free from dust and ends during fixing. Burr from the joints shall be removed after screwing. After laying the open ends of the pipes shall be temporarily plugged to prevent access of water, soil, or any other foreign matter.

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

##### **Fixing of tube fittings to wall ceiling & floors**

In case of fixing of tubes and fittings to the walls or ceilings, these shall run on the surface of the wall or ceiling (not in chase) unless otherwise specified. The fixing shall be done by means of standard pattern, holder clamps for inside and z & u clamp for outside keeping the pipes about 50 mm, clear of the wall for inside minimum 50mm for outside the wall. When it is found necessary to conceal the pipes and when specified so, chasing may be adopted or pipe fixed in ducts or recesses etc. provided that there is sufficient space to work on the pipe with usual tools. The pipe shall not ordinarily be buried in walls or solid floors, where unavoidable, pipes may be buried for short distances provided that adequate protection is given against damage and where so required joints are not buried. Where required M.S. tube sleeve shall be fixed at a place a pipe is passing through a wall or floor for expansion and contraction and other movements. In case the pipe is embedded in walls or floors, it should be painted with anti-corrosive bitumastic paint of approved quality. The pipe should not come in contact with lime mortar or lime concrete as the pipe is affected by lime. Under the floors, the pipe, shall be laid in layer of sand filling.

All pipes and fittings shall be fixed truly vertical and horizontal unless unavoidable. The pipes shall be fixed to walls with standard pattern clamps of required size and shape, one end of which shall be properly plugged or cemented into walls with cement mortar 1:3 (1 cement : 3 coarse sand) and the other tightened round the pipes to hold it securely. These clamps shall be spaced at regular intervals in straight lengths at 1.5m C/C interval in horizontal run and 1.5 m. interval in vertical run. For pipe of any dia the holes in the walls and floors shall be made by drilling with electric core cut machine and not by dismantling the brick work or concrete. However, for bigger diameter pipes the holes shall be carefully made of the smallest required size. After fixing the pipe, the holes shall be made good with cement mortar 1:1 (1 cement : 1 coarse sand) and properly finished to match the adjacent surface.

##### **Testing of joints :**

After laying and jointing the pipes and fittings shall be inspected under working conditions or pressure and flow. Any joints found leaking shall be redone, and all leaking pipes removed and replaced without extra cost.

The pipes and fittings after they are laid shall be tested to hydraulic pressure of 6 Kg./sq.cm. The pipe shall be slowly and carefully charged with water allowing all air to escape and avoiding all shock and water hammer. The draw off takes and stop cock shall then be closed and specified hydraulic pressure shall be

applied gradually. The pressure gauge must be accurate. The pipes and fittings shall be tested in sections as the work of laying proceeds, keeping the joints exposed for inspection during the testing.

#### **Mode of measurements and payment**

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

The length shall be measured on running meter basis of finishing work. The length shall be taken along the centre line of the pipe and fittings. The pipes fixed to walls, ceilings, floors etc. shall be measured and paid under this item.

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

- (i) Dimension shall be measured to the nearest 0.01 metre.
- (ii) Area shall be worked out to the nearest 0.01 sq. metre.

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

In case of fitting of unequal bore, the largest bore shall be measured for the test.

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

The rate includes galvanized steel tubing with screwed socket joints, together with all fittings (such as bends, sockets, springs, elbows, tees, crosses, short pieces, clamps and plugs union etc.) and fixing complete with clamping wall-hooks, Z & U Clamps, roll plugs etc. and also cutting, screwing and waste and for making forged (or handmade) bends on piping as required. Connector shall be inserted, where required or directed. The rate also includes cutting through walls, floors, etc. and their making good and painting exposed threads with anti-corrosive paint as above and testing. Where tubes are to be fixed to wall, ceiling and flooring, the rate shall include painting of pipes, providing sleeves and sand filling under floor.

The rate shall be for a unit of one running meter including painting, steel holder clamps as per details.

#### **2[23.3] Providing and laying trenches galvanized mild steel tubes (Medium grade) of the following nominal bore and tube fittings-earthwork in trenches to be measured and paid for separately : (A) 15 mm. dia. (B) 20 mm. (C) 25 mm. (D) 40 mm. (E) 50 mm. (F) 65 mm. (G) 80 mm.**

#### **Materials**

Galvanized mild steel tube specified dia. nominal bore and fittings shall conform to I.S. 1239-2004 (Reaffirmed 2014) or its relevant and latest edition. Galvanized shall confirm to IS 4736-1986 (Reaffirmed 2021).

#### **Workmanship**

The relevant specification of item 23.2 shall be followed for cutting, laying and jointing testing of joints except that the fixing of tube shall be done in trenches.

The width and depth of the trenches for different diameters of the tubes shall be as under : For 15 to 80 mm, dia. tube width of trenches shall be 30 cms and depth of trenches 60 cms.

At joints, the trench width shall be widened where necessary. The work of excavation and refilling shall be done true to line, and gradient in accordance with general specifications of earth work in trenches.

The pipes shall be painted with two coats of anti-corrosive bitumastic paint of approved quality. The pipe shall be laid on a layer of 75 mm. sand filled upto 150 mm. above the pipe if so specified. The remaining portion of trench shall be then filled with excavated earth. The surplus earth shall be disposed of as directed.

When the excavation is done in rock the bottom shall be cut deep enough to permit the pipe to be laid and cushion of sand 75 mm. In case of bigger diameter of tube where the pressure is very high, thrust block of cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 grade stone aggregate of 20 mm. nominal size) shall be constructed on all bends to transmit the hydraulic thrust without impairing the ground and spreading it over a sufficient area if so specified.

#### **Mode of measurements and payment**

The relevant specifications of item No.23.2 shall be followed. The authorized quantities shall be measured.

For purpose of calculating cubic content cross section shall normally be taken at suitable intervals i.e. at manhole or valve chamber intervals except in abnormal cases like sudden change in strata or undulating ground etc., when they may be taken at closer intervals as approved by the Engineer-in-charge whose decision shall be final, conclusive and binding.

#### **Authorized width :**

- (a) Up to 1 meter depth, the width of the trenches for the purpose of measurements of excavation shall be arrived at by adding 40 cms to external diameter of the tube (not the socket) where a pipe is laid on concrete bed/cushioning layer, the authorized width shall be the external diameter of tube plus 40 cms. or the width of the concrete bed cushioning layer whichever is more.
- (b) For depths exceeding one meter and allowance of 5 cms. per metre of depth for each side of the trench shall be added to the authorized width (i.e. external diameter of pipe plus 40 cms). This allowance

shall apply to the entire depth of the trench. The authorized width in such cases shall thereof be, equal to the depth of trench, plus external diameter of tube plus 40 cms.

- (c) Where more than one tube is laid, the diameter shall be reckoned as the horizontal distance for outside to outside of the outer most pipes.
- (d) Where sheeting etc. has been provided the authorized width of the trenches at bottom shall be increased to accommodate for sheeting etc. so that the clear width available between faces of sheeting is as per provisions (a), (b) & (c) above.

If the sides of the trench are not vertical, the toes of the side slopes shall end at the top of the pipe and vertical sided trench of authorized width as per (a), (b), (c) and (d) above shall be excavated from these down to the bed of trenches.

Where the tubes are laid in trenches, the work of excavation and refilling shall all round tubes for which separate payment shall be made, the length shall be measured on running meter basis.

The rate shall be for a unit of One running meter.

**3[23.3] Making connection of galvanized M.S. distribution branch with galvanized mild steel main to any dia. nominal bore by providing and fixing tee including cutting and threading the pipes etc. complete.**

**Materials**

The fittings required of specified dia. of pipe shall conform to I.S. 1237-2012 (Reaffirmed 2017) or its relevant and latest edition. Galvanized shall confirm to IS 4736-1986 (Reaffirmed 2021).

**Workmanship**

A pit of suitable dimensions shall be dug at the point where the connections to be made with the main and earth removed up to 150 mm below the main. The flow of water in water main shall also be disconnected by closing the sluice or wheel valves on the mains. The main shall first be cut. Water if any, collected in the pit shall be bailed out and ends of the pipe threaded.

The connections of distribution pipe shall be made by fixing malleable galvanized mild steel tee of the required size and fittings such as jam nut, socket, connecting piece etc.

The testing of the joints shall be done as per relevant specifications of item No.23.2.

Connection shall be carried out through licensed plumber register with concerned local authority.

After laying and jointing, the pipes and fittings shall be inspected under working condition of pressure and flow.

Any joint found leaking shall be redone and all leaking pipes removed and replaced without extra payment.

**Mode of measurement and payment**

The rate includes cost of all labour, materials, tools and plant required for satisfactory completion of this item towards, excavation, sand filling, laying and providing of pipes duly painted.

**4[23.4] Providing and fixing to wall ceiling and floor 6 kg/cm<sup>2</sup> working pressure polythene pipes of the following outside diameter, low density complete with special flange compression type fittings wall clips etc. including making good the wall/ceiling and floor. (A) 20 mm. dia. (B) 25 mm. dia. (C) 32 mm. dia. (D) 40 mm dia. (E) 50 mm. dia.**

**1.0 Materials**

1.1 The low density polythene pipe of specified diameter with 6 kg/cm<sup>2</sup> working pressure shall conform to I.S.3076-1985(R2003) or its relevant and latest edition. The specials and fittings required shall be of best quality.

**2.0 Workmanship**

2.1 The P.V.C. pipes of specified diameter shall be fixed as directed. Due to thermal expansion of rigid P.V.C. pipes, due allowance shall be made particularly in over ground pipe lines for any change in length of pipe line which may occur during installation or when pipe line is in service.

2.2 Above ground installation of rigid P.V.C. pipe should be under taken after preparations are observed for their protection against direct sun rays and mechanical damage.

2.3 The rigid P.V.C. pipe lines should not be kept exposed above ground when it passes through public places, railway lines, road side and foot paths.

2.4 P.V.C. pipes shall be supported at the following intervals :

- 20 mm. dia. 500 mm
- 25 mm dia. 750 mm.
- 32 mm dia. 900 mm.

2.5 Closer support spacing shall be provided if recommended by the manufacture.

2.6 The guide lines indicated by the manufacturer regarding handling, transportation, storing, laying and jointing of pipes shall be kept in view during execution.

2.7 P.V.C. pipes shall be fixed on wall with roll plugs and suitable Z & U clamps and/or with steel holder clamps.

## 2.8 Jointing the pipes :

2.8.1 The pipes and sockets shall be accurately cut. The ends of the pipes and fittings should be absolutely free from dirt and dust. The outside surface of the pipes and the inside of the fittings shall then be roughened with emery paper, and then solvent cement joint. Since solvent is aggressive to P.V.C. care must be taken to avoid applying excessive solvent to the inside of pipe sockets as any surplus solvent cannot be wiped off after jointing. Empty solvent cement tins, brushes, rags, or paper impregnated with cement should not be buried in the trenches. They should be gathered not left scattered about, as they can prove to be a hazard to animals, which may chew them.

2.8.2 If any manufacturer recommends its own methods of jointing the same shall be adopted after necessary approval from the Engineer-in-charge.

## 2.9 Laying pipes in Trenches:

2.9.1 The pipes shall be laid over uniform relative soft line grained soil found to be free of presence of hard objects such as large flints, rocky projections, large tree roots etc. The width of the trenches shall be minimum width required for working.

2.9.2 The pipes laid underground shall not be less than one meter from the ground level. The pipe shall be positioned in the trenches so as to avoid any induced stressed due to deflection. Any deviation required shall be obtained by using proper type of rubber ring joints.

## 3.0 Mode of measurements & payments

3.1 The relevant specifications of item 23.2 shall be followed except that the P.V.C. pipes of specified dia. shall be paid under this item.

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

### 5[23.5] Providing and fixing water closet squatting pan ( Orissa type W.C. Pan) size 580 mm x 440 mm, Earth work, bed concrete and trap to included ) Vitreous china. Long pattern white color.

#### 1.0 Materials

1.1 Water closet squatting pan (Orissa type W.C. Pan) shall conform to M-41. Cement mortar shall conform to M-11.

#### 2.0 Workmanship

Any damage caused to the building, or to electric, sanitary, water supply or other, installations etc. therein, either due to negligence on the part of the contractor, or due to actual requirements of the work, shall be made good and the building or the installation shall be restored to its original condition by the contractor. Nothing extra shall be paid for such restoration works except where otherwise specified.

2.1 The pan shall be sunk into the floor and embedded in a cushion of average 15 cm. cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate or brick aggregate 40 mm nominal size) or as specified. This concrete shall be left 115 mm. below the top level of the pan so as to allow for flooring and its bed concrete. The floor should be suitably sloped so that the waste water is drained into the pan. The pan shall be provided with 100 mm. 'P' or 'S' trap as specified in the IS Code 5219-2013 (Reaffirmed 2018) with approximately 50 mm. seal the joints between the pan and the trap shall be made leak-proof with cement mortar 1:1 (1 cement : 1 finesand).

#### 3.0 Mode of measurements and payments

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

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

### 6[23.6] Providing and fixing wash down water closet (European type W.C. Pan) with integral 'P' or 'S' trap including jointing the trap with soil pipe in C.M. 1:1 (1 cement : 1 fine sand) : Vitreous china pattern : In white colour including seat cover.

#### Materials

Wash down water closet (European type W.C. Pan) shall conform to M-40. Cement mortar shall conform to M-11.

#### Workmanship

The work shall be carried out, complying in all respects with the requirements of relevant bye-laws of the local body in whose jurisdiction the work is situated.

Any damage caused to the building, or to electric, sanitary, water supply or other, installations etc. therein,

either due to negligence on the part of the contractor, or due to actual requirements of the work, shall be made good and the building or the installation shall be restored to its original condition by the contractor. Nothing extra shall be paid for such restoration works except where otherwise specified. The closet shall be fixed to the floor by means of 75 mm. long 6.5 mm. diameter counter sunk bolts and nuts embedded in the floor concrete using rubber or fiber washers so as not to allow any lateral displacement. The joint between the trap of W.C. and soil pipe shall be made with C.M. 1:1 (1 cement : 1 fine sand).

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

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

3.2 The rate includes cost of all labour for fixing pans and seat and cover, inlet outlet connection for flushing etc. complete including testing the same of a completely commissioned W.C.

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

### **7[23.7] Providing and fixing 100 mm. size 'P' or 's' trap for water closet squatting pan including jointing the trap with the pan and soil pipe in cement mortar 1:1 ( 1 cement : 1 fine sand) Vitreous China.**

#### **1.0 Materials**

The 100 mm. size 'P' or 'S' trap for water closet shall conform to IS: 5219-2013 (Reaffirmed 2018) or its relevant and latest edition. Cement mortar shall conform to M-11.

#### **2.0 Workmanship**

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

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

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

The rate shall be for a unit of one number of complete commissioned unit.

### **8[23.8] Providing and fixing in C.M. 1:3 (1 cement : 3 coarse sand) a pair of white vitreous china 250 mm. x 130 mm. x 20 mm. foot rest for long pattern squatting pan water closet.**

#### **1.0 Materials**

The pair of white vitreous china foot-rests shall conform to M-43. Cement mortar shall conform to M-11.

#### **2.0 Workmanship**

After laying the floor, the floor shall be suitably sloped so that the waste water is drained into the pan, a pair of foot-rests of size 250 mm. x 130 mm. x 20 mm. of white vitreous china shall be set in cement mortar 1:3 (1 cement : 3 coarse sand). The foot-rests shall be fixed at a distance of 175 mm. from the inner edge of the back side of the pan and shall be fixed at convenient angle.

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

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

3.2 The rate shall be for a unit of one pair.

### **9[23.9] Providing and fixing G. I. Inlet connection for flush pipe with W.C. Pan.**

#### **1.0 Materials**

1.1 The G. I. inlet connection for flush pipe shall conform to M-36.

#### **2.0 Workmanship**

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

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

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

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

- 10[23.10] Providing and fixing wash basin of approved make by GSPHCL with single hole for pillar tap with C.I. or S.S. bolts including cutting holes, and making good the same but including fittings, vitreous china flat back wash basin 550 mm x 400 mm in white colour (pillar cock, stop cock, S. S. Bottle trap waste coupling and Connecting UPVC pipe to concerned NT with all fittings ,outlets, inlets all included as directed).**

**1.0 Materials**

- 1.1 The white glazed earthenware wash basin shall be 550 mm x 400 mm of 1<sup>st</sup> quality and make as approved by GSPHCL. The wash basin shall conform to M-39.

**2.0 Workmanship**

- 2.1 The wash basin shall be fixed on the wall as and where directed. The wash basin shall be supported on a pair of S.S. Bolts. The S. S. Bolts shall conform to I.S. 1367(Part-14/Sec2)-2018 or its relevant and special edition. The top edge of the wash basin shall rest on the wall plaster. After fixing the basin plaster the joints shall be filled with white cement.
- 2.2 The C.P. brass trap and union shall be connected to 32mm dia. solid UPVC waste pipe which shall be suitably laid towards the wall and which shall discharge into concerned NT as shown in drawings or as directed by GSPHCL.
- 2.3 The height of the front edge of the wash basin from the floor level shall be 80 Cms.
- 2.4 The necessary inlet, outlet, connections and fittings such as pillar cocks, CP brass waste trap, Waste Coupling, UPVC waste pipe, stop cock, PVC connection pipe from stop cock to bib cock, S. S. Bolts, S.S. bottle trap and rigid UPVC pipe up to bath N.T. etc. shall be provided.

**3.0 Mode of measurements & payment**

- 3.1 The rate includes cost of all labour, materials, tools and plant etc. required for satisfactory completion of this item as specified in workmanship.
- 3.2 The rate shall be for a unit of one number of the completely commissioned unit.

- 11[23.11] Providing and fixing 32 mm. dia. C.P. brass waste for wash basin or sink.**

**1.0 Materials**

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

**2.0 Workmanship**

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

**3.0 Mode of measurements & payment**

- 3.1 The rate includes all labours and providing C.P. brass waste trap and union including waste couplings of 32 mm. dia. The rate excludes the cost of waste pipe of 32 mm. dia.
- 3.2 The rate shall be for a unit of one number.

- 12[23.12] Providing and fixing 40 mm. dia. C.P. brass waste for wash basin or sink.**

**1.0 Materials & Workmanship**

- 1.1 The relevant specifications of item 23.11 shall be followed except that the diameter of C.P. brass waste is 40 mm. dia.

**2.0 Mode of measurements & payment**

- 2.1 The rate shall be for a unit if one number.

- 13[23.13] Providing and fixing 32 mm. dia. M.I. fisher union for wash basin or sink.**

**1.0 Materials**

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

**2.0 Workmanship.**

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

**3.0 Mode of measurements and payment**

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

**14[23.14] Providing and fixing 40 mm. dia. M.I. fisher union for wash basin or sink.****1.0 Materials and Workmanship**

1.1 The relevant specifications of item No. 23.13 shall be followed except that the diameter of M.I. fisher union shall be 40 mm. dia.

**2.0 Mode of measurements and payment**

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

**15[23.15] Providing and fixing PVC / S. S. Bottle trap.****1.0 Materials**

1.1 The PVC / S. S. Bottle Trap shall be of best quality and make as approved.  
Bottle Trap 32mm dia. with 300mm & 125mm Long Wall Connection Pipes.

**2.0 Workmanship**

2.1 After jointing the pipes and fitting shall be inspected under working conditions or pressure flow of any joints found leaking shall be redone and all leakage removed and replaced without any extra cost.

**3.0 Mode of measurements and payment**

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

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

**16[23.16] Providing and fixing C.P. brass shower rose with 15 mm or 20 mm inlet and Arm of minimum 150mm of approved make & model of GSPHCL make list.****1.0 Materials**

1.1 C.P. brass shower rose shall conform I.S. 2556 (Part-XI) and relevant and latest edition and of best quality and make as approved by the GSPHCL. The inlet of shower rose shall be 15 mm dia or 20 mm dia. as directed. The arm must be of minimum 150mm.

**2.0 Workmanship**

2.1 The C.P. brass shower rose shall be fixed as directed with 15 mm dia. or 20 mm dia. inlet pipe as the case may be.

**3.0 Mode of measurements and payment**

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

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

**17[23.17] Providing and fixing 600 mm x 450 mm bevelled edge mirror of superior glass mounted on wall with S. S. Studs (Mouthless) as directed by GSPHCL.****1.0 Materials**

1.1 Mirror shall be of superior glass with edge rounded off or beveled as specified. It shall be free from flaws specks, or bubbles and the size of the mirror shall be 600mm x 450mm and thickness shall not be less than 6 mm or as specified. The glass for the mirror shall be uniformly silver plated at the back and shall be free from silvering defects. Silvering shall have a protective uniform covering of red lead paint.

**2.0 Workmanship**

2.1 The mirror of 600 mm. x 450 mm. size mounted on wall with S. S. Studs (Mouthless). The work shall be carried out in best workman like manner.

**3.0 Mode of measurements & payment**

3.1 The rate includes cost of all labour and materials, tools and plant etc. required for satisfactory completion of this item. The rate shall be for a unit of one number.

**18[23.18] Providing and fixing C.P. brass towel rail complete with C.P. brass brackets fixed on wall with screws as per approved make & model of GSPHCL make list.**

**1.0 Materials**

1.1 The C.P. brass towel rail shall be of best quality as per approved make & model of GSPHCL make list.. The rail shall conform to IS 1068-1993 (Reaffirmed 2021) and its relevant and latest edition.

**2.0 Workmanship**

2.1 Towel rail shall be fixed by means of C.P. brass screws with S. S. Cap(katori) and S. S. Cap(katori) must be of L & Key firmly fixed to the wall. The towel rail shall be fixed at the location as shown in the drawing or as directed by engineer in charge.

**3.0 Mode of measurement and payment**

3.1 The rate includes cost of all labour and materials, tools and plant etc. required for satisfactory completion of this item.  
3.2 The rate shall be for a unit of one number.

**19[23.19] Providing and fixing 600 mm x 120 mm glass shelf with S. S. Studs.**

**1.0 Materials**

1.1 The glass shelf of 600 mm x 120 mm size shall be of 12 mm thick plain glass. The edge of the glass shall be grounded. The S.S.Studs shall be of best quality and make.

**2.0 Workmanship**

2.1 The glass shelf 600 mm x 120 mm shall be fixed with S.S.Studs firmly embedded in the wall.

**3.0 Mode of measurements and payment**

3.1 The rate includes cost of all labour and materials, tools and plant etc. required for satisfactory completion of this item.  
3.2 The rate shall be for a unit of one number.

**20[23.20(A)] Providing and fixing brass screw down bib taps of following size. Polished bright: 15 mm dia. as per approved make & model of GSPHCL make list.**

**1.0 Materials**

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

**2.0 Workmanship**

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

**3.0 Mode of measurements and payment**

3.1 The rate includes cost of all labour and materials, tools and plant etc. required for satisfactory completion of this item.  
3.2 The rate shall be for a unit of one number.

**21[23.20(B)] Providing and fixing brass screw down bib taps of following size : Polished bright : 20 mm. dia. as per approved make & model of GSPHCL make list.**

**1.0 Materials and workmanship**

The relevant specifications of item 23.20(A) shall be followed except that the bib taps of 20 mm. dia. shall be fixed.

**2.0 Mode of measurements & payment**

2.1 The relevant specifications of item 23.20(A) shall be followed.  
2.2 The rate shall be for a unit of one number.

**22[23.20(C)] Providing and fixing chromium plated brass screw down bib taps of the following size: 15 mm. dia. as per approved make & model of GSPHCL make list.**

**1.0 Materials and workmanship**

The relevant specifications of item 23.20(A) shall be followed except that the brass chromium screw down tap of 15 mm dia. shall be fixed.

**2.0 Mode of measurements & payment**

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

**23[23.20(D)] Providing and laying chromium plated brass screw down bib taps of following size : 20 mm. dia. as per approved make & model of GSPHCL make list.**

**1.0 Materials and workmanship**

The relevant specifications of item 23.20(A) shall be followed except that the brass chromium screw down tap of 20 mm dia. shall be fixed.

**2.0 Mode of measurements & payment**

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

**24[23.20(E)] Providing and fixing gun metal screw down bib taps of the following size: 15 mm. dia. as per approved make & model of GSPHCL make list.**

**1.0 Materials and workmanship**

The relevant specifications of item 23.20(A) shall be followed except that the 15 mm dia. gun metal screw down bib tap shall be fixed.

**2.0 Mode of measurements & payment**

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

**25[23.20(F)] Providing and fixing gun metal screw down bib taps of the following size: 20 mm dia. as per approved make & model of GSPHCL make list.**

**1.0 Materials and workmanship**

The relevant specifications of item 23.20(A) shall be followed except that the 20 mm. dia. gun metal screw down bib tap shall be fixed.

**2.0 Mode of measurements & payment**

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

**26[23.21] Providing and fixing brass screw down stop cock (A) 15 mm. dia. (B) 20 mm. dia. (C) 25 mm. dia. as per approved make & model of GSPHCL make list.**

**1.0 Materials**

The brass screw down stop cock of specified dia. shall conform to M-37.

**2.0 Workmanship**

The stop cock shall be fixed as directed the treated portions shall be smeared with white or red or lead and turned around with few turns of Teflon Tape. The cock shall then be screwed and fixed to the water tight position.

**3.0 Mode of measurements and payment**

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

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

**27[23.22] Providing and fixing gun metal check or non-return valve. (A) 15 mm. dia. (B) 20 mm. dia. (C) 25 mm. dia. (D) 32 mm. dia. (E) 40 mm. dia.**

**1.0 Materials**

1.1 The gun metal check or not return full way wheel valve of specified dia. shall conform to I.S: 778-1984 (Reaffirmed 2020) or its relevant and latest edition. The non-return valve shall be tested quality and approved make by GSPHCL.

**2.0 Workmanship**

2.1 The gun metal check or non return valve shall be fully cleared of all foreign matter before fixing. The fixing of shall be done by means of bolts nuts and 3 mm. rubber insertions with flanges of spigot and socketed tail pieces, drilled to the same specification as in case of socket and spigot flanges in case of flanged pipes. The joining shall be done leak proof.

**3.0 Mode of measurements and payment**

- 3.1 The rate includes all labours, materials, tools and plants etc. required for satisfactory completion of this item.
- 3.2 The rate shall be for a unit on one number.

**28[23.23] Providing and fixing chromium plated brass half turn flush cock of approved quality including fixing in pipe line etc. complete. (i) 25 mm. dia.****1.0 Materials**

- 1.1 Chromium plated brass half turn flush cock shall conform to M-44.

**2.0 Workmanship**

- 2.1 The half turn flush cock of specified diameter shall be fixed as directed. The flush cock shall be fixed in G.I. pipe/CPVC/PVC/UPVC Pipe line with necessary fittings. The joints shall be made leak proof by using Teflon Tape. The fixing work shall be carried out in best workman like manner.

**3.0 Mode of measurements and payment**

- 3.1 The rate includes cost of all materials and labour required for satisfactory completion of this item including fittings.
- 3.2 The rate shall be for a unit of one number.

**29[23.24(A)] Providing and fixing ball cock approved quality as directed (Copper metal) (I) 25 mm. dia. (II) 50 mm. dia.****1.0 Materials**

- 1.1 The ball cock of specified diameter shall conform to M-52.

**2.0 Workmanship**

- 2.1 The ball cock of specified diameter shall be fixed as directed. The fixing of ball cock shall be carried out as in best workman like manner.

**3.0 Mode of measurements and payment**

- 3.1 The rate includes cost of all materials and labour involved for carrying out satisfactory work.
- 3.2 The rate shall be for a unit of one number.

**30[23.24(B)] Providing and fixing ball cock approved quality as directed : Ebonite (1) 25 mm. dia. (2) 50 mm. dia.****1.0 Materials & Workmanship :**

The relevant specifications of item No.23.24(A) shall be followed except that the ball cock of specified dia of Ebonite shall be fixed.

**2.0 Mode of measurements & payment**

- 2.1 The relevant specifications of item No. 23.24(A) shall be followed.
- 2.2 The rate shall be for a unit of one number.

**31[23.25] Providing and fixing C.I. Manhole cover 0.60 M. x 0.45 M. size having weight not less than 35 kg.****1.0 Materials**

- 1.1 C.I. Manhole cover of 0.60 x 0.45 m. size shall be of best quality. The weight of C.I. cover and frame shall not be less than 35 kg. The C.I. manhole shall be of light duty and conform relevant I.S 1726-1991 (Reaffirmed 2017) and its relevant and latest edition.

**2.0 Workmanship**

- 2.1 The C.I. Manhole cover shall be fixed in best workman like manner.

**3.0 Mode of measurements & payment**

- 3.1 The rate includes cost of all labour and materials required for satisfactory completion of this item.
- 3.2 The rate shall be for a unit of one number.

**32[23.26] Providing and fixing G.I. rain water spout of 50 mm dia. and 30 cm length.****1.0 Materials**

1.1 G.I.M.S. tube of 50 mm. dia. shall conform to M-36.

## **2.0 Workmanship**

2.1 The G.I. pipe of 30 cm fixed as rain water pipe as directed. The pipe shall be fixed about ¼ dia. below the floor level so as to make approach of water easy. The inlet of pipe shall be rounded off easy entry of rain water pipe. The pipe shall be fixed in C.M. 1:3. The outlet shall be champhered as directed.

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

3.1 The rate includes of all labour and materials required for satisfactory completion of this item.

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

### **33[23.27] Providing and fixing pillar tap capstan head screw down high pressure, with screw shank and back nut. (A) 15mm. dia. 20mm. dia. as per approved make & model of GSPHCL make list.**

#### **1.0 Materials**

1.1 The capstan head pillar tap of specified dia. of C.P. over brass shall be of best quality and shall conform to I.S. : 1795-1982 (Reaffirmed 2020) and its relevant and latest edition. The pillar taps shall be tested.

#### **2.0 Workmanship**

2.1 The capstan head pillar tap of specified dia. shall be fixed as directed with required washers of selected leather or rubber asbestos composition or of plastic as directed. The cock shall fixed with pipeline with white zinc and Teflon tape to make joint water tight. The work shall be carried out in best workman like manner.

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

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

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

### **34[23.28] Providing and fixing concealed or open center point to wall ceiling & floor CPVC (SDR 13.5) PIPE having National Sanitation Foundation (NSF) seal for potable water of following dia. nominal bore tube fittings and clamps including making good the wall, ceiling and floor etc. complete. Pipe shall be concealed or open as mention in tender description. Pipe shall be as per approved make of GSPHCL make list.**

- (A) 15.00mm nominal dia.
- (B) 20.00mm nominal dia.
- (C) 25.00 mm nominal dia.
- (D) 32.00mm nominal dia.
- (E) 40.00mm nominal dia.
- (F) 50.00mm nominal dia.
- (G) 65.00 mm nominal dia.
- (H) 80.00 mm nominal dia.
- (I) 100.00 mm nominal dia.
- (J) 150.00 mm nominal dia.

#### **1.0 MATERIALS :**

CPVC pipes & fittings used in hot & cold potable water distribution system shall conform to requirement of IS 15778-2007 (Reaffirmed 2017). The material from which the pipe is produced shall consist of chlorinated polyvinyl chlorides. The polymer from which the pipe compounds are to be manufactured shall have chlorine content not less than 66.5%.

The internal and external surfaces of the pipe shall be smooth, clean and free from grooving and other defects. The pipes shall not have any detrimental effect on the composition of the water flowing through it.

Diameter and wall thickness of CPVC pipes are as per given in Table below.

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TABLE

Sl.No	Nominal size	Nominal outer diameter	Mean Outside Diameter		Outer diameter at any point		Wall Thickness					
							Class 2, SDR 13.5			Class 3, SDR 17		
			Max	Min	Max	Min	Avg. Max	Min	Max	Avg. Max	Min	Max
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(i)	15	15.9	15.8	16.0	15.8	16.0	1.9	1.4	1.9	-	-	-
(ii)	20	22.2	22.1	22.3	22.0	22.4	2.2	1.7	2.2	-	-	-
(iii)	25	28.6	28.5	28.7	28.4	28.8	2.6	2.1	2.6	-	-	-
(iv)	32	34.9	34.8	35.0	34.7	35.1	3.1	2.6	3.1	-	-	-
(v)	40	41.3	41.2	41.4	41.1	41.5	3.6	3.1	3.6	-	-	-
(vi)	50	54.0	53.9	54.1	53.7	54.3	4.6	4	4.6	-	-	-
(vii)	65	73.0	72.8	73.2	72.2	73.8	-	-	-	4.8	4.3	4.8
(viii)	80	88.9	88.7	89.1	88.1	89.7	-	-	-	5.9	5.2	5.9
(ix)	100	114.3	114.1	114.5	113.5	115.1	-	-	-	7.5	6.7	7.5
(x)	150	168.3	168.0	168.6	166.5	170.1	-	-	-	11.1	9.9	11.1

#### Notes

1. For CPVC pipes SDR is calculated by dividing the average outer diameter of the pipe in mm by the minimum wall thickness in mm. If the wall thickness calculated by this formula is less than 1.52 mm, it shall be increased to 1.52 mm. The SDR values shall be rounded to the nearest 0.5.

#### Dimensions of Pipes

The outside diameter, at any point and wall thickness shall be as given in above Table.

**Diameter :** The outside diameter and outside diameter at any point as given in above Table shall be measured according to the method given in IS 12235 (part 1)-2004 (Reaffirmed 2019).

**Diameter at any point :** The difference between the measured maximum outside diameter and measured minimum outside diameter in the same cross-section of pipe (also called tolerance on ovality) shall not exceed the greater of the following two values:

- (a) 0.5 mm, and
- (b)  $0.012 d_n$  rounded off to the next higher 0.1 mm.

**Wall Thickness:** The wall thickness of the pipes shall be as given in above Table. Wall thickness shall be measured by any of the three methods given in IS 12235 (part 1) 2004 (Reaffirmed 2019).

To check the conformity of the wall thickness of the pipe throughout its entire length, it is necessary to measure the wall thickness of the pipe at any point along its length. This shall be done by cutting the pipe at any point along its length and measuring the wall thickness as above. Alternatively, to avoid destruction of the pipe, nondestructive testing methods such as the use of ultrasonic wall thickness measurement gauges shall be used at any four points along the length of the pipe.

#### Tolerance on Wall Thickness

- (a) For pipes of minimum wall thickness 6 mm or less, the permissible variation between the minimum wall thickness (eMin) and the wall thickness at any point (e), (e - eMin) shall be positive in the form of +y, where  $y=0.1 eMin+0.2$  mm.
- (b) For pipes of minimum wall thickness greater than 6mm, the permissible variation of wall thickness shall again be positive in the form of +y, where y would be applied in two parts.
- (c) The average wall thickness shall be determined by taking at least six measurements of wall thickness round the pipe and including both the absolute minimum and absolute maximum measured values. The tolerance applied to this average wall thickness from these measurements shall be within the range  $0.1 eMin+0.2$  mm (see above Table).
- (d) The maximum wall thickness at any point shall be within the range  $0.15eMin$  (see above Table).
- (e) The results of these calculations for checking tolerance shall be rounded off to the next higher 0.1 mm.

**Effective Length (Le):** If the length of a pipe is specified, the effective length shall not be less than that specified. The preferred effective length of pipes shall be 3, 5 or 6 m. The pipes may be supplied in other lengths where so agreed upon between the manufacturer and the purchaser.

#### Pipe Ends

The ends of the pipes meant for solvent cementing shall be cleanly cut and shall be reasonably square to the axis of the pipe or may be chamfered at the plain end.

#### Marking:

Each pipe shall be clearly and indelibly marked in ink/paint or hot embossed on white base at intervals of not more than 3m. The marking shall show the following:

- (a) Manufacturers name or trade mark.
- (b) Outside diameter
- (c) Class of pipe and pressure rating
- (d) Batch and lot number.

## 2.0 Workmanship :

Pipe Can be concealed in chases or open as described in item or as directed. The Pipe and fitting are to be pressure tested prior to concealing with chases. To maintain alignment of CP Fittings while joining, all alignments of fittings and pipe shall be done correctly. Do not use nails for holding of pipes in the chases. For Pipes fixed in the shaft/Duct etc. there should be sufficient space to work on the pipe. Pipe sleeves shall be fixed at a place the pipe is passing through a wall or floor so as to allow freedom for expansion and contraction. Required size of Z & U clamps is to be provided at 1.5m c/c to support the pipe. The projection of pipe must be 50mm from wall surface. All joints of Pipe shall be fitted with the use of chemical solvents.

All water Supply system shall be tested to Hydrostatic pressure test. The Pressure test are similar to test pressure used for other plastic/metal pipes. hydrostatic Pressure test shall be in accordance with IS 12335(Part 8 sec 1):2004(Reaffirmed-2019). Network (Water Supply system) may be tested in sections and such section shall be entirely checked on completion of connection to the water tank or pumping system or mains. If any joint found leaking shall be redone and all leaking pipes removed and replaced by contractor without any extra payment.

All pipes and fitting shall be fixed truly vertical and horizontal unless unavoidable.

## 3.0 Mode of Measurements and payment

The description of each item shall unless otherwise stated be held to include where necessary conveyance, and delivery, handling , unloading sorting, fornication, hoisting, cutting and waste, return of packing etc.

The length shall be measured on running meter basis of finishing work the length shall be taken along the center line of the pipe and fittings the pies fixed to walls, ceilings, floors. Etc. shall be measured and paid under this item.

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

Dimension shall be measured to the nearest 0.01meter.

All measurement of cutting shall unless otherwise stated be held to include to consequent water.

In case of fitting of unequal bore, the largest bore shall be measured for the test.

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

The rate included CPVC piping with screwed socket joints, together with all fittings (such as bends, socket, elbows, tees, cresses , short pieces, clamps, and plugs union etc.) & fixing complete with clamping wall hooks, roll plug etc., and also cutting, screwing and waste and for making forged (or handmade) bends on piping as required . Connectors hall be inserted, where required or directed. The rate also includes cutting through wall, holes in wall to be provided by using core cutter machine floors etc. and finish the holes, floors etc. by cement mortar (1:3).Rates are also inclusive of making required width of jari and also filling those jaris in cement mortar (1:3).

The rate shall be for a unit of one running meter including all types of fittings, materials, labour etc complete. No extra payment for fittings shall be paid separately.

**35[23.29] Labour charges for placing fixing in position PVC water tank as supplied by corporation and size including making inlet and outlet. Over flow and washout arrangement with G.I. connection including using necessary M.H. for connection etc. complete with closed cover including applying two coats of oil painting outside the tank etc. complete.**

## 1.0 Material :

- 1.1 Water tank shall be installed on perfectly plained and smooth surface.
- 1.2 Outlet pipe shall be 7.5 cm high than bottom surface.
- 1.3 Diameter of overflow pipe shall be bigger than inlet pipe diameter.
- 1.4 Unions shall be used in inlet and outlet pipe.
- 1.5 For connection in water tank required washer and check nut shall be used.
- 1.6 Two coats of oil paint on external surface of tank shall be applied.

All damage during lifting, placing, operating will be borne by contractor.

**2.0 Mode of measurement and payment :**

2.1 The rate include for all labour, for installing PVC water tank in position, two coats of oil paints, and P&F all necessary fittings if required etc. completed. This shall be measured in and rates are of per litre basis.

**36[23.30] Providing, supplying & fixing ISI marked Rotational moulded polyethylene double layer cylindrical vertical storage tank.**

**Material**

PVC tanks shall be made of best virgin raw materials and latest technology bearing minimum 10years guarantee. The PVC tank shall be with white coating inner side. They shall be cylindrical vertical with closed top. The material of construction of tank, lid and fittings which come in contact with water such that it does not impart any taste, colour or odour to water, nor have any toxic effect, and it shall not contaminate water their by making it unpotable.

The density of resin (base material at 23 Degree Celsius when tested shall confirm to IS 7328-2020.

The percentage of carbon black content in polyethylene shall be  $2.5 \pm 0.5$  percent and it shall be uniformly distributed. All tanks supplied shall bear brand name and valid ISI mark. i.e. IS 12701-1996 (Reaffirmed 2017). The dimensions of the tank shall be as per Table 1, Clause 5.1 of IS 12701-1996 (Reaffirmed 2017).

**Installation and Fittings**

The flat base of the tank shall be fully supported over its whole bottom area on a durable rigid flat and level platform sufficiently strong to stand without deflection the weight of the tank when fully filled with water. For inlet, outlet and other connections fully threaded GI or CPVC connections with hexagonal check nuts and washers on either side of the tank wall shall be provided. Holes for threaded connections shall be drilled and not punched. Pipes entering of leaving the tank shall be provided with unions and suitably supported on a firm base to avoid damage to the tank walls.

**Manhole Lid**

The lid shall rest evenly and fit over the rim of the manhole so as to prevent the ingress of any foreignmatter into the tank. The lid shall be provided with suitable arrangement for locking it with the tank.

The tank and its components shall conform to the local bye-laws for preventions of mosquito menace.

**Rates**

The rate shall include the cost of the tank, manhole lid, carriage and delivery at the place specified. Rate inclusive of cost of tank, hoisting at any height/floor, all fittings (Like Inlet, Outlet, Washout & Overflow etc.), one coat of primer and two coat of white oil paint at outside of the tank etc. complete. Making of platform/Base to rest the tank shall be paid separately.

The rate shall be paid for a unit per liter for the item completed as above.

The agency/contractor has to provide 10 years guarantee certificate against any manufacturing defects for water tank. During the final bill agency has to produce guarantee bond on Rs. 300/- stamp paper with notarized.

**37[23.31] Providing and fixing C.P. Brass Towel Ring shall be model & make as per approved make list of GSPHCL. Providing at wash basin fixed to wall with C.P. brass screws.**

**1.0 General**

1.1 C. Plated brass towel ring shall be model & make as per approved make list of GSPHCL.

**2.0 Mode of measurements and payment**

2.1 The rate shall be paid for a unit of one number.

**38[23.32] Providing and fixing C.P. Brass Towel Rack shall be model & make as per approved make list of GSPHCL.**

**1.0 General**

1.1 C. Plated brass towel rack shall be model & make as per approved make list of GSPHCL.

**2.0 Mode of measurements and payment**

2.1 The rate shall be paid for a unit of one number.

**39[23.33] Wall Hung Type WC Pan**

**Providing and fixing wash down white vitreous china WALL HUNG Approved Make and Model by GSPHCL with integral "P" trap including jointing the trap with pan and soil pipe in vitreous china white color. Rate inclusive of providing and fixing PVC Flush Tank Approved Make and Model by GSPHCL & Soft seat cover of the same make. Rate are inclusive of all necessary fittings required for installation of flushing tank and wall hung. Wall Hung Shall be fixed on S.S. heavy Duty rack bolt having 16mm dia., 165mm Length Using Plastic Sleeve. Make by Using Drill built only.**

Wash down water closet (European type W.C. Pan) shall conform to M-40 white vitreous china Wall Hung European type W.C. pan of Approved Make and Model by GSPHCL. Water Closet with integral "P" trap. PVC Flush Tank and Seat Cover of Approved Make and Model by GSPHCL.

**Workmanship**

Wall mounting water closet shall be of white vitreous China confirming to IS 2556 (Part-16)-2002 (Reaffirmed 2017). For general requirement relating to terminology, materials, manufacture, glazing, defects, minimum thickness, tolerances, performance and methods of tests shall confirm to IS 2556 (Part-1)-1994 (Reaffirmed 2017). Wall mounted water closet shall be of one piece construction. Each wall mounted water closet shall be provided with fixing arrangement and shall have an integral flushing rim of suitable type. It shall have an inlet for connecting the flushing pipe of dimension confirming to IS 2556. The flushing rim may be box or open rim type or a combination of both. In case of box rim, adequate number of holes and slot be provided. The flushing rim and the inlet shall be of the self-draining type and weep hole shall be provided at the flushing inlet of the wall mounted water closet.

Each wall mounted water closet shall have an integral trap and P type outlet confirming to IS 2556 (Part-16)-2002 (Reaffirmed 2017). Inside surface of water closet and trap shall be uniform and smooth in order to ensure an efficient flushing. The outlet if without serration, shall be glazed and if same is with serration, may not be glazed.

Wall hung WC shall be Fixed On Wall Hung Using S.S rack bolt with Plastic Sleeve (Gripper) make a hole with drill built in wall, then place a Plastic Sleeve (Gripper) in the Hole then insert the S.S. rack bolt in plastic sleeve. The Rack bolt shall be Heavy duty Minimum 16mm dia., 165mm Length. Then turn the rack bolt with Spanner & place the wall hung W.C. on Rack bolt, Insert the Grip, Washer, Unit & Cap on the rack bolt. Which shall be fixed in a manner as approved by the Engineer.

The WC Outlet shall be fixed to Drain Pipe with necessary PVC/Rubber gasket or Ring.

Each WC set shall be provided with approved quality of seat, rubber buffers and chromium-plated hinges.

Seat shall be so fixed that it remains absolutely stationary in vertical position without falling down on the WC.

Approved PVC Flush Tank Shall Be Fixing and Jointing with Proper Connection to WC Pan with all

Necessary Fittings as approved by engineer in charge.

**Plastic Seat and Covers for Water Closet**

The seat and cover shall be of thermosetting or thermoplastic conforming to IS 2548 (Part-1)-1996 (Reaffirmed 2017) or of thermoplastic conforming to IS 2548 (Part-2)-1996 (Reaffirmed 2017) as specified.

Unless otherwise specified these shall be of closed pattern.

Thermosetting plastic used shall conform to grade 2 or 3 of IS 1300 when it is phenolic plastic or IS 3389 when of urea formaldehyde.

Thermoplastic materials used may be of Polystyrene conforming to type 2 or 3 of IS 2267-1995 (Reaffirmed 2020) or of polypropylene, Appendix A of IS 2548-1996 (Reaffirmed 2017). In public buildings where rough and heavy use of seats and covers are common, plastic seats shall be moulded out of thermosetting materials, phenolic or urea formaldehyde only and the underside of the seat shall be flat with solid moulding.

The hinging device shall be bronze or brass with nickel chromium plating confirming to IS 1068 and the seat shall have not less than three rubber or plastic buffers of size 25 mm x 40 mm x 10 mm for closed front seats and not less than four for open front seats, which shall be securely fixed to the underside of the seat unless otherwise specified. The cover shall be fitted with the same number of buffers as provided for the seat.

Seats shall have a smooth finish and shall be non absorptive and free from cracks and crevices. They shall be capable of being easily cleaned and shall not be adversely affected by common solvents or household cleanser.

**Strength:** The seats shall withstand without permanent distortion of the seat or hinge fittings or damage to any finish, a load of 1150 N for 30 minutes applied in the manner prescribed in IS 2548-1996 (Reaffirmed 2017).

**Mode of measurements and payment:-**

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

The rate includes cost of all labour for fixing pans and seat and cover, inlet outlet connection for flushing etc. Complete including testing the same of a completely commissioned w.c.

The rate shall be for a unit of one number.

## SECTION — 12

### DRAINAGE & SEWERAGE

- 1[24.1(A)] Providing and laying (two level or slopes) and jointing with stiff mixture of cement mortar in proportion 1:1 salt glazed stone-ware pipes, following nominal internal diameters including testing of pipes and joints complete : 100 mm. dia.**

#### 1.0 Materials

- 1.1** Water shall conform to M-1, cement mortar of proportion 1:1 shall conform to M-11, glazed stoneware pipe shall conform to M-48. The glaze of the pipes shall be free from crazing. The pipes shall give a sharp clear tone when struck with a light hammer. There shall be no broken blisters. The thickness of pipes shall be as given in the below Table.

**TABLE**  
**Stoneware Pipes**

<i>Internal Diameter (mm)</i>	<i>Mean Thickness of the Barrel and Socket (mm)</i>
100	12
150	15
200	16
230	19
250	20
300	25
350	30
400	35
450	37

The length of pipes shall be 60, 75, 90 cm exclusive of the internal depth of the socket. The pipes shall be handled with sufficient care to avoid damage to them.

#### 2.0 Workmanship

- 2.1** The trenches for stoneware pipe drains shall be carried out as per relevant specifications of item No. 2[23.3] except that the work is for stoneware pipes of 100 mm.

#### 2.2 Laying :

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

Where pipes are not bedded on concrete, the trench floor shall be left slightly high and carefully bottomed up as pipe laying proceeds, so that the pipe barrels rest on firm and undisturbed ground. If the excavation has been carried too low, the desired levels shall be made up with concrete 1:5:10 (1 cement: 5 fine sand: 10 graded stone aggregate 40 mm nominal size) for which no extra payment shall be made.

#### 2.3 Jointing :

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

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

- 2.3.3** The mortar shall be mixed as necessary for immediate use.

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

- 2.3.5** The mortar shall be cured for 10 days.

#### 2.4 Testing of Joints :

Stoneware pipes used for sewers shall be subjected to a test pressure of 2.5 m. head of water at the highest point of the section under test. Before commencing test, the pipe line shall be filled with water and maintained full for 24 hours under head of 0.6 m of water. The test shall be carried out by suitably

plugging the lower end of the drain and the ends of the connection if any and filling the system with water. A knuckle bend shall be temporarily jointed in at the top end and a sufficient length of vertical pipe jointed to it so as to provide the required test head, or the top may be plugged with a connection to a hose ending in a funnel which could be raised or lowered till the required head is obtained and fixed suitable for observation. The tolerance of two liters per centimeter of diameter per kilometer may be allowed during a period of 10 minutes.

If any leakage is visible, the defective part of the work shall be cut out and made good. A slight amount of sweating which is uniform may be overlooked, but excessive sweating from a particular pipe or joint shall be watched for and taken as indicating a defect to be made good.

Any joint found leaking or sweating, shall be rectified or embedded into 15 cm layer of cement concrete (1:2:4) 30 cm in length and the section retested.

**Refilling :** In cases where pipes are not bedded on concrete special care shall be taken in refilling trenches to prevent the displacement and subsequent settlement at the surface resulting in uneven street surfaces and dangers to foundations etc. The backfilling materials shall be packed by hand under and around the pipe, and rammed with a shovel and light tamper. This method of filling will be continued up to the top of pipe. The refilling shall rise evenly on both sides of the pipe continued up to 60 cm above the top of pipe so as not to disturb the pipe. No tamping should be done within 15 cm of the top of pipe.

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

3.1 Pounding or watering of the trenches bed to fit the lower part of the pipe and "Grips" dug to take socket, collars etc. are included in the rate of laying the pipes.

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

The length of the pipe shall be measured in running metre nearest to a cm has laid or fixed, from inside of one manhole/chamber to inside of another manhole/chamber.

The length shall be taken along the centre line of the pipes over all fittings such as bends, junctions etc. which shall not be measured separately. The rate shall include cost of material, labour etc.

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

**2[24.1(B)] Providing and laying (two level or slopes) and jointing with stiff mixture of cement mortar in proportion 1:1 salt glazed stone-ware pipes, following nominal internal diameters including testing of pipes and joints complete : 150mm dia.**

#### **Material and workmanship:**

The relevant specification of item no.24.1(A) shall be followed except that the diameter of pipe shall be 150mm dia.

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

The relevant specification of item 24.1(A) shall be followed.

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

**3[24.2(A)] Providing and laying cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate 40 mm. nominal size) bedding for stoneware pipe of following internal diameter with necessary form work and curing complete : 100 mm. dia. 300 mm. width (112 mm. average bed thickness).**

**1.0 Materials :** (1) Water shall conform to M-1. (2) Cement shall conform M-3. (3) Sand shall conform to M-6. (4) Stone aggregate 40 mm nominal size shall conform to M-12.

#### **2.0 Workmanship**

2.1 The relevant specifications of item 5.3.6(A) shall be followed except that the concrete work shall be carried out in trenches as bedding for stoneware pipes. The width of concrete shall be 300 mm. and average thickness of bedding shall be 112 mm. The concrete shall be brought up at least to the invert level of the pipe to form a cradle and to avoid line contact between the pipe and the bed.

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

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

3.2 The rate includes cost of necessary form work required if any.

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

- 4[24.2(B)] Providing and laying cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate 40 mm. nominal size) bedding for stoneware pipe of following internal diameters with necessary form work and curing complete 150 mm. dia. 450 mm. width (166 mm. average bed thickness).**

**1.0 Materials & Workmanship :**

1.1 The relevant specifications of item 24.2(A) shall be followed except that the cement concrete work shall be carried out for bedding of stoneware pipe of 150 mm. dia. The average thickness of bedding shall be 166 mm. and width shall be 450 mm.

**2.0 Mode of measurements & payment**

2.1 The relevant specifications of item 24.2 (A) shall be followed.  
2.2 The rate shall be for a unit of one running metre.

- 5[24.3] Providing and fixing S.W. gully trap with C.I. grating brick masonry chamber and watertight precast R.C.C. cover with frame of 300 mm. x 300 mm. size (Inside) with standard weight: (A) square mouth trap 100 mm. x 100 mm. size P trap.**

**1.0 Material :** (1) Water shall conform to M-1. (2) Cement mortar of proportion 1:5 shall conform to M-11. (3) Burnt brick shall conform to M-15. (4) The S.W. Gully trap of 100 mm. x 100 mm. size shall conform to M-47.

**2.0 Workmanship**

2.1 Excavation for gully trap shall be done true to dimensions and levels as indicated on plans or as directed. The excavation work shall generally be done as per relevant specification of item 1[4.0.0(A)]. of earth work.

**2.2 Fixing :**

2.2.1.1 The gully trap shall be fixed over cement concrete 1:5:10 (1 cement : 5 sand : 10 graded brick bats aggregate, 40 mm. nominal size) foundation, 650 mm. square and 100 mm. thick. The depth of top of concrete below the ground level shall be as per site requirement. The joining of gully outlet to the branch drain shall be done similar to jointing of S.W. pipe as described in item No.1[24.1 (A)].

**2.3 Brick masonry chamber :**

After fixing and testing gully branch drain, a brick masonry 300 x 300 mm. inside with bricks in C.M. 1:5 (1 cement : 5 sand) shall be built with a 100 mm. brick work round the gully trap from the top of bed concrete upto ground level. The space between the chamber walls and the trap shall be filled with cement concrete 1:5:10. The upper portion of the chamber i.e. above the top level of the trap shall be plastered inside with cement mortar 1:3 (1 cement : 3 sand) finished with floating coat of neat cement. The corners and bottom of the chamber shall be rounded off so as to slope towards the grating.

Precast concrete cover with frame 300 x 300 mm size shall then be fixed on the top of the brick masonry cover shall be made in C.C. 1:2:4 (1 cement : 2 coarse sand : 4 graded aggregate 20mm. nominal size) having 40 mm thick and rendered smooth. The finished top of the cover shall be flushed with adjoining floor level.

**3.0 Mode of measurements & payment**

3.1 The rate includes cost of all labour, materials, tools and plant etc., required for satisfactory completion of this item as described above.  
3.2 The rate shall be for a unit of one number basis.

- 6[24.4] Providing and laying (to level or slopes) and jointing reinforced concrete light duty non-pressure pipes I.S. class N.P. 2 of the following internal diameters with collars and butt ends prepared for collar joints including testing of joints etc. complete (B) 150 mm. (C) 250 mm. (D) 300 mm. (E) 450 mm. (F) 500 mm. (G) 600 mm. (H) 900 mm. (K) 1000 mm. (M) 1200mm.**

**Materials :**

The reinforced concrete light duty non-pressure pipes of specified diameter shall conform to I.S. 458-2021 or its relevant and latest edition.

The pipes shall be with or without reinforcement as required and shall be of class not lesser than NP2. These shall conform to IS 458 and shall be capable of withstanding a test pressure of 0.07 MPa (7 m head). The reinforced cement concrete pipes shall be manufactured by centrifugal (or spun) process while un-reinforced cement concrete pipes by spun or pressure process. All pipes shall be true to shape, straight, perfectly sound and free from cracks and flaws. The external and internal surface of the pipes shall be smooth and hard. The pipes shall be free from defects resulting from imperfect grading of the aggregate mixing or moulding.

Concrete used for the manufacture of un-reinforced and reinforced concrete pipes and collar shall not be leaner than 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate). The maximum size of aggregate should not exceed one third of the thickness of the pipe or 20 mm whichever is smaller for pipes above 250 mm internal diameter. But for pipes of internal diameter 80 to 250 mm, the maximum size of aggregate should be 10mm. The reinforcement in the reinforced concrete pipe shall extend throughout the length of the pipe. The circumferential and longitudinal reinforcements shall be adequate to withstand the specified hydrostatic pressure and further bending stresses due to the weight of water when running full across a span equal to the length of pipe plus three times its own weight.

The dimensional requirements of concrete pipes are given in Appendix I.

## APPENDIX – 'I'

### A: DIMENSIONAL REQUIREMENT OF CLASS NP2-REINFORCED CONCRETE LIGHT DUTY, NON PRESSURE PIPES & COLLAR (Clause 19.2.2)

Nominal Internal Diameter of Pipe	Barrel Wall Thickness of pipe	Collar Dimensions			Reinforcements in Collar		
		Minimum Caulking Space	Minimum Thickness	Minimum Length	Longitudinal, Mild steel or Hard Drawn Steel		Spiral Hard Drawn Steel
					Minimum Number	Weight Kg/Collar	
mm	mm	mm	mm	mm			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
80	25	13	25	150	6	0.08	0.07
100	25	13	25	150	6	0.08	0.08
150	25	13	25	150	6	0.08	0.10
200	25	13	25	150	6	0.08	0.12
225	25	13	25	150	6	0.08	0.14
250	25	13	25	150	6	0.08	0.16
300	30	16	30	150	8	0.11	0.22
350	32	16	32	150	8	0.11	0.25
400	32	16	32	150	8	0.11	0.27
450	35	19	35	200	8	0.15	0.40
500	35	19	35	200	8	0.15	0.60
600	45	19	40	200	8	0.15	0.70
700	50	19	40	200	8	0.23	1.05
800	50	19	45	200	8	0.23	1.85
900	55	19	50	200	8	0.23	2.05
1000	60	19	55	200	8	0.33	2.25
1100	65	19	60	200	8	0.33	3.09
1200	70	19	65	200	8	0.33	4.11
1400	75	19	75	200	12	0.50	5.08
1600	80	19	80	200	12 or 8+8	0.67	6.55
1800	90	19	90	200	12 or 8+8	0.67	9.00
2000	100	19	100	200	12+12	1.00	12.15
2200	110	19	110	200	12+12	1.00	13.30

#### Note:

1. If the mild steel is used for spiral reinforcement, the weight specified under col. 7 shall be increased by a factor 140/25.
2. Soft grade mild steel wire may be used as reinforcement for collars of pipes of nominal internal diameter up to 250 mm only, by increasing the weight by a factor 140/84. Where only soft grade mild steel wire is used for making collar cages, the weight of reinforcement shall be total weight or col. 6 and 7 multiplied by 140/84. This is allowed as a process requirement.
3. Internal diameter of collar to suit the actual diameter of pipes with minimum caulking space as given in col. 2

The minimum clear cover for reinforcement in pipes and collars shall be as given in Table 19.3.

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**TABLE 19.3**

<i>Sl. No.</i>	<i>Precast concrete pipe/collar</i>	<i>Minimum clear cover, mm</i>
(i)	Barrel wall thickness	
(a)	Upto and including 75 mm	8
(b)	Over 75 mm	15
(ii)	At spigot steps	5
(iii)	At end of longitudinal	5

**Note :** An effective means shall be provided for maintaining the reinforcement in position and for ensuring correct cover during manufacture of the unit. Spacers for this purpose shall be of rust proof material or of steel protected against corrosion.

### **Laying**

The pipes shall be lowered into the trenches carefully. Mechanical applications may be used. Where necessary pipe shall be laid in straight lines or with easy curves and true to line and gradient as specified. The laying of pipe shall proceed upgrade of a slope. In the pipe spigot and socket joints; the socket ends shall face upstream. In case of pipes with joints to be made with loose collars, the collars shall be slipped on before the next pipe is laid.

In case where the foundation conditions are unusual such as the proximity of trees or holes, under existing or proposed around in 150 mm. thick cement concrete 1:5:10 (1 cement : 5 fine sand : 10 graded stone aggregate 40 mm. nominal size) or compacted sand or gravel shall be laid.

In case where the natural foundation is inadequate the pipes shall be laid either in concrete cradle, supported on proper foundations or on any other suitably designed structure. If concrete bedding is used, the depth of concrete below bottom of the pipe shall be at least  $1/4^{\text{th}}$  of the internal diameter of the pipe subject to a minimum of 100 mm and a maximum 300 mm. The concrete shall be extended up the sides of the pipe at least to a distance of  $1/4^{\text{th}}$  of the outside diameter for pipes 300 mm and over in diameter.

The pipes shall be laid in the concrete bedding before the concrete has set. Pipes laid in trenches in earth shall be bedded evenly and firmly and as far as up to the haunches of the pipe as to safely transit the load expected from the back fill through the pipe to the bed. This shall be done either by excavating the bottom of the trenches to fit the curve of the pipe or by compacting the earth under a round curve of the pipe to form an even bed. Necessary provision shall be made for joints wherever required.

### **Jointing**

The joints shall be done by slipping the collar over the joint, covering equally both the pipe. The annular space shall be filled with steep mixture of cement mortar 1:  $1\frac{1}{2}$  (1 cement :  $1\frac{1}{2}$  fine sand) which shall be rammed with caulking tool. After a days work any extraneous material shall be remove from the inside of the pipe and the newly made joint shall be cured. Care shall be taken that the underside of the joints is properly filled with mortar.

### **Testing: For pressure pipes**

The completed pipeline shall be tested for pressure (Known as site test pressure) which shall not be less than the maximum pipeline operating pressure plus the calculated surge pressure, but in no case shall it exceed the hydrostatic test pressure. For non-pressure pipes the joints shall be tested as per procedure laid down item no.24.1(A).

### **Curing**

Every joint shall be kept wet for about 10 days for maturing. The section of the pipe line laid and jointed shall be covered immediately to protect from weather effects.

The joints shall be left exposed for observation.

### **Mode of measurements & payment**

The relevant specifications of item 24. 1(A) shall be followed except that the rate includes for laying to (level or slope in trenches etc. measured separately), making the joints as indicated and testing to stand the water test.

The measurements shall be net, without any allowance for cutting and waste. The length of bends, junctions and other connections (measured along the centre line) shall be included in the total length of the Pipes.

The size of bends, junctions, etc. shall suit the size of pipe. The bore (internal diameter of pipe) shall be the criterion for payment.

Nothing extra shall be paid separately for the use of mechanical appliances, where necessary, as described above.

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

<b>7[24.5]</b>	<b>Constructing Manhole with R.C.C. top slab in 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) foundation concrete 1:3:6 (1 cement : 3 coarse sand : 6 brick bats 40 to 50 mm. size) plastering 15 mm. thick with C.M. 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement and making channels in CC 1:2:4 mix (1 cement : 2 coarse sand : 4 stone aggregate 20 mm. nominal size) finished smooth complete including curing and testing (I) Inside size 900 mm. x 1200 mm. and 1.5 Mt. deep, Including precast cover and frame shall be heavy duty circular (HD-20) (Clear opening in frame 600mm) (A) with 230 mm. thick walls of conventional brick masonry using bricks having crushing strength of not less than 35 Kg. / cm<sup>2</sup> in C.M. 1:5 (1 cement : 5 coarse sand)</b>			
<b>I.</b>	<b>A type depth</b>	<b>0.90</b>	meter for	150 mm or any dia. <b>sewer</b>
<b>II.</b>	<b>B type “</b>	<b>1.50 “</b>	150 or any dia	“
<b>III.</b>	<b>C type “</b>	<b>2.25 “</b>	150 or any dia	“
<b>IV.</b>	<b>D type “</b>	<b>3.15 “</b>	150 or any dia	“

**1.0 Materials :** Water shall conform to M-1. Cement shall conform to M-3. Burnt bricks shall conform to M-15. Brick bats of 40 to 50 mm. size shall conform to M-14. Stone coarse aggregate of 20 mm. nominal size shall conform to M-12. Grit shall conform to M-8. Cement mortar of specified proportion shall conform to M-11.

## **2.0 Workmanship**

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

## **2.2 Bed Concrete :**

The manhole shall be built on a bed of cement concrete 1:3:6 (1 cement : 3 coarse sand : 6 brick bats)(40 to 50 mm, nominal size) to the thickness of the bed concrete shall be 15 cm. For manhole up to 1m depths and 20 cm. for manholes over meter and up to 2 metre, depth and 30 cm. for manholes of greater depth. Projection of bed concrete beyond the masonry well shall be 15 cm.

## **2.3 Walls:**

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

## **2.4 Plaster :**

2.4.1 The outer faces of the wall shall be plastered from top of manhole to 300mm deep from existing/finished Ground Level with 15 mm. thick in C.M. 1:3 (1 cement : 3 coarse sand) and the inside wall shall be plastered 15mm thick in C.M. 1:3 (1 cement : 3 coarse sand) finished with floating coat of neat cement. All angles shall be rounded to 7.50 cm radius and all rendered internal surfaces shall have hard impervious finish obtained by using a steel trowel. The external joints of masonry shall be finished smooth.

## **2.5 Channels & Benching :**

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

2.5.2 The channel and benching shall be done in C.C. 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) rising at a slope in line from edges of channel. The channels of the bottom of the chamber shall be plastered with C.M. 1:2 (1 cement : 2 coarse sand) and steel trowelled smooth.

## **Slab:**

The cover slab of R.C.C. 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) 15 cm thick reinforced with 10 mm bars at 15 cm C/C both ways, surface and edges finished fair, full bearing equal to the width of wall shall be given to the slab on all slides. The frame of manhole cover shall be embedded firmly in R.C.C. slab so that the top of the frame remains flush with the top of R.C.C.

**Pre-Cast Concrete Manhole Covers & Frames:**

Pre-cast reinforced cement concrete manhole covers intended for use in sewerage and waterworks shall generally conform to IS 12592-2002 (Reaffirmed 2018).

Concrete: The mix proportions of concrete shall be determined by the manufacturer and shall be such as will produce a dense concrete without voids, honey combing etc. The minimum cement content in the concrete shall be 410 kg/m<sup>3</sup> with a maximum water cement ratio of 0.45. Concrete weaker than grade M-30 (design mix) shall not be used. Compaction of concrete shall be done by machine vibration.

**Reinforcement**

- (a) The reinforcement steel shall conform to IS 1786-2008 (Reaffirmed 2018). Reinforcement shall be clean and free from loose mill scale, loose rust, and mud, oil, grease or any other coating which may reduce or destroy the bond between the concrete and steel. A light film of rust may not be regarded as harmful but steel shall not be visibly pitted by rust.
- (b) Fibers Steel: The diameter/equivalent diameter of steel fibers where used, shall not be greater than 0.75 mm. The aspect ratio shall be in the range of 50 to 80. The minimum volume of fibers shall be 0.5 percent of the volume of concrete.

The reinforced concrete manhole cover and frame shall be designed in accordance with the provisions of IS 456-2000 (Reaffirmed 2021). Clear cover to reinforcement shall not be less than 15 mm.

**Shapes and Dimensions:** Clear opening in frame 600mm, cover shall be heavy duty circular (HD-20) has mention in Table 1, of IS 12592-2002 (Reaffirmed 2018). Outside dimension of cover at top shall match with corresponding frame so that the maximum clearance at top between the frame and the cover all round the periphery is not more than 5 mm and the top surface of the frame and covers, is in level within a tolerance of  $\pm 5$  mm.

For facility of removing the cover from the frame, suitable taper matching with taper given for the frame shall be provided to the periphery of the cover.

**Lifting Device:** The minimum diameter of mild steel rod used as lifting device shall be 12 mm for light and medium duty covers and 16 mm for heavy and extra heavy duty covers. The lifting device shall be protected from corrosion by hot galvanizing or epoxy coating or any other suitable treatment.

**3.0 Mode of measurements & payment**

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

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

**8[24.6(A)]      Extra rate for constructing B.B. masonry for every additional depth of 0.1 m. and part thereof over item 24.5(I) for depth from 0.90 m. to 1.50 m.**

**1.0 Materials and Workmanship**

The relevant specifications of item No. 24.5(I) shall be followed for excavation same, except that the depth of manhole shall be done 0.1 m. or part thereof more than 0.90 meter up to 1.5 m. The extra payment shall be made for additional depth of 0.1 m or part thereof manhole done over and above the depth 0.90 metre.

**2.0 Mode of measurement and payment**

2.1 The relevant specifications of item No. 24.5(I) shall be followed, except that the extra rate shall be paid for every additional depth of 0.1 m. or part thereof shall be paid over and above the rate of item No.24.5(I).

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

**9[24.6(B)]      Extra rate for constructing B.B. masonry for every additional depth of 0.1 m. and part thereof over item 24.5(II) for depth from 1.50 m. to 2.25 m.**

**1.0 Materials and Workmanship**

The relevant specifications of item No. 24.5(I) shall be followed, except that the depth of manhole shall be done 0.1 m. or part thereof more than 1.50 meter and up to 2.25 m. The extra payment shall be made for additional depth of 0.1 m or part thereof manhole done over and above the depth 1.50 m. and up to 2.25 m.

**2.0 Mode of measurement and payment**

2.1 The relevant specifications of item No. 24.5(I) shall be followed, except that the extra rate shall be paid for 0.1 m. or part thereof additional depth of manhole provided over and above item No. 24.5(II).

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

**10[24.6(C)]      Extra rate for constructing B.B. masonry for every additional depth of 0.1 m. and part thereof over item 24.5(III) for depth from 2.25 m. to 3.15 m.**

**1.0 Materials and Workmanship**

The relevant specifications of item No. 24.5(I) shall be followed, except that the depth of manhole shall be done 0.1 m. or part thereof more than 2.25 meter up to 3.15 m. The extra payment shall be made for additional depth of 0.1 m or part thereof manhole done over and above depth 2.25 m. and up to 3.15 m.

**2.0 Mode of measurement and payment**

2.1 The relevant specifications of items No. 24.5(I) shall be followed, except that the extra rate shall be paid for every addition 0.1 m. or part thereof depth provided over and above item No.24.5(III).

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

**11[24.6(D)]      Extra rate for constructing B.B. masonry for every additional depth of 0.1 m. and part thereof over item 24.5(IV) for depth above 3.15 m.**

**1.0 Materials and Workmanship**

1.1 The relevant specifications of items No. 24.5(I) shall be followed, except that the depth of manhole shall be done 0.1 m. or part thereof more than 3.15 m. above.

1.2 The extra payment shall be made for additional depth of 0.1 m or part thereof manhole done over and above 3.15 m. and above depth.

**2.0 Mode of measurement and payment**

2.1 The relevant specifications of items No. 24.5(I) shall be followed, except that the extra rate shall be paid for every additional 0.1 m. or part thereof depth provided for and above item No.24.5(IV).

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

**12[24.7]              Providing and fixing C.I. steps of size 500 x 150 mm. x 22.5 mm. and painting with two coats of anti-corrosive paint etc. complete.**

**1.0 Materials :** The C.I. steps of size 500 x 150 x 22.5 mm. size shall conform I.S. 5455-1969 (Reaffirmed 2017) or its relevant and latest edition. Paint shall conform to M-30.

**2.0 Workmanship**

2.1 The C.I. steps of size 500 x 150 x 22.5 mm. size shall be fixed in manhole as and where directed. The steps shall be staggered in vertical runs 380 mm. apart horizontally. The top step shall be 450 mm. below the manhole cover and lowest not more than 300 mm. above the benching. The steps shall be embedded in wall of man hole with C.C. 1:3:6 up to 200 mm. depth and the surface finished with cement plaster 15 mm. thick in C.M. 1:5. The steps shall be painted with two coats of anti-corrosive paint.

**3.0 Mode of measurements & payment**

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

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

**13[24.8]              Supplying and fixing C.I. cover 300 x 300 mm. without frame for gully trap (Standard pattern). The weight of cover to be not less than 4.53 kg.**

**1.0 Materials:** The C.I. cover 300 x 300 mm. size shall be of standard pattern and approved make by GSPHCL. The weight of C.I. cover shall not be less than 4.53 kg. Without frame.

**2.0 Workmanship**

The C.I. cover 300 x 300 mm. size without frame shall be fixed on top of the brick masonry with cement concrete 1:2:4 (1 cement : 2 sand : 4 graded stone aggregate 20 mm. nominal size) 40 mm. thick and rendered smooth. The finished top of the cover shall be left about 40 mm. above the adjoining ground level so as to exclude the surface water from entering the gully trap.

**3.0 Mode of measurements and payment**

3.1 The relevant specifications of item 24.3 shall be followed.

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

**14[24.9]              Constructing brick masonry road gully chamber 500 mm. x 450 mm. x 600 mm. including 500 mm. x 450 mm. C.I. horizontal gratings with frame complete.**

**1.0 Materials :**

Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Brick shall conform to M-15. C.I. Grating of 500 x 450 mm. size of standard make shall be of approved quality by GSPHCL. Stone aggregate 40 mm. nominal size shall conform to M-12.

## 2.0 Workmanship

- 2.1 The chamber shall be of size 500 mm. x 450 mm. internal clear dimensions between the masonry wall faces. The height of 600 mm. shall be measured from the top of the bed concrete to the top of the C.I. frame. The size of grating indicate the clear internal dimensions of the C.I. frame of the grating.
- 2.2 The excavation shall be done to true dimensions and levels.
- 2.3 The foundation concrete shall consist of 650 mm x 600 mm x 15 mm thick C.C. 1:5:10 (1 cement : 5 sand : 10 graded stone aggregate 40 mm. nominal size) & 40mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 coarse aggregate, 20mm nominal size).
- 2.4 The wall of the chamber shall be constructed in brick work with C.M. 1:5 and 23 cm. thick as per relevant specifications of item [6.14(B)]. Outside of the chamber shall be finished with 15mm thick cement plaster in C.M. 1: 3 with floating coat of neat cement slurry. Outside plaster is carried out from top of chamber to 300mm deep from existing/finished ground level.
- 2.5 The walls and the bed concrete of chamber shall be plastered inside with 12 mm. thick cement plaster 1:3 (1 cement : 3 coarse sand) finished smooth floating with a neat coat of cement slurry.
- 2.6 The gully grating cover shall be hinged to frame to facilitate its opening for cleaning and repairs. The frames of the gully grating shall be fixed on the top of masonry walls of the chamber in 15 cm. thick C.C. 1:2:4 (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. nominal size) laid over the full thickness of walls.
- 2.7 The chamber shall have connection pipe, the length of which in metre between the road gully chamber and the manhole of the drain shall not be less than 1/40 times the nominal diameter of the pipe in mm. i.e. for 150 mm. connection pipe, the length shall not be less than 3.75 metre. The invert of the pipe at the junction with the wall shall be flush with the top of the cement plaster on the bed concrete.
- 2.8 Painting : After the completion of the work of the exposed surface of the grating of the frame shall be painted with a thick coat of coal tar.

## 3.0 Mode of measurements and payment

- 3.1 The cost of connection pipes is not included in the item and shall be paid separately. However, fixing the connection pipes in the walls of gully chamber is included in the rate for gully chambers and nothing extra shall be paid for this separately.
- 3.2 The rate includes all labours and materials required for satisfactory completion of this item as described above.
- 3.3 The rate shall be for a unit of one number.

**15[24.10(A)] Constructing brick masonry chamber for underground inspection chamber and bends with brick having crushing strength not less than 35 Kg/Cm<sup>2</sup> in C.M.1:5 455 x 610 mm. internal dimensions, including precast cover and frame shall be medium duty rectangular (MD-10) (Clear opening in frame 450x600mm) R.C.C. top slab C.C. 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. size) foundation concrete 1:5:10, inside plaster 15 mm. thick with C.M. 1:3 finished smooth with a finishing coat of neat cement on walls and bed concrete etc. complete : Inside dimensions 455 mm. x 610 mm. and 450 mm. deep for single or multi inlet pipe-line.**

## 1.0 Materials :

Water shall conform to M-1. Cement shall conform to M-3. Coarse sand shall conform to M-6. Brick shall conform to M-15. Stone aggregate shall conform to M-12. M.S.bar shall conform to M-18.

## 2.0 Workmanship

The size of inspection chamber shall be of 455 mm. x 610mm internal clear dimensions between the masonry wall faces. The height of 450 mm. shall be measured from the top of the bed concrete to the bottom of the precast cover.

The excavation shall be done to true dimensions and levels.

- 2.9 The foundation concrete shall consist of 605 mm x 750 mm x 15 mm thick C.C. 1:5:10 (1 cement : 5 sand : 10 graded stone aggregate 40 mm. nominal size) & 40mm thick cement concrete 1:2:4 (1 cement : 2 coarse sand : 4 coarse aggregate, 20mm nominal size).
- 2.10 The wall of the chamber shall be constructed in brick work with C.M. 1:5 and 23 cm. thick as per relevant specifications of item [6.14(B)]. Outside of the chamber shall be finished with 15mm thick cement plaster in C.M. 1: 3 with floating coat of neat cement slurry. Outside plaster is carried out from top of chamber to 300mm deep from existing/finished ground level.
- 2.11 The walls and the bed concrete of chamber shall be plastered inside with 12 mm. thick cement plaster 1:3 (1 cement: 3 coarse sand) finished smooth floating with a neat coat of cement slurry.
- 2.12 At every change of alignment, gradient or diameter of drain, there shall be an inspection chamber. Bends

and junctions in the drain shall be group together in inspection chamber as far as possible. The maximum distance between chambers shall be 30m.

- 2.13 Where the diameter of the drain is increased, the crown of the pipe shall be fixed at the same level and necessary slope given in the invert of the inspection chamber.
- 2.14 Drainage of unequal sectional area shall not be joined at the same invert in a inspection chamber. The invert of the smaller drainage at its junction with main shall be at least 2/3 the diameter of the main above the invert of the main.

### **Precast cover & frame**

The relevant specifications of item 24.5 shall be followed except cover shall be medium duty rectangular (MD-10) having clear opening in frame 450x600mm.

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

The rate includes cost of all labour, materials, tools and plant etc., required for satisfactory completion of this item as described above. The rate also inclusive of excavation, filling etc.

The rate shall be for a unit of one number basis. (Precast cover and frame paid separately).

- 16[24.10(B)] Constructing brick masonry chamber for underground inspection chamber and bends with brick having crushing strength not less than 35 Kg/Cm<sup>2</sup> in C.M.1:5 500x700mm. internal dimensions, Including precast cover and frame shall be medium duty rectangular (MD-10) (Clear opening in frame 450x600mm) R.C.C. top slab C.C. 1:2:4 mix (1 cement : 2 coarse sand : 4 graded aggregate 20 mm. size) foundation concrete 1:5:10, inside plaster 15 mm. thick with C.M. 1:3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete : Inside dimensions 500 mm. x 700 mm. and 450 mm. deep for single pipe-line with single or multi inlets.**

#### **1.0 Materials and Workmanship :**

The relevant specifications of item 24.10(A) shall be followed except that the inside dimension of brick masonry chamber shall be 500 mm. x 700 mm. and 450 mm. deep for pipe linewith single or multi inlets.

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

2.1 The relevant specifications of item 24.10(A) shall be followed

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

- 17[24.10(C)] Constructing brick masonry chamber for underground . inspection chamber and bends with brick having crushing strength not less than 35 Kg/Cm<sup>2</sup> in C.M.1:5 600x850mm. internal dimensions, Including precast cover and frame shall be medium duty rectangular (MD-10) (Clear opening in frame 450x600mm) R.C.C. top slab C.C. 1:2:4 mix (1 cement : 2 coarse sand : 4 graded stone aggregate 20 mm. size) foundation concrete 1:5:10, inside plaster 15 mm. thick with C.M. 1:3 finished smooth with a floating coat of neat cement on walls and bed concrete etc. complete : Inside dimensions 600 mm. x 850 mm. and 450 mm. deep for pipes line with three or more inlets.**

#### **1.0 Materials and Workmanship :**

The relevant specifications of item 24.10(A) shall be followed except that the inside dimension of brick masonry chamber shall be 600 mm. x 850 mm. and depth 450 mm. for pipe lines with three or more inlets.

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

2.1 The relevant specifications of item 24.10(A) shall be followed

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

- 18[24.11] Extra over item 24.44 for every additional depth of 1.0 m. or part thereof beyond 450 mm. depth for brick masonry chamber. (I) For 455 mm. x 610 mm. size. (II) For 500 mm. x 700 mm. size. (III) For 600 mm. x 850 mm. size.**

#### **1.0 Materials & Workmanship :**

The relevant specifications of item 24.10(A), 24.10(B), 24.10(C) shall be followed same except that extra depth of 0.1 m. or part thereof shall be constructed over and above the depth of respective items.

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

2.1 The relevant specifications of item 24.10(A) shall be followed except that extra shall be paid for providing additional depth of 0.1 m. or part thereof over and above the item no. 24.10(A), 24.10(B), 24.10(C) as the case may be.

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

- 19[24.12] Providing soak pit of 2 cu.m. volume including excavating and filling brick bats with dry masonry work at top for 450 cm. height including covering, the top with stone including providing Vatas in C.M. 1:3 with finishing curing etc. complete as directed.**

**1.0 Materials :**

Water shall conform to M-1. Cement mortar shall conform M-11. Burnt Bricks shall conform to M-15. Rough kotah stone slab 40 to 50 mm thick shall conform to M-33. Brick bat shall conform to M-14.

**2.0 Workmanship**

- 2.1 The excavation for soak pit shall be carried out as per relevant specifications of item 4.00(A) except that the size of soak pit such that the clear volume shall remain 2 cu.m. The diameter and depth shall be as directed.
- 2.2 The periphery of the soak pit shall be provided with dry masonry wall with burnt bricks in 23 cm. thick. The masonry wall shall be done with best workman like manner in true line and plumb.
- 2.3 The soak pit shall be filled in with brick bats of burnt brick 40 mm. nominal size in 45 cm. height. The work of filling brick-bats shall be done in such a way that no dry masonry shall be damaged during filling of brick bats.
- 2.4 The top of the soak pit shall be covered with rough stone slab 40 to 50 mm. thickness. The length of the stone shall be in single piece in length.
- 2.5 The cement mortar 1:3 shall be used to fill up the joints and preparing vata as directed.
- 2.6 The cement work shall be cured for 4 days.

**3.0 Mode of measurements and payment**

- 3.1 The rate includes costs of all labour and materials required for satisfactory completion this item as described above.
- 3.2 The rate shall be for a unit of one number.

- 20[24.13] Providing soak-pit of 5 cu.m. volume inc. excavating and filling brick bats with dry masonry work at top for 45 cm. height including covering the top with stone including providing vatas in C.M. 1:3 with finishing curing etc. complete as directed.**

**1.0 Materials and Workmanship :**

The relevant specifications of item 24.12 shall be followed except that the volume of soak pit shall be 5 cu.m. clear.

**2.0 Mode of measurements and payment**

- 2.1 The relevant specifications of item 24.12 shall be followed.
- 2.2 The rate shall be for a unit of one number.

- 21[24.14] Providing, supplying and Fixing Corrugated DWC HDPE Pipes of Class SN8 Structured Wall polyethylene Piping systems (Pipe with online/offline coupler and elastomeric sealing ring) with non-smooth External Annular Corrugated and Smooth Internal Surfaces (Double Wall) for non-pressure underground Sewerage & Drainage application as per EN:13476-3 including all local and central taxes, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to the departmental stores etc. complete. Including Lowering, laying and jointing of class SN 8 structured wall ( External Annular Corrugated & Smooth Internal surface) Polyethylene Piping and fittings with the help of coupler ( on line / off line ) attached with one end of pipes, sliding over the elastomeric sealing rubber ring placed on the specified valley of the corrugation at the spigot end, lowering the same into the trench, laying on the lower bedding (constructed at bottom of trenches) at prescribed gradient, depth & alignment ,testing the water tightness of the joints, ensuring the continuity tests of specified pipe segments etc. complete as per drawing, specifications & detailed engineering, including carriage of pipes & fittings from site stacks to the place of laying etc. as per direction of Engineer-in-charge. The brand of the DWC pipe shall be as per the approved make list of GSPHCL. For diameter of pipe from 75mm to 1000mm.**

**Scope**

This specification covers the requirements for manufacturing, supplying, transportation, handling, stacking, installation, jointing, and testing of Class SN 8 Structured Double Wall (Non-Smooth External Annular Corrugated wall & Smooth Internal wall) Polyethylene/Polypropylene Piping System for non-pressure underground Sewerage & Drainage Applications herein after called the DWC PE Piping System.

## Applicable Codes

The manufacturing, testing at factory, supplying, transportation, handling, stacking, installation, jointing, and testing at sites shall comply with all currently applicable National statutes, standards & codes. If requirements of these specifications are at variance with any other standards, this particular document shall supersede.

IS 16098(Part-2) : 2013 (Reaffirmed 2018)	Structured Wall Plastics piping Systems for non-pressure drainage and sewerage- Specification Part 2: Pipes and fittings with non-smooth external surface, Type B
ISO 9001: 2008	Quality Management Systems

Other Indian standards which are integral part of above standard as normative references form a significant portion of this specification document.

## Manufacturing

TheDWC Piping System of stiffness class designation SN 8 shall confirm to the Indian standards as mentioned above and shall be configured as per the indicative Cross-sectional & Profile Drawings (Annexure A&B) annexed herewith. Each pipe shall be Socket (On-line or Off-line Coupler) and spigot type along with elastomeric rubber sealing ring (as designated under Clause 8.3 of above specifications).

## Transportation

The arrangement of loading the pipes in a telescopic manner is advised, i.e. smaller diameters inserted into the next higher sizes of pipes. While loading the pipes onto the truck, care should be taken that the coupler- end should be arranged alternatively in the corresponding layers so as to avoid the damage to the coupler/ socket ends.

## Handling

Following Recommendations shall be followed while handling the pipes:

- Adherence to National Safety requirements
- Pipes to be smoothly lowered to the ground
- Pipes should not be dragged against the ground to avoid the damages to the Coupler/pipes.
- 800mm and larger diameter pipes are carried with Slings at two points spaced approximately at 3 Meters apart
- For smaller diameters (400mm – 800mm) one lift point shall be sufficient & can be handled either manually or mechanically
- Do not use a loading Boom or Fork Lift directly on or inside pipe.

## Pipe Storage at Site

- Stockpiling shall be done temporarily on a Flat Clear Area as per Fig. 1 & 2.
- For avoiding collapse of Stacks, use Wooden Posts or Blocks
- Stacking shall not be higher than 2.5 Meters
- While stacking, alternate the socket/coupler ends at each row of stacked pipes as shown in Fig. 2.



Fig 1



Fig 2

## Lowering, Laying & jointing of Pipes

The width of a Sewer Trench depends on the soil condition, type of side protection needed and the working space required at the bottom of Trench for smooth installations. Increase in width over required minimum would unduly increase the load on pipe and cost of road restoration.

Considering all above factors, the Minimum Trench Width is specified as per Table below :-

Indicative Trench Widths**	
Pipe Diameter (mm)	Trench Width (M)
75-200	0.6
250	0.7
300	0.8
400	0.9
600	1.2
800	1.3
1000	1.8

\*\*In actual practice the trench width shall be kept as narrow as possible but shall be adequate to allow the workmen to execute the Lowering, Laying & Jointing job satisfactorily.

The pipe segment between two manholes shall be laid approximately in straight line without any vertical undulations (at prescribed Gradient). However, on the strength of its flexibility, the DWC PE Piping system can be aligned and laid in smooth curve if found necessary. The piping system shall rest on the carefully prepared bedding portion of the Backfill Envelope (ref. Annexure A) and at appropriate jointing locations the trenches shall be excavated deeper to accommodate the bulges of coupler-spigot joints. However, special care shall be ensured as mentioned below:-

- Excavation of trenches shall be carried out in accordance with the drawing & specifications and as directed by the field engineer as well.
- The piping system shall be laid and jointed in true to gradient with the help of sight rails and boning rods as detailed in CPHEEO, MoUD, GoI Manual on Sewerage and sewerage treatment. The levels need be checked with calibrated modern Levelling Instrument. Specific care shall be taken to prevent entry of sand / mud /slush/ any other foreign material etc into the system during the installation operation.

The structural property of the system suggests that a minimum cover of 500 mm is adequate even for maximum quantum of superimposed (live) load.

In case of wider trenches than required (above table), the permission of the competent authority shall be necessary.

The bedding area (ref. Annexure A) is an essential portion of Back fill Envelope and shall be constructed with proper bedding material as computed in accordance with appropriate national code of practice for structural bedding design mentioned in the list of normative references under IS 16098-2. The bedding shall be laid to specified thickness and gradient with proper manual compaction of the aggregate. Indicative installation details with suggestive 'Backfill Envelop' have been shown in Annexure A.

The moulded on-line coupler (or separate coupler integrated to the pipe in case of lower sizes) will have a suitable internal surface to push-fit the said end over the spigot end of the next pipe. On first valley of the corrugation of said spigot end (destined to receive the pushed coupler), the sealing rubber ring of standard quality (as specified in Cl 8.3 of the mentioned IS Code) shall be placed so that the coupler end of the pipe smoothly but tightly slides over the sealing ring for making an absolute watertight joint. Similar system is also used for fabricated accessories or moulded fittings required such as Tee, Bends, Elbows, Reducer end caps for the purpose of installation of the system related to drainage/sewerage.

For quality connections following steps are to be ensured, failing which the performance aspects are to be severely compromised:-

- The non-coupler (socket) end needs to be thoroughly cleared and shall be free from any foreign material
- Clean and lubricate the coupler end of the pipe, if required.
- Lubricate the exposed Gasket in the same manner, if required.
- Keep the non-coupler end free from dirt, backfill material, and foreign matter so that the joint integrity is not compromised.
- Push the coupler onto the non-coupler end and align properly. Always push coupler end onto non-coupler end.

For smaller diameter pipes simple manual insertion shall be sufficient. It should be ensured that the coupler end is adequately 'homed' on non-coupler end to ensure installation and tight joining seal. Therefore prior to insertion always place a 'Homing Mark' on appropriate corrugation of the 'Non-Coupler End'.

### Construction of backfill envelope and final backfilling of the trenches

DWC Piping System with well compacted Backfill Envelope along with the bottom and sides of trench (native soil) work together to support soil overburden and superimposed (traffic) loads. The carefully constructed Backfill Envelop has three distinct but non-isolated stages (ref. Annexure A). The construction need to be done stage by stage as per the sequence stated below:

- Bedding portion
- Up to Haunch level
- Remaining portion

The material for backfill envelop shall be in accordance with the structural design of flexible buried conduit as per relevant National code in meticulous consultation with ISO 21138-1 & 3 :2007 and all other referred International Codes such as BS EN 1295-1 that forms an integral part of the said ISO Specifications. It can be the same material that were removed in the course of excavation or it can be fine sand/course sand/gravel / moram /other form of course / fine aggregates depending on the effected Design Load [Overburden + Superimposed (Live) load]. However, in no circumstances, the flexible pipe should not be embedded in cement concrete (un- reinforced or reinforced) which invariably induces undesired rigidity in the system. The Manufacturer may also be consulted to provide for the necessary module for the Structural Design of the 'Backfill Envelope'.

- The remaining portion of backfilling which do not contribute to the structural integrity of the system may be the materials that were removed in the course of excavation or any other foreign material as may be required to suit the particular site condition. These materials shall consist of at least clean earth and shall be free from large clod or stone above 75 mm, ashes, refuse and other injurious materials.
- After completion of bedding portion of the Backfill envelop and subsequent lying of pipes, etc, first the haunch portion & then upper portion of Backfill Envelope shall be constructed as per design around the pipe. Voids must be eliminated by knifing under and around pipe or by some other indigenous tools.
- The compaction, by hand rammers or compactors with necessary watering to a possible maximum level of proctor density shall be ensured.
- Remaining portion of the Construction of 'Backfill Envelope' (above the Bedding Portion) & subsequent final Backfilling of the Trench shall start only after ensuring the water tightness test of joints for the concerned sewer segments. However, partial filling may be done keeping the joints open.
- Precautions shall be taken against floatation (if at all necessary) as per the specified methodology and the minimum required cover. For indicative Drawing See Annexure C.

### **Continuity Test /Hydraulic Testing**

Continuity of the pipe segments in between two manholes is required to be ensured in the same modality as practiced for non-pressure RCC pipeline. Hydraulic testing of pipes shall be done, by the contractor, if specifically asked for by the client for any specific stretch. The procedure for hydraulic testing shall be similar to that for non-pressure RCC pipes.

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

The rate shall be for a unit of one Rmt. Including all material, labour and all necessary fittings required etc. complete.

The excavation & refilling shall be paid separately.

## **22[24.15] P & F U.P.V.C./SWR soil waste pipe with "O" ring as per I.S. 13592-2013 (Reaffirmed 2018) or its relevant & latest edition. [a] 75 mm dia. [ b ] 90mm dia. [c] 110 mm dia.**

### **1.0 Material :**

The SWR soil and waste water pipe of specified diameter shall confirm to I.S. 13592-2013 (Reaffirmed 2018) or its relevant & latest edition. The specials and fittings required shall confirm to I.S. 13592-2013 (Reaffirmed 2018) or its relevant & latest edition.

### **2.0 Workmanship :**

The SWR pipe of specified diameter shall be fixed as directed. SWR pipe shall be supported at 1.50 m interval by using G.I. Z & U dams as per details and direction for vertical line and horizontal line. The pipe must be 75mm away from the wall. The guide line indicated by the manufacture regarding handling, transportation, storing, laying and jointing of pipes shall followed during execution. All the specials and fittings like single or double 'Y' with door, coupler, reducer, single 'T' with door bend with shall be fixed as per instruction of Engineer in charge. All necessary fixtures & fittings shall be used with "O" ring and joints shall be sealed with pipe sealant. The holes for outlets of pipe in brick/concrete wall must be made with electric core cut machine. The hole shall be finished in C.M. 1:1 with waterproofing compound. A pipe bend shall be provided near the end of the pipe.

The wall / concrete slots should allow for a stress free installation, pipes and fittings to be inserted into the slots without a cement base have to apply first within coat of PVC pipe sealant followed by

sprinkling of dry sand. Allow it to dry. This process gives a sound base for cement fixation.

### **Fittings**

Fittings used shall be of the same make as that of the pipes Injection moulded or fabricated by them and shall have a minimum wall thickness of 3.2 mm. The fittings shall be supplied with grooved socketted ends with square grooves and provided with Rubber Gasket conforming to IS 5382-2018. The plain ends of the fittings should be chamfered. The fittings shall be joined with the help of Rubber lubricant. The details of fittings refer IS 13592-2013 (Reaffirmed 2018).

### **Testing of pipes :**

Seal all opening below the top of the section to be tested. The water level shall then be raised to a height to not less than three meter above the highest point of the section tested or as the Engineer in charge direct every joint shall be carefully examined for leakage. The connection between main pipe and branch pipe shall be made by using branches and bend with access door for cleaning.

The rates includes ISI pipe together with all fitting such as bends, single or double 'Y', Single 'T,' reducer, coupler, short pieces, W.C. and N.T. connector pipe, pipe clips fixed on G.I. Z & U clamps etc. The rate also includes cutting through walls & floors (core cut) etc. and their making good the same. The rate shall for a unit of one running meter.

### **23[24.16] Providing and fixing in position U.P.V.C. cowel vents to 75mm / 110mm dia. pipe.**

#### **1.0 General:**

The work shall be carried out in general as per the relevant specification as per the relevant I.S. unless otherwise specified with the following additions:

#### **2.0 Materials:**

2.1 The U.P.V.C. 75 mm / 110mm dia. cowel shall be approved make as per GSPHCL make list. It shall be got approved before fixing in position. Cowel vent shall be used of same manufacture as the manufacture of pipe & fittings.

#### **3.0 Mode of work:**

3.1 The U.P.V.C. cowel shall be fixed as per the instructions of the Engineer-in-charge and the joints shall be filled with relevant solution.

#### **4.0 Mode of measurements and payment**

4.1 The rate is inclusive of all cost of materials labourers for fixing etc. complete.  
The rate shall be paid on 1 no. basis.

### **24[24.17] Providing and fixing in position U.P.V.C. cowel vent to 100 mm dia. pipes.**

#### **1.0 General :**

1.1 The work shall be carried out in general as per the relevant specification of P.W.D. Hand Book Volume I and II, 1949 Edition as per the relevant I.S. unless otherwise specified with the following additions.

#### **2.0 Materials**

The U.P.V.C. 100 mm dia. cowel shall be approved make as per GSPHCL make list. It shall be got approved before fixing in position. Cowel vent shall be used of same manufacture as the manufacture of pipe & fittings.

#### **3.0 Mode of work:**

3.1 The U.P.V.C. cowel shall be fixed as per the instructions of the Engineer-in-charge and the joints shall be filled with relevant solution.

#### **4.0 Mode of measurements and payment**

4.1 The rate is inclusive of all cost of materials, labours for fixing etc. complete.  
4.2 The rate shall be paid on 1 No. basis.

### **25[24.18] Providing & fixing to wall, ceiling and floor PVC pipe 63mm to 110mm dia. having 4kg/Sq.cm. / 6kg/Sq.cm. / 10kg/Sq.cm. working pressure. Pipe shall be as per the approved make list of GSPHCL.**

### **Materials :**

The PVC pipe of specified diameter 4kg/Sq.cm. / 6kg/Sq.cm. / 10kg/Sq.cm. working pressure shall be confirmed to I.S. 4985-2021. The specials and fitting shall conform to I.S. 13492-1992 (Reaffirmed 2019). Pipe shall be as per the approved make list of GSPHCL.

### **Cutting, Laying & Jointing:**

The relevant specification shall confirm to 23.2 except G.I. pipe, PVC pipe is to be used.

### **Workmanship :**

The PVC pipe of specified diameter & working pressure shall be fixed as specified in tender item or as directed. Due to thermal expansion of rigid PVC pipes, Due allowance shall be made particularly in over ground pipe lines for any change in length of pipe line which may occur during installation or when pipe line is in service.

Above ground installation of rigid P.V.C. pipe should be under taken after preparations are observed for their protection against direct sun rays and mechanical damage.

The rigid PVC pipe lines should not be kept exposed above ground when passes through public places, railway line, road side and foot paths. PVC pipe shall be supported at 1.5mt intervals.

The guide lines indicated by the manufacturers regarding handling, transportation, staking, laying and jointing and supporting of PVC pipe shall be kept in view during execution.

PVC pipe shall be fixed on wall with G.I. Z & U clamp and G.I. Z & U clamp shall be fixed at the regular intervals of 1.5m. The projection of PVC pipe shall be minimum 50mm from the wall.

The pipe and sockets shall be accurately cut. The ends or joints of the pipes and fitting should be absolutely free from dirt and dust. The outside surface of the pipe and inside of the fittings shall then be roughened with emery paper and then pipe sealant. Since pipe sealant is aggressive to PVC, care must be taken to avoid applying excessive pipe sealant to the inside of pipe sockets as any surplus pipe sealant cannot be wiped off after jointing. Empty solvent cement tins, brushes rags, or paper impregnated with pipe sealant should not be buried in the trenches. They should be gathered, not left scattered about, as they can prove to be a hazard to animals, which may chew them.

If manufacture recommends its own methods of jointing, the same shall be adopted after necessary approval from the engineer-in-charge.

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

The rate include cost of all labour, materials, all necessary fixtures & fittings, tools and plants required for satisfactory completion of this item.

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

## **26[24.19] Providing and fixing SWR Nahni trap of the following nominal dia. Self-cleaning design with top jali and stainer including cost of cutting and making good the walls and floors 100mm inlet and 50mm outlet. Including 150 mm x 150 mm stainless steel jali with grating.**

### **1.0 Material :**

1.1 SWR Nahni trap shall be of best quality and shall generally conformed to relevant Indian standards and approved by Engineer-in-charge. The surface shall be smooth and free from chips and other flaws or any other kind of defects which effect serviceability. The size of Nahni trap shall be as specified and shall be self-cleaning design. Nahni trap provided shall be with deep seal minimum 50 mm except at places where deep seal cannot be accommodated. The nahni trap must be covered with 150x150mm S.S. jali with grating. Nahni trap shall be free from porosity or other defects which effect service area.

### **2.0 Workmanship :**

2.1 The nahni trap shall be fixed as per drawing or as directed. The nahni trap shall be jointed with SWR pipe of 75 mm dia. with pipe sealant joint hydraulic testing of joint shall be given.

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

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

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

**EQUIVALENT PLAIN AREAS OF UNEVEN SURFACES**

( For items relating to : Painting &amp; Polishing)

<b>Sr. No.</b>	<b>Description of work</b>	<b>How measured</b>	<b>Multiplying Factor</b>
1.	Panelled or framed and braced on ledged and battened or ledged and braced joinery.	Measured flat (not girthed) including chowkat or frame Edges; chocks cleats, etc. shall be deemed to be included in the item.	1.30 (For each side)
2.	Flush joinery	Measured flat (not girthed) including chowkat or frame Edges, chocks cleats, etc. shall be deemed to be included in the item.	1.20 (For each side)
3.	Fully glazed or guazed joinery	Measured flat (not girthed) including chowkat or frame Edges, chocks cleats, etc. shall be deemed to be included in the item.	0.80 (For each side)
4.	Partly panelled and partly glazed or guazed joinery	Measured flat (not girthed) including chowkat or frame Edges; chocks cleats, etc. shall be deemed to be included in the item.	1.00 (For each side)
5.	Fully venetioned or jouvered joinery.	Measured flat (not girthed) including chowkat or frame Edges; chocks cleats, etc. shall be deemed to be included in the item.	1.80 (For each side)
6.	Weather boarding	Measured flat (not girthed), supporting frame work shall not be measured separately.	1.20 (For each side)
7.	Wood single roofing	Measured flat (not girthed)	1.10 (For each side)
8.	Boarding with cover fillets at match boarding	Measured flat (not girthed)	1.05 (For painting)
9.	Tile and Slate battening	Measured flat, overall, no deduction shall be made for open space over.	0.80 (For each side)
10.	Trellies (or Jafri) work one way or two way	Measured flat, over all, no deduction shall be made for the open spaces, supporting members shall not be measured separately.	1.00 (For painting all over)
11.	Guard bars, baulstrades, gates, grarings, grills, expanded metal and railings.	Measured flat, over all, no deduction shall be made for the open spaces over supporting members shall not be measured separately.	1.00 (For painting all over)

12. Gates and open palisade  
fencing including standards

Measured flat, over all, no  
deduction shall be made for the  
open spaces, supporting members  
shall not be measured separately  
(See not).

1.00 (For painting all over)

13.	Curved or enriched work	Measured flat	2.0 (For each side)
14.	Steel roller shutter	Measured flat (size of opening) over all jamb, guides bottom rails and locking arrangement etc., shall be included in the item (top cover shall be measured separately).	1.10 (For each side)
15.	Plain sheet door and windows	Measured flat (not girthed) including frame.	1.10 (For each side)
16.	Full glazed or guage steel door and windows	Measured flat (not girthed) including frame edges etc.	0.50 (For each side)
17.	Partly panelled and partly glazed or guazed steel doors	Measured flat (not girthed) including frame edges etc.	0.50 (For each side)
18.	Collapsible gate	Measured flat (size of opening) no separate measurements shall be taken for the top and bottom guide rails, rollers, fittings etc.	1.50 (For painting all over)

**Note:** The height shall be taken from the bottom of the lowest rail if the palisades do not go below it (or from the lower end of palisades, if they protect below the lowest rail) up to the top of palisades, but not upto the top of standards if they are higher than the palisades.

## SECTION-13

### WINDOWS, VENTILATORS / DOORS

- 1.0 Providing and fitting steel windows, ventilators, with fully glazed steel shutters, butt type hinges including iron fixtures and fastening with 12 mm. square M.S. safety bars @ 10 cm. c/c. distance with one coat of re-lead paints and two coats of oil painting etc. complete inclusive of plain or bajari glass all necessary putty pins.**

The structure steel conform to M-20(A), Oil paint shall conform to M-30, Glass shall conform to M-27.

The frame shutters of fully glazed windows shall be prepared from best rolled standard steel section (Z, F, and T) in accordance with at least I.S. specifications. Section for frame shutters are of FB7 and vertical member are 4B. Section and horizontal tees are 19X19X8mm.

The size of steel section of window frame and shutter shall be as per detail drawing or as directed by Engineer-in-charge.

Vertical and horizontal member for window frame and shutter shall be cut to required length and shall be welded by Arc welding or as approved by Engineer-in-charge forming the shape and size of window as per drawing or as directed and welding shall be made smooth by filling as directed.

Steel frame shall be provided with welding 12 cm. square M.S. bars at 10 cm. Center to center horizontally. The bars shall be welded-properly and finished smooth.

Windows shall be provide with Three box type hinges, handles, hold-fast peg-stag and such other fixtures shall be of iron oxides conforming to relevant Indian standard specifications and shall be fixed with the frame and shutter by way of welding or bolting as directed.

The windows shall have openable shutter or fixed or combination of both as by Engineer-in charge as per drawing.

The steel shutter of window shall have panel of glass. The glass panes shall be of BAJRI – 4 mm thick pannels as/drawing unless specified other wise as per drawing. 1.5 mm. tolerances all the sides of the panel shall be allowed. Glass panel shall be fixed to the shutter with glazing clips and cement putty. The glass shall be thoroughly cleaned.

The iron work and putty work shall be painted with one coat of red-lead primer and two coat of oil paint of approved quality and shade.

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

Rates includes all materials and labour including providing and fixing fully glazed steel window including fixing of fixtures and fastening including one coat of primer and two coats of oil painting.

The measurement shall be taken for the finished product.

The rate shall be paid per Sq. Mt. of steel window provided and erected as above.

- 2.0 Providing and fixing standard Angle section 40 mm. X 40 mm. X 5 mm. thick steel door frame and 32 mm. thick door shutter from well seasoned chemically treated, non teak frame (Ralls and styles) with panels 19 mm. thick partial boards. Rates inclusive of providing and fixing black anodized fixtures and fastenings including one coat of primer and two coats of oil paint etc. complete as per drawing and specification.**

#### **Material: (Fully Paneled Doors)**

**Frame:** The steel of Angle section steel frame shall be conform to M-20A, Primer and Paint shall conform to M-30 and Non teakwood shall confirm to M-23.

#### **Non Teak Wood**

The non teak wood shall be chemically treated and well-seasoned as per I.S. specifications and of good quality. For this purpose non teak wood or any other wood confirm to I.S. 1003 (Part-1)-2003 (Reaffirmed 2013) as approved by GSPHCL shall be used. The non teak wood shall be free from large, loose, dead knots, flaws, warps, bends or any other defects. It shall be uniform in substance and of straight fibers as far as possible. It shall be free from rots, decay, harmful fungi and other defects of nature which will affect the strength, durability or its usefulness for the purpose for which it is required. The colour of wood shall be uniform as far as possible. The planks etc. shall be sawn in straight lines and planes in the direction of grain and shall be of uniform thickness. The agency shall produce certificate from forest Department in the event of dispute and the decision of the Corporation shall be final and binding. The tolerance in the dimension shall be allowed to 1.5 mm. per face to be planed.

Code of practice for seasoning shall be as per IS 1141-1993 (Reaffirmed 2020). Wood preservation for chemical treatment should be as per Is-401-2001 (Reaffirmed 2016).

Permissible moisture should be maintained as recommended in IS 287-1993 (Reaffirmed 2017). The shutter should satisfy I.S. 1003 (Part-1)-2003 (Reaffirmed 2013).

**Particle Board:** The particle board used for panels shall be of best quality and free from any defects. The particle boards shall be made with phenomaldelyede adhesive. The particle board shall conform to I.S. 3087-2005 (Reaffirmed 2020). "Specification for wood practice board for general purpose". The size and thickness shall be as per drawing. The brand of particle board should be got approved by GSPHCL before using the same.

**Teak wood beading patti:**

The teak wood shall conform to M-22 and well-seasoned as per I.S. specifications & of good quality as shown in drawings.

**Workmanship:**

The rails and styles for shutter shall be made from chemically treated well seasoned non-teak wood. The thickness and width of styles shall be as per drawing. The width of top rail shall be 100 mm. and that of lock and bottom rail shall be 150 mm.

The panel shall be of particle board and the thickness of panel shall be as per drawing. Teak wood beading of 20 mm. X 24 mm. size shall be provide as per detailed drawing. The panel shall be made of single piece and fixed with style and rail with tongue and groove joint and adhesive as per detailed drawing. The work shall be done as per drawing and in best workman like manner.

The shutter be painted with one coat of approved quality primer after preparing the surface clean with sand paper. Hair lines, shabbiness and patches etc. shall not appear on finished surface. Before applying primer coat of paints concerned Executive Engineer of GSPHCL should be informed in writing for inspection of manufactured shutter at manufacturers premises and should be got cleared for painting.

**Fixing**

Fixing or steel frame and shutter shall be done in the most workman like manner. It shall be in proper line level and plumb. It shall be fixed to true position with all necessary concrete etc. making required chases. Doing and redoing of surfaces, making good to surfaces etc. all complete as directed by Engineer-in-Charge.

**Mode of Measurement and Payment**

The size of frame and shutter shall be as per drawing or as per actual site condition.

Rate shall be inclusive of all labour, material, taxes, octroi, local taxes, freight, carting, loading, unloading, and fixing of position.

The rate shall be paid for unit of one square meter in which width shall be measured out to out of the frame and height is measured from top of the frame to finish top of the flooring.

10% of the billed amount for the tendered item shall be withheld till one year from the date of completion of the work. All the details noticed shall be rectified by the agency at his cost before release of deposited amount.

**3.0 Providing and fixing standard Angle section 40 mm X 40 mm X 5 mm. thick steel door frame and 28 mm. thick door shutter from well seasoned. Chemically treated non-teak frame (rails and styles) with panels 19 mm thick partical board with 4 mm thick plain glass panes. Rates inclusive providing and fixing black anodized fixtures and fastenings, primer coat of approved quality and two coats of oil painting etc. complete as per drawing and specification. (Partly paneled partly glazed).**

**Materials**

**Frame**

The steel angle section frame shall conform to M-20A, Primer & Paint shall conform to M-30 and Non teakwood shall confirm to M-23.

**Non Teak Wood**

The non teak wood shall be chemically treated and well seasoned as per I.S. specifications and of good quality. For this purpose non teak wood confirming to as per I.S. 1003 (Part-1)-2003 (Reaffirmed 2013). as approved by GSPHC shall be used. The non teak wood shall be free from large, loose, dead knots, flaws, warps, bends or any other defects, it shall be uniform in substance and of straight fibers as far as possible. It shall be free from rots, decay, harmful fungi and other defects of nature which will affect the strength, durability or its usefulness for the purpose for which it is required. The colour of wood shall be uniform as far as possible. The planks etc. shall be sawn in straight lines and planes in the direction of grain and shall be uniform thickness. The agency shall produce certificate from Forest Department in the event of dispute and decision of the Corporation shall be final and binding. The tolerance in the dimension shall be allowed to 1.5 mm. per face to be planed.

Code of practice for seasoning shall be as per IS 1141-1993 (Reaffirmed 2020). Wood preservation for chemical treatment should be as per Is-401-2001 (Reaffirmed 2016).

Permissible moisture should be maintained as recommended in IS 287-1993 (Reaffirmed 2017). The shutter

should satisfy I.S. 1003 (Part-1)-2003 (Reaffirmed 2013).

#### **Particle Board**

The particle board used for panels shall be of best quality and free from any defects. The particle board shall be made with phenolmaldeyede adhesive. The particle boards shall conform to I.S. 3087-2005 (Reaffirmed 2020). "Specification for wood particle board for general purpose". The size and thickness shall be as per drawing. The brand of particle board should be got approved by GSPHCL before using the same.

#### **Teak wood beading patti**

The teak wood shall confirm to M-22 and well-seasoned as per I.S. specifications & of good quality as shown in drawings.

Glass panel shall be of 4 mm thick plain glass.

#### **Workmanship**

The rail and styles for shutter shall be made from chemically treated well seasoned non teak wood. The thickness and width of styles shall be as per drawing. The width of top rail & bottom rail for glass panel shall be 100 mm. and that of lock and bottom rail shall be 150 mm. The panel shall be of particle board and the thickness of panel shall be as per drawing. Teak wood beading of 20 mm X 24 mm size shall be provided as per detailed drawing. The panel shall be made of single piece and fixed with style and rail with tongue and groove joint and adhesive as per detailed drawing. The shutter shall be painted with one coat of approved quality primer after preparing the surface clean with sand paper. Hair lines. Shabbiness and patches etc. shall not be appear on finished surface. Before applying primer coat of paints concerned Executive Engineer of GSPHC should be informed in writing for inspection of manufactured shutter at manufacturer premises and should got cleared for painting.

#### **Fixing**

Fixing of steel frame and shutter shall be done in most workman like manner. It shall be in proper line, level and plumb. It shall be fixed to true position with all necessary concrete etc. making required chases doing and redoing of surfaces, making good to the surface etc. all complete as directed by the Engineer-in-charge.

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

The size of frame and shutter shall be as per drawing or as per actual site condition.

The rate shall be inclusive of all labour material, taxes, octroi, local taxes, freight, carting, unloading, and fixing in position.

The rate shall be paid for unit of one square meter in which width shall be measured out to out the frame and height from top of the frame to finish top of the flooring.

10% of the billed amount for the tendered item shall be with held till one year from the date of completion of the work. All the details noticed shall be rectified by the agency at his cost before release of deposited amount.

## SECTION-14 MISCELLANEOUS ITEMS

- 1[22.20] Providing and fixing 1.20 meter high fencing with 2 meter long M.S. angle posts 40 mm. X 40 mm. X 6 mm. and oil painting 3 coats[1 coat of zinc primer & 2 coats of oil paint] fixed at 2.5 M C/C with five horizontal lines, and two diagonals of galvanized steel barbed wire weighing 9.38 Kg. per 100 meter. (Min.). Strained and fixed to posts with G.I. staples including fixing the posts in ground with 0.5M X 0.5 M block in C.C 1:5:10 (1cement : 5 sand : 10 graded brick aggregate 40 mm. nominal size) etc. complete.**

### **1.0 Materials**

(1) Water shall conform to M-1. Cement shall conform to M-3. Sand shall conform to M-6. Brick bats aggregate shall conform to M-14. Oil paint shall conform to M-30. Barbed wire shall conform to M-54.

### **2.0 Workmanship**

2.1 The pits of the size 0.5 m X 0.5 m X 0.5 m. shall first be excavated, true to line and level to receive the post at 2.5 m C/C. The relevant specifications of item 4.00.(A) shall be followed for excavation work.

2.2 The pits shall be filled with a layer of 0.15 m. thick with lean concrete 1:5:10 (1 cement: 5 sand: 10 graded brick bat aggregates 40 mm. nominal size). The M.S angles 40 mm X 40 mm X 6 mm. shall be filled in with leanconcrete 1:5:10 and rammed properly so as to form total 0.5 m X 0.5 m X 0.5 m concrete block. The concreteshall be cured for 7 days to allow it to set.

2.3 The barbed wire shall be stretched and fixed in 5 horizontal rows and two diagonals. The bottom row shall be 140 mm. above ground and the rest at 125 mm centre to centre. The diagonal shall be stretched between adjacent post from top wire of one post to the bottom wire of 2<sup>nd</sup> post. The wires shall be fixed to posts by means of staples. The M.S. Angle posts shall be painted with 3 coats[1 coat of zinc primer & 2 coats of oil paint] of approved make by GSPHCL .

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

3.1 The work shall be measured for the finished work from centre to centre of the posts.

3.2The rate shall include the cost of all labour and materials involved in the operations described above.

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

- 2[22.21] Providing and fixing Rajula stone 75 mm / 60 mm. thick 60 cm X 45 cms. size including fixing in cement mortar as directed.**

### **1.0 Materials**

Water shall conform to M-1. Cement mortar shall conform to M-11. Rajula stone of specified size shall be of best quality and free from any defects. The stone shall not be less than in thickness as specified in tender item.

### **2.0 Workmanship**

2.1 Size of the stone shall be as described in tender item shall be fixed as and where directed in cement mortar in 1:3. All the edges of the stone shall be fixed with cement mortar in C.M. 1:3 and sloped at 45° and finished smooth. The work shall be cured for 7 days after fixing.

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

3.1 The work shall be measured for finished work.

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

3.3 The rate shall be for a unit of one Sq.m.

- 3[22.22] Treating the bottom and sides (up to height of 300 mm.) of the excavations made for themasonry foundations and basement with chemical emulsion at the rate of 5 litres per Sq. metre of the surface area.**

### **Materials:**

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

	<b>Chemicals</b>	<b>Concentration</b>
1.	IMIDA	30.50 % (by weight)
2.	BIFLEX	2.50 % (by weight)
3.	FIPRONIL	2.50% (by weight)

## 2.0 Workmanship

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

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

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

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

2.5 The treatment against termite infection shall remain fully effective for a period not less than 10 years from date of issue of the final certificate of completion of work. If at any time during this period, any defects in treatment are revealed or any evidence of infection in any part of the building or structure is noticed, the contractor shall rectify the concerned defects within 14 days on receipt of notice from Engineer-in-Charge on contractor's failure, to do so the Engineer in charge may get the same rectified through any other agency at contractor's risk and cost, and decision of Engineer-in-Charge as to the cost payable by the contractor for the same shall be final and binding to the contractor.

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

### FORM OF GUARANTEE BOND ( Note : For any sort of Pest control work executed)

"I/We..... (contractor) hereby guarantee that work will remain unaffected and will not be in any way damaged by termite or any other germs of similar types, for a period of 10 years after completion of the work of anti-termite as per the terms and conditions of the contract and contractor hereby indemnifies and agrees to save harmless and GSPHCL from any loss and or damage that might be caused on account of termite and or other similar type of germs and hereby guarantees to make good any loss or damages suffered by the GSPHCL and further guarantee to re-do the effective work without claiming any extra cost."

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

2.8 The Contracting agency shall be required to submit along with final bill towards security, total 50% of the cost of this item in the form of FDR / Bank Guarantee of the approved bank mentioned in the tender document for the period of 10 years from the date of final bill.

## 3.0 Mode of measurements & payment

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

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

**4[22.23] Treating the backfill immediately in contact with foundation structure with chemical emulsion at the rate 7.5 litres per sq. Mt. of vertical surface of the sub structure for each side (in case of R.C.C. columns, beams and R.C.C. basement walls, treating the sides of 50 cm. from ground level with chemical emulsion at the rate of 7.5 litres/sq.Mt.)**

## 1.0 Materials

The specification of the item 22.22 shall be followed.

## 2.0 Workmanship

2.1 After masonry foundations and retaining walls of basement come up, the backfill immediately in contact with foundation shall be treated with the chemical emulsion at the rate of 0.75 litres per sq. m. of the vertical surface of the sub structure for each side. The filling of earth is usually carried out in layers and the treatment shall be directed towards the concrete or masonry surfaces of the columns and walls so that the earth in contact with these surfaces is well treated with chemical.

2.2 In case of R.C.C. framed structure with columns and plinth beams, and R.C.C. basements the treatment shall start at the depth of 50 cm. below ground level from this depth backfill around the columns,

beams and

R.C.C. basement walls shall be treated at 7.5 lit/sq.m. of vertical surface. The relevant specifications shall be followed same as item 22.22.

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

3.1 The area of substructure in contact with backfill to be measured. The length and breadth shall be measured correct to a cm. as per dimension of sanctioned plans for the surfaces in contact with backfill.

3.2 No deduction shall be made nor extra paid for any opening for pipes, etc. up to 0.1 sq. m.

3.3 The rate includes cost of all labour, materials required for satisfactory completion of this item.

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

**5[22.24] Applying general insecticide pest control treatment at the top surface of the plinth filling with chemical emulsion at rate of 5 litres sq.meter before the sand bed or sub grade is laid.**

#### **1.0 Materials:**

The relevant specifications of item 22.22 shall be followed.

#### **2.0 Workmanship**

2.1 The relevant specifications of item 22.22 shall be followed except that the top surface of the consolidated earth within the walls shall be treated with the chemical emulsion at the rate of 5 litres/sq. meter of the surface before the sand bed or sub-grade is laid. If the filled earth has been well rammed and the surface does not allow the emulsion to seep through, holes up to 50 to 75 mm. deep at 150 mm. centers both ways may be made with 12 mm. dia M.S. rod on the surface to facilitate absorption of the emulsion.

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

3.1 The length and breadth shall be measured clear for the area actually treated.

3.2 No deduction shall be made nor extra paid for any opening for pipes, etc. up to 0.1 sq. m.

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

**6[22.25] Treating the junction of walls and floor area with chemical emulsion at the rate of 7.5 litre/sq. Mt. by making holes at junction of walls, and columns with the floor before laying sub grade to a depth of 15 cm. making holes.**

**1.0 Materials:** The relevant specifications of item 22.22 shall be followed.

#### **2.0 Workmanship**

2.1 The relevant specifications of item 22.22 shall be followed except that the junction of walls columns with the floor shall be treated with the chemical emulsion at the rate 7.5 litres/sq. meter. Special care shall be taken to establish continuity of the vertical chemical barrier on inner wall surfaces from the ground level up to the level of filled earth surface. To achieve this, a small channel 3X3 cm. shall be made at the junctions of the wall and columns with floor (before laying the sub grade) and rod holes made in the channels up to the ground level 15cm apart and the rod moved backward and forward to break-up the earth and chemical emulsion poured along the channel at the rate of 7.5 litres per sq. m. of the vertical walls or column surfaces of sub structures so as to soak the soil right to the bottom. The soil should be tamped back in to place after this operation.

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

3.1 The relevant specifications of the item no. 22.22 shall be followed.

3.2 The vertical area of sub-structure in contact with filled up earth above ground level to top of filled up earth shall be measured for payment.

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

**7[22.26] Treating the earth along the external perimeter of the building by making holes 15 cm.apart up to a depth of 30 cm. with chemical emulsion at the rate of 7.5 litres per sq. meter along the wall.**

**1.0 Materials:** The relevant specification of item 22.22 shall be followed.

#### **2.0 Workmanship**

2.1 The relevant specifications of the item 22.22 shall be followed except that the external perimeter of the

building shall be treated with chemical emulsions. After building is complete the earth along the external perimeter of the building should be rodded at intervals of 15 cm. and to a depth of 30 cm. The rods shall be moved backward and forward parallel to the wall to break up the earth and chemical emulsion poured along the wall at the rate of

7.5 litres per sq. meter of vertical surfaces. After the treatment the earth shall be tamped back in to place the earth outside of the building should be graded on compaction of building, this treatment shall be carried out on the completion of such grading. In event of filling being more than 30 cm. the external perimeter and treatment shall be extended to the full depth of filling up to ground level so as to ensure continuity of the chemical barrier.

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

3.1 The relevant specifications of item No. 22.22 shall be followed.

3.2 The vertical surface area of sub-structure 30 cm. in depth from finished ground level in external periphery only shall be measured and paid under this item. The depth of wall treated under back filled shall not be included in this item.

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

### **8[22.27] Providing treatment along outside of foundation using chemical emulsion at 7.5 litres per sq. m. of vertical surface (for each side) of sub-structure.**

**1.0 Materials:** The chemical used for the soil treatment shall be any one of the following with concentration shown against each in aqueous emulsion:

	<b>Chemicals</b>	<b>Concentration</b>
1.	IMIDA	30.50 % (by weight)
2.	BIFLEX	2.50 % (by weight)
3.	FIPRONIL	2.50% (by weight)

### **2.0 Workmanship**

2.1 The surface of consolidated earth around the existing building shall be treated with chemical emulsion at the rate 7.5 litres/sq.m. of vertical surface of sub-structure. The minimum height to sub-structure shall be considered 60 cms. for treatment. If the earth along the perimeter does not allow emulsion to seep through holes up to 300 mm. deep at 150 mm. centres both ways be made by 25 mm dia GI Pipe on the surface to facilitate saturation of the soil with chemical emulsion.

2.2 The chemical barrier shall be complete and continuous under whole on the structure to be protected.

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

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

3.1 The length shall be measured along the periphery of the sub-structure. The depth shall be taken 0.60 m.

3.2 No deduction shall be made nor extra paid for any opening for pipes etc. up to 0.1 sq. m.

3.3 The rate includes cost of all labour and material required for the operations involved for satisfactory completion of this item.

### **9[22.28] Providing treatment along external wall perimeter below concrete or masonry apron using chemical at 5 lit. per linear including drilling and plugging etc.**

**1.0 Materials:** The relevant specification of item no.22.27 shall be followed.

**2.0 Workmanship:** The relevant specification of item no.22.27 shall be followed except that the treatment shall be carried out along external wall perimeter below concrete or masonry apron, using chemical at rate of 5 lit/running meter.

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

3.1 The relevant specification of item no.22.27 shall be followed

3.2 The rate includes drilling and plugging holes in apron etc. complete.

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

### **10[22.29] Treatment of soil below existing floor using chemical at litre per hole at 300 mm. including drilling plugging holes etc.**

**2.0 Materials:** The relevant specification of item no.22.27 shall be followed.

**2.0 Workmanship:**

- 2.1 The relevant specification of item no.22.27 shall be followed except that the termite control treatment shall be carried out in soil below existing floors.
- 2.2 The holes of 12 mm. dia. Rod shall be drilled in floor up to 150 mm. depth at 300 mm. apart both ways. The chemical shall be then injected with pressure at the rate of 1 litres/hole of the surface area.

**3.0 Mode of measurements and payment**

- 3.1 The relevant specification of item no.22.24 shall be followed.
- 3.2 The rate shall include cost of drilling hole and plugging.
- 3.3 The rate shall be for a unit of one sq. metre.

**11[22.30] Treatment of voids in masonry using chemical at 1 lit/hole at 300 mm. apart including drilling holes and plugging.****1.0 Materials:**

The relevant specifications of item no.22.27 shall be followed.

**2.0 Workmanship**

- 2.1 The walls affected by termite shall be cleaned off all live forms binding inside and the holes or voids in masonry wall surface shall be treated by chemical emulsion at rate 1 lit. Hole. The holes in cracks in surface of wall shall be drilled at 300 mm. apart.

**3.0 Mode of measurements and payment**

- 3.1 The rate shall be for a unit of one number of voids treated.

**12[22.31] Treatment to wood work by chemical emulsion in oil or kerosene based including 6 mm. dia. downward slanted holes 150 mm. C/C and plugging the same with cement mortar.**

**1.0 Materials:** The relevant specifications of item no 22.22 shall be followed.

**2.0 Workmanship**

- 2.1 The wood work affected by Ants shall be cleaned of all lives form hiding inside. The whole wood surface shall be then treated with oil or kerosene based chemical emulsion. The holes of 6 mm dia. shall be drilled slanted downwards at 150 mm centre to centre and chemical emulsion shall be poured in to holes by means of funnels specifically prepared for the same and allowed to seep. After funnels become empty another dose of chemical shall be poured in them. This process shall be done repeatedly till the whole wood work is fully saturated with chemical.
- 2.2 The holes drilled in wood work shall be filled in with putty and other similar materials as directed and the whole wooden surface shall be made good as before.

**3.0 Mode of measurements and payment**

- 3.1 The work shall be measured for the finished work in sq. metre including frame.
- 3.2 The out to out of frame shall be measured as width and from top of flooring to top of frame shall be as height. This area includes for treating frame and shutters both.
- 3.3 The rate includes cost of all labours and materials, required for satisfactory completion of this item.
- 3.4 The rate includes drilling holes plugging the same after treatment completed and making good as before.
- 3.5 The rate shall be for a unit one sq. mere.

**13[22.32] Providing and fixing S.S. peg nails (5 Nos of pegs on 2.00mm thick on S.S. Patti).**

**1.0 General :** The work shall be carried out as per approved make list of GSPHCL or as directed by Engineer-in- Charge.

**2.0 Materials**

**Wall Pegs :** The pressed S.S. wall pegs & Patti shall be of SS 304 Grade of approved quality as per GSPHCL.

**3.0 Mode of Works:** The stainless steel Patti of minimum size 25.0cm length, 4.0cm width and 2.0mm thick with 5 nos. of S.S. pegs shall be fixed on S.S. Patti. The peg nails shall be fixed with S.S.Screws.

**4.0 Mode of measurements and payment:**

The rate includes of all cost of materials like S.S. Patti 5 nos. of wall pegs with screws etc. complete.

The rate shall be paid per 1 No. of set (S.S. Patti with 5 nos. of pegs consider as 1 set).

**14[22.33] Providing & Filling Cinder including watering, consolidation etc. complete.****Materials**

The cinder shall be of best quality and as per the sample approved by the Engineer-in-charge. Cinder shall not be dust type and shall be proper grading. The cinder shall be stocked on site of work only after approval of the Engineer-in-charge.

**Mode of work :**

It shall be filled in 20 cms. layer and well rammed and finished to the desired level. The required quality of sand shall be added in the cinder in proportion as directed by the Engineer-in-charge of the work. The work shall be carried out to the entire satisfaction of Engineer-in-charge.

**Mode of measurements and payment :**

The item is payable in cubic meter basis for consolidated quantity only, which includes laying watering, ramming etc. as required.

The rate shall be paid per one cu. m of work done

**15[22.34] Providing & Filling Broken AAC Blocks including watering, consolidation etc. complete.****1.0 Materials**

The broken AAC Block shall confirm to M-55. The broken AAC block Shall be of nominal 40mm size. The AAC blocks shall be of best quality and as per the sample approved by the Engineer-in-charge. The AAC Block shall be free from dust, harmful matters harming to concrete or any other deleterious materials. The AAC blocks shall be stocked on site of work only after approval of the same.

**2.0 Mode of work :**

It shall be filled in 20 cms. layer and well rammed and finished to the desired level. The required quality of sand shall be added in the AAC block in proportion as directed by the Engineer-in-charge of the work. The work shall be carried out to the entire satisfaction of Engineer-in-charge.

**1.0 Mode of measurements and payment :**

The item is payable in cubic meter basis for consolidated quantity only, which includes laying watering, ramming etc. as required.

The rate shall be paid per one cu. m of work done

**16[22.35] Providing and supplying welding and fixing in position M.S. pipe ralling of 40 mm dia including two coat of oil painting with primer coat of approved quality.**

**1.0** The stell shall conform to M-20 of General specification red lead paint primer shall conform to latest IS.oil paint shall conform to M-30 of General specification

**2.0** The M.S. tube shall be welded with M.S. flat of 15 cm length at the ends (on each side) and embedded in masonry work R.C.C. work, as instructed by Engineer-in-charge.

**3.0** The M.S. tube shall be painted with one coat of red primer and two coats of synthetic enamel paint of specified shade and approved quality as per M-30 of general specifications.

**4.0** The surface shall be well cleaned and rubbed with sand paper. One coat of primer at approved by the Engineer-in-charge shall be applied over the surface prepared as above. the primer coat shall be allowed to dry and the two coats to dry and the two coats of synthetic enamel paint of approved quality and types shall be applied Each coat of paint shall be allowed to dry before laying of next coat.

**5.0** The rates shall be paid per R.M. of completed visible work.

**17[22.36] Providing and fixing stainless steel ( 304 Grade ) 1mm thick Matt / Satin Finish Kitchen sink of over all Minimum size 533mm X 457mm X 203mm deep having bowl Minimum size 470mm x 395mm x 203mm with cement mortar 1:3 etc. complete. Rate including of 32mm dia. C.P.brass waste coupling and 32mm dia. rigid PVC waste pipe upto N.T. S. S. Kitchen Sink Shall be of approved make by GSPHCL.**

- 1 Stainless steel (304 grade) fixing shall be as per I.S. code 13983-1994 (Reaffirmed 2019) or its relevant & latest editions.
- 2 Sink shall be made of one piece and joints less and of matt finish.
- 3 The size of sink shall be **533mm X 457mm X 203mm** with clear top opening of **470mm x 395mm**.
- 4 Stainless steel coupling of standard make and design shall be fixed to sink. The minimum internal dimension when measured on the bowl centre lines across the top of the bowl.
- 5 Steel sink shall be fixed as per instruction in C.M. 1 :3
- 6 The rate shall be for a unit of one number of completed item, which includes cost of labour, materialstools and plant and other equipment required for satisfactory completion of item. The rates are also inclusive of P&F **32mm dia. C. P. brass waste coupling and 32mm dia. rigid PVC waste pipe up to N.T.**
- 7 It shall be maintained free of any spots/scratches when completely handed over to the beneficiaries – if need be they shall be replaced at no extra cost if directed for.
- 8 The rate shall be of unit of one number basis.

**18[22.37] Providing , Fabricating and fixing M.S. GRILL/GATE of approved pattern fabricated from M.S. flat,square bars, round bars,c-channel, box pipe as per detail Drawings. Rate is inclusive of welding with grinding smooth surface, two coats of Oil paint and one coat of yellow Zinc primer coat of approved brand only. Oil paint shall be Luxol Enamel paint of Berger Paint india limited. or asian paint apcolite premium gloss Enamel of asian paint or Dulux premium gloss enamel of dulux paint only.**

#### **Materials :**

The structure steel shall conform to M-20A, Oil paint shall confirm to M-30.

#### **Workmanship :**

##### **Fabrication**

The steel sections as specified shall be straightened and cut square to correct lengths and measured with a steel tape. The cut ends exposed to view shall be finished smooth. No two pieces shall be welded or otherwise jointed to make up the required length of member.

All straightening and shaping to form, shall be done by pressure. Bending or cutting shall be carried out in such a manner as not to impair the strength of the metal.

Great accuracy shall be observed in the fabrication of various members, so that these can be assembled without being unduly packed, strained or forced into position and when built up, shall be true and free from twist, kinks, buckles or open joints.

The steel section shall be straight or to be straightened or flattened by pressure unless required to be of curvilinear form and shall free from twists. These shall be cut square either by shearing or sawing to correct length and measured by steel tape. No two pieces shall be welded or joined to make up for the required length of member.

##### **Erection**

Steel work shall be hoisted and placed in position carefully without any damage to itself and other building work and injury to workmen. Where necessary mechanical appliances such as lifting tackle winch etc. shall be used. The suitability and capacity of all plant and equipment used for erection shall be upto the satisfaction of the Engineer-in-charge.

##### **Welding :**

Welding shall generally be done by electric arc process as per IS 816-1969 (Reaffirmed 2019) and IS 823. The electric arc method is usually adopted and is economical. Where electricity for public is not available generators shall be arranged by the contractor at his own cost unless otherwise specified. Gas welding shall only be resorted to using oxyacetylene flame with specific approval of the Engineer-in-charge. Gas welding shall not be permitted for structural steel work Gas welding required heating of the members to be welded along with the welding rod and is likely to create temperature stresses in the welded members. Precautions shall therefore be taken to avoid distortion of the members due to these temperature stresses.

The work shall be done as per drawings which should clearly indicate various details of the joint to be welded, type of welds, shop and site welds as well as the types of electrodes to be used. Symbol for welding on plans and shops drawings shall be according to IS 813(Part-1)-2018.

As far as possible every efforts shall be made to limit the welding that must be done after the structure is erected so as to avoid the improper welding that is likely to be done due to heights and difficult positions on scaffolding etc. apart from the aspect of economy. The maximum dia of electrodes for welding work shall be as per IS 814-2004 (Reaffirmed 2021). Joint surfaces which are to be welded together shall be free from loose mill scale, rust, paint, grease or other foreign matter, which adversely affect the quality of weld and workmanship.

### **Painting**

All surfaces of painted priming coat of approved steel primer such as a Zinc Chromate primer conforming to IS 2074(Part-1)-2015 (Reaffirmed 2020) shall be applied before any member of steel structure are placed in position or taken out of workshop. All the member shall be dry and thoroughly cleaned to remove all loose scale and rust. After erection, two coats of oil paint of approved make of GSPHCL shall be applied to the structure. For application of the oil paint relevant specification of 19.7 shall be followed.

### **Mode of measurement and payments :**

The work as fixed in place shall be measured in running metres correct to a millimetre and weights calculated on the basis of standard tables correct to the nearest kilogram. The standard weight of steel sections shall conform to IS 808-2021 with tolerance in sizes as per IS 1852-1985 (Reaffirmed 2017). Steel sections shall be acceptable within tolerance limits. Payment for steel sections shall be made as per actual weight within tolerances. Sections having weight on higher side than permissible tolerance, maybe acceptable but payment shall be made on the basis of standard weight only. Steel sections having weight variations lower side than permissible variation shall not be acceptable.

The weight of steel sheets, plates and strips shall be taken from relevant Indian standards based on 7850Kg/Cum. for every millimeter sheet thickness. For rolled sections, steel rods and steel strips, weight given in relevant Indian Standards shall be used. No payment shall be made for weight of screws, bolts, nuts etc. only weight of steel structure shall be paid.

Rate inclusive of applying one coat of yellow zinc primer and two coats of oil paint of approved brand by GSPHCL.

The rate shall be for a unit of the one kg. actually measured (weighted) at site.

### **19[22.38] Providing a ISI mark 7 levers keys brass pad lock of Navtal Godrej make 65 mm dia.**

#### **1.0 Materials :**

Agency should provide I.S.I. mark 7 lever three keys brass pad locks of Navtal (Godrej) make 65mm dia.

#### **2.0 Workmanship :**

On completion of the project agency has to lock the each units and require to paint mark on block

/ unit number on lock and key.

2.2 Agency has to make bunch of keys per unit properly tied with chain.

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

3.1 The rate shall be for one number of completed item.

### **20[22.39] Providing and fixing Flat Back Urinal as per approved make & model by GSPHCL. Urinal size specified in tender item. Including With trap, integral longitudinal flush pipe etc. Complete with all Necessary Fittings.**

#### **1.0 Materials :**

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

Urinal basins shall be of flat back or corner wall type lipped in front. These shall be of white vitreous china conforming to IS 2556(Part-6)-1995 (Reaffirmed 2018). The urinals shall be of one piece construction. Each urinal shall be provided with not less than two fixing holes of minimum dia. 6.5 mm on each side. Each urinal shall have an integral flushing rim of suitable type and inlet or supply horn for connecting the flush pipe. The flushing rim and inlet shall be of the self-draining type. It shall have a weep hole at the flushing inlet of the urinals.

#### **2.0 Workmanship :**

2.1 The squatting plate urinal shall be fixed as directed.

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

### 3.0 Mode of measurements and payment :

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

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

The rate shall be for a unit of one number.

### 21[22.40] P & F chicken wire mesh jali.

#### Material :

Chicken wire mesh jali shall be confirm to IS 3150-1982 (Reaffirmed 2018). Diameter of the wire shall be 0.90mm(20 gauge).

The galvanized coating of the steel wire shall conform to IS 4826-1979 (Reaffirmed 2021).

Wire netting woven has to be produce hexagonal openings of uniform size.

The wire used in the manufacture of netting shall be annealed mild steel wire conforming to IS 280-2006 (Reaffirmed 2015). The wire shall be galvanized before weaving.

The finished surface of the netting shall be even, without any distortions. The netting shall not have any in between break in the wires in either direction.

#### Workmanship :

To prevent surface cracks appearing between junctions of column/beam and walls, 180 mm wide chicken wire mesh should be fixed with U nails 150 mm centre to centre and cement mortar 1:1 before plastering the junction. The plastering of walls and beam/column in one vertical plane should be carried out in one go.

#### Mode of measurement and payment :

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

The rate shall be of Sq.m. basic.

### 22[22.41] Providing, supplying and laying WATER BOUND MACADAM WITH STONE AGGREGATE (WBM)

#### Water Bound Macadam with Stone Aggregate

Coarse aggregate shall consist of clean, crushed or broken stone. Coarse aggregate shall confirm to one of the grading in table below. Grading 1 shall be used only for sub base course, with a compacted layer thickness of 100mm. Stone aggregate of specified size is used. This is a standard sub base/base and is used where stone aggregate is available at reasonable rates. This consists of clean crushed coarse aggregate mechanically interlocked by rolling and voids thereof filled with screening and binding material with the assistance of water, laid on a prepared sub grade, sub-base, base or existing pavement as the case may be. Water bound macadam may be used as a sub base, base course or surfacing course.

**Table**  
**Size and Grading Requirement of Coarse Aggregate for WBM**

Grading No.	Size Range and compacted thickness for layer	Sieve Designation (IS 460)	Percent by Weight passing the sieve
1	90mm to 45mm (100mm)	125 mm	100
		90 mm	90-100
		63 mm	25-60
		45 mm	0-15
		22.4 mm	0-5
2	63 mm to 45 mm (75 mm)	90 mm	100
		63 mm	90-100
		53 mm	25-75
		45 mm	0-15

		22.4 mm	0-5
3	53 mm to 22.4 mm (75 mm)	63 mm	100
		53 mm	90-100
		45 mm	65-90
		22.4 mm	0-10
		11.2 mm	0-5

### Approximate Quantities of Materials

Quantities of coarse aggregate, screening and binding material required to be stacked for 100 mm approximate compacted thickness of W.B.M. for 10 sq.m. shall be as per Table-1 for stone aggregate of the size 90 mm to 45 mm. For stone aggregate of other size, 63 mm to 45 mm and 53 mm to 22.4 mm quantity of coarse aggregate and stone screening for 75 mm approximate compacted thickness of WBM base for 10 sqm. shall be as per Table-2.

**TABLE -1**

Coarse Aggregate			Stone Screenings		Binding Material
Classification	Size Range	Loose Quantities	Grading/classification and size	Loose Quantity	Quantity
Grading 1	90 mm to 45 mm	1.21 cum to 1.28 cum	Type A 13.2 mm	0.27 cum to 0.30 cum	0.08 cum to 0.10 cum

**Note :** Net quantity = Loose quantity measured in stacks minus 7.5%.

**TABLE -2**

Coarse Aggregate				Stone Screenings		
Classification	Size Range	Compacted Thickness	Loose Quantity	Grading Classification & Size	For WBM Sub-base/Base Course (Loose Quantity)	For WBM surface course (Loose Quantity)
Grading 2	63-45 mm	75 mm	0.91 to 0.96 m3	Type A 13.2 mm	0.12 cum to 0.15 cum	0.10 cum to 0.12 cum
-Do-	-do-	-do-	-do-	Type B 11.2 mm	0.20 cum to 0.22 cum	0.16 cum to 0.18 cum
Grading 3	53-22.4 mm	75 mm	-do-	Type B 11.2 mm	0.18 cum to 0.21 cum	0.14 cum to 0.17 cum

- \* **Note :**
1. The quantity of metal measured in stacks and reduced by 7.5% to calculate net quantity.
  2. The above mentioned quantities should be taken as a guide only for estimation of quantities for construction etc.

The quantity of binding material required for 75 mm (approximate) compacted thickness will be 0.09 cum/10 sq.m. in the case of W.B.M. base course and 0.13 cum/10 sq.m. when the W.B.M. is to function as a surface course.

### Binding Material

Binding material to be used for WBM has filler shall consist of a fine grained material passing 100 percent through 425 micron sieve and possessing PI value of 4-8 when the WBM is used as a surfacing course, and less than 6 when the WBM is adopted as a sub-base/base course with bituminous surfacing.

### Preparation of Foundation

In the case of an existing unsurfaced road, where new materials is to be laid, the surface shall be scarified and reshaped to the required grade, camber and shape as necessary. Weak places shall be strengthened, corrugations removed and depressions and pot holes made good with suitable materials, before spreading the aggregate for W.B.M.

Where the existing surface over which the sub base of W.B.M. is to be laid is black topped, to ensure effective internal drainage, furrows 50 mm x 50 mm (depth of furrows increased to reach bottom of bituminous layer where necessary) at one metre intervals shall be cut in the existing bituminous surface at 45 degree C to the central line of the carriageway before the W.B.M. is laid.

### Provision of Lateral Confinement of Aggregates

Before starting with W.B.M. construction, necessary arrangements shall be made for lateral confinement of aggregates. One method is to construct side shoulders in advance to a compacted layer of the W.B.M.

coarse. Inside edges may be trimmed vertical and the included area cleaned off all spilled material thereby setting the stage for spreading the coarse aggregate.

The practice of laying W.B.M. after excavating a trench section in the finished formation must be completely avoided.

### **Spreading Aggregate**

The coarse aggregate shall be spread uniformly and evenly upon the prepared base in required quantities with a twisting motion to avoid segregation. In no case shall these be dumped in heaps directly on the area where these are to be laid nor shall their hauling over a partly completed base be permitted. The aggregates shall be spread uniformly to proper profile by using templates placed across the road six metres apart. Where specified, approved mechanical devices may be used to spread the aggregates uniformly. The levels along the longitudinal direction up to which the metal shall be laid, shall be first obtained at site to the satisfaction of Engineer-in-Charge, and these shall be adhered to.

The surface of the aggregate spread shall be carefully trued up and all high or low spots remedied by removing or adding aggregate as may be required.

The W.B.M. sub-base shall be normally constructed in layer of 100 mm compacted thickness and W.B.M. base shall be normally constructed in layers of 75 mm compacted thickness. No segregation of large or fine particles shall be allowed and the coarse aggregate as spread shall be of uniform gradation with no pockets of fine material.

The coarse aggregate shall normally not be spread in lengths exceeding three days average work ahead of the rolling and blending of the proceeding section.

### **Rolling**

Immediately following at spreading of the coarse aggregate, it shall be compacted to the full width by rolling with either the three-wheel power roller of 8 to 10 tones capacity or an equivalent vibratory roller. Initially, light rolling is to be done, which shall be discontinued when the aggregate is partially compacted with sufficient void space in them to permit application of screenings.

The rolling shall begin from the edges with the roller running forward and backward and adding the screenings simultaneously until the edges have been firmly compacted. The roller shall then progress gradually from the edges to the centre, parallel to the centre line of the road and overlapping uniformly each preceding rear wheel track by one half width and shall continue until the entire area of the course has been rolled by the rear wheel. Rolling shall continue until the road metal is thoroughly keyed with no creeping of metal ahead of the roller. Only slight sprinkling of water may be done during rolling, if required. On super elevated curves, the rolling shall proceed from the lower edge and progress gradually continuing towards the upper edge of the pavement.

Rolling of sub base shall not be done when the sub-grade is soft or yielding or when the rolling causes a wave like motion in the sub-base or sub-grade. When rolling develops irregularities that exceed 12 mm when tested with a three metre straight edge, the irregular surface shall be loosened and then aggregate added to or removed from it as required and the area rolled until it gives a uniform surface conforming to the desired cross-section and grade. The surface shall also be checked transversely by template for camber and any irregularities corrected in the manner described above. In no case shall the use of screenings to make up depressions be permitted.

### **Application of Screenings**

After the coarse aggregate has been lightly rolled to the required true surface, screenings shall be applied gradually over the surface to completely fill the interstices. Dry rolling shall be continued while the screenings are being spread so that the jarring effect of the roller causes them to settle into the voids of the coarse aggregates. The screenings shall not be dumped in piles on the coarse aggregate but shall be spread uniformly in successive thin layers either by the spreading motion of the hand, shovels or a mechanical spreader.

The screenings shall be applied at a slow rate (in three or more applications) so as to ensure filling of all voids. Rolling and brooming shall continue with the spreading of the screenings. Either mechanical brooms or hand brooms or both may be used. In no case shall the screenings be applied, so fast and thick as to form cakes, ridges on the surface making the filling of voids difficult, or to prevent the direct bearing of the roller on the coarse aggregates. The spreading, rolling and brooming of screenings shall be performed on sections which can be completed within one day's operation and shall continue until no more screenings can be forced

into the voids of the coarse aggregate. Damp and wet screenings shall not be used under any circumstances.

### **Sprinkling and Grouting**

After spreading the screening and rolling the surface shall be copiously sprinkled with water, swept and rolled. Hand brooms shall be used to sweep the wet screening into the voids and to distribute them evenly. The sprinkling, sweeping and rolling operations shall be continued and additional screenings applied where necessary until the coarse aggregates are well bonded and firmly set for the entire depth and until a grout has been formed of screenings and water that will fill all voids and form a wave of grout ahead of the wheels of the roller. The quantity of water to be used during the construction shall not be excessive so as to cause damage to the sub-base or sub-grade.

### **Application of Binding Material**

After the application of screenings and rolling, a suitable binding material shall be applied at a uniform and slow rate in two or more successive thin layers. After each application of binding material, the surface shall be copiously sprinkled with water and the resulting slurry swept in with hand brooms or mechanical brooms or both so as to fill the voids properly. The surface shall then be rolled by a 8-10 tonne roller, water being applied to the wheels in order to wash down the binding material that may get stuck to the wheels. The spreading of binding material, sprinkling of water, sweeping with brooms and rolling shall continue until the slurry that is formed will, after filling the voids form a wave ahead of wheels of the moving roller.

### **Setting and Drying**

After final compaction of the course, the road shall be allowed to cure overnight. Next morning defective spots shall be filled with screenings or binding material, lightly sprinkled with water, if necessary and rolled. No traffic shall be allowed till the macadam sets.

### **Surface Evenness**

The surface evenness of completed W.B.M. sub -base in the longitudinal and transverse directions shall be as specified in Table-3 for sub base with stone aggregate of size 90-45 mm and above.

**TABLE -3**

Size of Coarse aggregates	Longitudinal profile measured with a 3 metre straight edge			Cross profile
	Maximum permissible undulation	Max. No. of Undulations permitted in any 300 m length exceeding		Max. permissible undulation when measured with a camber template
		15 mm	10 mm	
90-45 mm & above	15 mm	-	30	12 mm

The longitudinal profile shall be checked using a 3 meter long straight edge and graduated wedge at the middle of each traffic lane along a line parallel to the Centre line of the road. The transverse profile shall be checked with adjustable template at intervals of 10 meters. For base with stone aggregate of size 63 to 45 mm and 53 to 22.4 mm surface evenness to be as per Table-4.

**TABLE-4**

Size of Coarse aggregates	Longitudinal profile measured with a 3 metre straight edge			Cross profile
	Maximum permissible undulation	Max. No. of Undulations permitted in any 300 m length exceeding		Max. permissible undulation when measured with a camber template
		15 mm	10 mm	
63-45 mm and 53-22.4 mm	12 mm	-	30	8 mm

The longitudinal profile shall be checked with a three metre long straight edge and graduated wedge at the middle of each traffic lane along a line parallel to the centre line of the road. The transverse profile shall be checked with adjustable templates at intervals of 10 metres.

### **Rectification of Defective Construction**

Where the surface irregularity of the W.B.M. sub-base course exceeds the tolerances specified in Table-3 or where the course is otherwise defective due to sub grade soil mixing with the aggregates, the layer to its full thickness shall be scarified over the affected area, reshaped with added material or removal and replaced with fresh materials as applicable, and recompact. The area treated in the aforesaid manner shall not be less than 10 sq.m. In no case shall depressions be filled up with screenings and binding materials.

### Measurements

The length and breadth shall be measured to the nearest centimetre. The depth of consolidated layer shall be computed to nearest half centimetre by taking average of depths at the centre and at 30 cm from the left and right edges at a cross section taken at 100 metre interval or less as decided by the Engineer-in-Charge by making small pits. The consolidated cubical contents shall be calculated in cubic metres correct to two places of decimal. The cubical contents shall be compared with net quantity of stone aggregates paid (that is stacked quantity – 7.5%). If the cubical contents are within ( $\pm$ ) 5% of the paid net stacked quantity of stone aggregates, the work shall be treated as acceptable. If the cubical contents is short of net stacked quantity by more than 5% then the payment shall be restricted to the quantities derived from cubical content.

### Rate

The rate shall include the cost of all labour and materials involved in all the operations described above, including cost of stone aggregate, kankar/moorum, screenings and spreading, rolling, watering, etc. completed. The rate shall be for a unit of One Cu.m. for consolidated item.

#### 23[22.42] Surface dressing of ground including disposal of rubbish, cleaning of ground lift.

##### Workmanship:

Surface dressing shall include cutting and filling upto a depth of 15 cm and clearing of shrubs, rank vegetation, grass, brushwood, trees and saplings of girth upto 30 cm measured at a height of one metre above the ground level and removal of rubbish and other excavated material upto a distance of 50 metres outside the periphery of the area under surface dressing. High portions of the ground shall be cut down and hollows depression filled upto the required level with the excavated earth so as to give an even, neat and tidy look.

##### Mode of measurement and payment:

The rates shall be for a unit of one sq.m.

#### 24[22.43] Disposing of all unserviceable material and excavated surplus earth up to any lead & lift including spreading to level as directed by engineer in charge.

##### Disposing of excavated materials.

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

##### Mode of measurement and payment:

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

#### 25[22.44] Providing and fixing precast R.C.C. cover 0.60m x 0.45 m x 0.075 m size along with 40x40x5mm M.S. angle frame to I.C. chamber / manhole etc. including finishing complete with necessary steel reinforcement etc. complete with steel handles.

##### Materials :

Water shall confirm to M-1 cement shall confirm to M-3 , sand shall confirm to M-6, cement mortar shall confirm to M-11, mild steel shall confirm to M-18, paint shall confirm to M-30, Aggregate shall conform to M-12, and structural steel shall conform to M-20A.

##### Workmanship :

I.C. / Manhole frame should be made of ISA 40 x 40 x 5 mm section which is fixed to manhole slab as directed by site in charge.

2.1 2.2 Precast R.C.C. Cover casting in C.C. (1:1.5:3) with using 8 mm steel reinforcements both ways 15cm C/c distance

2.2 2.3 R.C.C. cover shall be well finished in C.M. 1:3 on all side of cover and frame painted with

one coat of primer and two coats of oil paint. Each coat of paint shall be allowed to dry before laying of next coat.

**Mode of measurement & payment :**

The rate shall be paid per number basis. This includes providing and fixing steel frame and a precast cover.

**26[22.45] Filling brick bats of 40 mm nominal size at required depth as per drawing and specification and direction of engineer in charge.**

**Material:**

Brick bat aggregate shall confirm to M-14.

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

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

**Workmanship :**

The brick bats shall be filled up to depth as specified in the drawing and as per the instruction of engineer in charge.

**Mode of measurement and payment :**

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

**27[22.46] Providing and fixing mosquito proof wire mesh jali shutter having non-teak wood frame of 8 cm x 2.5 cm in size.**

**1.0 Material :**

- 1.1 The non-teak wooden frame for mosquito proof jali shall be well seasoned & chemically treated shall confirm to M-23.
- 1.2 The mosquito proof jali shall confirm to IS 1568-1970 (Reaffirmed 2018).
- 1.3 The mosquito proof jali shall be stainless steel having nominal dia. of wire shall be 0.50mm and average width of aperture shall be 1.00mm.

**2.0 Workmanship :**

- 2.1 The size of wooden frame shall be 8 cm x 2.5 cm. The mosquito proof jali shall be properly fixed with teakwood bidden patti as per required on the wooden frame such that no mosquito should pass through it. It shall be fixed in proper groove of the wooden frame. If the span of jali is more than 1.0 m, extra wooden support shall be fixed.

**3.0 Mode of measurement and payment :**

- 3.1 The payment shall be made on a units of sq.m. basis including of all materials and labours.

**28[22.47] Providing and fixing corrugated asbestos cement sheets roofing fixed with G.I. plain and bitumen washers complete cost of purlins, rafters and trusses 7mm thick corrugated Asbestos Sheet (ISI) including making good to the base frame structure as and when necessary.**

**1.0 Materials :**

- 1.1 Asbestos cement sheet shall conform to M-24.

**2.0 Workmanship :**

- 2.1 The maximum spacing of purlins shall be 1.6 meters in case of 7mm thick A.C. sheet and 1.4 meter for 6mm thick A.C. sheet.
- 2.2 Laying and fixing of sheets : The sheet shall be laid on the purlins and other roof members as per code of practice. Top bearing surface of all purlins and other roof members shall be checked and made in one plane so that the sheets when being fixed shall not be required to be forced to rest on the purlins. The finished roof shall present uniform slope and the line of corrugation shall be straight and true. The sheets shall be laid with smooth side upwards. Corrugated sheet shall be laid starting at the eaves either from left to right or right to right.

to left depending up on the direction of wind before actual laying of the sheet is started. The purlins spacing and the size of sheets shall be checked to ensure that the arrangements shall be provided the laps required and the specified over hang at the eaves. In the sheet are laid from right to left, the first sheet shall be laid uncut but the remaining sheet in the bottom row shall have the top left hand corners cut or mitred. The sheets in the second and other immediate rows shall have bottom right hand corner of the first sheet cut. All other except the last sheets shall have both bottom right hand corners and top left hand corner cut with exception of the last sheet, which shall be left uncut. If the sheets are laid to right, the first sheet shall be laid and cut the remaining procedure shall be reversed.

- 2.3 The free overhanging of the sheet at the eaves shall not exceed 400mm in case of 7mm thick sheets and 300 mm in case of 6mm thick sheet.
- 2.4 The mitre described above is necessary to provide snug fit. Where 4 sheets meet at a lap the length of mitre shall be 150 mm and width of mitre shall be equal the width of the side lap. The caving may be done with ordinary wood saw at site.
- 2.5 Laps : The sheet shall be laid with an end lap of 150mm minimum. In case of roof with a pitch flatter than 1 vertical to 2.5 horizontal (Approx. 22°) or in the case of very exposed situations approximate larger laps may be provided. The sheet shall be laid with side lap of half a corrugation.
- 2.6 Fixing Accessories : The sheets shall be secured to the purlins and other roof members by means of 8 mm dia galvanized iron bolts ('J') type hook bolts in case of angle iron purlins and 'L' type bolts in case of R.S. joints, precast concrete or timber purlins and nuts bearing on galvanized iron washers and bitumen washers. The grip of 'J' or 'L' bolts on the side, of purlins shall not be less than 25mm. Each galvanized iron 'J' or 'L' hook bolts shall have a bitumen washer and galvanized washers placed. Over the sheet before the nuts is screwed down from above. On each purlin there shall one hook of bolt on the crown adjacent to the side lap on either side. Bitumen washer shall be approved quality. The G.I. flat washer shall be 25mm in diameter and 1.6mm thick and bitumen washer shall be 35mm in dia and 1.5mm thick with hole to suit the required size of fixing accessory. Each nut shall be screwed lightly at first. After a dozen or more sheets are laid, the nuts shall be tightened to ensure a leak-proof joint and also nut tightened only to extent so as to prevent damage to the sheets. The length of the 'J' bolts or crank bolts shall be 75mm more than the depth of purlins for single sheets fixing and 90 mm more where two sheets overlap or where ridges or other accessories are to be fixed. The minimum length of coach screw for timber purlins shall be 110 mm.
- 2.7 Holes : The hole for fixing the sheet shall be drilled in the center of end lap of sheet to suit the purlins i.e. on the center line of the purlins, if there are of timber and square head coach screws are used, or as close as possible to the back of purlins if 'j' or 'l' bolts are used as with steel angles or precast concrete or timber purlins. Holes for hook bolts etc. shall be 2mm more than the diameter of the fixing bolts. No holes shall be nearer than 40mm to any edge of sheet or accessory.

### **3.0 Mode of measurement and payments :**

- 3.1 The cover lap of the corrugate sheet over valley gutter, roof lights, eaves, filers pieces and underlay of the corrugated sheet below ridges, hips north light eaves, flashing pieces, roof light sheet and barge board shall be included in the measurement. No deduction shall be made of for hole cut for extractor or cowl type ventilators. Deduction shall be made for roof light sheets.
- 3.2 The rate shall be for a unit of one square meter. Open visible flat measurement where in laps as nominated above shall not be considered separately – measurements include for them.

**29[22.48] Major repairs of doors, windows, shutters (Fully paneled or partly paneled and partly glazed doors) and frames including partly replacing panels styles, rails hinges, anodized aluminium fittings and fixtures re-fixing aligning resizing including painting.**

In case of major repairs of doors and windows following items shall be considered for repairs, prior approval of Engineer in charge.

Replacement of broken frames with new frames.  
 Replacement of broken shutters with new shutters.  
 Replacement of broken fittings and fixtures with new one.  
 Replacement of broken glass and with new glasses and putty.

All the parts of doors and windows shall be checked thoroughly. The doors and windows, which are to be repaired, shall be removed from the opening. Due care shall be taken not to disturb adjoining masonry). Frames and shutters shall be changed, if required and as directed by engineer in charge. All damaged fittings and fixtures shall be replaced with the new fittings and fixtures as approved by engineer in charge.

Specified timber shall be used for repair work. Sawing shall be truly straight and square and in the direction of grains. The scantlings shall be accurately planed smooth to the full dimensions and rebates roundings and mouldings shown in the drawings. Patching or plugging of any kind shall not be permitted.

Broken glasses shall be removed and old putty shall be rocked out with hack knite. The glass panes shall confirm the relevant IS. The pieces of glass panes as found useful shall be handed over to the engineer in charge of the work. All other work shall be carried out as , directed by engineer in charge.

Joints :

Joints shall be simple, neat and strong. All joints shall fit in fully and accurately without wedging or fittings. The joints shall be as per detail drawings or as directed by the Engineer in charge. Before the frames are fixed in position these shall be inspected and passed by the Engineer in charge.

Fixing :

After repair all doors and windows shall be fixed to the positions. The sides of frames of doors and windows to be embedded in masonry shall be painted with two coats of cool tar before being placed in position. The frames then shall be inserted in position with their holdfasts bolted tight. The frames shall then be adjusted to proper line and plumb and secured in position by temporary branchings, which shall not be disturbed or removed until the holdfasts are embedded in the masonry and the latter shall have set. The concrete to be used for embedding holdfasts shall be 1:3:6 mix (1 cement : 3 coarse sand : 6 graded stone aggregates 20 mm nominal size).

After surface surrounding the holdfasts has sufficiently dried it shall be cleaned of dust etc. and welled, it shall then be plastered with cement mortar 1:4 ( 1 cement : 4 fine sand) flush with the surrounding plasterwork. Any other portion of the wall opening, if damaged, shall be repaired in similar way.

After the cement plaster patched have been thoroughly cured and have dried, they shall either be white washed or colour washed as required unless otherwise specified. All malba and debris obtained from cutting etc. shall be disposal of to the painting coat.

The oil paint of two coats shall be done over the painting

coat. Mode of measurement and payment :

The payment shall be made on the number basis.

The payment shall be inclusive of two coats of oil paints.

**30[22.49] Minor repairs of doors, windows, shutters and frames including refixing, aligning, shutters. Providing, replacing and fixing black anodized fittings and fixtures etc. complete excluding the painting as per specification.**

All the parts of doors and windows shall be checked thoroughly. The doors and windows, which are to be repaired, shall be removed from the opening. Due care shall be taken not to disturb adjoining masonry). Frames and shutters shall be changed, if required and as directed by engineer in charge. All damaged fittings and fixtures shall be replaced with the new fittings and fixtures as approved by engineer in charge.

Specified timber shall be used for repair work. Sawing shall be truly straight and square and in the direction of grains. The scantlings shall be accurately planed smooth to the full dimensions and rebates roundings and mouldings shown in the drawings. Patching or plugging of any kind shall not be permitted.

Broken glasses shall be removed and old putty shall be rocked out with hack knito. The glass panes shall confirm the relevant IS. The pieces of glass panes as found useful shall be handed over to the engineer in charge of the work. All other work shall be carried out as , directed by engineer in charge.

**Joints :**

Joints shall be simple, neat and strong. All joints shall fit in fully and accurately without wedging or fittings. The joints shall be as per detail drawings or as directed by the Engineer in charge. Before the frames are fixed in position these shall be inspected and passed by the Engineer in charge.

**Fixing :**

After repair all doors and windows shall be fixed to the positions. The sides of frames of doors and windows to be embedded in masonry shall be painted with two coats of cool tar before being placed in position. The frames then shall be inserted in position with their holdfasts bolted tight. The frames shall then be adjusted to proper line and plumb and secured in position by temporary branchings, which shall not be disturbed or removed until the holdfasts are embedded in the masonry and the latter shall have set. The concrete to be used for embedding holdfasts shall be 1:3:6 mix (1 cement : 3 coarse sand : 6 graded stone aggregates 20 mm nominal size).

After surface surrounding the holdfasts has sufficiently dried it shall be cleaned of dust etc. and welled, it shall then be plastered with cement mortar 1:4 ( 1 cement : 4 fine sand) flush with the surrounding plasterwork. Any other portion of the wall opening, if damaged, shall be repaired in similar way.

After the cement plaster patched have been thoroughly cured and have dried, they shall either be white washed or colour washed as required unless otherwise specified. All malba and debris obtained from cutting etc. shall be disposal of to the painting coat.

The oil paint of two coats shall be don over the painting

coat. Mode of measurement and payment :

The payment shall be made on the number basis.

The payment shall be inclusive of two coats of oil paints.

**31[22.50] Providing and fixing 4mm thick bajari glass bended in putty / wooden bedding patti with scrapping of existing putty and glass in existing windows as directed by Engineer in charge.**

**Material :**

1.1 The glass shall conform to M-27. Non-teakwood beading patti shall confirm to M-23, Putty shall conform to IS 419-1967 (Reaffirmed 2019) or its relevant & latest edition.

**Workmanship :**

The glass shall be sheet glass of selected quality for 4 mm thick.

The size of glass for glazing shall allow a clearance of 2.5 mm between the edges of glass and the wood or metal surrounds. The clearance may be increased as case maybe, provided the depth of the rebate of groove is sufficient to provide not less than 1.5 mm cover to the glass. The detailed process of glazing shall be as specified in IS 3548-1988 (Reaffirmed 2019) or its relevant & latest edition. The glass shall be fixed in putty / wooden beading as specified in item.

All stains from the surface of glass shall be removed and cleaned with thinner or spirit without any extra payment.

**Beading :**

The size of wood beads for glass panes shall be 1.5 cms x 3 cms unless otherwise specified. Beads shall be secured to wooden frames with either panels pains or screws and to metal frames in the way provided for in the frame.

Sufficient putty compound shall be applied to the rebate so that when the glass has been pressed into the rebate, a bed or compound not less than 1.5mm thick will remain between the glass and the rebate. There should also be surplus of compound squeezed out above the rebate which should be stripped at an angle not under cut to prevent water accumulating. Beads should be bedded with compound against the glass. Care should be taken to see that no voids are left between the glass and the bend.

**Mode of measurement and payment :**

All measurement of cutting shall unless otherwise stated, be held to include the consequent waste.

Each pane of glass shall be measured to the nearest 0.5 cms both in width and height / length.

Irregular shaped or circular panes shall be measured as the smallest rectangular area from which the irregular or circular pane can be cut.

The rate includes cost of materials, labour, required for complete of the item including hoisting, carriage, temporary erections like scaffolding etc.

The rate also includes (i) the wastage and breakage involved in the process. (ii) Straight cutting on glass and glazing putty, teak wood beading, glass, pin, putty etc. complete.

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

**32[22.51]      Cleaning of choked waste sewerage pipes including of removing rubbish, ash, loose soil, stone pieces etc. as directed by Engineer in charge.**

**Materials :****The choked / blocked sewer line shall be cleaned in following steps:**

1. The manhole covers shall be kept open for same time before the cleaning of sewer line so as to escape the foul gases.
2. Sucking the choked malba material by diesel running, vehicle mounting hydraulic operated suction/jetting cleaning machine with appropriate capacity as per requirement.
3. Disposal of the accumulated malba, rubbish to the approved dumping ground with the help of trolley/wheel barrows properly lined with PVC sheet to avoid splashes of the sewage/ rubbish on the ground.

All above mentioned 2 operations shall be done in presence of supervisor and by making all adequate safety arrangement to the labour including providing them medical aid, rubber gloves, helmets, masks, oxygen cylinder etc.

**Mode of measurement and payment :**

Payment shall be made on running meter basis. Inclusive of all labour, material, required equipment and disposal of the sludge etc. completed.

**33[22.52]      Cleaning of inspection chamber, gully traps and man hole including of removing rubbish, ash, loose soil, stone pieces etc. as directed by Engineer in charge.**

**Materials :**

The gully trap/chamber shall be cleaned and de-silted in following manner:

Removal of rubbish mixed with earth by deployment of sufficient manual labour.

Disposal of the accumulated malba, rubbish to the approved dumping ground with the help of trolley/wheel barrows properly lined with PVC sheet to avoid splashes of the sewage/rubbish on the ground.

All above mentioned 2 operations shall be done by making all adequate safety arrangement to the labour including providing them medical aid, rubber gloves, helmets, masks, oxygen cylinder etc. and make the site neat and clean after completion of work.

The payment to be making is inclusive of all operation like labour, material and T&P whichever is required.

**Mode of measurement and payment :**

Payment shall be made on number basis. Inclusive of all labour, material, required tools & plants and disposal of the sludge etc. completed.

**34[22.53]      Filling the joints of existing white glazed tiles / kota stone floors and dado with white cement / ordinary cement as directed by engineer in charge.**

**Materials:**

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

**Workmanship :**

First clear the existing joints of white glazed / kota stone flooring & dado and properly with the help of water and other suitable material / equipment as directed by engineer in charge. Then scrapped off the weak joints of the existing floors/ dado.

Joints shall be filled by using either ordinary Portland cement for kota stone flooring and white cement for glazed tiles flooring & dado as specified in tender item.

The joints shall be cured for at least 7 days. All the work shall be carried out as per instruction of engineer in charge strictly.

**Mode of measurement and payment :**

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

**35[22.54] Providing and fixing tiles roofing with manglore tiles including non teak reapers of size 50mm x 25mm including 1.25mm thick valleys.**

**Material :**

Manglore pattern roof tiles shall conform to I.S.-654-1992 (Reaffirmed 2016) or its relevant & latest edition, Non teak wood batten shall conform to M-23.

**Workman ship :**

The maximum distance between center to center of rafters shall be not more than 600mm. Non teak wood reapers 50 mm x 25 mm shall be nailed to each rafter at centre distances to size of the tiles by means of nails 50mm long. The reapers shall be well seasoned non teak wood and shall be straight places of uniform size and colour and not shorter than the necessary to cover at least four rafter. The under face and sides of the reapers shall be before fitting up. Joints shall come over the rafters. The joints of two adjacent rows shall not corner over the same rafter. At the eaves, there shall be two reapers of such and shape that the uniformity of the top of slope of the roof shall be preserved.

**Work of valleys shall be executed as under :**

Iron sheet 1200 mm wide and 1.25mm thick shall be used for valleys. The sheet shall be about 450mm under tiles on either side in depth of 100 mm at center. The sheet carried 75 mm into the wall and set with cement mortar unless flashing is specified. The any, on the slope shall be 300 mm. The sheet be laid over the reapers and nailed. Reapers 50 mm x 25 mm each shall be fixed over the galvanized iron sheet 150 mm away centre line of the valley on either side to keep the tiles and mortar from falling into of the valley.

The tiles shall be laid from the eaves towards the ridges after fitting of the reapers, the tiles resting full against the reapers. The joints of the hips and ridges tiles and also between them and the plain tiles shall be set in and well grouted with cement mortar and, mortar surface painted and finished off with a mixture of red paint with cement pigment colour. The finished slope of roof shall be uniform ridges to eaves. The eaves line shall be straight, horizontal and parallel to each other. The over gables shall be protected borders and neatly finished. Side of valleys and for 230 mm on either side of the roof at valleys, thick cement plastering in C.M. 1:3 shall be done to prevent the rain water from the gutter leaking by the side of eaves, wind tile shall be placed over the ends of the last tiles and secured by means of iron washers and screws in the ridges and not in the gutter of the tiles, where full not necessary, half tiles manufactured for the purpose shall be used.

**Mode of measurement & payment:**

The measurements of the roof shall be taken for finished work for superficial area flat in the plane of the roof and not girthed. Laps shall not be measured.

No deduction in measurements of roof shall be made for openings at area upto 0.40 sq.mt. nor shall any extra be paid for labour and wastage in forming such openings.

The rate includes the cost of all materials and labour including ridges hips, eaves and battens. The rate shall be for a unit of one sq. meter.

**36[22.55] Providing and replacing chemically treated and well-seasoned non teak wood purlins or rafters or any part of purlins or rafters any size as per site requirement. Rate inclusive of cost of repairing of old broken purlins or rafters and refixing the same or replacing & providing, fixing new purlins, rafters by using nails etc. in wall with cement concrete 1:2:4. Rate inclusive of all labour and materials and cost of repairing of purlins or rafters for all floor.**

**Material :**

Non teakwood shall conform to M-23.

Non teak wood shall be chemically treated and well-seasoned. The face of the purlin / rafter in contact with the wall shall be painted with coat-tar.

Rate inclusive of all cost of labour for removing the old reapers / purlins or any part of and replacing the new

reapers / purlins.

Reapers / purlins shall be fixed on wall in C.C. 1:2:4.

Rate also inclusive of all cost of labour and material required for providing, repairing and replacing of the reapers/ purlins in well finished condition etc. completed. Rate shall be per cum. of wood actually used.

**37[22.56] Providing ridges or hips 600 mm overall in plain G.I. sheets fixed with G.I. "J" or "L" hooks bolts and nuts 8 mm dia. G.I. limpet and bitumen washer etc. complete 0.80 mm thick sheet.**

#### **1.0 Materials :**

1.1 The G.I. gutters and ridges shall be confirm to M-23A.

#### **2.0 Workmanship :**

2.1 The relevant specification of item no. shall be followed except that the work shall be carried out for ridges or hips. The overlaps for laps for ridges and hips on either side over the C.G.I. sheet and legs shall be minimum 225 mm width of the ridges and hips shall be described in the item.

2.2 Ridges shall be fixed to the purlins with same 8 mm dia. G.I. hook bolts and nuts and bitumen and

G.I. limpet washers, which fix the sheet for the purlins. Hips shall be fixed to the roof members with the same 8 mm dia. G.I. hook bolts and nuts and bitumen and G.I. limpet washers which fixed the sheet. At least one of the fixing bolts shall pass through the end laps of the ridges and hips on other sides. If this is not possible, extra hook bolt shall be provided. End laps of ridges and hips shall be jointed together by galvanized iron seam bolts and G.I. washers. There shall be at least two such bolts in each end lap.

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

3.1 The measurements of ridges or hips shall be taken for finished work in length along their center lines.

3.2 No laps shall be measured.

**38[22.57] cutting cut minor cracks of wall in V section making rectangular slots to insert key stone/brick at every 60 cm interval and grout it with cement and sand slurry in cm 1:2 mixed with non-shrinking binding agent and agent and plastering surface using chicken mesh of 18 cm wide strip.**

#### **Material:**

Water shall confirm to M-1. The cement plaster of proportion of 1:2 shall confirm to M-11. Non-shrinking binding agent shall be fabricated from FBR, flow grout – 40 or equivalent.

#### **Workmanship:**

The existing plaster along the cracks shall be scrapped off. After the cleaning the surface with the effected portion shall be sealed with using C.M. 1:2 with non-shrinking primer adhesive and using chicken mesh as directed by engineer in charge.

Make sure that surface shall be properly repaired with nearby using plaster in space & then after a cutting compound on it and leave the surface for 48 hours to check whether fresh cracks are developed or not.

#### **Mode of measurement and payment:**

The rate shall be for a unit of one running meter length of finished cracks.

**39[22.58] Providing and fixing non teak wood new door/window shutter or styles and rails or panels as directed by Engineer in charge.**

#### **1.0 Materials**

Non teak wood shall confirm to M-23.

#### **1.1 Method**

The non teak wood shall be chemically treated and well seasoned as per I.S Specification and of good quality. For this purpose non teak wood or any other wood conforming to class 'C' of table 1 page 6 as per I.S 1003( part1) 2003 (Reaffirmed 2013) or its relevant & latest edition as approved by GSPHCL shall be used. The non teak wood shall be free from large, loose, dead knots, flaws, warps, bends or any other defects. It shall be uniform in substances and of straight fibers as far as possible. It shall be free from rots,

decay, harmful fungi and other defects of nature which will effect the strength, durability or its usefulness for the purpose for which it is required. The color of wood shall be uniform as far as possible. The planks etc. shall be sawn in straight lines and planes in the direction of grain and shall be uniform thickness. The agency shall produce certificate from forest Department in the event of dispute and the decision of the corporation shall be final and binding. The tolerance in the dimension shall be allowed to 1.5 mm per face to be planed.

Code of practice for seasoning shall be as per IS 1141-1993 (Reaffirmed 2020) or its relevant & latest edition. Wood preservation for chemical treatment should be as per IS 401-2001 (Reaffirmed 2016) or its relevant & latest edition.

**Workmanship :**

Frame shall be removed for damaged portion.

New frame made from above method shall be fixed in place of damaged portion with necessary bolts, screws,

jali.

Frame shall be replaced fully / partly as per situation and as per direction of Engineer in charge. Joints of old frame and new frame shall be in uniform manner.

**Mode of measurement and payment :**

The rate shall include all the material and labour.

The rate shall be for a unit of sq. m.

**40[22.59]      Repairing of windows, door or cupboard shutters including removing old hinges and refixing of shutter with new hinges.**

1. Defective shutter due to expansion and contraction effect style panels and frame and rails to be opened and re-fixed in proper manner as per instruction of engineer in charge.
2. Any un-serviceable fixtures and fastenings in the shutter should be replaced properly by contractor. With all required procedure.
3. Adhesive materials, nails and screws etc. are used if required for repairing of shutters and cupboard shutters.
4. Completed item is measured on number basis.

**41[22.60]      Dewatering and cleaning of existing ST / soak well by machine and/or manual including disposing the sludge up to any lead and lifts and making septic tank/soak well clear as per instruction of Engineer in charge. Soak well/septic tank loaded with excessive sludge and other deposits or any other foreign matter shall be cleaned of all solid and liquid / semi liquid matter complete of all the sludge as described below.**

Cleaning of such sludge / foreign matter should be carried out in proper manner and sludge /foreign matter is disposed of immediately, so that no health nuisance is created within the premise. Sludge/Foreign matter shall be dispose off upto any leads and lifts as directed by Engineer in charge.

Disposal of such sludge / foreign matter should be carried out in such a manner that it should not affected the existing structure and should not damage septic tank / soak well or drainage lines etc.

**Mode of measurement and payment :**

Payment shall be made on number basis i.e. job work.

**42[22.61]      Providing & fixing S.S. 304 grade jali on nahni trap.**

S.S. 304 grade jali shall be of best quality. Size of jali is 15 cm x 15 cm. The S.S. jali shall be fixed over Nahni trap. Joint between s.s. jali and flooring is filled with white cement with required shade of pigment as per instruction of Engineer in Charge.

The rates includes cost of all labours, materials, tools and plants etc. required for satisfactory completion of this item.

The rate shall be for a unit of one number.

**43[22.62]      Removing and refixing grill from site including cutting, welding etc. complete.**

- 1.0 All materials and equipment needed for refixing of defective grill. Grill is fixed in a proper manner so it

function in well.

- 2.0 Any unserviceable fixtures like chaplas shall be replaced properly by contractor with all required procedure.
- 3.0 Nails, screws and other minor welding works should be of such a way that it can be work like originally fixed and as per direction by Engineer in charge.
- 4.0 Rates are also inclusive of removing and refixing in properly positioned with all necessary repairs works.
- 5.0 No payment shall be made for weight of chaplas, screws, bolts, nuts etc. of minor necessary materials.
- 6.0 Rates inclusive of applying one coat of zinc primer and two coats of oil paint on a repair part.
- 7.0 The rate shall be for a unit of Job work.

#### **44[22.63]      Repairing the damaged or spalled concrete for all R.C.C. members.**

Repairing the damaged or spalled concrete by opening concrete up to reinforcement, applying rust, removing treatment providing anti corrosive treatment to reinforcement, applying acrylic polymer based binding chemical for bound between old and new concrete with not shrink cementation grout, additional mixture with polypropylene fibre, curing with curing compound etc. complete.

The item involves repair work of cracked or deteriorated concrete of slab, lintel etc. R.C.C. members in the specified manner.

Step-1 Remove all loose concrete and expose reinforcing steel in the deteriorated region. Clean all dust, loose particles etc. with wire brush.

Step-2 Wherever reinforcing steel found rusted, rust removing chemical of approved make shall be applied in the manner prescribed by the manufacturer and rust removed.

Step-3 Anti corrosive chemical of approved make shall be applied and let it set for the time prescribed by the manufacturer.

Step-4 Acrylic polymer based binding chemical of approved make shall be applied in the manner prescribed by the manufacturer.

Step-5 Concrete shall be applied within half hour of application of binding chemical. If the thickness or finishing required is more than 25 mm, first a coat of concrete of 1 grit, ½ sand and 1 cement shall be applied up to 15mm deeper than finishing level and roughened with wire marks than after next day second coat of the necessary thickness shall be applied to finish the surface.

Step-6 Finishing shall be done with cement mortar 1:2 along with non-shrink grout admixture (fair add or equivalent) and polypropylene fibre at the rate of half kilogram shall be added in cement mortar. Finishing of the plaster shall be done by a skilled mason with great care so that the joint with old finishing is not easily visible. If necessary, the joint shall be rubbed smooth with emery stone. Curing shall be done by applying chemical curing compound after initial setting of the plaster. If curing compound is not applied at the same day the new plaster shall be soaked in water and then curing compound shall be applied when it is wet.

The item includes all the operations, labour, materials, chemicals, scaffolding etc. requiring for satisfactory completion of the item and shall be paid on sq.mt. Basis of work done.

#### **45[22.64]      Repairing the cracks in walls**

The item involves repairing of cracks in plaster or masonry of joints of plaster and masonry. It shall be carried out in the following manner.

Step-1 Surface crack should be opened in 'V' groove with to width of about 25mm to 35 mm.

Step-2 If the crack is visible in brick masonry or brick joints, the same shall be first filled by non shrink cementitious grout.

Step-3 If the crack is through the wall masonry and visible on the other side, crack shall be open in "V" groove, necessary length of the nipple to be provided in the crack at about 30cm intervals on both side of the wall than after all the cracks shall be filled by non shrink cementitious grout. Next day non shrink

cementitious grout shall be carried out by using pressure grouting pump from one side. Grouting shall be carried out till the cementing material flow out from the nipple from other side. Then nipple on both surface shall be cut and fill with necessary cementing material.

Step-5 Curing compound shall be applied after initial setting (between one and two hours). If curing compound applied much later, the repaired cracks shall be fully soaked and compound applied when wet. If necessary curing compound may have to be applied again approximate two to three days. If the joint is not finished properly, it may require rubbing by emery stone and finishing.

The item including all the above operations, labour, materials scaffolding curing etc. complete and shall be paid on running meter basis of work done. Where the crack is repaired on both two sides of wall, single side measurements shall be given.

#### **46[22.65] Providing & applying injection grouting of concrete.**

##### **MATERIAL :**

The materials for injection grouting shall be approved by the Engineer-in-charge.

##### **Surface preparation**

The final chipped off concrete surface and exposed reinforcement, if any, of the affected structural member should be cleaned off all loose and foreign materials by free air blast and then with water and allow it to dry. For the honey combed portion of the concrete or cracked concrete, drill holes at least 18 mm in diameter and depth up to 50 mm or half the member thickness whichever is less, at the required spacing, as directed by the Engineer-in-Charge. For cracked surface, open up cracks by making V notch or groove of size 12 mm X 12 mm as directed by the Engineer-in-Charge. Remove coarse debris and dust in opened up cracks and drilled holes by blowing air with hand operated blow out pump. Concrete surface required to be grouted shall be free from all loose and unsound material. The prepared surface should be clear of dust which could obstruct free flow of grout material and also impede its bonding with concrete surface. Saturate the concrete in vicinity of crack / honey combed concrete surface with water (but without excess water) only if the cement / polymer admixed grout is to be injected.

##### **Application:**

The emulsified acrylic polymer/SBR polymer shall be as specified and shall conform to Manufacturer's specification. The physical and mechanical properties of polymers shall conform to manufacturer's specification. One test shall be carried out mandatory for every lot of acrylic polymer/SBR polymer supplied at site, before use in the work. The grouting equipment shall be capable of supplying mixing, stirring and pumping grout to the satisfaction of Engineer-in-charge. It shall have capacity to inject grout at a pressure up to 7 kg / sq. cm measured at grout connections. It shall be capable of mixing and pumping the cement sand grout 1:2(1 cement: 2 sand) with water cement ratio ranging from 0.5 to 1.0. Wherever epoxy is to be used, the surface of the concrete shall be dried with air blast, before grouting or applying epoxy. The cement grout in proportion as directed by the Engineer-in-Charge shall be prepared. It should be lump free of creamy consistency, thoroughly blended and shall be continuously stirred to keep the cement particles in suspension to retain uniform consistency till grout is injected. In case of vertical cracks the injection shall be started at the lowest nipple and continued until the injected grout begins to flow out at the next higher nipple. The first nipple shall then be closed and injection continued from second until grout flows out at the third and so on. The process shall be repeated until the whole surface is treated. As soon as the system is cured, the nipples shall be suitably cut. In case of honey combed concrete, each grout hole shall be grouted individually. The sequence of injection shall be as per the directions of the Engineer-in-Charge.

##### **Mode of Measurement :**

The measurement of grout material shall be on the basis of actual weight of approved grout injected. Premeasurements of the quantities of such grouting materials brought at site and balance quantities remaining at the end of grouting application shall be recorded separately, which will determine the quantity of grout material actually injected. Adequate care is to be taken by the contractor as not to waste the grout. The quantity which can be consumed immediately within the prescribed time only shall be prepared in batches. The quantity of grout material

wasted, discarded, hardened shall not qualify for payment and shall be recorded for deduction at the end of each operation.

The rate shall include all the operation, labour, materials described above except injection nipple which will be paid in the relevant item.

The rate shall be for a unit of Kg. of actual grout material used.

- 47[22.66] Providing and fixing PVC Plain colour FALSE CEILING with grid type with aluminum frame consisting of 600mm x 600mm.3mm thick plain PVC sheet used as panel insert in a frame work made using anodizedaluminum "T" section of size 1" x 1"(25mm x 25mm 19 gauge or of 1 mm thick) in square pattern of grid sizes of 2" X 2" (600 X 600mm). The aluminum frame work is supported from the ceiling with the help of G.I. hook G.I. wire / 6mm M.S. rods of required sizes to maintain proper level etc. The allunimium frame work is supported on side wall with the used of alluminium "L" section of size 1" X 1" (25mm X 25mm) anglesetc. complete as per direction of Engineer in charge manufacture's specification & drawings.**

**Materials :-**

PVC Plain colour sheet

**Workmanship :-**

Fixing false ceiling PVC plain colour false ceiling with grid type with aluminum frame consisting of 600mm X 600mm with 3mm thick PVC sheet insert in anodized aluminum frame work with the help of

G.I. hook and G.I. wire / 6mm M.S rods by using following sections to supported on side wall.

Section "T" 1" X 1" (25 X 25mm 19 gauge or 1mm thick)

Section "L" 1" X 1" (25 X 25mm)

The rate quoted shall include the making necessary opening / outlets with required frame work in theceiling to fixing sheet. No separate payment shall be made to projections. Change in level up to 4.00mtrheight as per direction of engineer in charge. Manufacture's specification & drawings.

**Made of measurement :-**

The ceiling shall be measured in square meter in plan no extra payment shall be made for curved wallsor wastage due to partially used board. No deduction shall be made for cut outs.

- 48[22.67] Box cutting the road surface to proper slope and camber for making a base for road work including removing the excavated stuff and disposing on the road side slope as directed up to 50 Mt. lead.**

- 1) The land width required for the road way, gutters, side slopes and catch water gutters shall be cleared of all trees, having a girth of 30 cms. And less, loose stones, vegetation, bushes, stumps and all other objectionable materials. The roots of trees and slumps shall be removed to depth of 30 cms. Below the grade formation and slopes and excavation filled up to with excavated materials and compacted. All thematerials cleaned with the property of Government. Useful materials shall be arranged in convenientstacks along the road boundary or as directed places within 50 mts. lead and handed over to the department in convenient sections. Unsuitable materials shall be burnt or otherwise disposed off by the contractor at his own cost without causing any nuisance inconvenience or damaged to the work properly or people in the neighborhood.

If the materials disposed off outside the road land, necessary permission from the private landowners shall be taken by the contractor and royalty etc. if any paid by him without claiming compensation. In all the road land, necessary permission from the private land owners shall be taken by the contractor and royalty etc. if any paid by them without claiming compensation. In all the materials shall be disposed off in a neat manner.

- 2) After clearing the site, the alignment of the road shall be properly set out true to lines, curves

slopes, grades and sections as shown on the plans or directed by the Engineer in charge. The contractor shall provide all labour and materials such as lime, strings, pegs, nails, bamboos, stones, mortar, concrete etc. required for setting out, establishing bench marks and giving profiles. The contractor shall be responsible for maintaining the benchmarks, profiles, alignments and other stakes and marks, as long as they are required for the work in the opinion of the Engineer.

If the contractor defaults in this respect even after the reaction of the Engineer within the specified time the Engineer in charge at the cost of contractor may restore them. Levels and sections of the ground shall be taken and recorded in the presence of the contractor or his authorized representative before the excavation is started so as to serve as the basis of measurement. The contractor or his representatives shall sign the book in token of his acceptance of the levels etc.

If there is any disagreement the contractor of the levels etc. If there is any disagreement the contractor shall inform of it in writing to the officer concerned with the specific reference to the Sections before starting further work. Once the work is started no cognizance of any complaint shall be taken merely not signing of the book shall not be deemed as disagreement.

- 3) Profiles of the section including the road side gutters to be excavated shall be laid at suitable intervals of 10 m. to 50 m. or other intervals as directed by the Engineer in charge to conform to the curved or straight alignment, sections, grades and side slopes. The line outs shall be clearly marked and profiles of embankment where excavated materials are to be used shall be set up with the line marked on each side.
- 4) The roadway sections shall first be excavated with vertical side for each lift and the sides' slopes when the excavation reaches the road formation. The contractor shall on no account excavate beyond the slopes or below the specified grade unless or as directed by the Engineer in writing. If excavation is done below the specified level or outside the section, it shall not be paid for the contractor shall be required to fill up at his own such extra excavation in the road portion, with approved materials of the embankment grade in layers watered and fully compacted to all in maximum density laid down for the embankment in its relevant them. The Engineer may require measurement ridges and dead men to be left at specified intervals or placed and kept in tact till ordered to removed for the purpose of check. The excavation shall be finished neatly, smoothly and evenly to the correct lines, curves, graded sections and side slopes as shown on the plans or directed by the Engineer.

The sub grades if loose, shall be scarified, watered and compacted to the same density as the embankment. The section side slopes and catch water gutter shall be maintained by the contractor at his own cost in such a way that the formation and gutters will be well drained by providing necessary diversions etc. and not damaged due to obstructions of any drainage. Necessary passages shall be provided for leading away seepage, springs, and surfaces flow or rainwater safely without damaging the work. If any damage occur due to default of the contractor in this respect the same shall make good the damage at his own cost, it is in necessary in the execution of the work to interrupt existing surface drainage, irrigation channels, sewers or under drainage, temporary arrangements shall be provided till such time as necessary.

The contractor at his own cost shall make good the interrupt drainage and sewer etc. unless separately provided in the tender. Any damage to the existing works or work in hand caused as a result of his operations or negligence shall be made good by the contractor at his own cost. Roadside gutters shall be excavated to the specified sections and shall be measured along with the main cutting in cubic meters.

- 5) If slides occur in the cutting they shall be removed as ordered by the Engineer. If finished slopes slide into the road way before the final acceptance of the work such slides shall be removed by the contractor and shall be paid for at the contract rate for the loss of excavation involved provided the slides are not due to negligence of the contractor. The classification of the materials in slides shall conform to its condition at the time of removal and payment made accordingly regardless of its prior

condition. Care shall be taken to see that excavation is arranged in a safe way so that there will be risk to the work or workman by slides falling materials, boulders and collapsing sides etc.

- 6) If there is traffic nearby or if there are town and villages in the neighborhood, barricades and or traffic signals shall be provided day and night for the duration of the work in such way as to prevent accidents. Warning signals shall be displaced at 7.0 Mt. from the danger point on both sides giving sufficient warning. If necessary, signalers shall be stationed at each end to regulate traffic where it is heavy. Measures shall be taken to see that the execution does not affect or damage adjoining structures or property. If there is damage to property, injury to workers, the members of the public animals etc., due to the negligence of the contractor, he will be responsible and liable to all the consequences including compensation.
- 7) All the excavated materials shall be property of Government. When the useful excavated materials is to be used in embankment within a lead of 200 meters and all lift it shall be directly deposited at the required location in specified layers. No handling or conveyance charges shall be paid if the material is temporarily deposited elsewhere and subsequently conveyed to site of deposition. The sequence of operations should be arranged properly. Materials required for items other than bank shall be arranged in neat stacks at convenient places without interfering with the drainage in any way.

If no Government lands is available but the excavated useful stuff is to be stacked temporarily before use under the same arrangement the contractor shall make his own arrangement for the stacking of this material temporarily on private land by paying rents etc. without claiming any compensation. Surplus material not required for use on embankment or unsuitable materials may be used of his own to uniformly widen embankment to flatten slopes and to fill low places in the road land if so permitted by the Engineer. Materials not required for use whatsoever may be disposed off by the contractor at his own cost in a manner approved by the Engineer. The excavated materials shall not be deposited within 8Mt. from top edge of slope or toe of the bank. The lead shall be measured from the junction point of cutting and embankment up to 200 Mt. on either side.

- 8) If the contractor does not wish to utilize the quantity of cutting within the specified lead for any reason then he may do the embankment work with the earth from other sources (except borrow pits) in length of the road where cutting stuff is to be utilized but in that case the full or part quantity of acceptable stuff for which payment is made or to be made will be deducted from the net quantity of earth work in the embankment arrived at within the chain age measured as above.
- 9) The contract rate shall be for a unit of one cubic meter for the strata mentioned in the working of the main of excavation acceptably complete, limited to the dimensions shown on the plans or as directed by the Engineer.

Excavation shall be measured in its original position by taking cross sections before the work starts and after it is entirely completed. The quantity shall be worked out by the average end area method. Where the classification of the strata changes, the contractor shall bring this to the notice of the Engineer, who will then verify any if necessary take levels for the changed strata for purpose of measurement.

#### **Embankment for Road.**

The earth to be used for embankment for the road shall be free from salt organic or other foreign matter. The selected earth shall be good yellow soil and shall be got approved from the Engineer-in-charge. In no case black cotton soil or similar expansive and shrinkable soil, shall be used. It shall be clean and free from all rubbish and perishable materials, stones or brick bats.

All clods of the earth shall be broken.

Contractor shall make his own arrangement at his own cost for land for borrowing selected earth. The stacking of material shall be done as directed by the Engineer-in-charge in such a way as not to interfere with any constructional activities and in proper stacks.

When excavated material is to be used only selected stuff got approved from the Engineer-in-

charge. It shall be stacked separately and shall comply with all the requirements of selected earth mentioned above.

For selected soil Maximum Dry Density (MDD) shall be in the range of 1850-2280 kg/Cum and Optimum Moisture Content (OMC) shall be in the range of 7 to 15%.

Earth shall be spread in a layer not exceeding 20 cm. Then water shall be sprinkle on each layer and each layer shall then be compacted by rolling with 8 to 10 tonnes power road roller and a sheep foot roller if required. The required amount of water shall be added during consolidation to keep the moisture content of the soil at the optimum as per test. The density to be achieved for each layer of the material shall not be less than 95% of the density obtained in the laboratory (Proctor Method).

In the case of earth work consolidated under optimum moisture conditions each layer of earth shall be carefully moistened to give field moisture content of about +1% to -2% of the optimum moisture content (OMC).

Each compacted layer shall be tested in the field for density and accepted before the operations for next layer are begun.

Control on compaction in the field shall be exercised through frequent moisture content and density determinations. A systematic record of these shall be maintained. At all times during construction the top of the embankment shall be maintained at such cross fall as will shed water and prevent ponding.

#### **Mode of measurement and payment**

The rate shall include all the operation, labour, materials and tools & plants etc. as described above.

The rate shall be for a unit of One Cu.m.

- 49[22.68] Providing and fixing solid PVC Flush Door shutter 24mm thick. made from Co-extruded three layer rigid PVC foam sheet(single Extruded) with density not less than 600kg/cbm outer layer (0.8-1mm)thick should be rigid PVC with density of not less than 1400kg/cbm. Door should be water proof, Termite proof, fire retardant & having good screw holding capacity(200 kgf). Providing and fixing 100% Solid Wood Plastic composite (WPC) Door Frame 90mmx45mm made from wood plastic composite(single Extruded Process)material with density 780kg/cbm. As per drawing as directed by the engineer in charge.**

#### **2 A1 Material:**

100%solid PVC Flush Door shutter 24mm thick. made from Co-extruded three layer rigid PVC foam sheet(single Extruded) with density not less than 600kg/cbm outer layer (0.8-1mm)thick should be rigid PVC with density of not less than 1400kg/cbm.

100% Solid Wood Plastic composite (WPC) Door Frame 90mmx45mm made from wood plastic composite (single Extruded Process) material with density 780kg/cbm.

#### **2 A2 Workmanship:**

Ontractor to check & verify all dimension before execution of the work.

Iron mongrey shall be alluminium anodised except but hinges, which shall be cold rolled M.S.

PVC sheet to be sealed on flush door with rubber based adhesive.

For fixing hinges on the stile pre drilled a hole of half the size of shaft, fitted screw then drive the screw. Do not hammer the screw.

PVC door frame shall be fixed to wall using 8/100mm long M.S. screw through the frame for using PVC fastners.

Colour of the PVC sheet to be finalized by Engineer in Charge.

#### **Accessory required for door**

- 1.Aldrop 300mm
- 2.Butt hinges 100mm long fixed with 30x6csk screw
- 3.Tower bolt 10th.100mm long fixed with 19x6 csk screw.
- 4.Handle 150mm long "D" type Fixed with 19x6 csk screw
- 5."L" shape bracket 150mm long(15x15 sc tube og 19guage)
6. Door frame fixing in wall with 100x8mmlong anchore fastners screw.

#### **2 A3 Mode of measurement of payment**

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

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

Measurement shall be in Sq.mt.

**50[22.69] Trimix RCC Road of Controlled C.C. M-300 using MS Channel of CC thickness on both side including applying screed Vibrator machine, dewatering system device and finished with float machine etc. complete.**

**Materials:**

Water confirm to M-1, Cement shall confirm to M-3, Sand shall confirm to M-6, Grit shall confirm to M-8 and stone aggregate shall confirm to M-12, Steel shall confirm to M-19.

**Steel Dowel Bars and Tie Bars**

These shall confirm to the requirements of IS 432-1982(Reaffirmed 2020) and IS 1786-2008(Reaffirmed 2018) as relevant. The dowel bars shall confirm to IS 432-1982(Reaffirmed 2020) of Grade I. Tie bars shall be Thermo- Mechanically Treated (TMT) bars confirming to IS 1786-2008(Reaffirmed 2018) and grade of Fe 500. If steel mesh is used, it shall confirm to IS 1566-1982 (Reaffirmed 2020). The steel shall be coated with appropriate anti-corrosive coating as per IS 13620-1993(Reaffirmed 2020).

**Temperature Reinforcement**

Whenever the steel bars are used as temperature, reinforcement bars, those shall be deformed TMT (Thermo Mechanically Treated) bars as per IS 1786-2008(Reaffirmed 2018) can be tied with binding wire to form the mesh. The size and spacing of bars depends on the design considerations, material properties and climatic condition of the region, but in any case the weight of the mesh shall not be less than 3.14 kg/m<sup>2</sup>. The steel mesh may be placed in the upper half of the slab between say 50-75 mm below the top surface and to be sufficiently above the dowel bars such as not to cause any interference to their movement.

**Materials for Joint Sealing**

**Joint Sealing**

The joint sealing compound shall be of hot poured, elastomeric type or cold polysulphide/polyurethane/silicon type having flexibility, durability and resistance to age hardening. Manufacturer's certificate shall be produced by the contractor for establishing that the sealant is not more than six months old and stating that the sealant complies with the relevant standard mentioned below.

The material for cold poured joint sealant shall conform to any one of the following:

Polysulphide	IS:11433(Part I)-1985(Reaffirmed 2020), BS:5212 (Part II)
Polyurethane	BS:5212
Silicon	ASTM D5893-04

If the sealant is of hot poured type, it shall conform to IS 1834-1984(Reaffirmed 2020) or ASTM: D 3406, as applicable. Hot poured joint sealing compound should not be heated above 180°C and also over long duration; both are not permitted as it will lose its properties due to overheating. Material once heated cannot be reheated again for use. Hence, the quantity of material to be heated should be such that it is used fully. The overheated or reheated material will be rejected. Therefore, quantity of sealing compound required for one operation of joint sealing work shall only be heated.

**Steel Forms**

All side forms shall be of mild steel. The steel forms shall be of M.S. Channel sections and their depth shall be equal to the thickness of the pavement.

The side forms shall have a length of at least 3.0 metres except on curves of less than 4.5 metres radius where shorter lengths may be used. When set to grade and stacked in place the maximum deviation of the top surface of any section from a straight line shall not exceed 3 mm. The method of connection between sections shall be such that the joint formed shall be free from play or movement in any direction. The use of bent, twisted or worn out forms shall not be permitted. At least three stake pockets for bracing pins or stakes shall be provided for each 3.0 M length of forms. Bracing and supports must be ample to prevent the springing of forms under pressure of concrete or weight or thrust of the machinery (like screed vibrator) operating on the forms. Support to the forms shall be sufficiently rigid to hold them in position during the entire operation of laying and compacting and finishing and that they shall not at any time deviate more than 3 mm from straight edge 3 metres in length. Forms which show a variation from the required rigidity of the alignment and levels shown on the plans shall be reset or removed as directed. The length and number of pins or stakes shall be such as to maintain the forms at the correct line and grade.

The supply of forms shall be sufficient to permit their remaining in place for at least 12 hrs. after the concrete has been placed or longer, if in the opinion of the Engineer-in-Charge, it is necessary.

The top line of the forms is not to vary from the correct level or alignment and the levels and alignment of the forms are to be checked and corrected as necessary immediately prior to the placing of concrete. The top edges and faces of the forms are to be carefully cleaned and maintained in clean condition.

While removing the steel forms, care shall be taken to withdraw them gradually, any damage to the bull nosed edges shall be made good while the concrete is still green.

#### **Workmanship:**

##### **Setting of Forms**

- (a) Setting of forms shall be according to the slab plan subject to the approval of Engineer-in-Charge and concreting shall not commence until the setting of forms is approved.
- (b) Forms shall be set for at least 50 metres in advance of the point where the concrete is being laid and shall not be removed until at least 12 hrs. of placing of the concrete or longer if in the opinion of Engineer-in-Charge is necessary.
- (c) After setting, the working faces shall be thoroughly oiled by using approved oil before concrete is placed against them.
- (d) The pavement joints of overlay layer would overlap with the joints of underlay cement concrete.

#### **JOINTS**

The location and type of joints shall be as shown in the drawings. Where semi-mechanized method of construction is used, the concrete along the face of all joints and around all tie bars and dowels shall be compacted with an internal vibrator inserted in the concrete and worked along the joint and around all tie bars and dowels to ensure a concrete free from honeycombing. It shall be ensured that vibrator should not contact the dowel bar, and the vibration operation does not misalign the dowels. In case of mechanized construction, working and their vibration/RPM of all the fixed vibrators shall be checked. There shall be two additional needle vibrators to compact the concrete near bulk head. Wherever, tie bars or dowel bars are inserted in the PQC/Trimix, proper marking on the projecting surface of DLC/PCC will help to cut the joint at proper location.

Initial cut or a slot of 2.5 to 5 mm wide and having a depth equal to one-third to one-fourth the depth of the PQC/Trimix slab at transverse and longitudinal joint is made as soon as the concrete sets. Normally, in summer when ambient temperature is more than 30°C initial cutting may be carried after 4-8 hours of laying and in winter when ambient temperature is less than 30°C, initial cut may be done at 8-12 hours of laying. In any case initial cut of all the transverse and longitudinal joints shall be completed within 24 hours to avoid the random cracking. Subsequent widening of joint groove will be done after 14-16 days of casting concrete pavements. No sealing of joints shall be undertaken before 21 days of construction. All joints shall be sealed using sealants and joints shall be sealed when grooves are dry and clean and free from foreign object or loose material. Alternatively, compression seals or solid seals can also be used to seal the joints after initial cut without widening with the permission of Engineer.

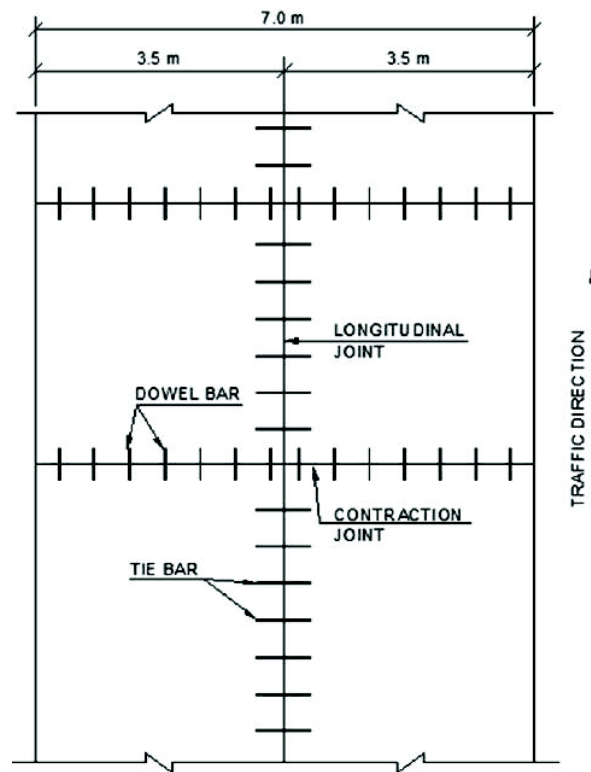
Joint cutting equipment which can be used to cut joint at the early age of concrete is called as early-entry saw. This is light weight equipment and has a plate on both sides of saw to keep concrete pressed at the location of saw cutting to basically control raveling. With use of early-entry joint cutting equipment, joints can be cut even earlier than that mentioned above using early-entry saw with the permission of the Engineer. Early-entry saw cutting are dry-cuts so their blades are designed for use without water for cooling. The depth of cut shall be minimum 10 per cent subject to 30 mm minimum.

#### **Types of Joints**

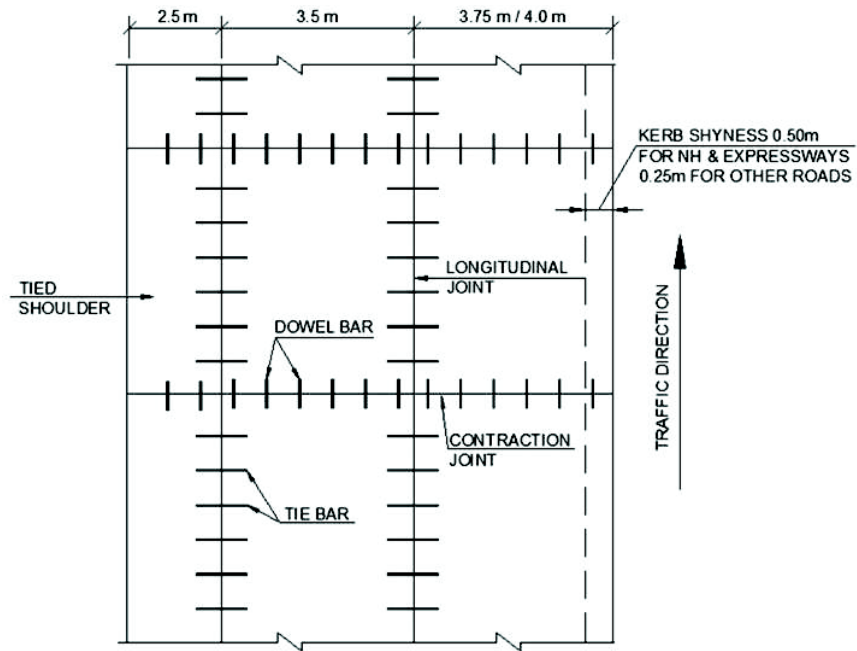
There are four types of joints (IRC:57). These are:

- (i) **Expansion joint:** Expansion joint provides the space into which pavement can expand thus relieving compressive stresses due to expansion and inhibiting any tendency towards buckling of concrete slabs.
- (ii) **Contraction joint:** Contraction joint relieves tensile stresses in the concrete and prevents formation of irregular cracks due to restraint in free contraction of concrete. Contraction joints also relieve stresses due to warping.
- (iii) **Longitudinal joint:** Longitudinal joint relieves stresses due to warping. These are commonly used for dividing the pavement into lanes when width of the slab becomes more than 4.5 m.
- (iv) **Construction Joint:** Construction joints are provided whenever day's construction operations start and stops/ends. These are full depth joints. Construction should be so planned that day's construction activity may end at the location of regular contraction joint. It may also be provided where paving stops for more than half an hour due to stoppage of work.

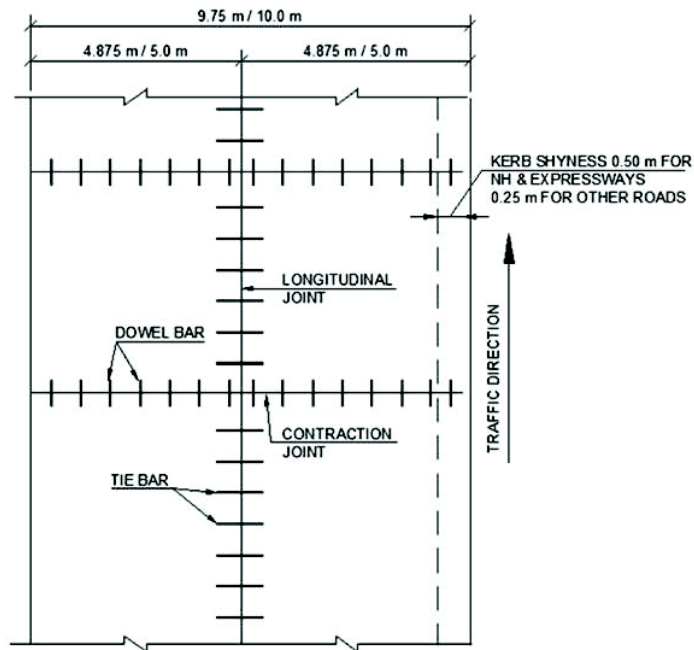
Figs. 2 to 5 show the location of contraction and longitudinal joints. All joints shall be carefully installed in accordance with the location and details given in the plans. The details of different types of joints, sealing groove, their plan, cross section etc., are shown in Figs. 6 to 10. For details IRC:57 may be referred.



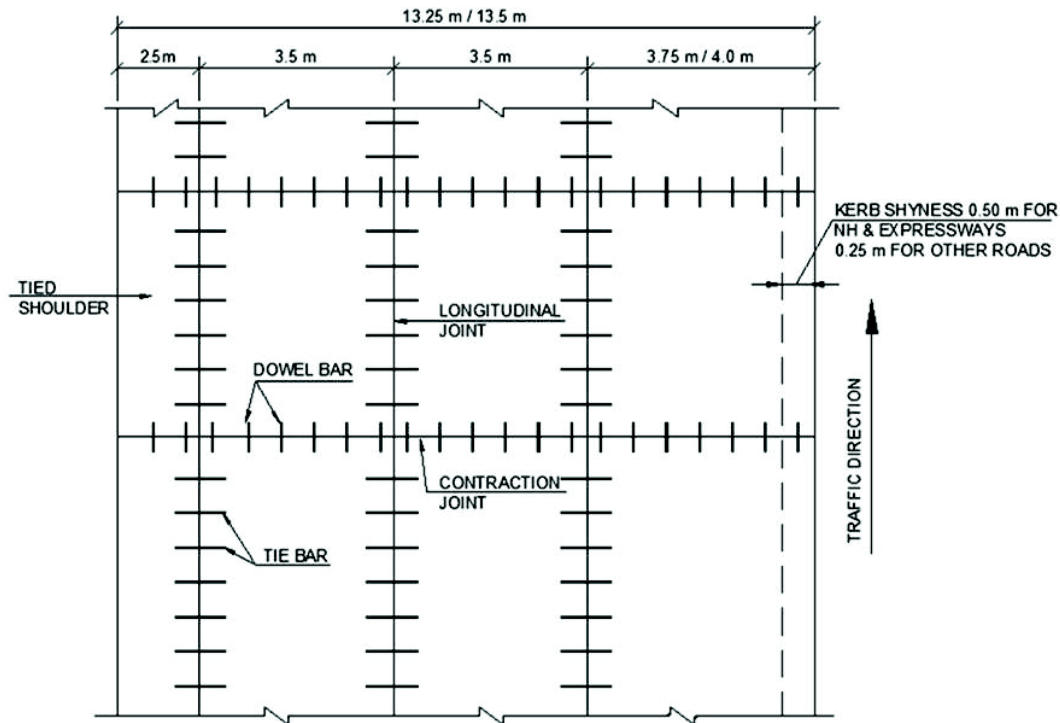
**Fig. 2: Joints Configuration of Two Lane Road without Tied Shoulder**



**Fig. 3 Joints Configuration for each Carriageway of Four Lane Divided Road with Tied Shoulder (Half Cross-Section)**



**Fig. 4 Alternate Joints Configuration for each Carriageway of Four Lane Divided Road (Half Cross-Section)**



**Fig. 5 Joints Configuration for each Carriageway of Six Lane Divided Road With Tied Shoulder (Half Cross-Section)**

### Contraction Joints

These shall be placed as shown on the drawing and shall be of the weakened plane of “dummy” groove type. The groove is formed preferably by a joint cutting saw. This groove is subsequently widened and sealed with sealant as shown in Figs. 6 to 10. Alternatively, in case of semi-mechanised construction and minor works, the slot may be formed in a manner approved by the Engineer-in-Charge, such as, by pushing into the concrete a flat bar or plastic strip or the web of a “T” bar using a suitable vibratory device, removing the bar subsequently, and keeping the slot open. It shall be ensured that no spalling of concrete occurs while removing the bar. Such manually formed grooves are found to affect the riding quality of the pavement.

### Construction Joints

These shall be formed whenever placing of concrete is suspended for more than 30 minutes. Excepting in the case of emergency, construction shall always be suspended at the regular site of expansion or contraction joint. If the construction joint is located at the site of an expansion joint, regular expansion joint shall be provided; if at the site of a contraction joint or otherwise, the construction joint shall be of butt type with dowels. In case of emergency the joints should be placed only in the middle third of the specified contraction joint interval or slab length.

At all construction joints, bulkhead shall be used to retain the concrete and care shall be taken in striking off and finishing the concrete surface to the top face of the bulkhead. When work is resumed, the surface of concrete laid subsequently, shall conform to the grade and cross-section of previously laid pavement, and a straight edge 3 m in length shall be used parallel to the centre line of pavement, to check any deviation in the surface of the two sections. Any deviation from the general surface in excess of 3 mm shall be corrected.

### General Requirements of Transverse Joints

#### Dowel Bars

Dowel bars shall be in accordance with details/dimensions as indicated in the drawing and free from

oil, dirt, loose rust or scale. These shall be coated with appropriate anti-corrosive coating as per IS 13620-1993(Reaffirmed 2020). Coated bars should be protected from scratching during handling, and should be manually recoated by epoxy or anti-corrosive paint wherever scratches are observed. For uniformity in thickness of coating, the coating done in factory environment is preferable. Coating shall be done within 4 hours of cleaning of bars from all rust. Cleaning is done by sand/shot blasting. They shall be straight, free of irregularities and burring restricting free movement in the concrete. The sliding ends shall be sawn or cropped cleanly with no protrusions outside the normal diameter of the bar. The dowel bar shall be supported on cradles/dowel chairs in pre-fabricated joint assemblies positioned prior to the construction of the slabs or mechanically inserted by a Dowel Bar Inserter (DBI) with vibration into the plastic concrete by a method which ensures correct placement of the bars besides full re- compaction of the concrete around the dowel bars.

Design of dowel bars has been given in IRC:58. The minimum length of dowel bar shall be 500 mm keeping in view the requirement of load transfer and placement errors. The diameter and spacing of dowels shall be designed as per IRC:58. The dowel bars shall be aligned parallel to the finished surface of the slab and to the centre line of the carriageway and to each other within tolerances as given hereunder:

- (a) Horizontal or vertical rotational alignment  $\leq 10$  mm
- (b) Longitudinal shift  $\leq 50$  mm
- (c) Depth of dowel bar: mid-depth  $\pm 25$  mm.

Dowel bars shall be covered by a thin plastic sheath for at least 60 per cent of the length from one end for dowel bars in contraction joints or half the length plus 50 mm for expansion joints. The sheath shall be tough, durable, smooth, slide fit, and of an average thickness not greater than 0.5 mm and shall have closed end. The sheathed bar shall comply with the following pull out test.

Four bars shall be taken at random from stock or without any special preparation shall be covered by sheaths as required. The ends of the dowel bars which have been sheathed shall be cast centrally into concrete specimens 150 x 150 x 600 mm, made of the same mix proportions to be used in the pavement, but with a maximum nominal aggregate size of 31.5 mm and cured in accordance with IS 516-1959 (Reaffirmed 2018). At 7 days a tensile load shall be applied to achieve a movement of the bar of at least 0.25 mm. The average bond stress to achieve this movement shall not be greater than 0.14 MPa.

For expansion joints, a closely fitting cap 100 mm long with closed end consisting of G1 pipe or stiff plastic of 2 mm thickness shall be placed over the sheathed end of each dowel bar. An expansion space at least equal in length to the thickness of the joint filler board shall be formed between the end of the cap and the end of the dowel bar by using compressible sponge. To block the entry of cement slurry between dowel and cap it may be taped all round.

**Table**  
**Recommended Dimensions of Dowel Bars (As per IRC 58-2015)**

Slab Thickness mm	Dowel Bar Details		
	Diameter, mm	Length, mm	Spacing, mm
200	25	360	300
230	30	400	300
250	32	450	300
280	36	450	300
300	38	500	300
350	38	500	300

### Longitudinal Joints

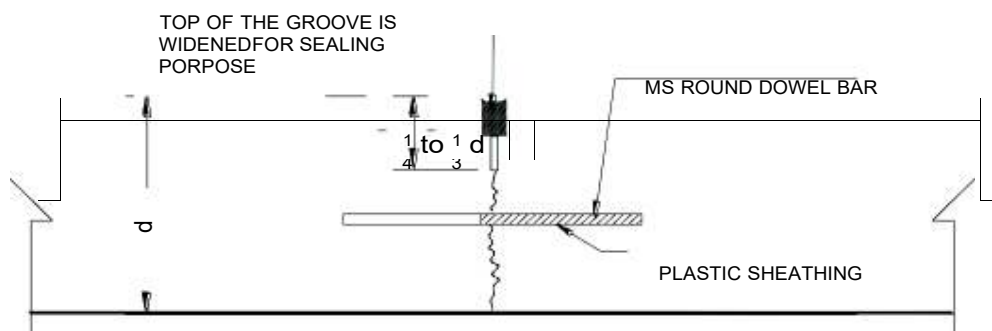
These joints are known as warping joints and can be formed by two different methods: (i) These can be of construction butt type formed by placing the concrete against the face of the slab cast earlier. The face of the slab cast earlier, shall be painted with bitumen before placing of fresh concrete. (ii) When a pavement of width of more than one lane is laid, the longitudinal joint may be cut by a joint cutting machine. In case of four lane divided road, when a two-lane carriageway (7.25/7.5 m wide) with tied shoulder (2.5 m wide) is laid using full width paver, then, two longitudinal saw cut joints shall

be provided- one between the inner and outer lane and the other between outer lane and tied concrete shoulder (Fig. 3). In place of two longitudinal joints, one longitudinal joint may also be provided in the centre of carriageway dividing the carriageway into two equal parts of 4.875/5.0 m width as per the design recommended by the designer (Fig. 4).

**Table**

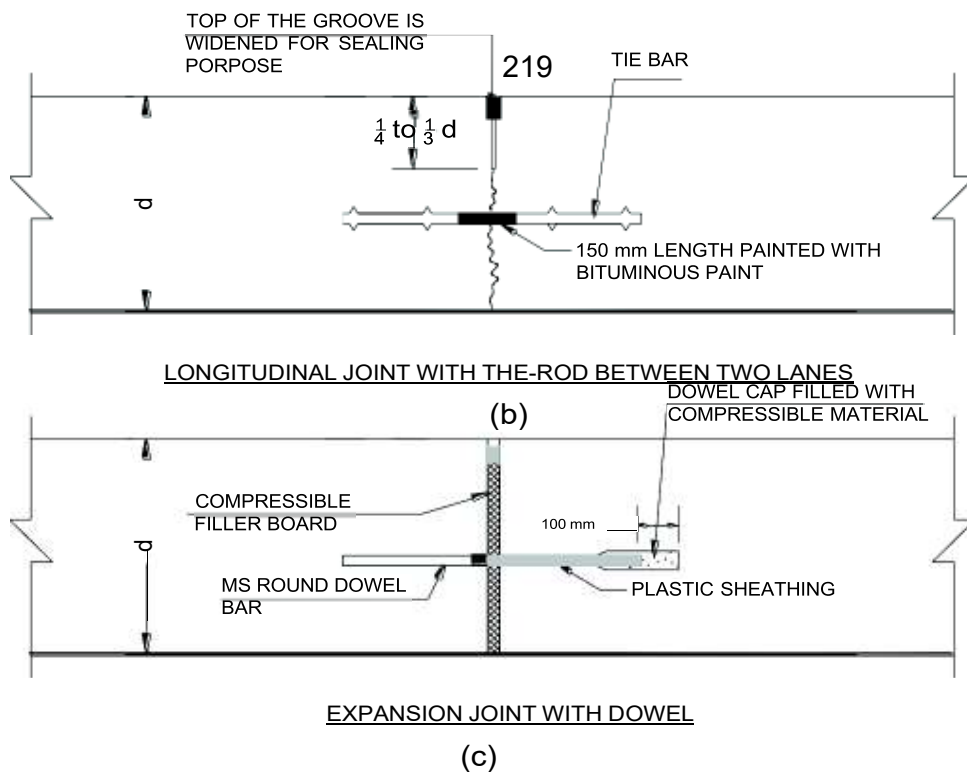
**Details of Tie Bars for Longitudinal Joint**

Slab Thickness mm	Tie Bar Details				
	Diameter (d) mm	Max. Spacing, mm		Minimum length, mm	
		Plain	Deformed	Plain	Deformed
150	8	330	530	440	480
	10	520	830	510	560
200	10	390	620	510	560
	12	560	900	580	640
250	12	450	720	580	640
300	12	370	600	580	640
	16	660	1060	720	800
350	12	320	510	580	640
	16	570	910	720	800



CONTRACTION JOINT WITH DOWEL BAR

(a)



**Fig. 7: Typical Cross – Section of Joints**

Note: Construction joint shall be same as contraction joint at (a) above with a butt type.

#### **Tie bars**

The bars shall be free from oil, dirt, loose rust and scale.

Tie bars are used across the longitudinal joints of concrete pavements to ensure firm contact between slab faces or to prevent abutting slabs from separating. Tie bars are not required for structural reasons, but their only function is to prevent separation of the slabs, especially at fills or curves. Tie bars are not designed to act as load transfer devices. Tie bars are designed to withstand tensile stresses only and provided at mid-depth.

Tie bars projecting across the longitudinal joint shall be protected from corrosion for 75 mm on each side of the joint by a protective coating of bituminous paint. The coating shall be dry when the tie bars are used.

Tie bars shall be laid automatically in a fully mechanized construction using slip form paver. For semi mechanized construction tie bars shall be made up into rigid assemblies with adequate supports and fixings to remain firmly in position during the construction of the slab. Alternatively, tie bars at longitudinal joints may be mechanically or manually inserted into the plastic concrete from top by vibration using tie bar inserter. This method ensures correct placement of the bars and re-compaction of the concrete around the tie bars. When the pavement is constructed in single lane width, tie rods are also inserted mechanically or manually from sides. During side insertion in fixed form paving these may be bent so that half-length remains along the form. After removal of forms, bars shall be straightened using hollow GI pipe so that they extend into the concrete placed on the other half of the concrete slab.

Tie bars shall be positioned to remain within the middle third of the slab depth but well below the proposed sawing depth as indicated in the Fig.7(b), normally parallel to the surface and perpendicular to the line of the joint, with the centre of each bar on the intended line of the joints within a tolerance of 50 mm, and with a minimum cover of 30 mm below the joint groove.

#### **Preparation of Joint Grooves for Sealing**

All grooves shall be cleaned of any dirt or loose material by air blowing with filtered, oil-free compressed air. If need arises, cleaning by pressurized water jets may be done depending upon the requirement of the sealant, the sides of the grooves may have to be sand blasted to increase the

bondage between sealant and concrete.

The groove shall be cleaned and dried at the time of priming and sealing.

### **Sealing with sealants**

When sealants are applied an appropriate primer shall also be used in accordance with the recommendation of the manufacturer. The sealant shall be applied within the minimum and maximum drying times of the primer. Priming and sealing with applied sealants shall not be carried out when the temperature of the pavement is below 7°C.

### **Placing of Concrete**

The Specification is followed as per IT. 19[5.8.2] Section 2 of General Specification booklet. Read controlled CC M-300 instead of M-200 and rate is including the cost of formwork.

Where semi-mechanized construction technique is adopted, concrete shall be deposited between the forms directly from head loads or wheel barrows. Where a certain amount of redistribution is necessary, it shall be done with shovels and not with rakes. The concrete shall be compacted with needle vibrators and vibrating screeds in semi-mechanized construction where a paver finisher is not available. Use of vibrator near side forms is essential to eliminate honey combing. To effect adequate compaction, the concrete shall be placed with appropriate surcharge over the final slab thickness. The amount of surcharge will depend on the mode of placement of concrete and shall be determined by trial. In general, the required surcharge is about 20 per cent of the required slab thickness. Any portion of the batch of concrete that becomes segregated while depositing it on sub-base shall be thoroughly mixed with the main body of the batch during the process of spreading. In case of unavoidable interruption, a full depth transverse joint shall be made at the point of stoppage of work provided the section on which the work has been suspended is about 2 to 3 m long.

### **Compaction**

Where semi-mechanized technique is adopted, compaction of the pavement shall be accomplished by a vibrating screed supplemented by plate/internal vibrators. For slabs of thickness more than 125 mm, vibrating screeds may be supplemented by needle vibrators. The vibrating screed shall rest on side forms. It shall be lowered vertically on to the concrete surface, evenly spread to the appropriate level above the base to provide the required surcharge for compaction; allowed to remain in position for a few seconds until compaction is complete, then lifted vertically and lowered to the adjacent strip of un-compacted concrete. The amplitude of vibration of the screed shall not be less than 1.5 mm and the speed of travel not more than 0.6 m per minute. The screed shall again be taken slowly over the surface, sliding with its axis slightly tilted away from the direction of sliding and the operation repeated until the required dense and closed surface is obtained. Compaction of concrete slabs up to 125 mm thickness may be done by means of vibrating screed alone. Even in the case of slabs of lower thickness, internal vibrators may be used with advantage of compacting the slab corners and edges. The working of the vibrators shall be regularly checked and stand by shall always be maintained for emergency use. Segregated particles of coarse aggregate which collect in front of the screed shall be discarded. Under no circumstances shall such segregated particles be carried forward and pushed on to the base in front of the mass. Compaction by screeding shall be carried on till the mortar in the mix just works up to the surface. Care shall be exercised and the operation of tamping so controlled as to prevent an excess of mortar and water from being worked on the top. Repeated operation other than to secure the necessary compaction and to eliminate voids shall be avoided. Immediately after the screening has been completed and before the concrete has hardened, i.e. while the concrete is still in the plastic stage, the surface shall be inspected for irregularities with a profile checking template and any needed correction made by adding or removing concrete followed by further compaction and finishing.

### **Floating**

As soon as practicable after the concrete has been compacted, its surface shall be smoothed by means of a longitudinal/skim float, operated from a foot-bridge. The longitudinal/skim float shall be worked with a sawing motion, while held in a floating position parallel to the carriageway centre line and passed gradually from one side of the pavement to the other. Movements ahead along the centre line of the carriageway shall be in successive advances of not more than one half the length of the float. This process may also be carried out in slip form or fixed form paving method.

Forms shall not be removed from freshly placed concrete until it has set, or at least 12 hours, whichever is later. They shall be carefully removed in such a manner that no damage is done to the edges of the pavement. After the forms have been removed, the slab edges shall be cleaned and any limited honey-combed areas pointed up with 1:4 cement and sand mortar, after which the sides of the slab shall be covered with wet hessian for curing. Slabs with excessive honey-combing as a result of inadequate compaction shall be removed up to the nearest transverse joints.

### **Brooming**

After belting and as soon as the surplus water, if any, has risen to the surface, the pavement shall be given a broom finish with an approved steel or fiber broom not less than 45 cm wide. The broom shall be pulled gently over the surface of the pavement from edge to edge. Adjacent strokes shall be slightly overlapped. Brooming shall be perpendicular to the centre line of the pavement and so executed that the corrugations formed shall be uniform in character and width and not more than 1.5 mm deep.

Brooming shall be completed before the concrete reaches such a stage that the surface is likely to be torn or unduly roughened by the operation. The broomed surface shall be free from porous or rough spots, irregularities, depressions, and small pockets such as may be caused by accidental disturbing of particles of coarse aggregates embodied near the surface. The brooming shall be of uniform pattern all through.

### **Honey Combing**

The side forms shall not be removed until 12 hours or such longer period as the Engineer- in-Charge may decide after the laying of concrete.

As soon as the side forms are removed, any minor honey combed area shall be filled with mortar composed of one part of cement and two parts of fine aggregate. Major honey combing areas or segregated concrete or other defective work or areas damaged by removal of the forms or concrete damaged by rain or due to any other reason whatsoever shall be considered as defective work and shall be removed and replaced by the contractor at his own expense. The total area of honey combed surface shall not exceed 4 per cent of the area of the slab side. However, no individual honeycomb patch shall exceed 0.1 sqm. Engineer-in-Charge's decision as to whether the concrete is defective or not shall be final and binding.

### **Surface Accuracy**

After the concrete has sufficiently hardened after about 12 hours and not later than 24 hours, the surface shall be tested again for high spots. All high spots shall be marked and those exceeding 3 mm shall be ground down immediately. Care shall be taken to see that the grinding does not in any way damage the concrete surface.

The final surface finish is to be such that when tested with a profilograph/roughness indicator/or a 3 metre long straight edge or an equivalent mechanical unevenness indicator placed anywhere within the same or adjoining slab in any direction on the surface, there shall be no variation greater than 3 mm.

If the surface irregularity exceeding 3 mm still remains despite grinding.

The concrete shall be removed to its full depth. The area of concrete to be removed shall be complete slab between the nearest joints, where the defective slab is less than 4.5 metres from the expansion joint, the whole area upto the expansion joint shall be removed to the full depth.

The concrete so removed shall not be reused in the work. Fresh concrete shall be laid in the manner already de-scribed in above paras and shall again be subject to test for surface accuracy and other quality control measures. Nothing extra shall be paid on this account.

Every slab shall bear an impression not exceeding 3 mm in depth comprising the number allotted to the slab and the date on which it is laid. This impression shall be formed by the contractor when the concrete is green so as to leave permanent mark on setting.

### **Initial Curing**

Immediately after completion of the finishing operations, the surface of the pavement shall be entirely covered with wetted burlap, cotton or jute mats. The mats used shall be of such length (or width) that as laid they shall extend at least 45 cm beyond the edges of the slab. The mats shall be placed so that the entire surface and both edges of the slab are completely covered. This covering shall be placed as soon as, in the judgment of the Engineer- in-Charge the concrete has set sufficiently to prevent damage to the surface prior to being placed, the mats shall be thoroughly saturated with water and shall be placed with the wettest side down. The mats shall be so placed and weighed down as to

cause them to remain in intimate contact with the surface covered, and the covering shall be maintained full wetted and in position for 24 hours after the concrete has been placed or until the concrete is sufficiently hard to be walked on without suffering damage. Water shall be gently sprayed so as to avoid damage to the fresh concrete. If it becomes necessary to remove a mat for any reason, the concrete slab shall not be exposed for a period of more than half an hour.

Worn burlap or burlap with holes shall not be permitted. Burlap reclaimed from previous use other than curing concrete shall be thoroughly washed prior to use for curing purposes. If burlap is obtained in strips, shall be laid to overlap by at least 150 mm.

Burlap shall be placed from suitable bridges. Walking on freshly laid concrete to facilitate placing burlap shall not be permitted.

### **Final Curing**

Upon the removal of the burlaps, the slab shall be thoroughly wetted and then cured as follows:-

All joints shall be filled with filler in order to prevent the edges of joints from getting damaged and entry of clay materials into the joints during final curing. Exposed edges of the slab shall be banked with a substantial berm of earth. Upon the slab shall then be laid a system of transverse and longitudinal dykes of clay about 50 mm high immediately covered with a blanket of sandy soil free from stones to prevent the drying up and cracking of clay. The rest of slab shall then be covered with sufficient sandy soil so as to produce a blanket of earth not less than 40 mm deep after wetting. The earth covering shall be thoroughly wetted while it is being placed on the surface and against the sides of the slab and kept thoroughly saturated with water for 21 days and thoroughly wetted down during the morning of the 22nd day and shall thereafter remain in place until the concrete has attained the required strength and permission is given by the Engineer-in-Charge. Thereafter the covering shall be removed and the pavement cleaned and swept. If the earth covering becomes displaced during the curing period, it shall be replaced to the original depth and resaturated.

### **Protection of Concrete**

Suitable barricades and sign boards shall be erected and maintained and watchmen employed to exclude traffic from the newly constructed pavement for the period wherein prescribed, and these barriers shall be so arranged as not in any way to interfere with or impede traffic on any lane intended to be kept open and necessary signs and lights shall be maintained clearly indicating any lanes open to the traffic. Where, as shown on the plans or indicated in the special provision, it is necessary to provide for traffic across the pavement suitable and substantial crossings to bridge over the concrete shall have to be provided. Such crossings, as constructed, shall be adequate for the traffic and approved by the Engineer.

Any part of the pavement damaged by traffic or other causes occurring prior to its final acceptance shall be repaired or replaced by contractor with his own expense in a manner satisfactory to the Engineer. The pavement shall be protected against all traffic usage including that of construction vehicles. Construction traffic may be allowed after 21 days of paving with written permission of the Engineer. However, it is preferable to open after 28 days of curing.

### **Tools & Equipment's :-**

#### **A. SURFACE VIBRATOR**

Beam Lengths (meters)	:	4.2 meters
Weights (Kgs)	:	41 Kgs.
Beam Spacing (mm)	:	300
Beam Height (mm)	:	100
Vibrator Unit	:	Electrically operated on 3 phase V,
415V, 50 Hz. A.C. Supply		
Power input (Watts)	:	450
Vibrator (Vib/min)	:	2860
Rated current (Amp.)	:	1.5
Centrifugal Force (N)	:	1350-4600
Weight (Kg)	:	19

#### **B. VACUUM PUMP**

Drive	:	Electrically operated on 3
Phase V, 415V, 50Hz.	:	A.C. Supply
Power (Kw)	:	4
Current (Amp)	:	7.5

Pump Capacity (Lit/Min)	:	1850
Max. Vacuum(mm Hg)	:	680(90%)
Overall Length (mm)	:	1300
Overall Width (With empty Tank):	:	125

C. **SUCTION MAT TOP COVER**

Length (Mt.)	:	6
Width (Mt.)	:	4
Weight (Kg)	:	31

D. **FILTER PAD**

Length / Pieces (Mt.)	:	3.8
Width (Mt.)	:	1.2
Weight (Kg)	:	4

E. **SKIM FLOATER**

Supply	:	3 Phase V, 415V, 50 Hz. A.C. Supply
Power (Kw)	:	2.1/1.8
Current (Amp.)	:	6/4
Motor Speed (rpm)	:	3000/1500
Final Speed (rpm)	:	115/57
Working Diameter (mm)	:	1000
Max. Reach (Meter)	:	3
Diameter of Floating Disc(mm)	:	985
Weight of Floating Disc(Kg)	:	16

**MODE OF MEASUREMENT :**

Above operation the rate shall be including all materials, formworks, machinery and labour charges etc. except dowel bars, making of joints filling with sealant.

The rate shall be for a unit of one cum.

**51[22.70] Providing and Applying water proofing layer of acrylic modified cementation composite coating system in two coats. 1<sup>st</sup> coat shall be acrylic polymer and cement and second coat shall be of acrylic polymer, cement and silica sand. The application of both the coats shall be as per manufacture's manual at any floor level including terrace.**

**1.0 Materials :**

Acrylic polymer liquid to produce (PMCC) polymer modified cementitious composite for waterproof coating. Cement shall conform to M.3 Water proofing material shall be used of CICO, Fairmate, Perma, Sika, Pidilite (Dr.fixit) as per manufacturer's specifications.

**2.0 Workmanship :**

- 2.1 Workmanship shall be as per manufacturer's specifications and recommendations. However, following steps shall be followed for workmanship.
- 2.2 The surface of the slab should be roughened by scrapping when the slab concrete is still green, however, the surface need not be hacked. In case the slab is already cast and surface fairly finished, the same shall be cleaned neatly of all mortar droppings, loose materials etc. with brooms/cloth prior to application of 1st coat.
- 2.3 Application of 1st coat of acrylic polymer modified cementitious slurry with cement. The recommended ratio is 100 parts of OPC 50 parts of acrylic polymer liquid or it is as recommended by manufacture placed on the surface to be treated after wetting the surface to saturation but without any free water. 2nd coat of acrylic polymer modified cementitious slurry with cement and silica sand, brush topping over 1st coat. Curing is required for minimum 4 days. Curing shall be start next day after application of 2<sup>nd</sup> coat.

**3.0 Mode of measurement and payment.**

- 3.1 The rate shall include the cost of materials and labours involved in the operations.
- 3.2 Rate shall be inclusive of all T & P, scaffolding as required to workman like manner.
- 3.3 Rate shall be for all floor and at any height.
- 3.4 The rate shall be for a unit of one sq. m.

**52[22.71] Providing, supplying & mixing plasticizers in all concrete items.**

### 1.0 Materials :

These are used as water-reducing agents, so that for a given workability, the water-cement ratio can be reduced to achieve a higher strength as compared to mix without the additive. The components of water-reducing admixtures are surface-active agents, which alter the physico-chemical forces at the interface between two phases. The agents are adsorbed on the surface of the cement particles, which gives them a negative charge, which cause mutual repulsion, leading to their dispersal. Even air bubbles are repelled and cannot attach themselves to the cement particles. The negative charge causes a sheath of oriented water molecules around each particle which separates them. The water, free from the flocculated system, is thus available to lubricate the mix, thereby increasing its workability. The decrease in mixing water varies between 20 and 25 per cent in case of superplasticizers and up to 40 per cent in case of PCE based HRWRA, and depends on the cement content, aggregate type, presence of pozzolana or admixture etc. Trial mixes should be made to ensure desired workability at paving site. The water/cement ratio shall however, not be less than 0.25. The Admixture used shall conform to below Table.

**Table  
Uniformity Tests and Requirement**

S. No.	Property	As per IS 9103-1999 (Reaffirmed 2018)
1	Chloride ion content (% by mass as Cl)	Within 10% of the value or within 0.2% whichever is greater as stated by the manufacturer and determined as per IS:6925
2	Relative Density	Within $\pm 0.02$ of the value stated by the manufacturer
3	pH value	7-8
4	Dry Material Content (DMC) (% by mass) at 105 $\pm$ 2oC)	0.97T < DMC < 1.03T T- manufacturer's stated value, DMC test Result
5	Ash Content (AC) ( % by mass at 600 $\pm$ 10oC)	0.99T < AC < 1.01T T- manufacturer's stated value, AC test Result

Plasticizer/ water reducing agent shall be as per approved make list of GSPHCL.

### 2.0 Workmanship :

- 2.1 Workmanship shall be as per manufacturer's specifications and recommendations.
- 2.2 Quantity of plasticizer shall be use in concerned grade of concrete as mention in mix design for concerned grade of concrete.

### 3.0 Mode of measurement & payments :

- 3.1 The rate shall include the cost of material and labour involved in the operations described under workmanship.
- 3.2 The payment shall be for a unit of Liter basis.

### 53[22.72] Providing Supplying and fixing alluminium section for Door , Windows and ventilator .

#### Material : -

#### Aluminium Sections

Aluminium sections used for fixed/openable windows, ventilators, partitions, frame work & doors etc. shall be suitable for use to meet architectural designs to relevant works and shall be subject to approval of the Engineer-in- Charge for technical, structural, functional and visual considerations. The aluminium extruded sections shall conform to IS 733-1983 (Reaffirmed 2017) and IS 1285-2002 (Reaffirmed 2017) for chemical composition and mechanical properties. The stainless steel screws shall be of grade AISI 304.

The permissible dimensional tolerances of the extruded sections shall be as per IS 6477-1983 (Reaffirmed 2021) and shall be such as not to impair the proper and smooth functioning/operation and appearance of door and windows.

Aluminium glazed doors, windows etc. shall be of sizes, sections and details as shown in the drawings. The details shown in the drawings may be varied slightly to suit the standards adopted by the manufacturers of the aluminium work, with the approval of Engineer-in-Charge. Before proceeding with any fabrication work, the contractor shall prepare and submit, complete fabrication and installation drawings for each type of glazing doors, windows, ventilators and partition etc. for the approval of the Engineer-in- Charge. If the sections are varied, the contractor shall obtain prior approval of Engineer-in-Charge and nothing extra shall be paid on this account.

**Anodising**

Standard aluminium extrusion sections are manufactured in various sizes and shapes in wide range of solid and hollow profiles with different functional shapes for architectural, structural glazing, curtain walls, doors, window & ventilators and various other purposes. The anodizing of these products is required to be done before the fabrication work by anodizing/electro coating plants which ensures uniform coating in uniform colour and shades. The extrusions are anodized up to 30 micron in different colours. The anodized extrusions are tested regularly under strict quality control adhering to Indian Standard.

**Tinted Float Glass**

The glass shall be clear tinted float glass and should be approved by the Engineer in Charge. It shall be clear, float transparent and free from cracks subject to allowable defects. The Tinted float glass shall conform to the IS 14900-2018.

**Thickness :**

The thickness of float glass shall depend on the size of panel. The tolerance in thickness shall be as under:

**TABLE**

Nominal Thickness (in mm )	Tolerance (in mm )
4.0	± 0.3
5.0	± 0.3
6.0	± 0.3
8.0	± 0.6

**Thickness:**

The thickness of float glass shall be measured with micrometers or a caliper which is graduated to 0.01 mm or with a measuring instrument having an equivalent capacity.

**EPDM- GASKETS**

The EPDM Gaskets shall be of size and profile as shown in drawings and as called for, to render the glazing, doors, windows, ventilators etc. air and water tight. Samples of gaskets shall be submitted for approval and the EPDM gasket approved by Engineer-in- Charge shall only be used. The contractor shall submit documentary proof of using the above material in the work to the entire satisfaction of Engineer-in-Charge.

The EPDM gasket shall meet the requirements as given in Table below:

**TABLE**

Sl. No.	Description	Standard Follow	Specification
1	Tensile strength Kg.f/cm <sup>2</sup>	ASTM-D 412	70 Min.
2	Elongation at break %	ASTM-D 412	250 Min.
3	Modulus 100% Kg.f/cm <sup>2</sup>	ASTM-D 412	22 Min.
4	Compression set % at 0° CC 22 Hrs.	ASTM-D 395	50 Max.
5	Ozone resistance	ASTM-D 1149	No visible cracks

**SEALANT**

The sealants of approved grade and colour shall only be used. The silicone for perimeter joints (between Aluminium section and RCC/Stone masonry) shall be of make approved by the Engineer in Charge.

**Workmanship****Frame Work**

First of all the shop drawings for each type of doors/windows/ventilators etc. shall be prepared by using suitable sections based on architectural drawings, adequate to meet the requirement/ specifications and by taking into consideration varying profiles of aluminium sections being extruded by approved manufacturers. The shop drawings shall show full size sections of glazed doors, windows, ventilators

etc. The shop drawings shall also show the details of fittings and joints. Before start of the work, all the shop drawings shall be got approved from the Engineer-in-Charge.

Actual measurement of openings left at site for different type of door/window etc. shall be taken. The fabrication of the individual door/windows/ventilators etc. shall be done as per the actual sizes of the opening left at site. The frames shall be truly rectangular and flat with regular shape corners fabricated to true right angles. The frames shall be fabricated out of section which have been cut to length, mitered and jointed mechanically using appropriate machines. Mitered joints shall be corner crimped or fixed with self-tapping stainless steel screws using extruded aluminium cleats of required length and profile. All aluminium work shall provide for replacing damaged/broken glass panes without having to remove or damage any member of exterior finishing material.

### **Fixing of Frames**

The holes in concrete/masonry/wood/any other members for fixing anchor bolts/fasteners/screws shall be drilled with an appropriate electric drill. Windows/doors/ventilators etc. shall be placed in correct final position in the opening and fixed to Sal wood backing using stainless steel screws of star headed, counter sunk and matching size groove. of required size at spacing not more than 250 mm c/c or dash fastener. All joints shall be sealed with approved silicone sealants.

In the case of composite windows and doors, the different units are to be assembled first. The assembled composite units shall be checked for line, level and plumb before final fixing is done. Engineer-in-Charge in his sole discretion may allow the units to be assembled in their final location if the situation so warrants. Snap beadings and EPDM gasket shall be fixed as per the detail shown in the shop drawings.

Where aluminium comes into contact with stone masonry, brick work, concrete, plaster or dissimilar metal, it shall be coated with an approved insulation lacquer, paint or plastic tape to ensure that electrochemical corrosion is avoided. Insulation material shall be trimmed off to a clean flush line on completion.

The contractor shall be responsible for the doors, windows etc. being set straight, plumb, level and for their satisfactory operation after fixing is complete.

### **Method of Application**

**Surface Preparation :** Clean all joints and glazing pockets by removing all foreign matter and contaminants such as grease, oil, dust, water, frost, surface dirt, old sealants or glazing compounds and protective coatings.

### **Masking**

Areas adjacent to joints shall be masked to ensure neat sealant lines. Masking tape shall not be allowed to touch clean surfaces to which the silicone sealant is to adhere. Tooling shall be completed in one continuous stroke immediately after sealant application and before a skin forms and masking shall be removed immediately after tooling.

### **Application**

Install backer rod of appropriate size and apply silicone sealant in a continuous operation using a positive pressure adequate to properly fill and seal the joint. The silicone sealant shall be tooled with light pressure to spread the sealant against backing material and the joint surfaces before a skin forms. A tool with convex profile shall be used to keep the sealant within the joint. Soap or water shall not be used as a tooling aid. Remove masking tape as soon as silicone joint is tooled.

**Tolerance:** A tolerance of + 3 mm shall be allowed in the width of silicone joints. The depth of the joints at throat shall not be less than 6 mm.

All members shall be accurately machined and fitted to form hairlines jointed prior to assembly.

The PVC wrapping protecting the anodized finish shall be retained and all work connection with installation of doors/ windows is complete.

All aluminum work shall be washed clean with a suitable thinner and left in a finished condition in approved uniform appearance and free from all marks and blemished. The contractor shall execute the work carefully to ensure that the finished work on external walls are not damaged in the event the said finished work are damaged they

shall be good by the contractor at his cost.

The materials for alluminium window / ventilator louvers shall be of extruded alluminium section of size as specified with 15 microns anodized coating 4 mm thick Tinted float glass special gaskets EPDM quality for weather tightening with silicon sealant compound.

[A]	Two track Bottom Section	:	20830
[B]	Two track top and side section	:	20829
[C]	Handle section	:	20738
[D]	Interlock	:	20737
[E]	Shutter top bottom section	:	20736
With all necessary fixtures and			

fasteners, **Workman ship :**

Alluminium alloy and finished certificates,

Contractor shall have to provide certificates from the extruded regarding alloy and certificate of the anodized finishing indicating micron thickness from the anodized. Contractor shall submit shop drawing (showing a fabricating details) to the client / Architect for the approval in advance of commencement of work for which decision of Superintending Engineer shall be final.

The weight of section given in the tender is minimum required weight and if the agency offers alternate section which have higher weight then used for such excess weight of section ,nothing extra shall be paid.

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

The rate shall include all cost of material and labour involved in the operations described in the item.

The payment shall for a unit of one Square meter.

**54[22.73] Supplying and filling rubbles including hand packing for dry stone pitching 15 cm. thick including preparing the surface etc. complete.**

#### **Material**

1.0 Rubble stone shall confirm to M-16, Sand shall confirm to M-6.

#### **2.0 Workmanship**

The relevant specification item no.4.12 of tender specification shall be followed except the Rubble stone shall be filled in foundation or plinth 15 cms. Layers including filling voids with rubble chips and sand including watering, ramming, consolidation etc., complete.

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

The relevant specification of item no. 4.12 of tender specification shall be followed.

The rates includes all cost of material, labour and tools & plants required for filling in trenches and plinths etc. complete. The thickness shall be measured of compacted layer.

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

**55[22.74] Labour charges for fixing 40mm thick fully panelled double shutter provided hinges doors, including Indian teak wood frame of size 15cm x 10cm or any other size supplied by the corporation styles and top rails 15cm wide bottom rail 20cm wide, middle rail shall be 25cm wide intermediate rails and indian teak wooden panel shall be as per drawing supplied by the Engineer - in Charge. Rates also inclusive of providing and fixing 4 Nos. of brass pivoted hinges as per detail drawings supplied by Engineer in charge. Rates are also inclusive of following fixture and fastening (1) 4 Nos. of brass hinges pivoted type size as per detail drawings (2) 2 Nos. of brass aldop of size 300mm x 18mm of decorative type (3) 4 Nos. brass handle of size 20cm long decorative type. (4) 2 Nos. of brass door holder of 7.5cm long (5) 2 Nos. brass tower bolt of size 200mm long. Rate are also inclusive of primer coat and lapi coat to get smoothness and line level upto satisfaction of Engineer in charge. Rates are also inclusive of two coat of oil paint or polishing with french polish to give even shade including cleaning the surface of all dirt & dust and sand papers smooth & including a coat of wooden filler all the work done as per drawing and upto the satisfaction Engineer in charge. Rates are also inclusive of providing and fixing 6 Nos. of M.S. flat hold fast of size 15cm long 25mm wide and 6mm thick as per drawing supplied by Engineer in charge. (For MAIN ENTRANCE DOOR)**

**MATERIAL :**

Iron hold fast confirm to M-29, all brass fittings shall be approved by Engineer in charge. Paints confirm to M-30. French polish of required tint and shade shall be prepared with denatured spirit of approved quality, chandres, shellac and pigment. The French polish confirm to I.S. 348-1968 (Reaffirmed 2019).

**FRENCH SPIRIT POLISHING**

Pure shellac conforming to IS 16 varying from pale orange to lemon yellow colour, free from resin or dirt shall be dissolved in methylated spirit at the rate of 140 gm of shellac to 1 litre of spirit. Suitable pigment shall be added to get the required shade. Ready made polish conforming to IS 348 can also be used.

**Polishing New Surface****Preparation of Surface :**

The surface shall be cleaned. All unevenness shall be rubbed down smooth with sand paper and well dusted. Knots if visible shall be covered with a preparation of red lead and glue size laid on while hot. Holes and indentations on the surface shall be stopped with glazier's putty. The surface shall then be given a coat of wood filler made by mixing whiting (ground chalk) in methylated spirit at the rate of 1.5 Kg of whiting per litre of spirit. The surface shall again be rubbed down perfectly smooth with glass paper and wiped clean.

**Application :**

The number of coats of polish to be applied shall be as described in the item.

A pad of woolen cloth covered by a fine cloth shall be used to apply the polish. The pad shall be moistened with the polish and rubbed hard on the wood, in a series of overlapping circles applying the mixture sparingly but uniformly over the entire area to give an even level surface. A trace of linseed oil on the face of the pad facilitates this operation. The surface shall be allowed to dry and the remaining coats applied in the same way. To finish off, the pad shall be covered with a fresh piece of clean fine cotton cloth slightly dampened with methylated spirit and rubbed lightly and quickly with circular motions. The finished surface shall have a uniform texture and high gloss.

**WORKMANSHIP :**

Teak wood frame and shutter shall be supplied by the Corporation. Minimum 3 Nos. of hold fast shall be fixed on each side of door frame. Size of hold fast shall be 15 cm long 25 cm wide and 6 mm thick made from M.S. plate with split end. The hold fast shall be fixed with screw to frames M.S. hold fast shall be protected with coating of paint. The surface of frame abutting the masonry or concrete face shall be properly treated by applying a coat of coal tar approved coating.

Doors and frames shall be stacked in proper manner as directed by Engineer in charge. Fixing of door frame and shutter shall be done in proper position on line level as per instruction given by Engineer in charge. Shutter shall be fixed by using pivoted hinges as per detailed working drawing supplied by Engineer in charge.

**Preparation of Surface for polishing:**

The surface shall be cleaned. All unevenness shall be rubbed down smooth with sand paper and well dusted. Knots if visible shall be covered with a preparation of red lead and glue size laid on while hot. Holes and indentations on the surface shall be stopped with glazier's putty. The surface shall then be given a coat of wood filler made by mixing whiting (ground chalk) in methylated spirit at the rate of 1.5 Kg of whiting per litre of spirit. The surface shall again be rubbed down perfectly smooth with glass paper and wiped clean.

**Application for polishing:**

The number of coats of polish to be applied shall be as described in the item.

A pad of woolen cloth covered by a fine cloth shall be used to apply the polish. The pad shall be moistened with the polish and rubbed hard on the wood, in a series of overlapping circles applying the mixture sparingly but uniformly over the entire area to give an even level surface. A trace of linseed oil on the face of the pad facilitates this operation. The surface shall be allowed to dry and the remaining coats applied in the same way. To finish off, the pad shall be covered with a fresh piece of clean fine cotton cloth slightly dampened with methylated spirit and rubbed lightly and quickly with circular motions. The finished surface shall have a uniform texture and high gloss.

**FIXTURES AND FASTENING:**

**Following fixtures and fastening shall be provided and fixing.**

**Hold fast:**

6 Nos. of size 150 mm x 25 mm x 6 mm thick made from M.S. plate with split end.

**Hinges: (brass) pivoted type**

4 Nos. of 100mm x 75mm x 3mm thick size as per details drawings.

**Aldrop: (brass)**

2 Nos. of size 300 mm long and 16 mm dia.

**Handle: (brass)**

2 Nos. per shutter of size 20 cm long.

**Tower bolt: brass**

2 Nos. of size 20 cm long and 10 mm dia.

**Door holder brass**

1 Nos. of size 7.5 cm long

#### **MODE OF MEASUREMNT AND PAYMENT :**

The rates include labour charges for fixing doors with frame. Cost of providing and fixing brass fixtures and fastening, iron hold fast, oil painting or french polishing. The measurement shall be taken out to out of frame in width and top of frame to floor finish in height.

The rate shall be paid per One Sq.mt. for the work done.

**56[22.75] LABOUR CHARGES FOR NON TEAK WOOD 10 x 7 CM size door frame including fixing 32mm wooden shutter to frame using butt hinges and screws including providing and fixing stainless steel fixture and fastening quality and providing primer coat of approved brand and two coats of oil paint over one coat of primer painting etc. complete as per drawing and specification (Fully paneled doors)**

#### **MATERIAL :**

Iron hold fast confirm to M-29, all stainless steel fittings shall be approved by Engineer in charge. Paints confirm to M-30.

#### **WORKMANSHIP :**

Teak wood frame and shutter shall be supplied by the Corporation. Minimum 3 Nos. of hold fast shall be fixed on each side of door frame. Size of hold fast shall be 15 cm long 25 mm wide and 6 mm thick made from M.S. plate with split end. The hold fast shall be fixed with screw to frames M.S. hold fast shall be protected with coating of oil paint. The surface of frame abutting the masonry or concrete face shall be properly treated by applying a coat of coal tar.

Doors and frames shall be stacked in proper manner as directed by Engineer in charge. Fixing of door frame and shutter shall be done in proper position on line level as per instruction given by Engineer in charge. Shutter shall be fixed by using pivoted hinges as per detailed working drawing supplied by Engineer in charge.

#### **FIXTURES AND FASTENING:**

**Following fixtures and fastening shall be provided and fixing.**

**Hold fast:**

Nos. of size 150 mm x 25 mm x 6 mm thick made from M.S. plate with split end.

**Hinges: (SS)**

3 Nos. of size 100mm x 75mm x 3mm thick.

**Aldrop: (SS for door)**

1 Nos. of size 250 mm long and 16 mm dia.

**Handle: (SS for door)**

2 Nos. per shutter of size 15 cm long.

**Tower bolt: (SS for door)**

1 Nos. of size 20 cm long and 10 mm dia.

**Tadi: (SS for door)**

1 Nos. of size 200 mm long and 12 mm thick.

**Painting:**

The wood work in contact with masonry shall be painted with two coats of coal tar and one coat of primer and two coat of synthetic enamel paint of specified shade as approved by the Engineer in charge shall be applied as detailed under:

The surface shall be well cleaned and rubbed with sand paper, holes, cracks, open joints and similar other defects in wood work shall be made good by filling them with appropriate putty one coat of primer as approved by Engineer in charge shall be applied over the surface prepared as above.

The primer coat shall be allowed to dry and the two coats of synthetic enamel paint of approved quality and type shall be applied. Each coat of paint shall be allowed to dry before laying of next coat. Finished surface shall not show any hair lines shabbiness and patches etc. if it is shown, it shall be made good as directed by Engineer in charge.

**MODE OF MEASUREMENT AND PAYMENT :**

The rates include labour charges for fixing doors with frame. Cost of providing and fixing Stainless Steel fixtures and fastening, iron hold fast, oil painting. The measurement shall be taken out to out of frame in width and top of frame to floor finish in height.

The rate shall be paid per One Sq.mt. for the work done.

**57[22.76] Providing and laying plantation including providing and fixing tree guard. Rates are also inclusive of maintaining the tree plant in live condition at the time of completion of work and handing over of treeplants. Tree to be planted well in time say at the time of excavation of the building i.e. initial starting time the tree shall be planted. Minimum height of Tree plant shall be 1.50 mt.**

**Materials: -**

Tree and pattern of tree – guard shall be as per direction of Engineer – In – Charge. Tree plant shall be minimum height of 1.5 mt. and of good quality. Quality & Selection of plants shall be as decided by Engineer- In-Charge. Plants shall be selected suiting to the local region.

**Mode of work: (Workmanship)**

A fresh tree with roots are planted at the time of excavation of main civil work (i.e. at the start of the project work ) at those places which are given in Layout /Architect drawing as per direction of Engineer– In – Charge. The tree plants shall be covered by the appropriate tree guards in such a manner to protect the same tree plant against animals. Supply & spreading of sufficient water and all other necessary materials like fertilizer, pesticides etc. which are required to growth the tree plants by the contractor without any extra cost. The design and pattern of tree guard shall be as per drawing or as directed by Engineer – In – Charge. The trees shall be maintained in a manner that the same trees remains in a live condition till the end of the project handed over to the beneficiary. No payment shall be given to the contractor for those tree guards which are not maintain proper and trees are not in the live condition till the original works handed over to the concern police department.

**Mode of Measurement: -**

The rate includes the cost of trees, tree gaurds, fertilizers, pesticides, labour, materials, painting of trees guards etc. complete.

The rate shall be for a unit of one no. basis.

**58[22.77] Providing and Fixing Sluice valve class I tested to 20kg/cm<sup>2</sup> for body and 10 kg/cm<sup>2</sup> for seat of ISI mark. Diameter & class of the sluice valve shall be as described in tender item.**

**Materials:**

Sluice valve of I.S.I make the dia. as specified in tender item. Sluice valve body shall be grew cost iron. It shall be without any short of wasp, knot and short of Sluice valve shall be painted with bitumen base paint. Sluice valve shall be of class – I type of 20kg/cm<sup>2</sup>.

The sluice valves are used in a pipe line for controlling or stopping flow of water. These shall be of specified size and class and shall be of inside non-raising screw type up to 300 mm size and raising or non-raising screw type above 300 mm with either double flange or double socket ends and cap or hand

wheel. These shall in all respects comply with the Indian Standard Specification IS 14846-2000(Reaffirmed 2020). Class I sluice valves are used for maximum working pressure of 10 Kg/sq.cm (100 metre head) and class II sluice valve for 15 Kg/sq.cm (150 metre head).

The body, domes covers, wedge gate and stuffing box shall be of good quality cast iron, the spindle of bronze, and the nut and valve seats of leaded tin bronze. The bodies, spindles and other parts shall be truly machined with surface smoothly finished. The area of the water way of the fittings shall be not less than the area equal to the nominal bore of the pipe.

The valve shall be marked with an arrow to show the direction of turn for closing of the valve.

#### **Workmanship:**

The valve shall be fully examined and cleared of all foreign matter before being fixed. The fixing of the valve shall be done by means of bolts, nuts and 3 mm rubber insertions or chemically treated compressed fiber board 1.5 mm minimum thickness and of weight not less than 0.183 gm./ sq.cm. with the flanges of spigot and the socketed tail pieces drilled to the same specification in case of S&S pipes and with flanges in case of flanged pipes. The tail pieces shall conform to IS 1938. These shall be jointed to the pipe line by means of lead caulked joints.

Necessary fitting materials such as nuts, bolts, flanges, rubber packing etc. shall be supplied by the contractor at his own cost.

On completion of jointing in pipe line alignment contractor shall have to give the testing of joints.

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

All rates are inclusive of all material, labour and tools & plants etc. charges.

The rates shall be unit of a number basis.

**59[22.78] Gypsum Ceiling Providing and fixing gypsum board ceiling as per manufactures' specifications incl. acrylic paint. Fixing of suspended gypsum plain false ceiling by using standard company section (GYPSTEEL ULTRA), which includes providing and fixing G.I. parameter channels of size 20 X 28 X 30 X 0.55 mm thick having one flange of 20 mm and another flange of nylon sleeves and screws at 610 mm center. Then suspending G.I intermediate channels of size 15 X 45 X 15mm, 0.9 mm thick fixed with two flanges of 15 mm each from the soffit at 1220 mm center with ceiling angle of width 25 mm x 10 mm x 0.55 mm thick fixed to soffit with G.I. cleat and steel expansion fasteners. Ceiling section of 0.55 mm. thickness having knurled web of 51 mm. and two flanges of 26 mm each with lips of 10.5 mm. area then fixed to the intermediate channel with the help of connecting clips and in direction perpendicular to the intermediated channel at 457 mm. center 12.5 mm tapered edge gypsum board (conforming to IS 2095-1982) is then screw fixed to ceiling section with 25 mm drywall screws at 230 mm center. Screws fixing is done mechanically either with screwdriver or drilling machine with suitable attachment. Standard company manufactured section (GYPSTEEL ULTRA) should be used for the entire framework. Finally the board are to be jointed and finished, so as to have a flush look which includes filling and finishing the tapered and square edges of the boards with jointing compound, paper tape and two coats of primer suitable for Gyp-board (as per recommended practices of India Gyproc - Saint Gobain make). (also including application of primer and preparing surface even & smooth by rubbing the sand paper, two coats of lapi...) Including two coats of plastic emulsion paint. Lapi, Primer and Plastic emulsion paint shall be as per approved make list of GSPHCL. Including all materials and labour etc. complete as per detail drawing and instruction of engineer-in charge.**

#### **Materials :**

Gypsum plaster board shall be confirm to IS 2095(Part-1)-2011 (Reaffirmed 2021), Thickness of the gypsum plaster board shall be as specified in tender item.

Make of Suspended G.I. section shall be as specified in tender item.

Plastic emulsion paint shall confirm to M-30.

#### **Workmanship:**

Suspended ceiling which include G.I. periphery channels of size 0.55 mm thick heaving one flange of 20mm and other flange of 30mm and a web of 28mm along with perimeter of ceiling screw fixed to the wall/ partition with help of nylon sleeves and screw at 610mm Centre, then suspending G.I. intermediate channels to size 45mm x 0.9mm thick with two flange of 15mm each from the slab at 1.220 center to soffits with G.I. cleat and steel expansion fasteners ceiling section of 0.55 mm thickness having knurled web of 40mm and two flanges of 35mm each with lips of 10.5 mm are then fixed to the intermediate channel at 457mm centers.

12mm thick gypsum calcium silicate tapered edge board is than screw fixing is done mechanically either with screw driver of drilling machine with suitable attachment. The boarding is to be done keeping a gap/groove of 2mm to 3mm shall be maintain from all sides of the boards and making a 3mm tapered edge on the two

sides of the boards.

Jointing and finishing method : finally the boards are to be jointed and finished so as to have a flush which includes filling and finishing the square edges of the boards with lime and PVA based materials with fiber tape.

Necessary gape for light diffuser fans and cut out shall have to be made.

Two coats of lapi, One coat of primer and two coats of plastic emulsion paint shall be apply to Gyp-board.

Application of Lapi, primer and plastic emulsion paint shall be followed as per 18.21 of Section-8.

#### **Mode of Measurements and Payment**

The rate includes the cost of materials, labour and tools & plants etc. complete

Measurement shall be taken for finished visible work.

Rate shall be for a unit of one Sq. m.

#### **60[22.79] Providing and fixing Door closer pneumatic Hydraulic of ISI mark with heavy duty as per specification.**

##### **Materials:**

These shall be made of cast iron/aluminium alloy/zinc alloy and of shape and pattern as approved by Engineer-in-Charge. Make shall be as specified in tender item or as directed.

These shall generally conform to IS Specifications for door closers (Hydraulically regulated) IS 3564-1995 (Reaffirmed 2018).

The door closers may be polished or painted and finished with lacquer to desired colour. Aluminium alloy door closer shall be anodized and the anodic coating shall not be less than grade AC15 of IS 1868-1996 (Reaffirmed 2021). All dents, burrs and sharp edges shall be removed from various components and they shall be pickled, scrubbed and rinsed to remove grease, rust, scale or any other foreign elements. After pickling, all the M.S. parts shall be given phosphating treatment in accordance with IS 3618-1966 (Reaffirmed 2021).

The nominal size of door closers in relation to the weight and the width of the door size to which it is intended to be fitted shall be given in Table.

**TABLE**  
**Type and Designation of Door Closers**

<i>Designation of closers</i>	<i>Mass of the door (kg)</i>	<i>Width of the door (mm)</i>	<i>Remarks</i>
1.	Upto 35	Upto 700	For light doors such as double leaved and toilet doors.
2.	36 to 60	701 to 850	Interior doors, such as of bed rooms, kitchen and store
3.	61 to 80	851 to 1000	Main doors in a building, such as entrance doors

##### **Workmanship:**

After being fitted in its position when the door is opened through 90°, the same should swing back to angle of 20° ± 5° with nominal speed but thereafter, the speed should get automatically retarded and in case of doors with latches, it should be so regulated that in its final position the door smoothly negotiates with the latch.

##### **Mode of measurement and payment:**

Rate are inclusive of all material and labour etc.

The rate shall be for a unit of Number basis.

#### **61[22.80] Providing and Laying integrated cement based proprietary water proofing treatment of required thickness over the roof including Providing and Applying water proofing layer of acrylic modified cementa tion composite coating system in two coats. 1<sup>st</sup> coat shall be acrylic polymer and cement and secondcoat shall be of acrylic polymer, cement and silica sand. The application of both the coats shall be as per manufacture's manual at terrace. and 10 mm thick water proofing cement plaster in C.M. 1:3 and china mosaic fitting and finally finishing the surface with white cement slurry including treating the vertical surface of the parapet wall up to 20cms height above finished level of terracing including finishing the top with joint less water proofing plaster, curing, testing etc. complete. Rate including ten years performance**

**of guarantee bond to be given on Rs.50/- stamp paper. (No extra shall be paid for variation in thickness.)**

#### **MATERIALS:**

Sand M – 6, Cement M – 3, White Cement M – 4, China Mosaic quality and uniform in colour. Acrylic polymer liquid to produce (PMCC) polymer modified cementitious composite for waterproof coating. Cement shall conform to M.3 Water proofing material shall be used of CICO, Fairmate, Perma, Sika, Pidilite (Dr.fixit) as per manufacturer's specifications.

#### **WORKMANSHIP:**

Workmanship shall be as per manufacturer's specifications and recommendations. However, following steps shall be followed for workmanship.

Cleaning the roof surface by means of wire brush to make the roof surface free from all loose particles, dust etc prior to application of 1<sup>st</sup> coat.

Application of 1<sup>st</sup> coat of acrylic polymer modified cementitious slurry with cement. The recommended ratio is 100 parts of OPC 50 parts of acrylic polymer liquid or it is as recommended by manufacturer placed on the surface to be treated after wetting the surface to saturation but without any free water. 2<sup>nd</sup> coat of acrylic polymer modified cementitious slurry with cement and silica sand, brush topping over 1<sup>st</sup> coat. Curing is required for maximum 4 days starting one day after application.

Finishing the surface with 10mm thick water proofing cement plaster in cement mortar 1:3 then applying glazed tiles pieces over cement mortar with required slope as directed by Engineer – In – Charge towards rain water pipe and finally finishing the surface with towel with white cement slurry.

The whole terrace so finishing shall be flooded with water for a minimum period of two weeks of curing and for final test. All above operations to be done in order and as directed and specified by the Engineer – In – Charge.

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

The flooring shall be measured in Sq.mt, for visible area of work done. It inclusive the rounding of junction and corner of walls.

The rate shall include the cost of all materials and labour involved in all the operation described above, hire charges of all machinery, scaffolding, curing for complete above items.

The rate shall be for a Unit of One Sq.mt.

**62[22.81] Constructing a counter basin platform (Sandwich type) 80cm high resting on sandwich polished granite slab in C.M. 1:3 with providing and fixing 25mm thick single side polish kotah stone at bottom and 18 to 20mm thick polished granite stone (Single piece, telephonic black or colour as directed) on top. Vertical polished granite stone (single piece) shall be fixed at the end of the counter as per detail drawing or as directed. Half rounded facia shall be fixed on the exposed face of counter as per detail drawing or as directed. With making of necessary holes in stone/counter for fixing of basin. Width of the counter shall be as specified in drawing or as directed.**

#### **Material:**

Water shall conform to M-1, Cement shall conform to M-3. Sand shall conform to M-6 Polish kotah stone conform to M-34, Granite shall conform to I.S.-14223(Part-1)-1995 (Reaffirmed 2017) or its latest edition.

#### **Workmanship**

The counter basin must be of 18 to 20mm thick polished granite stone fixed on 25mm thick polished kotah stone slab in cement mortar 1:1. The bearing between granite and polish kotah stone must be of 12mm thick in cement mortar 1:1.

Width of the granite facia shall be as specified in detail drawing or as directed and fixed with adhesive material. Facia shall be fixed on exposed surface of the counter as specified in detail drawing or as directed.

The facia shall be chamfered / half chamfered / half rounded as specified in detail drawing or as directed. At the end of counter, a vertical round moulded granite shall be fixed as specified in detail drawing or as directed. The exposed surface of vertical granite shall be double polished.

#### **Mode of measurements and payment**

The rate includes cost of all material & labour required for satisfactory completion of this item. The rate for basin shall be paid separately.

The rate also inclusive of making necessary holes in stone/counter.

The rate shall be for a unit Sq. m. for visible length & width of counter.

**63[22.82] S.S. Sinage Board (Name Plate)(18"x4.5")**

**Providing and fixing S.S. signage board made from 2 mm thick Stainless steel sheet**

**fixed on 12mm thick pre-laminated plywood on wall with s.s. screw with cap as per detail drawing or as directed by Engineer-In-Charge.**

**Material:**

S.S. sheet shall confirm to IS 5522-2014 (Reaffirmed 2019) & S.S. sheet shall be 304 grade.

Plywood shall confirm to M-26.

Laminate shall confirm to IS 2046-1995 (Reaffirmed 2020) and thickness shall be 1.0mm.

**Workmanship**

S.S. signage board shall be made from Stainless steel sheet 304 grade in required size and fixed on 12mm thick laminated plywood finished. S.S. signage board shall be fixed on wall with s.s. screw with cap as per detail drawing or as directed by Engineer-In-Charge.

**Mode of Measurements and Payment Measurement:**

The rate includes the cost of materials and labour etc. complete.

The rate shall be for a unit of Number Basis.

**64[22.83] Applying two coats of water proofing chemical (Zycosil) in proportional 1:10 (one part of zycosil + 10 part of water) on the water proofing plaster including preparing the surface and ponding test etc. complete as directed by Engineer-In-charge.**

**Material:**

ZYCOSIL: Use Zydex Industries made ZYCOSIL water proofing material

Water : Water confirm to M-1.

**Application:**

Clean the surface thoroughly. Remove dirt, dust, efflorescence, mold, salt, grease, oil, asphalt, curing compound, paint, coating and other foreign material.

Repair and cure visible cracks having more than 0.5 mm width by using epoxy based crack filler. Then apply two coat of Zycosil which shall be dilute Zycosil with water in proportion 1 : 10 (1 part of Zycosil and 10 part of Water).(Do not store diluted Zycosil)

All toping/finishing must be completed and allowed to be cured.

In case of rains, allow the structure to dry for at least for 24 hours prior to apply the Zycosil coat.

Horizontal strokes shall be given first and vertical strokes shall be applied immediately afterwards which together shall constitute one coat.

Apply first coat of the solution with help of painting brush.

Allow the surface to dry completely and then apply second coat of solution after 24 hours.

After 24 hours of second coat, fill the surface with water for 24 hours and check the dampness, if any.

**Mode of measurements & payment**

- (a) All the work shall be measured to the nearest 0.01 M.
- (b) Deductions for openings exceeding 0.5 sq. mt. but not exceeding 3 sq.mt. each shall be made.
- (c) No deductions shall be made for attachment such as casing, conducts, pipe and the like.
- (d) The rate shall include the cost of all materials, labour, scaffolding, protective measures etc. Involved in all the operations described above.
- (e) The rate shall be for a unit of one sq. meter.

**65[22.84] Rebaring work including drilling hole of required size & depth & grouting of required dia. T.M.T. bars of approved brand fixed by Epoxy based chemical of fairmate or its equivalent I.S.I. mark.**

For introducing additional reinforcement bars for new structural connections or supplementing additional steel area to the existing RCC member, the cross sectional area (diameter and no. of bars) and length required shall be approved by the Engineer-in-Charge. Also the depth of embedment of reinforcement bar shall be approved by the Engineer-in-Charge. The holes have to be power drilled in RCC. The drilled hole in dry state has to be cleaned with round brush and by blowing air through a tube inserted in the hole and connected to hand operated blower.

Then epoxy is to be injected from foil pack with help of epoxy dispenser and epoxy cartridge holder and disposable PVC mixing nozzle inserted inside the drilled hole to fill it from bottom of hole and upwards. Then the reinforcement bar is to be inserted and allowed to remain undisturbed for minimum 24 hours and allow epoxy adhesive to be air cured. Epoxy resin anchor grout shall be approved by the Engineer-in Charge.

**Mode of Measurement and payment :**

Rate shall include cost of all inputs of material, labour etc. involved in all the operations except the cost of reinforcement.

Rate shall be paid in units of Number basis of each dia. of bars.

**66[22.85] Full Glass Door on Patch Fitting**

**Providing and fixing glass door with patch fitting door as shown in dwg. Door shall consist of make 12mm thk. Toughened clear float glass. Rate shall include necessary designer film, approved locking systems, S.S. handle pair, floor spring (heavy duty or equivalent) gasket & miscellaneous hardware items. Including all material and labour etc. Complete as per detail drawing and instruction of engineer in charge and consultant.**

**Materials:****12mm toughen glass**

This is a clear 12mm toughened safety glass frameless shutter having a consulate top and bottom self-closer mechanism with a pivot connecting to a discrete metal patch fitting at the top and bottom corners to the door.

**Hydraulic Floor Spring**

The hydraulic floor spring shall be heavy duty double action floor spring of make approved by the Engineer -in-Charge suitable for door leaf of weight minimum 100 kg. The top cover plate shall be of stainless steel, flushing with floor finish level. The contractor shall cut the floor properly with stone cutting machine to exact size & shape. The spindle of suitable length to accommodate the floor finish shall be used. The contractor shall give the guarantee duly supported by the company for proper functioning of floor spring at least for 10 years.

**Tubular Handle**

The tubular handle bar shall be S.S. 304 grade. Outer dia. of tube shall be 32 mm, tube thickness 3.0 mm and centre to centre length as specified in detail drawing or as directed by engineer in charge.

**Lock (Floor mounted & wall mounted)**

S.S. 304 grade

**Patch**

Size and shape of the patch shall be as specified in detail drawing or as directed by engineer in charge.

**Workmanship****Application**

The 12mm thick clear toughened safety glass frameless shutter is fixed with the help of corner patch fittings. The corner patch fittings are simply a bolt through glass metal fitting requiring a corner cut out and hole in the glass. These discrete corner patch fittings provide a sleek and clean frameless look. The lock body patch fitting can also be installed where there is a necessity to provide locking arrangements for frameless shutter. The maximum size of frameless doors shutters using corner patch fittings should not exceed from 1000mm X 2400mm. bigger size doors should not be fixed with these fittings. The figure shows the fixing of frameless door shutters with top and bottom corner patch fittings.

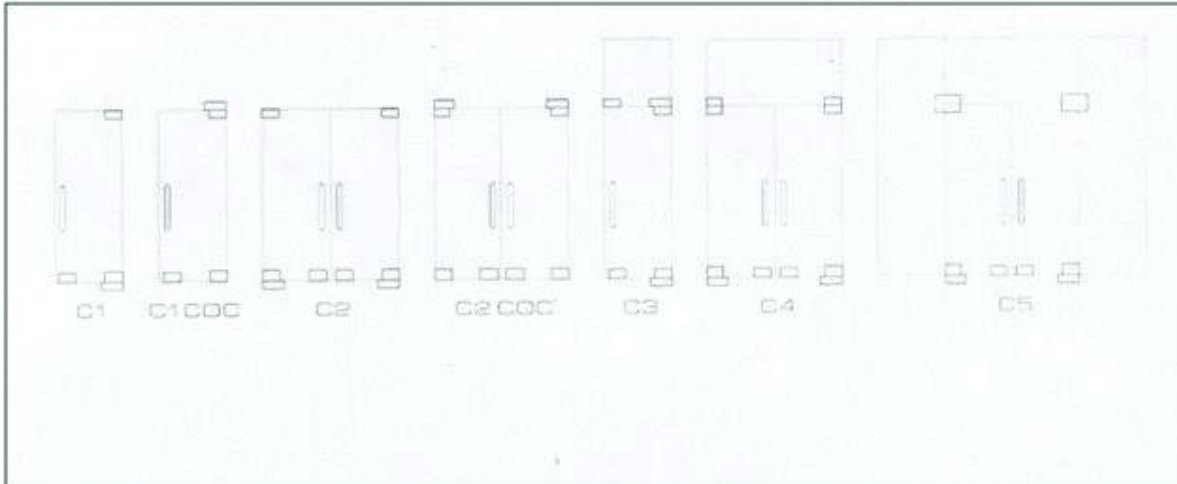


Fig.

### Installation

The frameless toughened glass door shutters of required thickness as specified in the item should be installed with the help of 304 grade stainless steel patch fittings of approved brand and manufacturer. These fittings should be complete in all respect with top and bottom pivots and doubleaction hydraulic floor spring types fixing arrangement. These fittings should be based on a modular system, consisting of a base unit, functional inserts, and clip-on covers in a wide range of finishes. The fittings should be suitable to support the weight of the complete glass door in such a way that the movement of the door is smooth and free. The fittings should be got approved from the engineer-in-charge and all the fixings etc. shall be done as per manufacturer specification and corresponding codes described in the description of the fitting.

### Mode of Measurements and Payment:

The finished final length/ height and width of the glass door should be measured correct to two places of decimal and overall area in sq.m. correct to two places of decimal should be calculated for payment.

The rate shall include the cost of all the materials, labours involved in all the operations above and as described in the nomenclature of item and particular specification.

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

### 67[22.86] Two way Bib Cock

**Providing, supplying and fixing C.P. brass Two way Bibcock of approved quality (a) 15mm nominal bore make & model shall be as per approved make list of GSPHCL.**

### Materials :

The minimum wall thickness of the body not less than 3mm at any section. The operating knob and the fitting should be made of brass. The seat bore inlet and outlet bore of the body and the internal water passage of the body throughout the whole length should be minimum 12.7mm. The valve and spindle used in the cartridge should be made of extrude brass rods and should bear. Rubber seat washer should be of 0.19mm with thickness 4.5mm further the hardness and tensile strength of the materials used should conform as per the material norms. Rubber 'o' ring of size 12.5 x 2.5mm should be provided on the valve used in internal cartridge and O-ring 0.6 x 2.25 on the spindle. The minimum plating thickness at all points of the plated body section and knob should conform as per specification of manufacturer's product manual. The component should be able to withstand a pressure of 20kg/Sq.cm. for a minimum period of 5 minutes, during this period it should not be sweating or leaking. Two way bibcock shall be legibly marked with the manufacturers name and trade mark.

### Workmanship :

Teflon tape should be used on thread, the end shall be screwed in the socket/tee etc. with pipe wrench. Care shall be taken that two way bibcock is properly jointed so as to make the joint completely water tight. The fitting shall be inspected under working condition or pressure flow. If any joints found in leaking conditions shall be redone. All leakage shall be removed and replaced without any extra cost. Fitting should

be carried out as per manufacturer's product manual and as directed by engineer in-charge.

**Mode of Measurement and Payment :**

The rate shall include the cost of all the materials, labours involved in all the operations above and as described in the nomenclature of item and particular specification.

The rate shall be for a unit of Number basis.

- 68[22.87] Hand Health Faucet Spray**  
**Providing and fixing 15mm dia. chromium plated brass hand health Faucet Spray with tube and hook including fixing in pipe line etc. complete. Make & model shall be as per approved make list of GSPHCL.**

**Materials :**

Hand health faucet spray of 15mm dia. of ABS body.

**Workmanship :**

Teflon tape should be used on thread, the end shall be screwed in the socket/tee etc. with pipe wrench. Care shall be taken that hand health faucet is properly jointed so as to make the joint completely water tight. The fitting shall be inspected under working condition or pressure flow. If any joints found in leaking conditions shall be redone. All leakage shall be removed and replaced without any extra cost. Fitting should be carried out as per manufacturer's product manual and as directed by engineer in-charge.

**Mode of Measurement & Payment :**

The rate shall include the cost of all the materials, labours involved in all the operations above and as described in the nomenclature of item and particular specification.

The rate shall be for a unit of Number basis.

- 69[22.88] S.S. Railing**  
**Providing and fixing of stainless steel 304 grade pipe railing 1.05 mt. height or as specified in detail drawing or as directed. Top round pipe (Baluster) shall be of 2" dia. Vertical baluster 1.5" x 1.5" at every maximum 0.90m c/c or as specified in detail drawing or as directed and intermediate 3 nos. runners pipe mid rail of 1" dia. and S.S. katori shall be minimum 50mm x 50mm. All S. S. Pipe and S. S. katori must be 16 gauge. The railing system shall be floor mounted with anchor fastener completed as per detailed drawing & as directed by engineer in charge. Rate are inclusive of all material, labour, taxes & polishing.**

**Materials:**

The stainless steel of 304 grade of as per IS 6911- 2017 shall be used for further fabrication of railing as per Architectural Design.

Stainless steel of 304 grade is most common in 300 series of Austenitic stainless steel.

It is still sometimes referred to by its old name 18/8 which is derived from the nominal composition of type 304 being 18% chromium and 8% nickel.

Fabrication of all stainless steel sections should be done only with tools dedicated to stainless steel materials. Tooling and work surfaces must be thoroughly cleaned before use. These precautions are necessary to avoid cross contamination of stainless steel by easily corroded metals that may discolour the surface of the fabricated product. Some specific hints are as under:

Remove all moisture by blowing with dry air or heating with a torch.

Eliminate organic contaminates like oil, paints, anti-spatter compounds, grease, pencil marks, cutting compounds, adhesive from protective paper, soap used for leak testing etc.

Stainless steels cannot be flame cut with a torch. Acceptable results are achieved with an arch plasma cutter.

Be particularly careful to avoid zinc contamination. Do not use brushes or tools previously used on galvanized steel.

Use only stainless steel wire brushes and use these brushes only on stainless steel.

**Fixing**

Fixing with railing with necessary accessories & stainless steel dash fasteners, stainless steel bolts etc. of required size, on the top of the floor / tread or the side of waist slab with suitable arrangement as per approval of Engineer-in-charge.

**Mode of measurement and payment:**

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

Nothing extra shall be paid for fixing arrangements i.e. drilling, nut & bolts etc.

Measurement shall be in running meter of the top handrail  
Rate shall be for a unit of One running meter.

- 70[22.89] Long body bib cock**  
**Providing, supplying and fixing C.P. brass Long body Bibcock of approved quality (a) 15mm nominal bore make & model shall be as per approved make list of GSPHCL.**

**Materials :**

The CP brass long body bib cock shall be conforming to IS standards. The body shall be of chromium plated copper alloy and external and internal surfaces shall be clean, smooth and free from sand. The 15mm nominal bore shall be designated by the nominal bore of the pipe outlet to which the long body bib cocks are normally fitted.

The weight of long body Bib Cock shall be less than 690 grams. Each bib cock shall be legibly marked with the Manufacture's name and trade mark.

**Workmanship :**

Teflon tape should be used on thread, the end shall be screwed in the socket/tee etc. with pipe wrench. Care shall be taken that two way bibcock is properly jointed so as to make the joint completely water tight. The fitting shall be inspected under working condition or pressure flow. If any joints found in leaking conditions shall be redone. All leakage shall be removed and replaced without any extra cost. Fitting should be carried out as per manufacturer's product manual and as directed by engineer in-charge.

**Mode of Measurement and Payment :**

The rate shall include the cost of all the materials, labours involved in all the operations above and as described in the nomenclature of item and particular specification.  
The rate shall be for a unit of Number basis.

- 71[22.90] Applying all weather proof synthetic fibre groove finish (scratch type) texture paint of make & manufacturer of approved by GSPHCL.**

**Material :**

Synthetic fibre texture paint (Asian, Burger or ISI mark of equivalent mark)

**Workmanship:**

Synthetic fibre groove paint should be applied on absolutely dry surface. Care should be taken to ensure that no water or moisture finds its way behind the texture paint coating. On newly plastered surface it can be applied directly without any dilution by steel/plastic trowel in desired texture finish. Unlike other similar factory made coatings, texture paint provides enough flexibility to the uses as its colors and designs of the panels are specially made for each site. A single coat in 1.2 to 2.0 mm thickness is recommended on smooth surface and multiple coats of up to 3mm thickness if the surface is rough and uneven, with sand or other particles sticking out. Old flaky/chalky surfaces should be so scraped to remove all the old plaster and a sealing primer applied before texture paint application, it has to be finished with 2 top coats of desired shades.

Synthetic fibre groove paint dries completely after 24 hours in normal climatic conditions.

**Mode of Measurement and payment:**

The rate for marble texture paint shall include the cost of materials, surface preparation, labour, tools, plants, lead lift and transportation etc. required to finish the work. The unit rate for the item shall be for a unit Smt.

- 72[22.91] ACP PANELLING**

**Providing and Fixing 4mm thick external grade aluminium composite panel over plaster with aluminium frames as directed by Engineer - in - charge properly screwed over plaster. ACP should be properly fixed and screwed with the frame and all joints to be filled and finished with silicone sealant. Colour and pattern of ACP shall be as specified in detail drawing or as directed by the architect.**

**MATERIAL :**

4mm thick PVDF coated aluminum foil composite section in three layers top layer of the PVDF coated metallic coloured aluminum foils shall not less than 0.30mm thick and bottom layer of the aluminum foils shall not less than 0.30mm thick and middle layer of polyethylene. 50mm x 25mm aluminum box pipe with 20mm x 20mm. Aluminum clamping G.E. (Winsil - 20) weather silicone sealant.

**1.0 WORKMANSHIP :**

- 1.1 Finishing the surface by aluminum section cladding.  
 The aluminum box pipe of 50mm x 25mm size shall be fix on existing wall at all required distance with screwing to correct length as per drawings and design. In case of different shapes other than structural parts, aluminium framing to be done as per drawing and instructions of consultants as a base for gi framing.  
 The cut and exposed to view shall be finished smooth. Two pieces shall not be allowed or otherwise jointed to make up the required length of member. Powdered coated M.S. clamp shall be used in R.C.C. work where ever necessary. Roll plugs shall be used while drilling in wall for screwing.  
 The aluminum PVDF coated foil composite section of selected and approved metallic colour finishing and of leading company having 4mm thick. PVDF coated aluminum foil composite section in three layers, top layer of the PVDF coated metallic coloured aluminum foils shall not less than 0.30mm thick and bottom layer of the aluminum foils shall not less than 0.30mm thick and middle layer of polyethylene. It shall be fold from surrounding edge to fix with 20 x 20mm aluminum angle screwing using tray system and panels sites as per detailed design supplied by Architect or Engineer in charge.  
 Tray shall be formed of aluminum PVDF coated foil in required size as per design and suggested by Engineer in charge.  
 The aluminum PVDF coated tray shall be fixed to the 50mm x 25mm box pipe on exterior face of building wall with the help of screw. Roll plugs to correct line length and width.  
 The Horizontal and vertical joints between tray shall be sealing with structural sealant GE (Winsil - 20) weather silicon sealant to cover the expose surface with matching colour.  
 The detail design for the entire framing work shall be made by the contractor at his own cost and get approved from Engineer in charge before executing the work. The aluminum PVDF coated composite section, tray size shall be as approved by Engineer in charge.

## 2.0 MODE OF MEASUREMENT AND PAYMENT :

The rate shall be included the cost of all materials, all labour and scaffolding etc. involve to complete and finished the said items.  
 All the finished visible surface of aluminum cladding shall be measured in Square meter correct to a two decimal.  
 The rate shall be for a unit of One square meter.

- 73[22.92] S. S. Letters**  
**Providing, supplying & fixing Stainless steel letters 304 grade with spraying colour on surface etc. complete as directed. Size of the S.S. letters shall be as described in tender item. Coating of the S.S. letters shall be as directed by engineer in charge. Letter shall be fixed at any height as directed by engineer in charge.**

### Materials :

The stainless steel letter shall be confirm to IS 6911- 2017 and shall be of 304 grade.

### Workmanship :

The letter shall be fixed in true line and level and at any height as per the drawing or as directed by engineer in charge. Work shall be carried out with all the required tools, plants, materials, labour and chemicals required for fixing of letter.

### Mode of measurement and payments

Rates are inclusive of all labour, materials, tools, plants, scaffolding etc. to complete the work.  
 The rate shall be paid per unit of No.

- 74[22.93] Supplying and fixing glass brick of size 190mm x 190mm x 80mm with white cement and wooden patti as per design given by architect.**

### Materials :-

Glass brick (190 x 190 x 80mm)  
 Wooden patti shall confirm to M-22  
 White cement shall confirm to M-4  
 French polish confirm to I.S. 348-1968 (Reaffirmed 2019).

### Workmanship :-

Teakwood patti shall be fixed inside the frame on which glass brick shall be fixed. Size of the teakwood patti shall be same size of the frame and thickness of the teakwood patti shall be as per site requirement. After fixing the wooden patti on frame fixed the glass bricks on that patti in proper line & level and finished with white cement for bonding the glass brick with each other. Glass brick shall be installed as per

manufacturer guide line. Glass brick shall not be cut. Glass brick wall are self-supported but should not be used as a free standing wall. Wooden patti & frame shall be finished with French polish or as directed by engineer in charge or architect.

**Mode of measurement & payment :-**

The rate for the glass brick shall include the cost of material and labour involved to finish the work. The payment shall be made for above item on Sq.m. basis of work completed as above.

**75[22.94] Providing and fixing ANODIZED ALLUMINIUM GLAZING (Jindal/banco make) having top/sides section - 22735 (64.0 x 58.0 x 1.70 mm wt. 0.831kg/mt.) with 8mm thick reflection toughened glass (Saint Gobin / Ashahi-AIS) fixing with pressure patti, screws and cleats as per architectural detailed drawings and specifications and as directed by Engineer in Charge.**

**Materials**

Materials shall be of approved quality and shall be generally confirmed to the latest IS specifications and size of the 3 sections are as specified in the item description. The contractor shall order all the materials required for the execution of work as early as necessary and ensure that such materials are on site well ahead of requirement for use in the work. The work involved calls for high standard or workmanship combined with speed and to the entire satisfaction of the Consultant.

Glass in doors, windows, glazing and ventilators shall be 8mm thick toughen glass, clearer tinted, reflective as mentioned in the tender item, and shall be approved quality free from stains, scratches, bubbles and flaws of any kind and shall be properly cut to fit frames and mullions. All windows and ventilators shall be glazed from outside with snap fit anodized aluminum beading and EPDM / gasket lining complete. The buildings shall be snap fit and shall be fitted without use of screws. No screws other than those on some of the hardware shall be visible.

EPDM gaskets of approved size and profile shall be provided and installed at all locations as shown and as called for to render the doors, windows, etc. absolutely air tight and weather tight. Openable shutters shall have single row continuous EPDM weather strip. Weather strips shall not be interrupted by any fittings.

The specifications, drawings, and schedule of quantities cover the major requirement only. Supply and fixing of additional fastenings, fixtures and other items of work not mentioned specifically but which are necessary for satisfactory completion of the work are deemed to be included in the rates quoted by the contractor. Nothing extra shall be paid on this account.

Weather strips, gaskets and sealant shall be of high quality material capable of resisting local environment exposure and performance requirements. Interior primary seal shall be of compression type weather seal. The contractor shall make his own arrangement for necessary scaffolding/staging, cradle etc., for erection of the aluminium doors, windows, ventilators etc.

**Workmanship**

Specification for sliding and fixed (composite) window:

The windows shall be made out of extruded aluminum sections.

Each shutter shall be provided with two ball bearing rollers, 2 anti-rattling piece guides one each at top and bottom PVC weather strip all around.

All joints shall be mechanical.

8.0mm thick toughen glass shall be fixed in the shutters by means of rubber gasket.

The contractor shall submit for approval to the Consultants shop drawings of each type of door, windows, glazing ventilator etc. The shop drawings should show full size section of doors, windows etc. thickness of metal, details of construction, anchoring details, hardware and connection of the framework hardware such as hinges, handles, floor springs, sample of joints of fastenings and joining etc. along with the shop drawings.

**Covering channels:**

The members shall be covered by suitable anodized, aluminum channels so that no screens etc. are visible and the quoted rate shall allow for the same.

**Drainage:**

The system offered by the contractor shall have a burn in provision for drainage of water.

**Replacement and cleaning of glass:**

The system offered by the contractor shall allow for ease of cleaning and easy replacement of glass panels.

**Technical Considerations:**

1. The aluminum sections shall be extruded from aluminum alloy HE 9 WP & HV 9 WP as per IS 733-1983 (Reaffirmed 2017) and IS 1285-2002 (Reaffirmed 2017) respectively and free from all defects impairing appearance strength and durability. The permissible dimensional tolerance of the extruded sections shall be such as not to impair the proper and smooth function/operation appearance of doors and windows.
2. The aluminum sections shall be confirmed to the following parameters also
  - a) The minimum tensile strength shall be 19kgf/m
  - b) The maximum allowable deviation in length from a straight line shall be 0.5 mm/mtr.
  - c) The maximum allowable deviation from a straight line shall be 1 degree.
  - d) The maximum permissible twist shall be 0.5 mm/mtr.
3. All aluminum section shall be anodized t matt finish colour & shade anodizing shall be 6 microns thick prior to anodizing to all aluminum members shall be rendered uniform in appearance free from scratches, stains or other blemishes.
4. All aluminum members shall be wrapped with self-adhesive non staining PVC tapes.
5. All members shall be accurately machined and lifted to form hairline joints. Prior to assembly, the design of the joint and accessories shall be such that the accessories are fully concealed. The fabrication of doors, windows etc. shall be done in suitable sections to facilitate easy transportation, handling and installation. Adequate provision shall be made in the members for anchoring to supports and fixing of hardware and other fixtures and approved by the Consultants.
6. Fabricated materials shall be erected in an approved manner to protect the material against any damage during transportation. The loading & unloading shall be carried out with utmost care.
7. Prior to installation, the doors, windows etc. shall be stacked on edge on level bearers and supported evenly. The assembled doors/windows etc. shall be placed in correct final position in the opening and fixed to wall as per detail and rawel cadmium plated machine screws, plugs, fasteners etc. of required size and spacing. All the joints with approved silicon sealants
8. In case of composite windows and doors, the different units are to be assembled first. The assembled composite units should be checked for line, level and plumb before final location if the situations so warrants.
9. Where aluminum member comes into contact with masonry brick work, concrete, plaster or dissimilar metal, it shall be coated with an approved insulation lacquer paint or plastic tape to ensure that their elector chemical corrosion is avoided. Insulation material shall be trimmed off to a clean flush line on completion.
10. The contractor shall be responsible for assembling composite units, bedding and pointing with mastic inside and outside, at the transoms and mullions and placing the doors, windows etc. in their respective openings, after the doors, windows etc. have been fixed in their correct assigned position the open hollow sections abutting masonry/concrete shall be filled with cement grout (1 cement : 3 coarse sand) densely packed and finished neat backing (grout shall be of the expanding type made by approved additive). The contractor shall be responsible for the doors, windows etc. being set straight, plumb, level and for their satisfactory operation after fixing is complete.
11. The gap between frames & supports & also gaps in the door & window section shall be filled with approved silicon sealant of approved colour and make to ensure the complete water tightness and the silicon sealant shall be of such colour and composition that it would not stain the masonry/concrete work. The masonry/concrete work should receive paint without bleeding. Silicon sealant should set or dry out under any condition of weather; silicon sealant shall be applied with special guns as per manufacturer's recommendations.
12. The PVC wrapping protecting the anodized finish shall be retained till the glazing work is commenced and all work connected with installation of doors/windows is complete. All aluminum work shall be washed clean with a suitable thinner and left in a finished condition in approved uniform appearance and free from all marks and blemishes.

**Mode of measurement and payment:**

The clear opening in close position shall be considered for measuring the area of windows. Measurement shall be taken in length and width of completed dimension.

The rate includes for execution of whole item and shall be paid for a unit of one sq. meter as per actual work done.

**76[22.95] Providing and fixing weep holes.**

Adequate number of weep holes not existing one meter spacing in both direction should be provided to prevent any accumulation of water and building up of hydrostatic pressure behind the wall. The weep holes should be provided above the low water level.

The size/diameter of the weep hole shall be as mentioned in detailed drawing or as directed.

PVC pipe of necessary dia. (As mentioned in detail drawing or as directed) shall be used for weep hole.

Length of the PVC pipe shall be as per the wall thickness of the member plus 5mm projected from the outer face of the wall.

The rate shall be include labour and material etc. completed.

The rate shall be for a unit of One running meter.

**77[22.96] Providing and laying gravel base filter media as specified in detail drawing.**

**Material:**

Gravel shall be confirm to IS 4097-2019.

**Workmanship:**

The gravel selected for packing of filter media shall consist of hard quartz (about 96 percent SiO<sub>2</sub>) or other suitable material, with an average specific gravity of not less than 2.5. Not more than 10 percent by weight of the material shall have a specific gravity of less than 2.25. The gravel shall contain no more than two percent by weight of thin flat or elongated pieces. In the case of such pieces, the larger dimensions shall not be more than 3 times the smallest dimensions. The quartz shall be of sub-rounded to rounded grains with minimum angular features.

The gravel for use as pack shall be free from impurities, such as shale, mica, feldspar, clay, sand, dirt, loam, and hematite and organic materials.

The porosity of the gravel when laid as a pack shall not be less than 25 percent.

**Gravel Sizes:**

The gravel conforming to this standard as per IS 4097-2019 shall be of the following grades:

Sl. No.	Grade	Pack	Particle Size Range Mm	IS Sieves (see IS:460-1962*)
1	A	Fine Gravel	Over 2.0 to 3.35	2.0 , 3.35
2	B	Fine Gravel	Over 3.35 to 4.75	3.35 , 4.75
3	C	Medium Gravel	Over 4.75 to 6.3	4.75 , 6.3
4	D	Medium Gravel	Over 6.3 to 8.0	6.3 , 8.0
5	E	Coarse Gravel	Over 8.0 to 12.5	8.0 , 12.5

**Note:-** The particle size distribution of gravel shall be determined by screening through standard sieves in accordance with IS: 460-1985. The percentage distribution of the sizes shall be determined from a graph in which the percentage of material passing through each sieve is plotted against the standard aperture of that sieve. Any size, say D<sub>20</sub>, will thus indicate that the cumulative weight of all the grains smaller than this size is 20 percent of the total weight of the test sample. The uniformity coefficient of the gravel, that is, the ratio of its D<sub>20</sub> to D<sub>10</sub> sizes shall not exceed 2. A material with uniformity coefficient less than 2 shall be classified as uniform and if greater than 2 it shall be taken as non-uniform. The limiting sizes given in above table are the minima and maxima, and the stacks containing smaller or bigger sizes as shown by sieve analysis shall be rejected.

The gravel shall have a hardness of not less than 5 in **Moh's scale**.

The pack aquifer ratio ( P/A ratio) is defined as the ratio of 50 percent size ( D<sub>30</sub>) of the gravel pack to the 50 percent size of the aquifer. The size of gravel when used as pack in tubewells shall be decided in accordance with the size of the aquifer material proposed to be tapped. The gravel size shall be limited as below:

Uniform aquifer with uniform gravel pack.

Pack aquifer ratio — 9 to 12.5

Non-uniform aquifer with uniform gravel pack. Pack aquifer ratio — 11 to 15.5

**Note:-**The thickness of gravel pack shall be limited to 13 to 18 cm.

The filter material shall be well packed to a thickness of not less than as specified in detail drawing or as directed. With smaller size towards the soil and bigger size towards the wall and provide over the entire surface behind wall/ abutment, wings or return walls to the full height.

**Mode of measurement and payment:**

The rate shall be include labour, material, compaction, consolidation etc. completed.

The rate shall be for a unit of One Cu.m.

- 78[22.97] Non-Woven Geotextile: Supplying and laying of polypropylene needle punched non woven geotextile as filter media behind Terramesh facia units, as per MoRTH 700 Type-I geotextile. The width of geotextile roll shall not be less than 4.5 m, at easily accessible location including top and bottom, with all leads and lifts, manpower and machinery, materials, labour etc. complete and as directed by Engineer - In - Charge.**

**General:**

All works shall be done strictly according to section 702.1 specifications of MORTH & designed using IRC SP 116-2018.. In the event of any discrepancy of above, the decision of Engineer-in-charge shall be final and binding on the contractor. Good workmanship and neat appearance is the prerequisite for all sections of work. The total planning and sequence of different activities must be got approved by the Engineer – in – charge.

**Testing and Acceptance criteria:**

The material should get approval from the client before the actual supply start. Contractor within 30 days of issue of work order shall intimate Engineer in charge about the brand of material he intend to procure along with technical literature, past experience and other details about the manufacturer / supplier.

Testing shall be done on material as per codes specified in Table 1 at every 40,000 sqm. The manufacturer / supplier of geogrid shall provide Certificate of Conformity for the material with every lot/shipment. The Manufacturers Certificate of Conformity for geotextile shall be provided for certifying that material conforms to all the technical and special requirements. The material shall be tested Laboratory BTRA or TRI or BTG or TBU-Germany. Cost of material testing shall be borne by contractor.

**Specification of Geotextile:**

The product should have 'CE' certification and the manufacturer should be ISO certified. The non woven PP geotextile should be thermally bonded and should be manufactured using continuous polypropylene filaments coated with polypropylene without using any glues or chemical binders. The product should not contain any color or dyes so as to prevent any possible ground / ground water contamination.

The geotextile to be used for the work should be a Non-woven continuous filament thermally bonded geotextile, in white colour and having a minimum roll width of 4.5 m without joints – meeting the following specifications:-

**Table 1 Properties of thermally bonded nonwoven geotextile**

PROPERTIES:	Value	Tolerance	Test Method
Mechanical Properties:			
Mean Peak Strength	8.0 kN/m	- 2 kN/m	EN ISO 10319
Elongation	24 %	± 15%	EN ISO 10319
Mass Per Unit Area	120 gsm		
Tensile Strength @ 5% Elongation	3.4 kN/m	NA	EN ISO 10319
CBR Puncture Resistance	1500 N	-270 N	EN ISO 12236
Dynamic Cone Puncture	38 mm	NA	EN ISO 13433
Opening Size O90	150 µ.m	≤ 110 µ.m	EN ISO 12956
Permeability (H50)	100 l/m2.s	- 10%	EN ISO 11058
Minimum Roll width	4.5 m		
Minimum Roll Length	100 m		

**Note:** Values indicated in above table are typical.

**Testing and acceptance criteria**

The material should get approval from the client before the actual supply start. Contractor within 30 days of issue of work order shall intimate Engineer in charge about the brand of material he intend to procure along with technical literature, past experience and other details about the manufacturer and if client intended for testing of supplied material, contractor shall arrange a visit of client to factory for inspection and testing of the material. The visit expenses (traveling, lodging and boarding) and testing expenses will be borne by the Contractor.

The manufacturer shall have ISO or CE Certification for manufacturing process and quality control.

The manufacturer shall provide 'Manufacturer's Test Certificate' for every lot supplied from the factory.

The supplier shall provide third party test reports from an independent laboratory with valid accreditation for all the test values in 'Manufacturer's Test Certificate'.

The materials shall be Tested in accordance with tests prescribed by BIS. In absence of IS codes, tests

prescribed by either ASTM, EN, BS or ISO shall be conducted.

The material shall meet the requirements as specified in the contract.

**The material/packing shall be marked with the following information:-**

- (a) Manufacturer's name
- (b) Roll number
- (c) Grade
- (d) Size/length
- (e) Date of manufacture
- (f) Product identification details.

### **Eligibility Criteria**

Manufacturer / Supplier should have production facility ISO 9001:2008 Quality Management System certified. Manufacturer/ Supplier shall have in-house technical support facilities to provide site specific design and required technical assistance at site.

Manufacturer should undertake for site supervision during the execution of Reinforced Soil wall work.

The Manufacturer / Supplier should not have a history of poor performance such as abandoning the works, financial failures, blacklisting. If it is observed, Manufacturer / Supplier will be automatically disqualified.

The Manufacturer / Supplier shall be manufacturing / supplying the system in India for more than 10 years from the date of this tender notice. Manufacturer must produce performance certificate for a minimum of 10 year old waterfront structure made of gabion fascia with integrated tail soil reinforcement, from the central or state government authority..

### **Construction Requirements**

- A. Geotextile packaging and storing** – Geotextile materials should not be left directly exposed to sunlight for a period longer than the period recommended by the manufacturer. If stored outdoors, they shall be elevated and protected with a waterproof cover. Prevent excessive mud, wet concrete, epoxy, or other deleterious materials from coming in contact with and affixing to the geogrid materials.
- B. Site preparation** – The subgrade or natural ground shall be prepared as indicated on the construction drawings or as directed by the Engineer.
- C. C. Installation** – The geotextile shall be laid at the proper elevation and alignment as shown on the construction drawings. The geotextile shall be installed in accordance with the installation guidelines provided by the manufacturer or as directed by the Engineer. The geotextile may be temporarily secured in place with sand bags or backfill as required by fill properties, fill placement procedures or weather conditions or as directed by the Engineer.
- D. D. Overlap** – An overlap of 300 mm or as indicated by Engineer shall be provided between the adjacent rolls..

### **Mode of measurement and payment for Geotextile**

Accepted geotextile shall be paid at the unit price (per square metre Plan area) for each pay item included in the contract. Wastage due to overlap will not be paid extra.

**79[22.98] Providing and Fixing of Mineral Fiber Ceiling at any height, Tiles size of 595mmx 595mm x 16mm (20mm) beveled angular edge. Make & model shall be as per specified in tender or as directed by Engineer in charge.**

### **Materials**

#### **Tiles**

Mineral Fiber Ceiling Tiles shall be made of granulated high-density Mineral Wool as the main material and top production technique which gives it superior features of fire-proofing, sound absorption, heat insulation & sag resistance. They are cost effective and are mainly used for acoustics and decoration.

Tiles shall be appropriate class and of finished thickness as specified in the description of the item. Only selected tiles of uniform width shall be used. Unless otherwise specified in the description of the item or shown in the drawings, the width of tiles selected for use shall not be less than 595 x 595mm in size and of approved texture, design and patterns and shall be of 16mm/ 20mm thick Beveled Tegular

edge type.

Where width of room/ corridor is in multiple of standard width of tiles, same pattern shall be maintained throughout the length. Where the width of rooms/ corridor is not in multiple of standard width of tiles, borders with appropriate width and material of boards shall be provided in design approved by the Engineer-in-charge and maintained uniformly throughout of the length/ width of room/ corridor.

**Mineral Fibre tiles shall have the following properties:**

**Surface:** Shall be of approved texture, design and pattern.

**Dimensions:** 595mm x 595mm x 16mm (20mm) thick Beveled Tegal edge type. Size referred to are always module sizes. The nominal panel size may differ depending on the suspension system used.

**Relative humidity:** 99% RH resistant.

**Fire resistance:** Fire performance as per BS:476 (Part-6 & 7)

**Thermal conductivity:** 0.052 W/m-K – 0.057 W/m-K

**Acoustic control:** Noise reduction coefficient (NRC) = 0.50 to 0.60

**Light reflectance:** >85%.

**Weight:** 3.10 Kg/m<sup>2</sup> (for 16mm thick) & 5.29 Kg/m<sup>2</sup> (for 20mm thick)

**Suspension system:**

Suspension system shall be made of interlocking metal T-grids of hot-dipped all round galvanized steel.

**Frame**

Frame is made up of interlocking metal T-grids of hot dipped all round galvanized steel sections of 0.33mm thick (Galvanized @ 120 grams per sq.m. including both sides) comprising of main T runners of size 15 x 32mm of length 3000mm, cross T of size 15 x 32mm of length 1200mm and secondary intermediate cross T of size 15 x 32mm of length 600mm to form grid modules of size 600 x 600mm. This grid shall be suspended from ceiling using galvanized mild steel members (Galvanized @ 80 gms/m<sup>2</sup> including all sides) i.e. 50mm long, 8mm outer diameter M-6 dash fasteners, 6mm dia fully threaded hanger rod up to 1000 mm length and L-shaped level adjuster of size 85 x 25 x 2mm. Frame also consist of galvanized iron perimeter wall angle of size 24 x 24 x 0.40mm of length 3000mm to be fixed on periphery wall/ partition with the help of plastic rawl plugs at 450mm centre to centre and 40mm long dry wall SS screws.

The bottom surface of the frame shall be checked and corrected to true plans and slopes.

**Fixing**

Outer wall angle shall be fixed accurately and truly at required height and level, parallel and close to the wall. Thereafter all the T members shall be placed and fixed carefully to form the grid. The grid comprises of main T-runners at 1200mm centres securely fixed to the structural soffit by approved and adjustable hanger rods at 1200mm maximum centres and not more than 150mm from spliced joints of main T-runners. The last hanger at the end of each runner should not be greater than 600mm from the adjacent wall. Similarly, cross T-runners of 1200mm length shall be placed at 600mm centre to centre. 600x600mm modules to be formed by fitting 600mm long flush fitting cross Tees (secondary cross T) centrally between 1200mm cross T-runners. The tiles shall then be placed properly in the grids as per required pattern, texture and design/ drawing and as per directions of the Engineer-in-Charge. If required, level of the false ceiling grid shall be checked after placing of calcium silicate tiles and necessary adjustment shall be made wherever required through level adjuster.

**Finishing**

Care should be taken while placing calcium silicate tiles into the grid so that there will be no displacement to grid and stains/ dirty marks put by the workers.

**Measurements**

Length and breadth shall be measured correct to a cm.

Areas shall be worked out to nearest 0.01sqm.

The superficial area of the finished work ceiling shall be measured in square metres.

No deduction in measurements shall be made for openings of areas upto 0.36 Sq.m.

Nothing extra shall be payable either for any extra material or labour involved in forming such openings.

For openings exceeding 0.36 sq.m. in area, deductions in measurements for the full opening in multiple of area of each tile (0.36 Sq.m.) will be made.

**Mode of measurement and payment**

Rates are inclusive of all labour, materials, tools, plants, scaffolding etc. to complete the work.

The rate shall be a unit of one Sq.m.

**80[22.99]**

**Calcium Silicate False Ceiling**

**Providing and Fixing Eco-friendly light weight calcium silicate false ceiling at any height,**

**Tiles size of 595mmx 595mm x 15mm tagular edge. Make & model shall be as per specified in tender or as directed by Engineer in charge.**

## **Materials**

### **Tiles**

Eco friendly light weight calcium silicate tiles shall be made from Non-cementitious hydrated wet moulded calcium silicate slurry/mixture, reinforced with fibers and natural fillers. Free from formaldehyde and other harmful materials. Does not contain any toxic ingredients. Shall have appropriate recycled material contents. The Ceiling Tiles shall be of appropriate class and of finished thickness as specified in the description of the item. Only selected tiles of uniform width shall be used. Unless otherwise specified in the description of the item or shown in the drawings, the width of tiles selected for use shall not be less than 595 x 595 mm in size and shall be 15 mm thick integral densified tegular edged type, light weight wet moulded calcium silicate. Where width of room/ corridor is in multiple of standard width of tiles, same pattern shall be maintained throughout the length. Where the width of rooms/ corridor is not in multiple of standard width of tiles, borders with appropriate width and material of boards shall be provided in design approved by the Engineer-in-charge and maintained uniformly throughout of the length/ width of room/ corridor. Calcium silicate tiles shall have the following properties:

- (a) **Surface:** All tiles are prime coated on both sides. Standard finish in two coats white dispersion type, solvent free paint.
- (b) **Dimensions:** 595mmx595mmx15mm thick tegular edged. Size referred to are always module sizes. The nominal panel size may differ depending on the suspension system used.
- (c) **Thickness:** 10 mm thick in the center and 15mm thick all around on edge resting portion with integral densified edge.
- (d) **Density of material:** 350 kg per cum in the central 10 mm thick portion and 450 kg cum on the edges, (Average 370 kg per cum as per ECBC Code 2007).
- (e) **Relative humidity:** 100% RH resistant.
- (f) **Fire resistance:** Non-combustible as per BS:476 Part-4. Fire performance: as per BS:476 (Part-6) for fire propagation and BS 476 (Part 7) for Surface spread of flame.
- (g) **Thermal conductivity:** 0.048 W/m- K - 0.052 W/m- K as per ECBC Code 2007 and ASTM 518-1991.
- (h) **Recycled Content:** Shall have 46-50% recycled content out of which 18-20% should be FLYASH.
- (i) **Acoustic control:** Sound Attenuation 30-32dB Noise reduction coefficient (NRC)  
Plain & Designer tile: 0.10-0.15.  
For Pin Hole/Texture pattern tiles: 0.20-0.30.  
Pin hole/Texture fully perforated tile: 0.30-0.40. For 5mm fully perforated 0.40-0.50.  
For 5mm fully perforated with 50mm/48gsm glass wool 0.65-0.85.
- (j) **Light reflectance:** >85%.
- (k) **Weight:** 5 - 5.5Kg/m<sup>2</sup>.

### **Frame**

Frame is made up of interlocking metal T-grid of hot dipped galvanized steel sections of 0.33mm thick (Galvanized @ 120 gms/m<sup>2</sup> including all sides) comprising of main T runners of size 24 x 38mm of length 3000mm, cross T of size 24 x 32 mm of length 1200mm and secondary intermediate cross T of size 24 x 32mm of length 600mm to form grid modules of size 600 x 600mm. This grid shall be suspended from ceiling using galvanized mild steel members (Galvanized @ 80 gms/m<sup>2</sup> including all sides) i.e. 12x50mm long dash fasteners, 6mm dia fully threaded hanger rod upto 1000 mm length and L-shaped level adjuster of size 76 x 25 x 25x 1.6mm fixed with grid and Z cleat of size 25x37x25x1.6mm thick with precut hole on

both 25mm flange to pierce into 12x50mm or even bigger dash fastener if require. Frame also consist of galvanized iron perimeter wall angle of size 24 x 24 x 0.40mm of length 3000mm to be fixed on periphery wall/ partition with the help of plastic rawl plugs at 450mm centre to centre and 40mm long dry wall SS screws.

The bottom surface of the frame shall be checked and corrected to true plans and slopes.

### **Fixing**

Outer wall angle shall be fixed accurately and truly at required height and level, parallel and close to the wall. Thereafter all the T members shall be placed and fixed carefully to form the grid. The grid comprises of main T-runners at 1200mm centres securely fixed to the structural soffit by approved and adjustable hanger rods at 1200mm maximum centres and not more than 150mm from spliced joints of main T-runners. The last hanger at the end of each runner should not be greater than 600mm from the adjacent wall. Similarly, cross T-runners of 1200mm length shall be placed at 600mm centre to centre. 600x600mm modules to be formed by fitting 600mm long flush fitting cross Tees (secondary cross T) centrally between 1200mm cross T-runners. The tiles shall then be placed properly in the grids as per required pattern, texture and design/ drawing and as per directions of the Engineer-in-Charge. If required, level of the false ceiling grid shall be checked after placing of calcium silicate tiles and necessary adjustment shall be made wherever required through level adjuster.

### **Finishing**

Care should be taken while placing Light Weight calcium silicate tiles into the grid so that there will be no displacement to grid and stains/ dirty marks put by the workers. (worker should preferably wear clean soft cotton gloves while placing tile).

### **Measurements**

Length and breadth shall be measured correct to a cm.

Areas shall be worked out to nearest 0.01sqm.

No deduction in measurements shall be made for openings of areas upto 0.36 Sq.m.

Nothing extra shall be payable either for any extra material or labour involved in forming such openings.

For openings exceeding 0.36 sq.m. in area, deductions in measurements for the full opening in multiple of area of each tile (0.36 Sq.m.) will be made.

### **Mode of measurement and payment**

Rates are inclusive of all labour, materials, tools, plants, scaffolding etc. to complete the work.

The rate shall be a unit of one Sq.m.

**81[22.100] Providing, supplying and fixing M.S. rolling shutter including one coat of zinc chromate primer and two coats of oil paint. Width & height of the rolling shutter shall be as detail drawing.**

### **ROLLING SHUTTERS**

Rolling shutters shall conform to IS 6248-1979 (Reaffirmed 2017). These shall include necessary locking arrangement and handles etc. These shall be suitable for fixing in the position as specified i.e. outside or inside on or below lintel or between jambs of the opening. The door shall be either push and pull type or operated with mechanical device supplied by the firm. Shutters up to 10 sq. metre shall be of push and pull type and shutters with an area of over 10 sq. metre shall generally be provided with reduction gear operated by mechanical device with chain or handle, if bearings are specified for each of operation, these shall be paid for separately.

**Shutter:** The shutter be built up of inter locking lath section formed from cold rolled steel strips. The thickness of the sheets from which the lath sections have been rolled shall be not less than 0.90mm for the shutters upto 3.5 m width. Shutters above 9 metres width should be divided in 2 parts with provision of one middle fixed or movable guide channel or supported from the back side to resist wind pressure. The lath section shall be rolled so as to have interlocking curls at both edges and a deep corrugation at the centre with a bridge depth of not less than 12 mm to provide sufficient curtain of stiffness for resisting manual pressures and normal wind pressure. Each lath section shall be continuous single piece without any welded joint. When interlocked, the lath sections shall have a distance of 75 mm rolling centers. Each alternate lath section shall be fitted with malleable cast iron or mild steel clips securely riveted at either ends, thus locking in the lath section at both ends preventing lateral movement of the individual lath sections. The clips shall be so designed as to fit the contour of the lath sections.

**Spring :** The spring shall be of coiled type. The spring shall be manufactured from high tensile spring steel wire or strips of adequate strength conforming to IS 4454 (Part-I)-2001 (Reaffirmed 2015).

**Roller and Brackets :** The suspension shaft of the roller shall be made of steel pipe conforming To heavy duty as per IS 1161. For shutter upto 6 metre width and height not exceeding 5 metre, Steel pipes of 50 mm nominal bore shall be used. The shaft shall be supported on mild steel brackets of size 375 x 375 x 3.15 mm for shutters upto a clear height of 3.5 metre. The size of mild steel brackets shall be 500 x 500 x 10 mm for shutters of clear height above 3.5 m and upto 6.5 m. The suspension shaft clamped to the brackets shall be fitted with rotatable cast iron pulleys to which the shutter is attached. The pulleys and pipe shaft shall connected by means of pretension helical springs to counter balance the weight of the shutter and to keep the shutter in equilibrium in any partly open position.

When the width of the opening is greater than 3.5 mtr. The cast iron pulleys shall be interconnected with a cage formed out of mild steel flats of at least 32 x 6 mm and mild steel dummy rings made of similar flats to distribute the torque uniformly. Self-aligning two row ball Bearing with special cast iron casings shall be provided at the extreme pulley and caging rings shall have a minimum spacing of 15mm and at least 4 number flats running throughout length of roller shall be provided.

In case of shutters of large opening with mechanical device for opening the shutter the roller shall be fitted with a purion wheel at one end which in contact with a worm fitted to the bracket plate, caging and pulley with two ball bearing shall be provided.

**Guide Channel :** The width of guide channel shall be 25 mm the minimum depth of guide channels shall be as follows:

Clear width of shutters	Depth of guide channel
Up to 3.5 m	65 mm
3.5 m up to 8 m	75 mm
8 m and above	100 mm

The gap between the two legs of the guide channels shall be sufficient to allow the free movement of the shutter and at the same time close enough to prevent rattling of the shutter due to wind.

Each guide channel shall be provided with a minimum of three fixing cleats or supports for attachment to the wall or column by means of bolts or screws. The spacing of cleats shall not exceed 0.75 m. alternatively, the guide channels may also be provided with suitable dowels, hooks or pins for embedding in the walls.

The guide channels shall be attached to the jambs, plumb and true either in the overlapping fashion or embedded in grooves, depending on the method of fixing.

**Cover:** Top cover shall be of mild steel sheets not less than 0.90 mm thick and stiffened with angle or flat stiffeners at top and bottom edges to retain shape.

Lock plates with sliding bolts, handles and anchoring rods shall be as per IS 6248-1979 (Reaffirmed 2017).

**Fixing:** The arrangement for fixing in different situations in the opening shall be as per IS 6248-1979 (Reaffirmed 2017).

Brackets shall be fixed on the lintel or under the lintel as specified with rawl. Plugs and screws bolts etc. The shaft along with the spring shall then be fixed on the brackets.

The lath portion (shutter) shall be laid on ground and the side guide channels shall be bound with ropes etc. The shutter shall then be placed in position and top fixed with pipe shaft with bolts and nuts. The side guide channels and cover frames shall then be fixed to the walls through the plate welded to the guides. These plates and bracket shall be fixed by means of steel screws bolts, and rawl plugs concealed in plaster to make their location invisible. Fixing shall be done accurately in a workmen like manner that the operation of the shutter is easy and smooth.

#### **Painting**

All the members of the collapsible gate including T-iron shall be thoroughly cleaned off rust, scales, dust etc. and given a priming coat of approved steel primer conforming to IS 2074 (Part-1)-2015 (Reaffirmed 2020) before fixing them in position. Then after installation of collapsible gate painting two coats of oil paint shall be as per item 19.7.

#### **Mode of Measurements and payment:**

Clear width and clear height of the opening for rolling shutter shall be measured correct to a mm. The clear distance between the two jambs of the opening shall be clear width and the clear distance between the sill

and the soffit (bottom of lintel) of the opening shall be the clear height.

The rate shall include the cost of materials and labour involved in all the operations described above including cost of top cover and spring except ball bearing and mechanical device of chain and crank operation, which shall be paid for separately.

The area shall be calculated in square metres correct to two places of decimal.

The rate shall be unit of One Sq. m.

**82[22.101] Providing, supplying and fixing M.S. Collapsible gate including one coat of zinc chromate primer and two coats of oil paint. Width & height of the rolling shutter shall be as detail drawing.**

These shall be of approved manufacture and shall be fabricated from the mild steel sections.

The gates shall consist of double or single collapsible gate depending on the size of the opening. These shall consist of vertical double channels each 20 x 10 x 2 mm. at 10 cm. centre to centre braced with flat iron diagonals 20 x 5 mm and top and bottom rails of T- iron 40 x 40 x 6 mm @ 3.5 kg/m with 40mm dia. ball bearings in every fourth double channel, unless otherwise specified. Wherever collapsible gate is not provided within the opening and fixed along the outer wall surface, T- iron at the top may be replaced by flat iron 40 x 10 mm.

The collapsible gate shall be provided with necessary bolts and nuts, locking arrangement, stoppers and handles. Any special fittings like spring, catches and locks, shall be so specified in the description of item where so required. The gate shall open and close smoothly and easily.

**Fixing**

T-iron rails shall be fixed to the floor and to the Lintel at top by means of anchor bolts embedded in cement concrete of floor and lintel. The anchor bolts shall be placed approximately at 45 cm centres alternatively in the two flanges of the T- iron. The bottom runner (T- iron) shall be embedded in the floor and proper groove shall be formed along the runner for the purpose. The collapsible shutter shall be fixed at sides by fixing the end double channel with T -iron rails and also by hold- fasts bolted to the end double channel and fixed in masonry of the side walls on the other side. In case the collapsible shutter is not required to reach the lintel, beam or slab level, a Tee -section suitably designed may be fixed at the top, embedded in masonry and provided with necessary clamps and roller arrangement at the top. All the adjoining work damaged in fixing of gate shall be made good to match the existing work, without any extra cost.

**Painting**

All the members of the collapsible gate including T-iron shall be thoroughly cleaned off rust, scales, dust etc. and given a priming coat of approved steel primer conforming to IS 2074 (Part-1)-2015 (Reaffirmed 2020) before fixing them in position. Then after installation of collapsible gate painting two coats of oil paint shall be as per item 19.7.

**Mode of Measurements and payment:**

The height and breadth shall be measured correct to a cm.

The height of the gate shall be measured as the length of the double channels and breadth from outside to outside of the end fixed double channels in open position, of the gate.

The area shall be calculated in square metres, correct to two places of decimal.

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

The rate shall be unit of One Sq. m.

**83[22.102] Providing, making and filling the polysulphide / polyurethane / silicon joint.**

The relevant specification shall be followed as per item no. 50[22.69].

The joint shall be finished smooth after filling the filler materials.

The mode of measurement and payment shall be made on Rmt. basis of work done incl. labours & materials.

**84[22.103] Providing, supplying and grouting epoxy base grouting for tiles.**

**Material:**

Epoxy Grout

Grout is the material that is used to fill the space between adjacent tiles and support the joints.

The Epoxy grout consists of mix of 0.70 kg of organic coated filler of desired shade and mixing of 0.10 kg of hardener and 0.20 kg of resin per kg.. They have very low water absorption, higher compressive strength and are resistant to staining and easy to maintain. Epoxy grout is a waterless mix formed by mixing a base

material (part A) and a hardener (part B). These components are mixed at site just prior to grouting. Generally, epoxy grouts require no additional sealer to protect the surface.

### **Application process**

#### **Surface preparation**

It shall be ensured that tiles are firmly set and adhesive or mortar is completely dry for 24 hours. All spacers, pegs, ropes and string shall be removed and joints be cleaned by removing free loose dirt particles.

#### **Preparing mix and application**

The complete unit Part A (Base) and Part B (Hardener) shall be properly mixed in given ratio. The desired colour of grout shall be obtained by mixing required quantity of colour with base to ensure homogeneity.

The grout shall be pressed firmly by using a hard rubber squeeze into joints ensuring that joints are completely filled. Excess grout material shall be removed from joints and surface by moving squeeze on grout line after 22 to 25 minutes. The damp sponge shall be used in circular motion on tile surface to achieve the flush joint. After completion of work the grout haze shall be cleaned with clean water or soap solution. The suitable rubber gloves shall be used to avoid skin contact during application.

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

Length and breadth of grouted tile area shall be measured correct to a cm and the area shall be calculated in sq.m. correct to two places of decimal.

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

Nothing extra shall be paid.

The rate shall be unit of One sq. m.

### **85[22.104] Providing, supplying and laying Precast kerb stone.**

#### **Laying**

Trenches shall first be made along the edge of the wearing course of the road to receive the kerb stones of cement concrete of specified grade. The bed of the trenches shall be compacted manually with steel rammers to a firm and even surface and then the stones shall be set in cement mortar of specified proportion.

The kerb stones with top 15 cm. wide shall be laid with their length running parallel to the road edge, true in line and gradient at a distance of 30 cm. from the road edge to allow for the channel and shall project as shown in detail drawing or as directed. The joints of kerb shall not be more than 10 mm. wherever specified all joints shall be filled with mortar 1:3 (1 cement: 3 coarse sand) and pointed with mortar 1:2 (1 cement: 2 fine sand) which shall be cured for 7 days.

The necessary drainage openings of specified sizes shall be made through the kerb as per drawings or as directed by the Engineer-in-Charge for connecting to storm water drains.

#### **Finishing**

Berms and road edges shall be restored and all surplus earth including rubbish etc. disposed off as directed by the Engineer-in-charge. Nothing extra shall be paid for this.

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

It shall be measured in running meter of the finished work (for specified width and height of stone) along the edge of the road correct to a cm.

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

The rate shall be unit of One running meter.

### **86[22.105] Providing, supplying and laying of Granular sub base course.**

This work shall consist of laying and compacting well-graded material on prepared subgrade in accordance with the requirements of these Specifications. The material shall be laid in one or more layers as sub-base or lower sub-base and upper sub-base (termed as sub-base hereinafter) as necessary according to lines, grades and cross-sections shown on the drawings or as directed by the Engineer-in-charge.

#### **Materials**

The material to be used for the work shall be natural sand, crushed gravel, crushed stone, crushed slag or combination thereof depending upon the grading required. Use of materials like Kankar and crushed

concrete shall be permitted in the lower sub-base. The material shall be free from organic or other deleterious constituents and shall conform to the grading given in Table-1 and physical requirement given in Table-2. Gradings III and IV shall preferably be used in lower sub-base. Grading V and VI shall be used as a sub-base-cum-drainage layer. The grading to be adopted for a project shall be as specified in the Contract. Where the sub-base is laid in two layers as upper sub-base and lower sub-base, the thickness of each layer shall not be less than 150 mm.

If the water absorption of the aggregate determined as per IS 2386(Part-3)-1963 (Reaffirmed 2021); if this value is greater than 2 per cent, the aggregate shall be tested for Wet Aggregate Impact Value (AIV) (IS 5640-1970 (Reaffirmed 2017)). Soft aggregates like Kankar, Brick ballast and laterite shall also be tested for Wet AIV (IS 5640-1970 (Reaffirmed 2017)).

**TABLE No. 1**  
**GRADING FOR GRANULAR SUB-BASE MATERIALS**

IS Sieve Designation	Percent by Weight Passing the IS Sieve					
	Grading I	Grading II	Grading III	Grading IV	Grading V	Grading VI
75.0 mm	100	--	--	--	100	--
53.0 mm	80-100	100	100	100	80-100	100
26.5 mm	55-90	70-100	55-75	50-80	55-90	75-100
9.50 mm	35-65	50-80	--	--	35-65	55-75
4.75 mm	25-55	40-65	10-30	15-35	25-50	30-55
2.36 mm	20-40	30-50	--	--	10-20	10-25
0.85 mm	--	--	--	--	2-10	--
0.425 mm	10-15	10-15	--	--	0-5	0-8
0.075 mm	<5	<5	<5	<5	--	0-3

**TABLE No. 2**  
**PHYSICAL REQUIREMENTS FOR MATERIALS FOR GRANULAR SUB-BASE**

Aggregate Impact Value (AIV)	IS 2386(Part-4)-1963 (Reaffirmed 2021) or IS 5640-1970 (Reaffirmed 2017)	40 Maximum
Liquid Limit	IS 2720(Part-5)-1985 (Reaffirmed 2020)	Maximum 25
Plasticity Index	IS 2720(Part-5)-1985 (Reaffirmed 2020)	Maximum 6
CBR at 98% dry density (at IS:2720-Part 8)	IS 2720(Part-5)-1985 (Reaffirmed 2020)	Minimum 30 unless otherwise specified in the Contract

### **Construction Operations**

#### **Preparation of Sub-Grade:**

The surface of the sub grade to receive the Granular Sub-base shall be prepared to the specified lines and crossfall (Camber) as necessary and made free of dust and other extraneous materials. Any ruts or soft yielding places shall be corrected in an approved manner and rolled with 80 – 100 kN smooth wheeled roller until firm surface is obtained if necessary by sprinkling water. Weak places shall be strengthened, corrugations removed and depressions and pot holes made good with suitable materials, before spreading the aggregate for GSB.

Where the existing surface over which the sub base of GSB is to be laid is black topped, to ensure effective internal drainage, furrows 50 mm x 50 mm (depth of furrows increased to reach bottom of bituminous layer where necessary) at one metre intervals shall be cut in the existing bituminous surface at 45 degrees to the central line of the carriageway at one metre intervals in the existing road before the GSB is laid.

#### **Spreading and compacting:**

The sub-base material of grading specified in the Contract and water shall be mixed mechanically by a suitable mixer equipped with provision for controlled addition of water and mechanical mixing. So as to ensure homogenous and uniform mix. The required water content shall be determined in accordance with IS 2720(Part-8)-1983 (Reaffirmed 2020). The mix shall be spread on the prepared sub-grade with the help of a motor grader of adequate capacity, its blade having hydraulic controls suitable for initial adjustment and for maintaining the required slope and grade during the operation, or other means as approved by the Engineer-in-charge.

Moisture content of the mix shall be checked in accordance with IS 2720(Part-2)-1973 (Reaffirmed 2020) and suitably adjusted so that, at the time of compaction, it is from 1 to 2 per cent below the optimum moisture content (OMC).

Immediately after spreading the mix, rolling shall be done by an approved roller. If the thickness of the compacted layer does not exceed 100 mm, a smooth wheeled roller of 80 to 100 kN weight may be used. For a compacted single layer upto 200 mm the compaction shall be done with the help of a vibratory roller of minimum 80 to 100 kN static weight capable of achieving the required compaction. Rolling shall commence at the lower edge and proceed towards the upper edge longitudinally for portions having unidirectional crossfall or on super elevation. For carriageway having crossfall on both sides, rolling shall commence at the edges and progress towards the crown.

Each pass of the roller shall uniformly overlap not less than one third of the track made in the preceding pass. During rolling, the grade and crossfall (camber) shall be checked and any high spots or depressions, which become apparent, corrected by removing or adding fresh material. The speed of the roller shall not exceed 5 km per hour.

Rolling shall be continued till the density achieved is at least 98 percent of the maximum dry density for the material determined as per IS 2720(Part-8)-1983 (Reaffirmed 2020). The surface of any layer of material on completion of compaction shall be well closed, free from movement under compaction equipment and from compaction planes, ridges, cracks or loose material. All loose, segregated or otherwise defective areas shall be made good to the full thickness of layer and re-compacted.

#### **Mode of Measurements and payment:**

Granular sub-base shall be measured as finished work in position in cubic metres.

The Contract unit rate for granular sub-base shall be payment in full for carrying out the required operations including all labour, tools, equipment, machinery and incidentals to complete the work to the specifications as described above.

The rate shall be unit of One Cu.m.

#### **87[22.106] Providing and fixing Water tight constuction or expansion joints of 150 mm dia wide thin ribbed PVC.**

#### **Water stops**

##### **Material:**

The material for the PVC waterstops shall be a plastic compound with the basic resin of polyvinyl chloride and additional resins, plasticizers, inhibitors, which satisfies the performance characteristics specified below as per IS 12200-2001 (Reaffirmed 2019).

Testing shall be in accordance with IS 8543(Part-1)-1978 (Reaffirmed 2020).

a)	Tensile strength	:	3.6 N/mm <sup>2</sup> minimum
	Ultimate elongation	:	300% minimum
b)	Tear resistance	:	4.9 N/mm <sup>2</sup> minimum
d)	Stiffness in flexure	:	2.46 N/mm <sup>2</sup> minimum
c)	Accelerated extraction		
	i) Tensile strength	:	10.50 N/mm <sup>2</sup> minimum
	ii) Ultimate elongation	:	250% minimum
(d)	Effect of Alkali	:	7 days
	i) Weight increase	:	0.10% maximum
	ii) Weight decrease	:	0.10% maximum

iii) Hardness change :  $\pm 5$  points

- (e) Effect of Alkali : 28 days
- i) Weight increase : 0.40% maximum
- ii) Weight decrease : 0.30% maximum
- iii) Dimension change :  $\pm 1\%$

PVC water stops shall be either of the bar type, serrated with centre bulb and end grips for use within the concrete elements or of the surface (kicker) type for external use. PVC water stops shall be of approved manufacture. Samples and the test certificate shall be got approved by the ENGINEER INCHARGE before procurement for incorporation in the works.

### Workmanship

Water stops shall be cleaned before placing them in position. Oil or grease shall be removed thoroughly using water and suitable detergents.

Water stops shall be procured in long lengths as manufactured to avoid joints as far as possible. Standard L or T type of intersection pieces shall be procured for use depending on their requirement. Any non-standard junctions shall be made by cutting the pieces to profile for jointing. Lapping of water stops shall not be permitted.

Water stops shall be placed at the correct location/level and suitably supported at intervals with the reinforcement to ensure that it does not deviate from its intended position during concreting and vibrating. Care shall also be taken to ensure that no honey-combing occurs because of the serrations/end grips, by placing concrete with smaller size aggregates in this region. Projecting portions of the water stops embedded in concrete shall be thoroughly cleaned of all mortar/ concrete coating before resuming further concreting operations. The projecting water stop shall also be suitably supported at intervals with the reinforcement to maintain its intended position during concreting so as to ensure that it does not bend leading to formation of pockets. In addition, smaller size aggregates shall be used for concreting in this region also.

### Mode of Measurements and payment:

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

The rate shall be unit of One running meter.

**88[22.107] Proving corrugated G.I. sheets roofing fixed with galvanized iron 'J' or 'L' hook bolts, and nuts 8mm dia. with bitumen and G.I. limpet washers filled with white lead complete excluding the cost of purline, rafters and trusses. Thickness of the G.I. sheet as per specified in tender item.**

These shall be of the thickness specified in the description of the item and shall conform to IS 277-2018. The sheets shall be of 275 grade of coating (See Appendix-A) unless otherwise specified in the description of item.

The sheets shall be free from cracks, split edges, twists, surface flaws etc. They shall be clean, bright and smooth. The galvanising shall be non-injured and in perfect condition. The sheets shall not show signs of rust or white powdery deposits on the surface. The corrugations shall be uniform in depth and pitch and parallel with the side.

### Purlins

Purlins of the specified material or M.S. rolled sections of requisite size shall be fixed over the principal rafters. These shall not be spaced at more than the following distances.

**TABLE**

<i>Thickness of C.G.S. sheet</i>	<i>Maximum spacing of purlins</i>
1.00 mm	2.00 metre
0.80 mm	1.80 metre
0.63 mm	1.60 metre

The top surfaces of the purlins shall be uniform and plane. They shall be painted before fixing on top. Embedded portions of wooden purlins shall be coal tarred with two coats.

### Slope

Roof shall not be pitched at a flatter slope than 1 vertical to 5 horizontal. The normal pitch adopted shall usually be 1 vertical to 3 horizontal.

### Laying and Fixing

The sheets shall be laid and fixed in the manner described below, unless otherwise shown in the working drawings or directed by the Engineer-in-Charge.

The sheets shall be laid on the purlins to a true plane, with the lines of corrugations parallel or normal to the sides of the area to be covered unless otherwise required as in special shaped roofs. The sheets shall be laid with a minimum lap of 15 cm at the ends and 2 ridges of corrugations at each side. The above minimum end lap of 15 cm shall apply to slopes of 1 vertical to 2 horizontal and steeper slopes. For flatter slopes the minimum permissible end lap shall be 20 cm. The minimum lap of sheets with ridge, hip and valley shall be 20 cm measured at right angles to the line of the ridge, hip and valley respectively. These sheets shall be cut to suit the dimensions or shapes of the roof, either along their length or their width or in a slant across their lines of corrugations at hips and valleys. They shall be cut carefully with a straight edge chisel to give a smooth and straight finish.

Lapping in C.G.S. sheets shall be painted with a coat of approved steel primer and two coats of painting with approved paint suitable for G.S. sheet, before the sheets are fixed in place.

Sheets shall not generally be fixed into gables and parapets. They shall be bent up along their side edges close to the wall and the junction shall be protected by suitable flashing or by a projecting drip course, the latter to cover the junction by at least 7.5 cm.

The laying operation shall include all scaffolding work involved.

Sheets shall be fixed to the purlins or other roof members such as hip or valley rafters etc. with galvanized J or L hook bolts and nuts, 8 mm diameter, with bitumen and G.I. limpet washers or with a limpet washer filled with white lead as directed by the Engineer-in-Charge. While J hooks are used for fixing sheets on angle iron purlins, and L hooks are used for fixing the sheet to R.S. joists, timber or precast concrete purlins. The length of the hook bolt shall be varied to suit the particular requirements. The bolts shall be sufficiently long so that after fixing they project above the top of the nuts by not less than 10 mm. The grip of J or L hook bolt on the side of the purlin shall not be less than 25 mm. There shall be a minimum of three hook bolts placed at the ridges of corrugations in each sheet on every purlin and their spacing shall not exceed 30 cm. Coach Screws shall not be used for fixing sheets to purlins.

The galvanized coating on J or L hooks, and bolts shall be continuous and free from defects such as blisters, flux stains, drops, excessive projections or other imperfections which would impair serviceability.

The galvanized coating should conform to IS 1367 (Part-XIII) (Sec-1)-2018. The mass of coating per square meter of the surface shall be as under:

#### Mass and Equivalent Thickness of Coating

Minimum Mass (g/m <sup>2</sup> )	Average Thickness (μm)	Minimum Mass (g/m <sup>2</sup> )	Individual Thickness (μm)
375	54	300	43

Where slopes of roofs are less than 21.5 degrees (1 vertical to 2.5 horizontal) sheets shall be joined together at the side laps by galvanized iron bolts and nuts 25 × 6 mm size, each bolt provided with a bitumen and a G.I. limpet washer or a G.I. limpet washer filled with white lead. As the overlap at the sides extends to two corrugations, these bolts shall be placed zig-zag over the two overlapping corrugations, so that the ends of the overlapping sheets shall be drawn tightly to each other. The spacing of these seam bolts shall not exceed 60 cm along each of the staggered rows. Holes for all bolts shall be drilled and not punched in the ridges of the corrugations from the underside, while the sheets are on the ground.

### Wind Tie

Wind ties shall be of 40 × 6 mm flat iron section or of other size as specified. These shall be fixed at the eaves of the sheets. The fixing shall be done with the same hook bolts which secure the sheets to the

purlins. The ties shall be paid for separately unless described in the item of roofing.

### **Finish**

The roof when completed shall be true to lines, and slopes and shall be leak proof.

### **Measurements**

The measurements of G.I. sheet roof shall be taken for finished work insuperficial area in general plane (not girthed on the roof). The laps between the G.I. sheets both at their ends and along the side edges shall not be measured. The overlaps of G.I. sheets over the valley piece and their underlap under the ridge, hip and flashing piece shall be included in the measurements.

No deductions in measurements shall be made for openings for chimney stacks, sky light etc. of area upto 0.40 Sq.mt. nor extra be paid for extra labour in cutting and for wastage etc. in forming such openings.

The rate of roof shall include the cost of all materials and labour involved in all operations described above. The rate also includes the cost of provision, erection and removal of the scaffolding, bending, ladders, templates and tools required for the proper erection and completion of the work. The rate includes the cost of purlines, rafters and trusses.

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

### **89[22.108] Proving ridges or hips 600mm overall in plain G.I. sheets fixed with G.I. 'J' or 'L' hooks, bolts and nuts 8mm dia. G.I. limpet and bitumen washer etc. complete. Thickness of the G.I. sheet as per specified in tender item.**

Ridges and hips of C.G.S. roof shall be covered with ridge and hip sections of plain G.S. sheet witha minimum lap of 20 cm on either side over the C.G.S. sheets. The end laps of the ridges and hips and between ridges and hips shall also be not less than 20 cm. The ridges and hips shall be of 60 cm overall width plain G.S. sheet, 0.6 mm or 0.8 mm thick as given in the description of the item and shallbe properly bent in shape.

### **Fixing**

Ridges shall be fixed to the purlins below with the same 8 mm dia. G.I. hook bolts and nuts and bitumen and G.I. limpet washers which fix the sheets to the purlins.

Similarly, hips shall be fixed to the roof members below such as purlins, hip and valley rafterswith the same 8 mm dia G.I. hook bolts and nuts and bitumen and G.I. limpet washers which fix the sheets to those roof members. At least one of the fixing bolts shall pass through the end laps of ridgesand hips, on either side. If this is not possible extra hook bolts shall be provided.

The end laps of ridges and hips shall be joined together with C.G.S sheet by galvanised ironseam bolts 25 x 6 mm size each with a bitumen and G.I. washer or white lead as directed by the Engineer-in-Charge. There shall be at least two such bolts in each end lap.

Surface of C.G.I. sheets of ridge and hip sections and the roofing sheets which overlap eachother shall be painted with a coat of approved primer and two coats of approved paint suitable for painting G.S. Sheets before they are fixed in place.

### **Finish**

The edges of the ridges and hips shall be straight from end to end and their surfaces should be plane and parallel to the general plane of the roof. The ridges and hips shall fit in squarely on the sheets.

### **Measurement**

The measurements shall be taken for the finished work in length along the centre line of ridge or hip, as the case may be, correct to a cm. The laps in ridges and hips and between ridges and hips shall not be measured.

The rate shall include the cost of all labour and materials specified above, including painting, costof seam bolts and any extra G.I. hook bolts, nuts and washers, required.

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

## SECTION- 15 DEMOLITION & DISMANTLING

### 15.0 GENERAL

This chapter relates to buildings only.

#### Precautions

All materials obtained from dismantling or demolition shall be the property of the Government unless otherwise specified and shall be kept in safe custody until they are handed over to the Engineer-in-Charge/ authorized representative.

The demolition shall always be well planned before hand and shall generally be done in reverse order of the one in which the structure was constructed. The operations shall be got approved from the Engineer-in-Charge before starting the work.

Due care shall be taken to maintain the safety measures prescribed in IS 4130-1991 (Reaffirmed 2017) and construction and demolition waste management rules 2016 shall be followed.

Necessary propping, shoring and or under pinning shall be provided to ensure the safety of the adjoining work or property before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining work or property. Wherever specified, temporary enclosures or partitions and necessary scaffolding with suitable double scaffolding and proper cloth covering shall also be provided, as directed by the Engineer-in-Charge. It shall be ensured that no dust is generated while demolishing. Demolition Rules – 2016 shall be followed.

Necessary steps shall be taken to keep noise and dust nuisance to the minimum. All work needs to be done under the direction of Engineer-in-Charge. Helmets, goggles, safety belts etc., should be used whenever required and as directed by the Engineer-in-Charge. The demolition work shall be proceeded with in such a way that it causes the least damage and nuisance to the adjoining building and the public. Barricading shall be provided as per NGT guidelines.

Dismantling shall be done in a systematic manner. All materials which are likely to be damaged by dropping from a height or by demolishing roofs, masonry etc. shall be carefully removed first. Chisels and cutters may be used carefully as directed. The dismantled articles shall be removed manually or otherwise, lowered to the ground (and not thrown) and then properly stacked as directed by the Engineer-in-Charge.

Where existing fixing is done by nails, screws, bolts, rivets, etc., dismantling shall be done by taking out the fixing with proper tools and not by tearing or ripping off.

Any serviceable material, obtained during dismantling or demolition, shall be separated out and stacked properly as directed by the Engineer-in-Charge within any lead. All unserviceable materials, rubbish etc. shall be disposed off at authorized locations by urban local bodies as directed by the Engineer-in-Charge.

The contractor shall maintain/disconnect existing services, whether temporary or permanent, wherever required by the Engineer-in-Charge.

No demolition work should be carried out at night especially when the building or structure to be demolished is in an inhabited area.

Appropriate screens shall be placed where necessary to prevent injuries due to falling pieces.

Water spray shall be used to reduce dust while tearing down plaster from brick work.

Safety belts shall be used by laborers while working at higher level to prevent falling from the structure. Wherever, possible mechanized working platform shall be used.

First-aid equipment shall be made available at all demolition works of any magnitude.

**1.0 Dismantling tiled or stone floors laid in mortar including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift.**

**Workmanship :**

The relevant specifications as above mention shall be followed.

**Mode of measurement and payment :**

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

**2.0 Demolition of brick work / stone masonry including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift (II) in cement mortar.**

**Workmanship :**

The relevant specifications as above mention shall be followed.

**Mode of measurements and payments :**

The wall and independent piers of columns of brick or stone masonry shall be measured in cubic meters. All copings, corbel, cornices and other projections shall be included with the wall measurements.

In measuring thickness plastered walls, the thickness of plaster shall be included.

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

**3.0 Dismantling C.I. pipes, G.S.W. pipes and A.C. rain water pipes with fitting and clamps including stacking the materials with all lead and lift for any dia. of pipe.**

**Workmanship :**

The relevant specifications as above mention shall be followed

**Mode of measurement and payment :**

The rate shall be for unit of one running meter.

**4.0 Dismantling mangalore or country tile roofing or A.C. Sheet roofing boarding etc. including stacking of serviceable materials and disposal of unserviceable materials with all lead and lifts.**

**Workmanship :**

The relevant specifications as above mention shall be followed

**Mode of measurement and payment :**

The supporting members shall be measured under separate items.

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

**5.0 Dismantling of existing plaster to the inner / external surfaces and preparing surface for plastering as directed by Engineer in charge for all heights with all scaffolding tools and plants.**

**Workmanship :**

The relevant specifications as above mention shall be followed

**Mode of measurement and payment :**

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

**6.0 Dismantling doors, windows, ventilators etc. not exceeding 3 sq.m. in area (wood or steel) shutters including chowkhats, architraves holdfasts and other attachment etc. complete and stacking them within all lead and lift.**

**Workmanship :**

The relevant specifications as above mention shall be followed

Dismantling of doors, windows, clerestory windows, ventilators etc. (wood or metal) whether done separately or along with removal of wall by making recess in the wall shall be enumerated. Those exceeding 3 sqm each in area shall be measured separately. The item shall include removal of chowkhats architraves, holdfasts and other attachments.

If only shutters are to be taken out it shall be measured separately.

**Mode of measurement and payment :**

The rate shall be for a unit of one number.

**7.0 Dismantling sanitary fittings like wash basin, W.C. pan, India, Orissa pan or European type flushing tank etc. including stacking the materials with all lead and lift.**

**Workmanship :**

The relevant specifications as above mention shall be followed

**Mode of measurement and payment :**

The rate shall be for a unit of one number.

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**SECTION- 16**  
**REFERENCES**

**REFERENCE To VARIOUS IS CODES**

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2	Cement:	
	- Specification ordinary portland cement	269-2015(Reaffirmed 2020)
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	-Chemical analysis	4032-1985(Reaffirmed 2019)
		4031-1996(Reaffirmed 2021)
3	Bricks	
	- Specification	1077-1992(Reaffirmed 2020)
	- Compressive strength, water absorption, efflorescence	3495-2019 (Part I, II, III)
	Sampling	5454-1978 (Reaffirmed 2020)
4	Aggregates	
	-Specification's to coarse & Fine aggregates	383-2016 2386-1963(Reaffirmed 2021) 6759-1972(Reaffirmed 2019)
	- Specification to aggregates for WBM	2386-1963 (Part I to VIII) (Reaffirmed 2021)
5	Masonry Mortar	
	-Specification	2116-1980(Reaffirmed 2017)
6	Concrete	456-2000(Reaffirmed 2021)
7	Steel	
	Specification for mild steel and high yield deformed Bar	1786-2008(Reaffirmed 2018)
	Ternate tests	1608-2018
	Bend Tests	1599-2019
	Re bend tests	1786-2008(Reaffirmed 2018)
8	Tiles	
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9	Structural steel, plates, sections, flats	2261-1975(Reaffirmed 2015)
10	Sand for masonry	2116-1980(Reaffirmed 2017)
	Sand for Plaster	1542-1992(Reaffirmed 2019)
11	Asbestoes Cement	1592-2003(Reaffirmed 2018)
	Pressure Pipe	9627-1980(Reaffirmed 2020)
12	A.C. Sheets code of practice for laying	
	Part I Corrugated	3007-I-1999(Reaffirmed 2019)
	Part II Semi Corrugated	3007-II-1999(Reaffirmed 2019)
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	Part II Pre constructional Chemical Treatment measures	6313(II)-2013(Reaffirmed 2018)
	Treatment for existing building	6313(III)-2013(Reaffirmed 2018)
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	Steel door frames	4351-2003(Reaffirmed 2013)
	Steel doors, windows, frames	1038-1983(Reaffirmed 2017)
15	Laying <i>in situ</i> cement concrete flooring Code of practice	2571-1970(Reaffirmed 2017)
16	Laying and finishing of cement concrete flooring tiles code of practice	1443-2018
17	Measurement of building and civil engineering works methods of	
	Earthwork	1200-I-1992(Reaffirmed 2017)
	Cement concrete works	1200-II-1974(Reaffirmed 2017)
	Brick works	1200-III-1976(Reaffirmed 2017)
	Formwork	1200-V-2013(Reaffirmed 2018)
	Steel work and iron work	1200-VIII-1993(Reaffirmed 2017)
	Paring, floor finishers –Dado and skirting	1200-XI-2013(Reaffirmed 2018)
	Plastering and Pointing	1200-XII-1976(Reaffirmed 2017)
	White washing, color washing, Distempering and other finishes	1200 -XIII -1994(Reaffirmed 2017)
	Glazing	1200-XIV-1984(Reaffirmed 2018)
	Laying of water and sewer lines	1200-XVI-1979(Reaffirmed 2017)
	Demolition and dismantling	1200-XVIII-1974(Reaffirmed 2017)
18	Measurement for plinth carpet and rentable area of building method of	3861-2002(Reaffirmed 2017)
19	A.C. Building Pipes and pipe fitting, gutter and gutter fittings	
	Pipe & pipe fitting	1626-I-1994(Reaffirmed 2020)
	Gutter and gutter fitting	1626-I-1994(Reaffirmed 2020)
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	Asbestos pressure pipe	1592-2003(Reaffirmed 2018)
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22	Painting concrete, plaster masonry shapes code of practice	
	Operations and workman ship	2395(I)-1994(Reaffirmed 2019)
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		2019)
23	Painting of feurous method in building for Pretreatment	1477-I-1971(Reaffirmed 2020)
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28	Glazed earth ware tiles	15622-2017
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30	Preparation and use of masonry mortars code of practice for	2250-1981(Reaffirmed 2020)
31	Water proofing of roofs with bitumen felts code of practice for	1346-1991(Reaffirmed 2020)
32	Building drainage code	1346-1991(Reaffirmed 2020)
33	Design and construction of septic tanks code of practice for	
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	G.I. Mild steel tubes	1239-2004(Reaffirmed 2014)
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34	Concrete pipes with or without Reinforcement	458-2021