

Name of work: Repairing Work in Dr.S&S.S Gandhi Collage Of Engineering & Tech.Surat (Diploma) (Barrier Free Building Disable and Rain Water Harvesting & Other Miss.Work)

ITEM WISE SPECIFICATION

Item No 1 Providing and supplying wheel chair for handicap including Ultra light weight aluminum alloy frame wheelchair, Detachable armrest, Elevating footrest,Detachable & height-djustable headrest,Duracle product.

The item includes Providing and supplying wheel chair for handicap including Ultra light weight aluminum alloy frame wheelchair, Detachable armrest, Elevating footrest,Detachable & height-djustable headrest,Duracle product.

The Material Selection and consolidated item shall be carried out as directed by Engineer in charge

The item shall be measured and paid on Number basis.

Item No 2 Providing and fixing Tectile PVC Strip size of 600 x 300mm of self adhesive quality & fixtures & fastenings etc directed by engineer in charge.

The item includes Providing and fixing Tectile PVC Strip size of 600 x 300mm of self adhesive quality & fixtures & fastenings etc directed by engineer in charge.

The Material Selection and consolidated item shall be carried out as directed by Engineer in charge

The item shall be measured and paid on Number basis.

Item No 3 Dismantling tiled of stone floors laid in mortar including stacking of serviceable materilas and disposal of unserviceable materials with all lead and lift

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.20.23/P.148

Item No 4 Dismantling santtary fittings like wash basin, W.C.Pan Indian and European type, flushing tank etc. including stacking the materials with all lead and lift.

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.20.00 I/P.151

Item No 5 Dismentling C.I. pipes G.S.W.pipes abd A.C. rain water pipes with fittings and clamps including stacking the materials with all lead and lift (for any dia, of pipe)

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.20.56(i)/P.151

Item No 6 P & L 30x30 cm. Matt Finished Ceramic Tiles 6 mm thick in flooring treads of steps and landing laid on a bed of 12 mm thick cement mortar 1:3(1-cement:3-coarse sand)finishing with flush pointing in colour cement slurry etc. complete. Colour and Shade approved by Engineer-In-Charge

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.14.29 P.No.96 except that using for 30X30 CM. Matt Finished Ceramic Tiles 6 mm thick or ISI mark instead of white glazed tiles.

- Item No 7 Providing and laying coloured glazed tiles of the size 300 mm x 200 mm x 8 mm / 300 mm x 450 mm x 8 mm in skirting, risers of steps and dedo on 10 mm. thick cement plaster 1:3 (1 cement : 3 coarse sand) & jointed with white cement slurry.**

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.14.32 P.No.97 Except coloured glazed tiles of the size 300 mm x 200 mm x 8 mm / 300 mm x 450 mm x 8 mm instead of white glazed tiles.

- Item No 8 "Providing laying and jointing in true line and level 15mm dia. U.P.V.C. Pipe (SCH- 40) for cold water including fittings as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two metre C/C or shall be concealed as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials."**

The relevant specifications of Building Booklet It. No.23.8.(A) Page No.162 shall be followed expect use level 15mm dia. U.P.V.C. Pipe (SCH- 40) for cold water including fittings and Pipe shall be fixed on the wall with the help of clamp at every two metre C C or shall be concerned as directed as approved by Engineer In Charge and instead of 6 kgs sq.cm. working pressure polythene pipes of 20mm dia.

- Item No 9 "Providing laying and jointing in true line and level 25mm dia. U.P.V.C. Pipe (SCH- 40) for cold water including fittings as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two metre C/C or shall be concealed as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials."**

The relevant specifications of Building Booklet It. No.23.8.(B) Page No.162 shall be followed expect use level 25mm dia. U.P.V.C. Pipe (SCH- 40) for cold water including fittings and Pipe shall be fixed on the wall with the help of clamp at every two metre C C or shall be concerned as directed as approved by Engineer In Charge and instead of 6 kgs sq.cm. working pressure polythene pipes of 25mm dia.

- Item No 10 "Providing laying and jointing in true line and level 40mm dia. U.P.V.C. Pipe (SCH- 40) for cold water including fittings as approved by Engineer In Charge. Pipe shall be fixed on the wall with the help of clamp at every two metre C/C or shall be concealed as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials."**

The relevant specifications of Building Booklet It. No.23.8.(D) Page No.162 shall be followed expect use level 40mm dia. U.P.V.C. Pipe (SCH- 40) for cold water including fittings and Pipe shall be fixed on the wall with the help of clamp at every two metre C C or shall be concerned as directed as approved by Engineer In Charge and instead of 6 kgs sq.cm. working pressure polythene pipes of 40mm dia.

- Item No 11 Providing laying and jointing in true line and level 50mm dia. U.P.V.C. Pipe (SCH- 40) for cold water including fittings as approved by Engineer In Charge. Pipe shall be fixed on the**

wall with the help of clamp at every two metre C/C or shall be concealed as directed including necessary fittings etc. including testing of pipe and joints and fixing the same with adhesive solvent, including cost of all materials.

The relevant specifications of Building Booklet It. No.23.8.(E) Page No.162 shall be followed expect use level 50mm dia. U.P.V.C. Pipe (SCH- 40) for cold water including fittings and Pipe shall be fixed on the wall with the help of clamp at every two metre C C or shall be concerned as directed as approved by Engineer In Charge and instead of 6 kgs sq.cm. working pressure polythene pipes of 50mm dia

- Item No 12 Providing, laying and jointing in true line and level 160 diameter U.P.V.C (Type B) conforming to IS 13592-1992 with one end plain and other end socketed with rubber ring, & fittings conforming to ISI 14735-1999 of approved make for drainage system pipe line, pipe shall be jointed with each other with rubber lubricant, pipe shall be fixed on wall using of PVC clamp of the size 160 mm diameter x 210 mm length x 196 mm heigh at every 2000 mm center to center or shall be concealed in walls as directed including necessary fittings such as bends, shoes etc. including testing of pipes and joints and jointed with adhesive solvent cement including cost of all materials.**

The relevant specifications of Building Booklet It. No.23.8. Page No.162 shall be followed expect use 160 diameter U.P.V.C (Type B) conforming to IS 13592-1992 with one end plain and other end socketed with rubber ring, and fittings conforming to ISI 14735-1999 of approved make for drainage system pipe line, pipe shall be jointed with each other with rubber lubricant, pipe shall be fixed on wall using of PVC clamp of the size 160 mm diameter x 210 mm length x 196 mm heigh at every 2000 mm center to center or shall be concealed instead of 6 kgs sq.cm. working pressure polythene pipe

- Item No 13 Providing laying (to level or slopes) and jointing reinforced concrete Light duty non-pressure pipes I.S. class NP2 of the following internal diameter with collars and butt ends prepared for collar joints including testing of joints complete.(D) 300mm**

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.24.22.(D) P.No.177

- Item No 14 Providing, laying and jointing in true line and level 75 mm dia. UPVC SWRType B pipe conforming to IS 13592-1992 with one end plain and other end socketed with rubbering and fitting conforming to ISI 14735-1999 of approved make for drainage system pipe line, pipe shall be jointed with each other with rubber lubricant, pipe shall be fixed on wall using of PVC clamp at every 2000 mm c/c or shall be concealed in walss as directed including necessary fittings such as bends, shoes etc. including testing of pipes and joints and jointed with adhesive solvent cement including cost of all materials.**

The relevant specifications of Building Booklet It. No.23.8.(E) Page No.162 shall be followed expect use 75 mm diameter U.P.V.C (Type B) conforming to IS 13592-1992 with one end plain and other end socketed with rubber ring, and fittings conforming to ISI 14735-1999 of approved make for drainage system pipe line, pipe shall be jointed with each other with rubber lubricant, pipe shall be fixed on wall using of PVC clamp of the size 110 mm

diameter x 149 mm length x 145 mm height at every 2000 mm centre to centre instead of 6 kgs sq.cm. working pressure polythene pipes of 50mm di

- Item No 15 Providing, laying and jointing in true line and level 110 diameter U.P.V.C (Type B) conforming to IS 13592-1992 with one end plain and other end socketed with rubber ring, & fittings conforming to ISI 14735-1999 of approved make for drainage system pipe line, pipe shall be jointed with each other with rubber lubricant, pipe shall be fixed on wall using of PVC clamp of the size 110 mm diameter x 149 mm length x 145 mm height at every 2000 mm center to center or shall be concealed in walls as directed including necessary fittings such as bends, shoes etc. including testing of pipes and joints and jointed with adhesive solvent cement including cost of all materials.**

The relevant specifications of Building Booklet It. No.23.8. Page No.162 shall be followed expect use 110 diameter U.P.V.C (Type B) conforming to IS 13592-1992 with one end plain and other end socketed with rubber ring, and fittings conforming to ISI 14735-1999 of approved make for drainage system pipe line, pipe shall be jointed with each other with rubber lubricant, pipe shall be fixed on wall using of PVC clamp of the size 160 mm diameter x 210 mm length x 196 mm height at every 2000 mm center to center or shall be concealed instead of 6 kgs sq.cm. working pressure polythene pipes

- Item No 16 Providing and fixing PVC SWR Nahni trap IS 14735 for drain - 100 mm diameter with jali of the following nominal diameter of self cleansing design with C.I screed down or hinged grating including the cost of cutting and making good the walls.**

The relevant specifications of Building Booklet It. No.23.87 Page No.164 shall be followed expect use PVC SWR **Nahni trap** IS 14735 for drain - 100 mm diameter with jail instead of cast iron (spun)nahni trap

- Item No 17 Providing and fixing screw down bib taps of following size.(B) Brass chromium plated screws down Bib Tap. (i) 15mm dia.**

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.23.92. (A)(I) P.No.170

- Item No 18 Providing and fixing brass screw down stop tap.(A) 15mm dia.**

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.23.96 (A) P.No.171 Expect using 15 mm dia Stop tap instead of Stop cock.

- Item No 19 Providing and fixing pillar tap, capstan head, screw down high pressure with screws, shanks and back nuts. (i) 15mm dia.**

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.23.95 (A) P.No.171except that using for 15mm dia.

- Item No 20 Providing and fixing wsh down water closet (European type, W.C. Pan) with integral P or S trap including jointing the trap with soil pipe in Cement Mortar 1:1 (1-Cement : 1-fine sand) (Seal and cover to be measured and paid for separately (A) vitreous China Pattern :(i) in white colour**

- Item No 21** "Providing and fixing 12.5 Litres low level flushing cistern with a pair, of C.I. or Mild brackets, complete with fittings such as lead valve less syphon, 15mm nom.nal size brass ball valve with polythene float, C.P brass handle unions and couplings for connections, with inlet, outlet and overflow pipes, 40mm dia. porcelain enamelled flush bend including cutting holes in walls and making good the same connecting the flush bend with cistern and closet (overflow pipe to be measured and paid for separately)(A) Vitreous China (I) In white colour"

The relevant specifications of Building Booklet It. No.23.115 (A)(I) Page No.165

- Item No 22** Providing and fixing plastic seat and cover for wash down water closer with C.P. brass hinges and rubber buffers. (B) Plastic seal and cover.

Item including Providing and fixing plastic seat and cover for wash down water closer with C.P. brass hinges and rubber buffers. (B) Plastic seal and cover. The solid plastic seat and cover shall be of best Indian make conforming to I.S 2548-1980. They shall be made of moulded synthetic materials which shall be tough and hard with high resistance to solvents and shall be free from blisters and surface defects and shall have chromium plated brass hinges and rubber buffer of suitable size.

Mode of measurement-

The item shall be measured and paid on **Number basis** of consolidated item of work

- Item No 23** Providing and fixing chromium plated brass half trun flush cock of approved quality including fixing in pipe line etc. complete.(ii) 25mm dia.

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.23.00.5 (A)(II) P.No.173 for 50 mm. expect use For half trun flush cock 25mm dia. instead of ball cock.(A) Copper Metal (ii) 50mm dia.

- Item No 24** "Providing and fixing Jet spray heavy duty with S.S. Braided hose 60 cm long with wall hook and other accessories etc. completed

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.23.96 (A) P.No.171 Expect using Jet spray instead of Stop cock.

- Item No 25** Providing and fixing G.I. inlet connection for flush pipe with W.C. Pan

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No. 23.120. P.No.167

- Item No 26** Providing and fixing wash basin with single hole for pillar tap with C.I. Or M.S. brackers painted white including cutting holes and making good the same including pillar tap, Brass waste, stop cack , bottle trap and M I fisher union fittings :(ii) Flat back wash basin 500mm x 400mm size including all necessary fittings etc complete shade and pattern as approved by Engineer in charge.

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.23.127. / P.No.167 +It.No.23.135(A) / P.No.168+It.No.23.136.(A)/ P.No.168 +It.No.23.96.(A)/ P.No.171+It.No.23.95 (A) / P.No.170 Expect using oval type under counter wash hand basin instead of Wash basin

Item No 27 "Providing and laying cement concrete 1:2:4 (1- Cement : 2- Coarse sand : 4- graded stone aggregates 20 mm nominal size) and curing complete excluding cost of formwork in (A) Foundation and Plinth

The relevant specification shall be followed as per General Technical specification for Building work booklet It. No. 5.3.13 P.No.40except that using for including the cost of form work for G.FLOOR instead of excluding the cost of form work.

For form work use the relevant specification shall be followed as per General Technical specification for Building work booklet It.No.9.1 (A) P.No.63

Consolidated item shall be measured and paid for actual size of RCC member casted on **Cubic meter** basis.

Item No 28 Providing and Fixing 15 mm thick 300 mm x 300 mm Tactile Warning Tiles (Attention Tiles i.e. Tactile Warning Surface Indicator {TWSI}) of Johnsan Endura Tac Button Yellow Plus or equivalent make in flooring laid on 20 mm thick cement mortar 1:6 (1 cement : 6 coarse sand) on new surface and jointed with cement slurry including finished with flush pointing & cleaning the surface for all floors as per detailed drawing etc. complete as directed by Architect or Engineer in charge. These tiles shall be Anti Skid, Chemical Resistant, Fade Proof, Frost - Heat & Weather Proof, High Flexural Strength, Highly Durable, Stain Resistance . All Tactile Warning Tiles meet the specific size and dimension standards as required by ISO/FDIS 23599.

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.14.29 P.No.96 except that using for 15 mm thick 300 mm x 300 mm Tactile Warning Tiles (Attention Tiles i.e. Tactile Warning Surface Indicator {TWSI}) of Johnsan Endura Tac Button Yellow Plus or equivalent make in flooring laid on 20 mm thick cement mortar 1:6 (1 cement : 6 coarse sand) on new surface and jointed with cement slurry including finished with flush pointing & cleaning the surface for all floors as per detailed drawing etc. complete as directed by Architect or Engineer in charge. These tiles shall be Anti Skid, Chemical Resistant, Fade Proof, Frost - Heat & Weather Proof, High Flexural Strength, Highly Durable, Stain Resistance . All Tactile Warning Tiles meet the specific size and dimension standards as required by ISO/FDIS 23599. instead of white glazed tiles.

Item No 29 Providing and Fixing a set of wall mounted 38 mm dia U shaped horizontal stainless steel collapsible grab bar , 38mm vertical stainless steel fixed grab rail of grade SS 304 from round pipe supported and 75 mm dia 8 mm thick SS 304 base flange on wall including anchor fasteners, nuts, accessories as per detailed drawing etc. complete as directed by Architect or Engineer in charge.

General

The work shall be consist of furnishing & Providing and Fixing a set of wall mounted 38 mm dia U shaped horizontal stainless steel collapsible grab bar , 38mm vertical stainless steel fixed grab rail of grade SS 304 from round pipe supported and 75 mm dia 8 mm thick SS 304 base flange on wall including anchor fasteners, nuts, accessories as per detailed drawing etc. complete as directed by Architect or Engineer in charge.

Material

1. anticorrosive 304 grade wall mounted of 38 mm dia (16Gauge)
2. S S 304 grade Baluster of 38 mm dia for vertical and horizontal support
And including accessories as per detailed drawing as directed etc. complete.

The material shall be free from loose miles scale rust piles or other affective strength and durability.

Workmanship

Fixing wall mounted 38 mm dia U shaped horizontal stainless steel collapsible grab bar , 38mm vertical stainless steel fixed grab rail of grade SS 304 from round pipe supported and 75 mm dia 8 mm thick SS 304 base flange on wall including anchor fasteners, nuts, accessories and shall be fixing by welding in true line and level and slope the railing shall be powder coats lines as per standards.

If stainless tell wall brackets of required size fixed in wall including providing and fixing the same with stainless steel wall brackets of approved type design and quality as directed by engineering in- charged

Mode of measurement & payment:

The item shall be measured for its length limiting dimensions to those specified on place of aa directed. The rat shall be for a unit of one per set.

The Payment will be made on per set.basis of the finished work.

The rate s hall be for all consolidate item of **unit of** per set.

Item No 30 Providing and fixing 90 cm & 120 cm high Stainless steel railing made from anticorrocive 304 grade S S pipe of 50 mm dia (16Gauge) as hand rail with S S 304 grade Baluster of 38 mm dia (16Gauge) as a vertical support fixed in RCC slab at 0.30m c/c including Four horizontal S S pipes of 16 mm dia (16Gauge) at eqal distance fixed including The Provisions in Nation Building Code 2016, part,Annex:B-6.2 with baluster ,accesies as per detailed drawing as directed etc. complete.

General

Providing and fixing 120cm & 90 cm high Stainless steel railing made from anticorrocive 316 grade S S pipe of 50 mm dia (16Gauge) as hand rail with S S 316 grade Baluster of 38 mm dia (16Gauge) as a vertical support fixed in RCC slab at 0.25m c/c including Four horizontal S S pipes of 16 mm dia (16Gauge) at eqal distance fixed including The Provisions in Nation

Building Code 2016, part,Annex:B-6.2 with baluster, accessories as per detailed drawing as directed etc. complete.

Material

anticorrosive 304 grade S S pipe of 50 mm dia (16Gauge) as hand rail

S S 304 grade Baluster of 38 mm dia for vertical and horizontal support

And including accessories as per detailed drawing as directed etc. complete.

The material shall be free from loose miles scale rust piles or other affective strength and durability.

Workmanship

Fixing 90 cm Height Stainless Steel Railing made from anticorrosive 304 grade S S pipe of 50 mm dia (16 Gauge) as hand rail with S S 304 grade Baluster of 38 mm dia (16 Gauge) as a vertical support fixed in RCC slab at 1.2m c/c including three horizontal S S pipes of 25 mm dia (16 Gauge) at eqal distance fixed by 18.75 mm dia (16 Gauge) S S pipe with baluster including accessories and shall be fixing by welding in true line and level and slope the railing shall be powder coats lines as per standards.

If stainless tell wall brackets of required size fixed in wall including providing and fixing the same with stainless steel wall brackets of approved type design and quality as directed by engineering in- charged

Mode of measurement and payment

The item shall be measured for its length limiting dimensions to those specified on place of directed. The rat shall be for a unit of one square meter.

The Payment will be made on Running meter basis of the finished work.

The rate s hall be for all consolidate item of unit of one running meters

Item No 31 Providing and laying hot applied thermoplastic compound 2.5 mm thick including reflectorising glass beads at 250 grams / Sq.mt. area. Thickness of 2.5 mm is exclusive of surface applied. Glass beads as per I.R.C. 35. The finished surface to be level uniform and free from streaks and holes.

General :-

Hot Applied Thermoplastic Road Marking.

- (i) The work under this section consists of marking traffic stripes using a thermoplastic compound meeting the requirements specified herein.
- (ii) The Thermoplastic compound shall be screened / extruded on to The pavement surface in a molten state by suitable machine capable of controlled preparation and laying with surface application of glass beads at a specific rate. Upon cooling to ambient pavement temperature, it shall be produce an adherent pavement marking of specified thickness and width and capable of resisting deformation by traffic.

- (iii) The colour of the compound shall be white or yellow (IS : colour No. 356) as specified in drawings or as directed by the Engineer.
- (iv) Where the compound is to be applied to cement concrete pavement sealing primer as recommended by the manufacture, shall be applied to the pavement in advance of placing of the stripes to ensure proper bonding of the compound. On new concrete surface any laitance and / or curing compound shall be removed before the marking are applied.

THERMOPLASTIC MATERIALS

GENERAL :

The thermoplastic material shall be homogeneously composed of aggregate, pigment, resins and glass reflectorizing beads.

REQUIREMENT :

Composition: the pigment, beads and aggregate shall be uniformly dispersed in the resin. The material shall be free from all skins, dirt and foreign objects and shall comply with requirements indicated in Table 800 – 3.

Table 800 – 3 PROPORTIONS OF CONSTITUENTS OF
MARKING MATERIAL (percentage by weight)

Component	White	Yellow
Binder	18.00 min.	18.00 min.
Glass Beads	30 – 40	30 – 40
Titanium Dioxide	10.00 min.	- - -
Calcium Carbonate and Inert Fillers	42.00 max	See Note
Yellow Pigments	- - -	- do -

Note : Amount of yellow pigment, calcium carbonate and inert fillers shall be at the option of the manufacturer, provide all other requirement of this Specification are met.

II Properties : The properties of thermoplastic material, when tested in accordance with ASTM D36/ BX-3262- (Pa. T1) shall be as below :

A) Luminance :

White : Daylight luminance at 45 degree 65 per cent min. as per AASHTO M 249.

- B) Drying time : When applied at a temperature specification by the manufactures and to the required thickness, the material shall set to bear traffic in not more than 15 minutes.
- C) Skid resistance : not less than 45 as per BS 6044.
- D) Cracking resistance at low temperature : The material shall show no cracks on application to concrete blocks.
- E) Softening point : $102.5 \div 9.5$ ” as per ASTM D 36.
- F) Flow resistance : Note more than 25 per cent as per AASHTO M 249.
- G) Yellowness index (for white thermoplastic paint) not more than 0.12 as per AASHTOM 249.

- III Storage life : The materials shall meet the requirement of there Specifications for period of one year. The thermoplastic material must also melt uniformly with no evidence of skins of un-melted particles for the one-year storage period. Any material not meeting the above requirements shall be replaced by the manufacturer/ supplier/ contractor.
- IV Reflectorisation : Shall be achieved by incorporation of beads, the grading and other properties of the beads shall be as specified in Clause 803.4.3 of MORT & H Specification.
- V Marking : Each container of the thermoplastic material shall be clearly and indelibly marked with the following information.
1. The name, trademark or other means of identification of manufacturer.
 2. Batch number.
 3. Date of manufacture.
 4. Colour (White or Yellow)
 5. Maximum application temperature and maximum safe heating temperature.
- VI Sampling and testing : The thermoplastic material shall be sampled and tested in accordance with the appropriate ASTM/BS method. The Contractor shall furnish to the Employer a copy of certified test report from the manufacturer of the thermoplastic material showing results of all tests specified therein and shall certify that the materials meets all requirements of this Specification.

REFLECTORZING GLASS BEADS

GENERAL : This Specification covers two types of glass beads to be used for to production of reflectiorised pavement markings. Type 1 beads are those which are a constituent of the basic thermoplastic compound vide Table 800 – 3 and type – 2 beads are those which are to be sprayed on the surface vide Clause 803.6.3.

The glass beads shall be transparent, colcurless and free from milliness, dark particles and excessive air inclusions.

These shall conform to the requirements spelt out in clause 5.4.3.3.

SPECIFIC REQUIREMENTS.

A GRADATION : The glass beads shall meet the gradation requirements for the two types as given in Table 800 – 4.

TABLE 800-4 GRADATION REQUIREMENT FOR GLASSBEADS

Sieve Size	Per Cent Retained	
	Table – 1	Table – 2
1.18 mm	0 to 3	--
850 micron	5 to 20	0 to 5
600 micron	--	5 to 20
425 micron	65 to 95	--
300 micron	--	30 to 75
180 micron	0 to 10	10 to 30
Below 180 micron		0 to 15

B. ROUNDNESS :

The glass beads shall have a minimum of 70 per cent true spheres.

C. REFRACTIVE INDEX :

The glass beads shall have a minimum refractive index of 1.50.

D. FREE FLOWING PROPERTIES :

The glass beads shall be free of hard lumps and clusters and shall dispense readily under any condition suitable for paints striping. They shall pass the free flow-test.

TEST METHODS :

The specific requirement shall be tested with the following methods.

- I Free-flow test : Spread 100grams of beads evenly in a 100 mm diameter glass dish. Place the dish in a 250 mm inside diameter desiccators which is filled within 25 mm of the top of a desiccators plate with sulphur acid water solution (specific gravity 1.10) Cover the desiccators and let it stand for 4 hours at 20 to 29 degree C. Remove Sample from desiccators, transfer beads to a pan and inspect for lumps or clusters. Then pour beads into a clean dry glass funnel having a 100 mm stem and 6 mm orifice. If necessary, initiate flow by lightly tapping the funnel. The glass spheres shall be essentially free of lumps and clusters and shall flow freely through the funnel.
- II The requirements of gradation, roundness and refractive index of glass beads and the amount of glass beads in the compound shall be tested as per BS 6088 and BS 3262 (Part 1).
- III The Contractor shall furnish to the Employer a copy of certified test report from the manufacturer of glass beads obtained from a reputed laboratory showing results of all tests specified therein and shall certify that material meets all requirements of this Specification. However, if so required, these tests may be carried out as directed by the Engineer in charge.

APPLICATION PROPERTIES OF THERMOPLASTIC MATERIAL

The thermoplastic materials shall readily get screed / extruded at temperatures specified by the manufacturers for respective method of application to produce a line of specified thickness which shall be continuous and uniform in shape having clear and sharp edges.

The materials upon heating to application temperatures shall not exude fumes which are toxic. Obnoxious or injurious to persons property.

PREPARATION :

- i) The material shall be melted in accordance with the manufacturer's instructions in a heater fitted with a mechanical stirrer to give a smooth consistency to the thermoplastic materials to avoid local overheating. The temperature of the mass shall be within the range specified by the manufacturer, and shall on no account be allowed to exceed the maximum temperature stated by the manufacturer. The molten material should be used as expeditiously as possible and for thermoplastic materials. Which has natural binders or is otherwise sensitive to prolonged heating the materials shall be maintained in a molten condition for more than 4 hours.
- II) After transfer to the laying equipment, the material shall be maintained within the temperature range specified by the manufacturer for achieving the desired consistency for laying.

PROPERTIES OF FINISHED ROAD MARKING :

- a) The stripe shall not be slippery when wet.
- b) The marking shall not lift from the pavement in freezing weather.

- c) After application and proper drying the stripe shall show no appreciable deformation or discoloration under traffic and under road temperatures up to 60 C.
- d) The marking shall be deteriorate by contact with sodium chloride calcium chloride or oil drippings from traffic.
- e) The stripe of marking shall maintain its original dimensions and position. Cold ductility of the material shall be such as to permit normal movement with the road surface without chopping or cracking.
- f) The colour of yellow marking shall conform to IS Colour No. 356 as given in IS : 164.

REFLECTORISED PAINT :

Reflectorised paint, if used shall conform to the specification by the manufacturers and approved by the engineer. Reflectorising glass beads for reflectorishing paints where used shall conform to the requirements of Clause 5.3.

APPLICATION

Marking shall be done by machine. For locations where painting cannot be done machine, approved manual methods shall be used with prior approval of the Engineer. The Contractor shall maintain control over traffic while painting operations are in progress so as to cause minimum inconvenience to traffic compatible with protecting the workmen.

The thermoplastic materials shall be applied hot either by screening or extrusion process. After transfer to the laying apparatus, the material shall be laid at a temperature within the range specified by the manufacturer for the particular method of laying being used. The paint shall be applied using a screed or extrusion machine.

The pavement temperature shall be less than 10 C. during application. All surface to be marked shall be thoroughly clean of all dust, dirt, grease, oil and all other foreign matter before application of the paint.

The material, when formed into traffic stripes, must be readily renewable by placing on overlay of new material directly over an old line of compatible material. Such new material shall so bend itself to the old line that no splitting or separation takes place.

Thermoplastic paint shall be applied in intermittent of continuous lines of uniform thickness of at least 2.5 mm unless specified otherwise. Where arrows or letters are to be provided, thermoplastic compound may be hand-sprayed. In addition to the beads included in the material, a further quantity of glass beads of Type 2, conforming to the above noted specification shall be sprayed uniformly into a mono layer on to the hot paint line quick succession of the paint spraying operation. The glass beads shall be applied at the rate of 250 grams per square meter area.

The minimum thickness specified in exclusive of surface applied glass beads. The method of thickness measurement shall be in accordance with Appendices B and C of BS-3262 (Part 3).

The finished lines shall be free from ruggedness on sides and ends and be parallel to the general alignment of the carriageway. The upper surface of the lines shall be level, uniform and free from streaks.

MEASUREMENT FOR PAYMENT.

The painted marking shall be measured in sq. meters of actual area marked (excluding the gaps. If any).

In respect of markings line directional arrows and lettering. Etc., the measurement shall be in Square meter basis.

Rate

The contractor unit rate for road markings shall be payment in full compensation of furnishing all labour, materials, tools, equipment, including all incidental costs necessary for carrying out the work at the site confirming to these specification complete as per the approved drawing (s) or as directed by the Engineer and other incidental cost necessary to complete the work to these Specifications.

- Item No 32** Providing and fixing of Ridge flashing for roof panel shall be made out of 0.5 mm thick pre coated GI sheet . The Precoated sheet shall be of minimum 240 mpa steel grade confirming to IS 14246:1995 and shall have zinc coating of minimum 120 gsm as per IS:277:1992 , 5-7 microns epoxy primer on both side of the sheet and polyester top coat 15-18 micron. The PPGI Sheet shall have plastic protective guard film of minimum 25 microns to avoid scratches during transportation. The ridge shall be fixed to the steel members by pop rivet or self drilling/self stitching fastners @ maximum 450 mm c/c along length of capping/flashing etc complete.

The item shall be executed as per the relevant specification of General Technical Specification for Building Works It. No.15.1 P 104 except pre coated GI Sheet 0.50mm instead of 0.80mm Corrugated GI Sheet

- Item No 33** Steel work, welded in built up sections framed work including cutting, hoisting, fixing in position and applying a priming coat of red lead paint & two coat oil paint. (A)In beams and joists, channels angles Tees, flats, with connecting plates or angle cleats as in main and cross beams. Hip and jack rafters, purlins conneted to common rafters and the like..

The item shall be executed as per the relevant specification of General Technical Specification for Building Works It. No.11.4.(D) P.no 81+ It. No.19.7 P.no 138

- Item No 34** Providing and fixing acrylic multilingual Braille (raised dots) DIRECTIONAL SIGNBOARDS of size 225 x 150mm designed as per accessibility standards and having 3.5mm thick acrylic base plate with Upper Case San Serif words made of white acrylic non glare cut out letters of height 15mm raised not less than 0.8mm above base plate and the equivalent word written in Hindi with Devanagari non glare acrylic letters of height 15mm raised not less than 0.8mm above base plate and having a non-glare acrylic cut arrow pointing in the required direction. Each signboard to be fixed as per manufacturers specifications on the wall at the approved location and at a height of 1200mm from FFL complete as per design / specifications and guidelines as per the entire satisfaction of the Engineer-in-charge

General

This work shall consist of Providing and fixing acrylic multilingual Braille (raised dots) DIRECTIONAL SIGNBOARDS of size 225 x 150mm designed as per accessibility standards and having 3.5mm thick acrylic base plate with Upper Case San Serif words made of white acrylic non glare cut out letters of height 15mm raised not less than 0.8mm above base plate and the equivalent word written in Hindi with Devanagari non glare acrylic letters of height 15mm raised not less than 0.8mm above base plate and having a non-glare acrylic cut arrow pointing in the required direction. Each signboard to be fixed as per manufacturers

specifications on the wall at the approved location and at a height of 1200mm from FFL complete as per design / specifications and guidelines as per the entire satisfaction of the Engineer-in-charge

The item shall be measured in Nos.

The rate shall include the cost of all material, labour, equipment and other incidental charges for fixing complete in all respects as shown on the drawings.

Mode of Measurement &Payment :

The Item shall be measured for its dimensions to those specified on plan or as directed. The rate shall be for a unit of one Nos.

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

The rate shall be for a unit of **one Nos**

Item No 35 P& F BRAILE INDICATOR OF SIZE 170 MM X 35MM FOR HANDRAILS OF THE APPROVED DESIGN AND MAKE HAVE BRAILE DOTS RAISED 0.5 MM ABOVE BASE PLATE TO BE INSTALLED AT SPECIFIC LOCATIONS AS PER DIRECTION OF ENGINEER IN CHARGE

General

This work shall consist of P& F BRAILE INDICATOR OF SIZE 170 MM X 35MM FOR HANDRAILS OF THE APPROVED DESIGN AND MAKE HAVE BRAILE DOTS RAISED 0.5 MM ABOVE BASE PLATE TO BE INSTALLED AT SPECIFIC LOCATIONS AS PER DIRECTION OF ENGINEER IN CHARGE

The item shall be measured in RMT.

The rate shall include the cost of all material, labour, equipment and other incidental charges for fixing complete in all respects as shown on the drawings.

Mode of Measurement &Payment :

The Item shall be measured for its **Length** limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one RMT

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

The rate shall be for a unit of **one RMT**

Item No 36 Providing and fixing of conspectus tape 50mm width on of treads in staircase including cutting pasting etc. As per harmonised guidelines complete in all respect to the entire satisfaction of engineer in charge.

General

This work shall consist of Providing and fixing of conspectus tape 50mm width on of treads in staircase including cutting pasting etc. As per harmonised guidelines complete in all respect to the entire satisfaction of engineer in charge.

The item shall be measured in RMT.

The rate shall include the cost of all material, labour, equipment and other incidental charges for fixing complete in all respects as shown on the drawings.

Mode of Measurement & Payment :

The Item shall be measured for its **Length** limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one RMT

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

The rate shall be for a unit of **one RMT**

- Item No 37** Providing and Fixing Size: L 75mm x W 75mm x H 1200 ; 15 mm thick U shape corner Rubber Reflective Guards with yellow reflective Patti fixing on RCC/brick surface Including all fitting and material charges & it shall be Chemical Resistant, Fade Proof, Frost - Heat & Weather Proof, High Flexural Strength, Highly Durable, Stain Resistance as per detailed drawing etc. complete as directed by Architect or Engineer in charge.

General

This work shall consist of Providing and Fixing Size: L 75mm x W 75mm x H 1200 ; 15 mm thick U shape corner Rubber Reflective Guards with yellow reflective Patti fixing on RCC/brick surface Including all fitting and material charges & it shall be Chemical Resistant, Fade Proof, Frost - Heat & Weather Proof, High Flexural Strength, Highly Durable, Stain Resistance as per detailed drawing etc. complete as directed by Architect or Engineer in charge.

The item shall be measured in per set.

The rate shall include the cost of all material, labour, equipment and other incidental charges for fixing complete in all respects as shown on the drawings.

Mode of Measurement & Payment :

The Item shall be measured for its dimensions to those specified on plan or as directed. The rate shall be for a unit of per set

The payment will be made on **per No** basis of the finished work.

The rate shall be for a unit of **one No**

- Item No 38** Providing and fixing high intensity grade Informatory (Handicap) Sign board made out of 2 mm alluminium sheet size 80 x 60 cms. Rectangle as per the design of IRC-67-1977 pre treated with Phosphering process and acid etching , coated with one coat of epoxy primer and two coats of best quality epoxy paint, reflectorised with retro reflective sheeting as per latest M.O.S.T.specifications: Letters and numerals should be as per IRC-30-1968-, 3.10 m long (2 Nos) stand post and frame fabricated from suitable size iron angle of 35 X 35 X 3 mm , 75 x 75 x 6 mm painted with best quality epoxy coating in black and white bends . The details of symbol or incription / numerals for each boards shall be as per the instruction of engineer in charge . The fixing at site shall be in 1:2:4 C.C. block of size 45 x 45 x 60 cms. for each leg including excavation , curing etc. complete under the supervision of engineer-in-charge. (High intensity grade)

801.1 GENERAL

- 801.1.1 The colour, configuration, size and location of all traffic signs for highways other than Expressways shall be in accordance with Code of Practice for Road

Signs, IRC:67 or as shown on the drawings. For Expressways, the size of signs, letters and their placement shall be as specified in the Contract drawings and relevant specifications. In the absence of any details or for any missing details, the signs shall be provided as directed by the Engineer. The Aluminum sheet size to be fixed shall be as specified in the Item.

801.1.2 The signs shall be either reflectorised or non-reflectorised as shown on the drawing or as directed by the Engineer. When they are of reflectorised type, they shall be of retro-reflectorised type and made of encapsulated lens type reflective sheeting vide Clause 801.3, fixed over aluminium sheeting as per these Specifications.

801.1.3 In general, cautionary and mandatory signs shall be fabricated. through process of screen printing. In regard to informatory signs with inscriptions, either the message could be printed over the reflective sheeting, or cut letters of non-reflective black sheeting used for the purpose which must be bonded well on the base sheeting as directed by the Engineer.

801.2 MATERIALS

The various materials and fabrication of the traffic signs shall conform to the following requirements :

801.2.1 Concrete : Concrete shall be of the grade shown on the contract drawings or otherwise as directed by the Engineer.

801.2.2 Reinforcing Steel : Reinforcing steel shall conform to the requirement of IS : 1786 unless otherwise shown on the drawing.

801.2.3 Bolts, nuts, washers: High strength bolts shall conform to IS: 1367 whereas precision bolts, nuts, etc. shall conform to IS: 1364.

801.2.4 Plates and supports: Plates and support sections for the sign posts. shall conform to IS:226 and IS:2062 or any other relevant IS Specifications.

801.2.5 Aluminium: Aluminium sheets used for sign boards shall be of smooth, hard and corrosion resistant aluminium alloy conforming to IS:736 Material designation 24345 or 1900.

801.2.6 Signs with a maximum side dimension not exceeding 600 mm shall not be less than 1.5 mm thick. All others shall be at least 2 mm thick. The thickness of the sheet shall be related to the size of the sign and its support and shall be such that it does not bend or deform under the prevailing wind and other loads.

801.2.7 In respect of sign sizes not covered by IRC:67, the structural details (thickness, etc.) shall be as per the approved drawings.

801.3 TRAFFIC SIGNS HAVING RETRO-REFLECTIVE SHEETING

- 801.3.1 General Requirements: The retro-reflective sheeting used on the sign shall consist of the white or coloured sheeting having a smooth outer surface which has the property of retro-reflection over its entire surface. It shall be weather-resistant and show colour fastness. It shall be new and unused and shall show no evidence of cracking, scaling, pitting, blistering, edge lifting or curling and shall have negligible shrinkage or expansion. A certificate of having tested the sheeting for these properties in an unprotected outdoor exposure facing the sun for two years and its having passed these tests shall be obtained from a reputed laboratory, by the manufacturer of the sheeting. The reflective sheeting shall be either of Engineering, Grade material with enclosed lens or of High Intensity Grade with encapsulated lens. The type of the sheeting to be used would depend upon the type, functional hierarchy and importance of the road.
- 801.3.2 **High Intensity Grade Sheetting** : This sheet shall be of encapsulated lens type consisting of spherical glass lens, elements adhered to a synthetic resin and encapsulated by a flexible, transparent water-proof plastic having a smooth surface. The retro-reflective surface after cleaning with soap and water and in dry condition shall have the minimum co-efficient of retro-reflection (determined in accordance with ASTM Standard E:810) as indicated in Table 800-1 .

Table 800-1

ACCEPTABLE MINIMUM CO-EFFICIENT OF RETRO REFLECTION FOR HIGH
INTENSITY GRADE SHEETING
(CANDELAS PER LUX PER SQUARE METRE)

Observation angle (in degrees)	Entrance Angle (in degrees)	White	Yellow	Orange	Green / Red	Blue
0.2	-4	250	170	100	45	20
0.2	+30	150	100	60	25	11
0.5	-4	95	62	30	15	7.5
0.5	+30	65	45	25	10	5.0

When totally wet, the sheeting shall not show less than 90 per cent of the values of retro-reflectance indicated in Table 800-1. At the end of 7

years, the sheeting shall retain at least 75 per cent of its original retro - reflectance.

- 801.3.3 Engineering grade sheeting :** This sheeting shall be of enclosed lens type consisting of microscopic lens elements embedded beneath the surface of a smooth, flexible, transparent, water-proof plastic, resulting in a non-exposed lens optical reflecting system. The retro reflective surface after cleaning with soap and water and in dry condition shall have the minimum coefficient of retro-reflection (determined In accordance with ASTM Standard :E-81 0) as indicated in Table 800-2.

Table 800 – 2

ACCEPTABLE MINIMUM COEFFICIENT OF RETRO-REFLECTION FOR ENGINEERING
GRADE SHEETING

(CANDELAS PER LUX PER SQUARE METRE)

Observation angle (in degrees)	Entrance Angle (in degrees)	White	Yellow	Orange	Green	Red	Blue
0.2	-4	70	50	25	9.0	14.5	4.0
0.2	+30	30	22	7.0	3.5	6.0	1.7
0.5	-4	30	25	13.5	4.5	7.5	2.0
0.5	+30	15	13	4.0	2.2	3.0	0.8

When totally wet, the, sheeting shall not show less than 90 per cent of the values, of retro-reflection indicated in Table 800-2. At the end of 5 years, the sheeting shall retain at least 50 per cent of its original retro reflectance.

- 801.3.4 Messages/Borders:** The messages (legends, letters, numerals etc) and borders shall either be screen-printed or of cut-outs. Screen printing shall be processed and finished with materials and in a manner specified by the sheeting manufacturer. Cut-outs shall be of materials as specified by the sheeting manufacturer and shall be bonded with the sheeting in the manner specified by the manufacturer.
- 801.3.5** For screen-printed transparent coloured areas on white sheeting, the coefficient of retro-reflection shall not be less than 50 per cent of the values of corresponding colour in Tables 800-1 and 800-2, as applicable.
- 801.3.6** Cut-out messages and borders, wherever used, shall be made out of retro-reflective sheeting (as per Clause 801.3.2 or 801.3.3 as applicable), except those in black which shall be of non-reflective sheeting.

801.3.7 Colour : Unless otherwise specified, the general colour scheme shall be as stipulated in IS:5 "Colour for Ready Mixed Paints", viz

Blue	-	IS	Colour	No.166: French Blue
Red	-	IS	Colour	No.537 : Signal Red
Green	-	IS	Colour	No.284 : India Green
Orange	-	IS	Colour	No.591 : Deep Orange

The colours shall be durable and uniform in acceptable hue' when viewed in day light or under normal headlights at night

801.3.8 Adhesives: The sheeting shall either have a pressure sensitive adhesive of the aggressive-tack type requiring no heat, solvent or other preparation for adhesion to a smooth clean surface, or a tack free adhesive activated by heat, applied in ct, heat-vacuum applicator, in a manner recommended by the sheeting manufacturer. The adhesive shall be protected by an easily removable liner (removable by peeling without soaking in water or other solvent) and shall be suitable for the type of material of the base plate used for the sign. The adhesive shall form a durable bond to smooth, corrosion and weather resistant surface of the base plate ,such that it shall not be possible to remove the sheeting from the sign base in one piece by use of sharp instrument. In case of pressure-sensitive adhesive sheeting, the sheeting shall be applied in accordance with the manufacturer's specifications. Sheetting with adhesives requiring use of solvents or other preparation for adhesive shall be applied strictly In accordance with the manufacturer's instructions.

801.3.9 Refurbishment: Where existing signs are specified for refurbishment, the sheeting shall have a semi-rigid aluminium backing pre- coated with aggressive-tack type pressure sensitive adhesive. The adhesive shall be suitable for the type of material used for the sign and should thoroughly bond with that material.

801.3.10 FABRICATION :

801.3.10.1 Surface to be reflectorised shall be effectively prepared to receive the retro reflective sheeting. The aluminium sheeting shall be degreased either by acid or hot alkaline etching and all scale/dust removed to obtain a smooth plain surface before the application of retro-reflective sheeting. If the surface is rough, approved surface primer may be used. After cleaning, metal shall not be handled, except by suitable device or clean canvas gloves, between all cleaning and preparation operation and application of reflective sheeting/primer. There shall be no opportunity for metal to come in contact with grease, oil or other contaminants prior to the application of retro-reflective sheeting.

801.3.10.2 Complete sheets of the material shall be used on the signs except where it is unavoidable; at splices, sheeting with pressure sensitive 1 adhesives shall be overlapped not less than 5 mm. Sheeting with heat activated adhesives may be spliced with an overlap not less than 5 mm or butted with a gap not exceeding 0.75 mm. Where screen printing with transparent colours is proposed, only butt jointing shall be used. The material shall cover the sign surface evenly and shall be free from twists, cracks and folds. Cut-outs to produce legends and borders shall be bonded with the sheeting in the manner specified by the manufacturer.

801.3.11 Warranty and durability: The contractor shall obtain from the manufacturer a seven year warranty for satisfactory field performance including stipulated retro-reflectance of the retro-reflective sheeting of high intensity grade and a five year warranty for the adhesive sheeting of engineering grade and submit the same to the Engineer. In addition, a seven year and a five year warranty for satisfactory in field performance of the finished sign with retro-reflective sheeting of high intensity grade and engineering grade respectively, inclusive of the screen printed or cut out letters/legends and their bonding to the retro-reflective sheeting shall be obtained from the Contractor/supplier and passed on to the Engineer. The Contractor/supplier shall also furnish a certification to that the signs and materials supplied against the assigned work meets all the stipulated requirements and carry the stipulated warranty.

Processed and applied in accordance with recommended procedures, the reflective material shall be weather resistant and, following cleaning, shall show no appreciable discolouration, cracking, blistering or dimensional change and shall not have less than 50 per cent of the specified minimum reflective intensity values (Tables 800-1 and 800-2) when subjected to accelerated weathering for 1000 hours, using type E or EH weatherometer (AASHTO Designation M 268).

801.4 INSTALLATION

801.4.1 Sign posts, their foundations and sign mountings shall be so constructed as to hold these in a proper and permanent position against the normal storm wind loads or displacement by vandalism. Normally, signs with an area upto 0.9 sq.m. shall be mounted on a single post, and for greater area two or more supports shall be provided. Sign supports may be of mild steel, reinforced concrete or galvanized iron (G.I.) Post end(s) shall be firmly fixed to the ground by means of properly designed foundation. The work of foundation shall conform to relevant specifications as specified.

801.4.2 All components of signs and supports, other than the reflective portion and G.I. posts shall be thoroughly descaled, cleaned, primed and painted with two coats of epoxy paint. Any part of mild steel(M.S.) post , below ground shall be painted with three coats of red lead paint.

801.4.3 The signs shall be fixed to the posts by welding in the case of steel posts and by bolts and washers of suitable size in the case of reinforced concrete or G.I. posts. After the nuts have been tightened, the tails of the bolts shall be furred over with a hammer to prevent removal.

801.5 MEASUREMENTS FOR PAYMENT

The measurement of standard cautionary, mandatory and information signs shall be in numbers of different types or signs supplied and fixed.

801.6 RATE

The Contract unit rate shall be payment in full for the cost of making the road sign, including all materials, installing it at the site and incidentals to complete the work in accordance with the specifications.

Item No 39 Providing and fixing in position 300 mm high, 150 mm wide English/Gujrati letters made from 1.0 mm thick stainless steel sheet as directed by Engineer in charge with all necessary tools & plants etc. complete.

General

This work shall consist of furnishing and placing providing and fixing in position 300 mm high 300 mm wide English/Gujrati letters of the shape and dimensions shown on the drawings and conforming to these specifications or as approved by the Engineer in charge.

MATERIAL

Stainless steel English letters

The Stainless steel English/Gujrati letters shall be of 300mm size in height The Stainless steel letters shall be made of approved quality of Stainless steel sheets of approved thickness the Width of letters shall be in proportion of its height and later shall be made in capital the spelling shall be grammatically true with reasonable spacing as directed

The Stainless steel English/Gujrati letters shall be free from any defect in surface and shall be glossy polished as directed

2.0. WORKMANSHIP

2.1. The English/Gujrati letters shall be firmly fitted in true line and level as and where directed . The English/Gujrati letters shall be fitted by wooden plugs

Mode of Measurement and Payment

The payment will be made on Number basis of the finished work.

All necessary labour materials Equipment tools and plant, conveyance including loading and unloading etc shall be provided by the contractor as directed by the Engineer in charge

The item shall be measured for its Number limiting dimensions to those specified on plan or as directed.

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

- Item No 40 Providing and fixing in position 8" x 4" x 2 mm Thick Silver Standard Stainless Steel (Grade: 304) Name plate including English or Gujarati Name Printing with MS Stand with all necessary fixtures as directed by Engineer in charge etc. complete.**

The item includes Providing and fixing in position 8" x 4" x 2 mm Thick Silver Standard Stainless Steel (Grade: 304) Name plate including English or Gujarati Name Printing with MS Stand with all necessary fixtures as directed by Engineer in charge etc. complete.

The Material Selection and consolidated item shall be carried out as directed by Engineer in charge

The item shall be measured and paid on Sqinch basis.

- Item No 41 Providing and fixing in position 8" x 4" x 4 mm Thick PVC or Acrylic Name plate including English or Gujarati Name Printing with MS Stand with all necessary fixtures as directed by Engineer in charge etc. complete.**

The item includes Providing and fixing in position 8" x 4" x 4 mm Thick PVC or Acrylic Name plate including English or Gujarati Name Printing with MS Stand with all necessary fixtures as directed by Engineer in charge etc. complete.

The Material Selection and consolidated item shall be carried out as directed by Engineer in charge

The item shall be measured and paid on Sqinch basis.

- Item No 42 Demolition of Brick work and stone masonry including stacking of serviceable materials and disposal of unserviceable materials with all lead and lift.(ii) In Cement Mortar.**

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.20.11(iii)/P.148

- Item No 43 Providing and fixing pre-cast concrete kerb stone of gray cement based concrete block 30cm length,30cm height and 15cm thick of M250 grade concrete as per approved design and including excavation for fixing in proper line and level,filling the joint with C:M 1:3 (1cement:3fine sand) etc complete.**

Precast concrete kerb stone shall be hard even sound, and regular in shape. Broken kerb stone or damaged one with cracks shall not be allowed for use.

The precast kerb stone shall be of size as specified or as approved by the Engineer. It shall be 30 cm x 30 cm x 15 cm size made from cement concrete M 250 grade The precast kerb stone shall have flat plain surface. When brought on site, the precast kerb stone shall be in good condition.

WORKMANSHIP

Excavation for kerb block as required and as directed by the Engineer shall be carried out as per detailed relevant specifications of It. No. 1 of this contract. Bick bat cement concrete in proportion of 1:4:8 and 10 cm thick bedding shall be carried out as per the relevant specifications of general technical specification for building work booklet Item No.5.3.3/ page No. 39.

The kerb stone shall be erected in position in true line and level. The Joints between two blocks shall be filled with cement slurry and joint shall be flushed.

MODE OF MEASUREMENT & PAYMENT:

The unit rate shall include the cost of all material, labour charges for excavation & fixing, cost of BBCC, tools and plant required, placing blocks in position and all other incidental expenses required to complete the work.

The work shall be measured in running meter

The payment will be made on **running meter** basis.

Item No 44 Providing & laying ave. 200 mm thick M-250 grade of controlled cement concrete including dressing sub base providing and laying 200 micron thick LDPE membrane over prepared sub base providing and mixing recron 3s fiber at 875 gm/cmt. of concrete placing the concrete and leveling with surface vibrator finishing the surface with power floater and trowel light brooming on the surface as directed including Providing and filling expansion joint having size 20 mm x 115 mm & filling the expansion joint having size 20 mm x 20mm by using cloper -200 as per manufacturer's specification and making construction joint having size 10 mm x 10mm by using concrete cutter machine etc. complete.

Providing & laying ave. 200 mm thick M-250 grade of controlled cement concrete including dressing sub base providing and laying 200 micron thick LDPE membrane over prepared sub base providing and mixing recron 3s fiber at 875 gm/cmt. of concrete placing the concrete and leveling with surface vibrator finishing the surface with power floater and trowel light brooming on the surface as directed including Providing and filling expansion joint having size 20 mm x 115 mm & filling the expansion joint having size 20 mm x 20mm by using cloper -200 as per manufacturer's specification and making construction joint having size 10 mm x 10mm by using concrete cutter machine etc. complete.

The relevant specification shall be followed as per item specification The relevant specification shall be followed as per General Technical specification for Building work booklet It. No. 5.3.2. (A) P.No.38 except that using for including the cost of form work for G.FLOOR instead of excluding the cost of form work.

For form work use the relevant specification shall be followed as per General Technical specification for Building work booklet It.No.9.1 (A) P.No.63

Consolidated item shall be measured and paid for actual size of RCC member casted on Cubic meter basis.

Item No 45 Providing and fixing Speed Breaker Ladwa Size 6 m x 50 mm Heavy Duty Road Hump Speed Breaker for Safety & High Visibilty Plastic Yellow & Black, LSI -RH50MM2PC etc directed by engineer in charge.

The item includes Providing and fixing Speed Breaker Ladwa Size 6 m x 50 mm Heavy Duty Road Hump Speed Breaker for Safety & High Visibilty Plastic Yellow & Black, LSI - RH50MM2PC etc directed by engineer in charge.

The Material Selection and consolidated item shall be carried out as directed by Engineer in charge

The item shall be measured and paid on Number basis.

Item No 46 Clearing and grubbing road land including uprooting rank vegetation grass bushes, shrubs, sapling and trees girth up to 300 mm removal of stumps of trees cut earlier and disposal of unserviceable materials (C) By mechanical means in area of light jungle

1.Scope

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

2.Preservation of Property Amenities

Roadside trees, shrubs, any other plants, pole lines, fences, signs, monuments, buildings, pipelines, sewers and all highway facilities within or adjacent to the highway which are not to be disturbed shall be protected from injury or damage. The Contractor shall, provide and install at his own expense, suitable safeguards approved by the Engineer for this purpose.

During clearing and grubbing, the Contractor shall take all adequate precautions against soil erosion, water pollution, etc., and where required, undertake additional works to that effect vide Clause 306. Before start of operations, the Contractor shall submit to the Engineer for approval, his work plan including the procedure to be followed for disposal of

waste materials, etc., and the schedules for carrying out temporary and permanent erosion control works as stipulated in Clause 306.3.

3. Methods, Tools and Equipment's

Only such methods, tools and equipment as are approved by the Engineer and which will not affect the property to be preserved shall be adopted for the Work. If the area has thick vegetation roots trees, a crawler or pneumatic tyred dozer of adequate capacity may be used for clearance purposes. The dozer shall have ripper attachments for removal of tree stumps. All trees, stumps, etc., falling within excavation and fill lines shall be cut to such depth below ground level that in no case foil within 500 mm of the subgrade. Also, all vegetation such as roots, under-growth, grass and other deleterious matter unsuitable for incorporation in the embankment subgrade shall be removed between fill lines to the satisfaction of the Engineer. On areas beyond these limits, trees and stumps required to be removed as directed by the Engineer shall be cut down to 1 m below ground level so that these do not present an unsightly appearance.

All branches of trees extending above the trimmed as directed by the Engineer.

All excavations below the general ground level arising out of the removal of trees, stumps, etc., shall be filled with suitable material and compacted thoroughly so as to make the surface at these points conform to the surrounding area.

Ant-hills both above and below the ground, as are liable to collapse and obstruct free subsoil water flow shall be removed and their workings, which may extend to several metres, shall be suitably treated.

4. Disposal of Materials

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

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

All products of clearing and grubbing which, in the opinion of the Engineer, cannot be used or auctioned shall be cleared away from the roadside in a manner as directed by the

Engineer. Care shall be taken to see that unsuitable waste materials are disposed of in such a manner that there is no likelihood of these getting mixed up with the materials meant for embankment, subgrade and road construction.

5. Measurements for Payment

Clearing and grubbing for road embankment, drains and cross-drainage structures shall be measured on area basis in terms of hectares. Clearing and grubbing of borrow areas shall be deemed to be a part of works preparatory to embankment construction and shall be deemed to have been included in the rates quoted for the embankment construction item and no separate payment shall be made for the same. Cutting of trees upto 300 mm in girth including removal of stumps and roots, and trimming of branches of trees extending above the roadway shall be considered incidental to the cleaning and grubbing operations. Removal of stumps left over after trees have been cut by any other agency shall also be considered incidental to the clearing and grubbing operations.

This work shall consist of cutting, removing and disposing of all materials such as trees, bushes, shrubs, stumps, roots, grass, weeds, top organic soil not exceeding 150 mm in thickness, rubbish etc., which in the opinion of the Engineer are unsuitable for incorporation in the works, from, the area of land containing structures and such other areas as may-be specified on the drawings or by the Engineer.

6. Rates

- 6.1.** The Contract unit rates for the various items of clearing and grubbing shall be payment in full-for carrying out, the required operations including full compensation for all labour, materials, tools, equipment and incidentals necessary to complete the work. These will also include removal of stumps of trees less than 300 mm in girth as well as stumps left over after cutting of trees carried out by another agency, excavation and back-filling to required density, where necessary, and handling, salvaging, piling and disposing of the cleared materials with all lead and lifts. The Rate shall be for a unit One Hectar.

Item No 47 Earthwork for embankment including breaking clods, dressing with all lead and lift (excluding watering and consolidation)(E) From Borrow area within 3.0 Km. lead

1. The land on which the earth work is to be done shall be cleared of all trees having a girth of 30 cm and less, loose, stones, vegetation, bushes, stumps and all other objectionable materials. All the materials cleared will be the property of Government. Useful material shall be arranged in convenient stacks along the road boundary or as directed at places within 50 meters lead, and handed over to the department in convenient section. Unsuitable material shall be burnt or otherwise

disposed off by the contractor at his own cost without causing any nuisance, inconvenience or damage to the works property or people in the neighbourhood. In all cases, 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 line, curves, slopes grades and sections as shown on the plan or directed by the Engineer-in-charge. The contractor shall provide all labours and materials such as lime, strings, pegs, nails, bamboos, stone, mortar, concrete etc. required for setting out, establishing. Bench Marks and giving profiles. The contractor shall be responsible for maintaining the B.Ms, profiles alignments and other marks as long as they are required for the work in the opinion of the Engineer-in-charge. If the contractor defaults in this respect they may be restored by the department at the cost of the contractor.
3. The soil to be used for embankment shall have CBR more than 5 % and shall be free from trees, stumps, roots, rubbish or any other objectionable materials. Only material considered suitable by the Engineer-in-charge shall be used for the construction and that considered unsuitable other disposed off as directed by him. The selection of the materials to be used in the construction of embankment shall be made after soil surveys and investigations are carried out by the Department.

Density requirement of embankment and sub-grade materials

Type of Work	Maximum laboratory dry unit weight when tested as per IS 2720 (Part-8)
Embankment up to 3 meter height, not subjected to extensive flooding.	Not less than 15.2 kN cum.
Embankment exceeding 3 meter height or embankments of any height subject to long periods of inundation.	Not less than 16.0 kN cum.
- Sub-grade and earthen shoulders verges backfill.	Not less than 17.5 kN cum.

Note (1) This table is not applicable for lightweight fill material e.g. cinder, fly ash etc.

(2) The Engineer may relax these requirements at his discretion taking into account the availability of materials for construction and other relevant factors.

Field density shall be percentage of laboratory density as recommended by Gujarat Engineering Research Institute.

4. When permitted, the contractor shall use the soil for embankment work available from box cutting the road. The soil shall be used after approval from Engineer-in-charge. For this purpose the contractor shall make his own arrangement for loading, transporting and unloading the cutting stuff available from box cutting to required site with all lead and lift.
5. The embankment shall be constructed in uniform layers not exceeding 250 mm in loose thickness. The soil shall be spread uniformly over the entire width of the embankment, unless otherwise directed by the Engineer-in-charge. The operation of laying the successive layer of earth shall have to be suitably synchronized with the consolidation work. If the soil as delivered to the road bed is too wet, it shall be dried by exposure to the sun till the moisture content is acceptable for compaction. All clods of hard lumps of earth shall be broken to have maximum size of 15 cm. when being placed in the embankment and a maximum of size 5 cm when being placed in the top 45 cm of the embankment. The work of next layer shall be allowed only after the first layer below it has been thoroughly compacted to the density specified.
6. Where an embankment is to be placed on sloping ground, the surface of the ground shall be benched in the steps of trenches or broken up in such a manner that the new material shall have perfect bond with the existing surface.
7. To avoid interference with the construction work, the fill material shall not be placed against any wall unless permission has been given by the Engineer-in-charge but in any case not until the concrete or masonry has been in position for 14 days, (the embankment shall be brought up simultaneously in equal layers on each side of the structure to avoid displacement and unequal pressure. The sequence of work in this regard shall be got approved from the Engineer-in-charge. Where it may be impracticable to use power rollers or other heavy equipment, the compaction shall be carried out by mechanical tempers or other methods approved by the Engineer-

in-charge. Care shall be taken to see that the compaction plant does not hit or come too close to any structural member so as to cause any damage to them.

8. The embankment shall be finished in conformity with the alignment, levels, cross sections and dimension shown on the plans or as directed by Engineer-in-charge.
9. **Measurements for Payment** The compacted earthwork measurements shall be paid on cross sectional area method and computing the volume in cubic meter. The contractor shall maintain the embankment by filling in ruts, rain cuts, depression due to shrinkage etc. to proper formation and grade till this item is finally measured and accepted by the Department. The measurements shall be taken on compacted earth work. No deduction for shrinkage shall be made from gross measured quantity of compacted earth work. However the contractor shall have to bear loss of quantity due to all settlements as well as other types of deformations etc. if any that might have taken place at the time of taking the final measurements of this item.
10. The rate of earthwork includes clearing jungles, dog belling, fixing profiles, excavating earth from borrow areas, breaking clods, conveying and spreading earth in layers with all lead and Lift, finishing the entire embankment and incidentals necessary to complete the work to the specifications. The cutting stuff of cutting in ordinary soil, soft murrum, soft rock, hard murrum and hard rock shall be utilized in embankment construction under this item within the lead specified in that particular item. No payment shall be made under this item for the cutting stuff used in the embankment but labour for cutting will be paid as per specifications in the particular item, and only balance quantity of earthwork brought from borrow areas will be paid in this item. The rate shall be for a Unit of **One Cubic meter**.

Item No 48 Providing and fixing pre-cast Rubber Dye inter locking concrete block 60mm thick with grade of concrete M300 pneumatic compressed/Vibrated mechanically and as per approved design conforming to IS 15658: 2006 including 35 mm Sand layer for levelling and filling the joint with sand in proper line and level as per guidelines of IRC : SP 63-2018 etc complete.

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

1.2 If required by the Engineer in charge it shall be tested by comparison with distilled water compression shall be made by means of standard cement tests for soundness time of setting and mortar strength as specified in I S 269-1976 Any indication of

unsoundness charge in time of setting by 30 minutes or more or decrease of more than 10 percent strength of mortar prepared with distilled water sample when compared with the result obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.

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

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

1.5 Hard and bitter water shall not be used for curing

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

2.0 CEMENT

Cement shall conform to M-3.

3.0 SAND

Sand shall conform to M-6.

4.0 CEMENT CONCRETE INTERLOCKING BLOCKS

4.1 Ruber dye Interlocking cement concrete reberous reflective blocks (M-200) shall be hard even sound, and regular in shape and generally uniform in colour. The colour of the interlocking BLOCKS shall generally be uniform colour. Bracken BLOCKS or damaged blocks with cracks shall not be allowed for use. They shall be without any soft veins cracks of flaws

4.2 The size of the Interlocking cement concrete blocks to be used for flooring shall be of required size or as directed. However smaller sizes will be allowed to be used to the extent of maintaining required pattern. Thickness shall be 60 mm.

4.3 The edges of Interlocking cement concrete blocks shall in true shape of casting. All angles and edges of the Interlocking cement concrete blocks shall be true, square and free chipping and surface shall be true and plain.

4.4 The Interlocking cement concrete blocks shall have flat plain surface with rubourous reflective top finish in required pattern and colour. When brought

on site, the Interlocking cement concrete blocks shall be in good condition. The Interlocking cement concrete blocks for paving shall generally be used in good condition

5.0 WORKMANSHIP

5.1 Interlocking cement concrete blocks of approved quality shall be laid evenly to level and slope as directed by Engineer in charge over a bed of a base layer consisting of 50mm to 60mm thick average sand bedding to maintain slope.

5.2 Joints shall be filled with a clean sharp sand by brooming.

5.3 The flooring work shall be finished by rubbing of flooring is set properly

5.4 The rate of flooring is inclusive of providing and laying in true line and level including filling the joints with finishing as directed by Engineer in charge

5.5 Protecting the open edges of paving with cement concrete as directed.

6.0 MODE OF MEASUREMENT and PAYMENT

6.1 The unit rate flooring shall include the cost of all materials, tools and plant required for mixing, laying of base layer in true level and slope as required applying and placing stones in position, compacting, finishing and all other incidental expenses for producing flooring work to complete the structure or its components as shown on the drawings and according to these specifications. They shall also include the cost of making, fixing and removing of all scaffolding and forms required for the work.

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

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

6.3 The payment shall be made on **square Meter** basis of the finished work

Item No 49 "Providing and laying machine cut and machine polished 60 x 60 cms.bule Kota stone 25mm thick in risers of steps,skirting Dedo and pillars laid on 10mm thick cement mortar 1:3 (1-Cement : 3 coarse sand) and jointed with gray cement slury mixed with pigment to match the shade of slab including rubbing and polishing etc. complete.

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.14.44 / P.No.99

- Item No 50** **Providing and fixing Mirror polished 18 mm thick Green Marble stone in Single piece with full round edge and polished of approved quality in cladding on Cill & Jambs and around the doors/ windows/ ventilation with 12 mm thick cement motor CM (1:4) and fixing with cement slurry & adhesive including moulding of exposed edges as directed by engineering in charge etc. complete.**

MATIRIAL

1.0 WATER

Water Shall confirm Material Specification no M- 1

○ CEMENT

Cement Shall confirm Material Specification no M- 3

○ SAND

Sand Shall confirm Material Specification no M- 6

4.0 Mirror polished 18 mm thick Green Marble stone

4.1. 18mm thick **mirror polished Green Marble stone** shall be hard even sound, and regular in shape and generally uniform in colour. The colour of the stone shall be approved by engineer in charge. Brown coloured shall not be allowed for use. They shall be without any soft veins cranks of flaws

4.2. The size of the stone to be used shall be of full length single piece and required width as directed. However smaller sizes will be allowed to be used to the extent of maintaining required pattern. Thickness shall be as specified

4.3. Tolerance of minus 18 mm. on accounts of chisel dressing of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be ± 3 % in mm.

4.5. When machine cut edges are specified the exposed and the edges at joints shall be machine cut the thickness of the exposed machine cut edges shall be uniform.

4.6. The stones shall have mirror polished surface.

5.0 WORKMANSHIP

5.1 Granite stone of approved quality shall be laid evenly to level and slope as directed by Engineer in charge over a bed of a base layer consisting of cement mortar 1:4(1 cement: 4 coarse sand by volume).

5.2. Cement and sand for base layer shall be mixed in proportions of 1:4 (1 cement : 4 coarse sand by volume) Cement and sand shall be proportioned by volume after making due allowance for bulking. The require quantity of water shall then be added and the mortar

mixed to produce workable consistency before mixing platform shall be thoroughly cleaned before changing from one type of cement to another.

5.3. The mixing for base layer shall be done intimately, The operation shall be carried out on clean water tight platform, and cement sand shall be first mixed dry in the required proportion to obtain uniform colour and then the mortar shall be mixed for at least two minutes after addition of water. In case of cement mortar, that has suffered because of evaporation of water the same shall be re-tempered by adding water as frequently as needed to restore the requisite consistency but its re-tempering shall be permitted only within thirty minute from the time of addition to water at the time of initial mixing.

5.4. Cement and sand for base layer shall be mixed in proportion as specified in the item, Cement and sand shall be proportioned by volume after making due allowance for bulking. The required quantity of water shall then be added and the mortar mixed to produce workable consistency.

5.5. Curing shall be started as soon as the mortar used for finished has hardened sufficiently no to be damaged when watered. It shall be kept wet for a period of at least 7 days. During this period, it shall be suitably protected from all damages;

5.6. During hot weather, all finished or partly finished work shall be covered or wetted in such manner as will prevent rapid drying of the flooring work.

5.7. Joints of flooring shall be through and continuous throughout the building as directed by Engineer in charge

5.8. joints shall be filled with a stiff mixture of gray cement surly

5.9. The flooring work shall be finished by rubbing and mirror polishing after the the work of flooring is set properly

6.0 PROPORTION OF MIX

6.1. The proportion of cement and sand for base layer shall be one part of cement. 4 (four) parts of sand and shall be measured by volume.

7.0 MODE OF MEASUREMENT & PAYMENT :

7.1. The unit rate cladding shall include the cost of all materials, tools and plant required for mixing, laying of base layer in true level and slope as required applying & placing stones in position, compacting, finishing, curing mirror polishing, and all other incidental expenses for producing flooring work to complete the structure or its components as shown on the drawings and according to these specifications. They shall also include the cost of making, fixing and removing of all scaffolding and forms required for the work.

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

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

7.3. The payment will be made on **square Meter basis** of the visible work.

- Item No 51** Providing and fixing polished 18 mm thick Granite stone in Single piece with all Exposed Edges Polished and Chamfered and Projected 6mm from finished wall thickness of approved quality in cladding on Cill & Jambs and around the doors/ windows/ ventilation with 12 mm thick cement mortar CM (1:4) and fixing with cement slurry & adhesive including moulding of exposed edges as directed by engineering in charge etc. complete.

MATERIAL

1.0 WATER

Water Shall conform Material Specification no M- 1

○ CEMENT

Cement Shall conform Material Specification no M- 3

○ SAND

Sand Shall conform Material Specification no M- 6

4.0 polished 18 mm thick Granite stone:

4.1. 18mm thick **polished granite stone** shall be hard even sound, and regular in shape and generally uniform in colour. The colour of the stone shall be approved by engineer in charge. Brown coloured shall not be allowed for use. They shall be without any soft veins cracks or flaws

4.2. The size of the stone to be used shall be of full length single piece and required width as directed. However smaller sizes will be allowed to be used to the extent of maintaining required pattern. Thickness shall be as specified.

4.3. Tolerance of minus 18 mm. on accounts of chisel dressing of edges shall be permitted for length as well as breadth. Tolerance in thickness shall be ± 3 % in mm.

4.4. When machine cut edges are specified the exposed and the edges at joints shall be machine cut the thickness of the exposed machine cut edges shall be uniform.

4.5. The stones shall have mirror polished surface.

5.0 WORKMANSHIP

5.1 Granite stone of approved quality shall be laid evenly to level and slope as directed by Engineer in charge over a bed of a base layer consisting of cement mortar 1:4 (1 cement: 4 coarse sand by volume).

5.2. Cement and sand for base layer shall be mixed in proportions of 1:4 (1 cement : 4 coarse sand by volume) Cement and sand shall be proportioned by volume after making due allowance for bulking. The required quantity of water shall then be added and the mortar mixed to produce workable consistency before mixing platform shall be thoroughly cleaned before changing from one type of cement to another.

5.3. The mixing for base layer shall be done intimately, The operation shall be carried out on clean water tight platform, and cement sand shall be first mixed dry in the required proportion to obtain uniform colour and then the mortar shall be mixed for at least two minutes after addition of water. In case of cement mortar, that has suffered because of

evaporation of water the same shall be re-tempered by adding water as frequently as needed to restore the requisite consistency but its re-tempering shall be permitted only within thirty minute from the time of addition to water at the time of initial mixing.

5.4. Cement and sand for base layer shall be mixed in proportion as specified in the item, Cement and sand shall be proportioned by volume after making due allowance for bulking. The required quantity of water shall then be added and the mortar mixed to produce workable consistency.

5.5. Curing shall be started as soon as the mortar used for finished has hardened sufficiently no to be damaged when watered. It shall be kept wet for a period of at least 7 days. During this period, it shall be suitably protected from all damages;

5.6. During hot weather, all finished or partly finished work shall be covered or wetted in such manner as will prevent rapid drying of the flooring work.

5.7. Joints of flooring shall be through and continuous throughout the building as directed by Engineer in charge

5.8. joints shall be filled with a stiff mixture of gray cement surly

5.9. The flooring work shall be finished by rubbing and mirror polishing after the the work of flooring is set properly

6.0 PROPORTION OF MIX

6.1. The proportion of cement and sand for base layer shall be one part of cement. 4 (four) parts of sand and shall be measured by volume.

7.0 MODE OF MEASUREMENT & PAYMENT :

7.1. The unit rate cladding shall include the cost of all materials, tools and plant required for mixing, laying of base layer in true level and slope as required applying & placing stones in position, compacting, finishing, curing mirror polishing, and all other incidental expenses for producing flooring work to complete the structure or its components as shown on the drawings and according to these specifications. They shall also include the cost of making, fixing and removing of all scaffolding and forms required for the work.

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

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

7.3. The payment will be made on **square Meter basis** of the visible work.

Item No 52	Wall Painting (Two coats) with weather proof acraylic emulsion paint of approved brand and manufacture and of required shade on exterior wall surface to give an even shade over of approved brand after thoroughly brushing surface to remove all dust and remains of loose powdered material etc. copm. for all height
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The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.18.51 P.No.135 and It.No.18.53 P.No.136. For weather proof exterior 100% acrylic emulsion paint.

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

Item No 53 Providing TMT Bar FE 500D reinforcement for R.C.C. work including bending, binding and placing in position complete up to All floor Level

1.0. GENERAL

This work shall consist of furnishing and placing TMT Fe-500 Conforming to IS 1786 2008 reinforcement Providing and applying anticorrosive treatment with polymer base materials to the steel reinforcement including descaling the dust and applying the preventive coating of approved make etc. complete, bars (intentioned) of the shape and dimensions shown on the drawings and conforming to these Specifications or as approved by the Engineer in charge.

2.0. MATERIAL

2.1. TMT Bars

Reinforcements may be either **TMT Fe-500** tensile steel, high strength deformed bars. They may be uncoated or coated with epoxy or with approved protective coatings.

2.2. T.M.T. bars reinforcement for R C C work shall conform IS 432 (Part II) 1966 and shall be of tested quality. It shall also comply with relevant part of IS 456-1966

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

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

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

3.0. Pitch

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

4.0. Binding wire

4.1. Mild steel binding wire shall be of 1.63 mm or 1.22 mm (16 to 18 gauge diameter and shall conform IS 280-1972

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

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

5.0. PROTECTION OF REINFORCEMENT

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

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

6.0. Workmanship

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

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

7.0. BENDING OF REINFORCEMENT

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

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

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

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

8.0. PLACING OF REINFORCEMENT

8.1. The reinforcement cage should generally be fabricated in the yard at ground level, and then shifted and placed in position. The reinforcement shall be placed strictly, in accordance with the drawings and shall be assembled in position, only when structure is otherwise ready for placing of concrete. Prolonged time gap, between assembling of reinforcements

and casting of concrete, which may result in rust formation on the surface, shall not be permitted.

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

8.3. Bars shall be kept in position usually by the following methods

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

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

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

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

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

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

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

9.0. Lapping

9.1. All reinforcement shall be furnished in full lengths as indicated on the drawing. No splicing of bars, except where shown on the drawing; will be permitted without approval of the Engineer. The lengths of the splice shall be as indicated on drawing or as approved by the Engineer. Where practicable, overlapping bars shall not touch each other, and shall be kept apart by 25 mm or 1 1 1 4 times the maximum size of coarse aggregate, whichever is greater, If this is not feasible, overlapping bars shall be bound with annealed steel binding

wire, not less than 1 mm diameter and twisted tight in such a manner as to maintain minimum clear cover to the reinforcement from the concrete surface. Lapped splices shall be staggered or located at points, along the span where stresses are low.

10.0. Welding

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

10.2. While welding may be permitted for T.M.T. reinforcing bars conforming to IS 432, welding of deformed bars conforming to IS 1786 shall in general be prohibited. Welding may be permitted in case of bars of other than S 240 grade including special. Welding grade of S 415 grade bars conforming to IS 1786, for which necessary chemical analysis has been secured and the carbon equivalent (CE) calculated from the chemical composition using the formula

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

is 0.4 or less.

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

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

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

10.6. All reinforcement bars shall be accurately placed in exact position shown on the drawings and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm in size and by using say blocks or metal chairs spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals, Bars shall not be allowed to sag between supports not displaced during concreting or any other operations of the work All devices used for positioning shall be of not corrodible material wooden and metal supports shall not extended to the surface of the concrete, except where shown in drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed. Pieces of broken stone or brick and wooden blocs shall not be used Layers of bars shall be separated by spacer bars pre-cast

mortar blocks or other approved devices. Reinforcement after bending placed in position shall be maintained in a clean condition until completely embedded in concrete, Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement form corrosion, concrete cover shall be provided as indicated on drawings. All bars protruding from concrete and to which other bars are to be sliced and which are likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout

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

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

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

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

11.0 MODE OF MEASUREMENTS and PAYMENT

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

Sr. No	Diameter of steel	weight of steel per running meter	Sr. No	Diameter of steel	weight of steel per running meter
1	6 mm	0.22 Kg Rmt	8	20 mm	2.47 Kg Rmt

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

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

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

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

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

The rate shall be for a unit of **One Kg.**

Item No 54 Excavation for foundation upto 1.50 mt depth including sorting out and stacking of useful materials and disposing the excavated stuff with all lead and lift. (A) Loose or soft soil.

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.4.0.0. (A) P.No.29.

Item No 55 20 mm Thick sand faced cement plaster on walls upto height 10 meters above ground level consisting of 12 mm Thick backing coat of c.m. 1:3 (1 cement : 3 sand) and 8 mm Thick finishing coat of c.m. 1:1 (1 cement : 1 sand) with 1x1cm Groves at junction of structure member etc. comp.etc. complete.

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.17.95 P.No.122 with sand faced cement Gutka plaster 1x1cm Groves at junction of structure member etc. complete.

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

Item No 56 Providing 20 mm thick double coat mala cement plaster on interior brick / concrete work for plastering comprising of base coat of 12 mm thick cement plaster in cement mortar (1

Cement : 4 coarse sand) in rough finishing and 8 mm thick top coat of cement mortar 1:2 (1 Cement : 2 Coarse sand) finished with trowel including scaffolding curing etc. complete.For Ground floor

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.17.95 P.No.122 with 20 mm thick double coat mala cement plaster on interior brick / concrete work with 10mm grooves at junction of structural members etc. complete. For Ground Floor

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

Item No 57 Providing 10 mm. Thick Mala cement plaster in single coat for plastering on ceiling and soffits of stairs and finished even and smooth in : (I) Cement mortar 1:4 (1 cement : 4 sand) including Mala troweled finish etc. complete.For Ground floor

The relevant specification shall be followed as per General Technical specification for Building work booklet It.No.17.58.(ii)/P.120 +17.69&17.91/ P.121 with Mala troweled finish etc. complete. Ground Floor

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

Item No 58 Construction of granular sub-base 150 mm thick by providing coarse graded machine crushed B.T. material satisfying MOST specification of grading I (B.T. stone aggregate 53 mm to 26.5 mm 35 %, 26.5 to 4.75 mm - 45 % and 2.36 mm below - 20 %)including spreading in uniform layer with motor grader on prepared surface, mixing by mix in place method with rotavator at OMC and compacting with vibratory roller to achieve the desired density etc. complete.

401.1 Scope :

This work shall consist of laying and compacting well graded material on prepared sub grade in accordance with the requirements of these specifications. The material shall be laid in one or more layers sub base and upper sub base (termed as sub base herein after) as necessary according to lines, grades and cross sections shown on the drawings or as directed by the Engineer.

401.2 Materials:

401.2.1 The materials to be used for the work shall be crushed stone of required grading. The material shall be free from organic or other deleterious constituents and conform to the grading I as mentioned below.

TABLE 400-2.

GRADING FOR COARSE GRADED GRANULAR SUB-BASE

MATERIALS.

IS sieve Designation	Percent by weight passing the IS sieve. Grading I
75.0 mm	100

53.0 mm	–
26.5 mm	55 – 75
9.5 mm	–
4.75 mm	10 – 30
2.365 mm	
0.425 mm	
0.075 mm	< 10
CBR Value (Minimum)	30

Material passing 425 micron (0.425 mm) sieve for all the three grading when tested according to IS : 2720 (Part 5) shall have liquid limit and plasticity index not more than 25 and 6 percent respectively.

401.2.2 Physical requirements:

The materials shall have a 10 percent fines value of 50 KN or more (for sample in soaked condition) when tested in compliance with B.S.: 812 (Part 111). The water absorption value of the coarse aggregate shall be determined as per IS : 2386 (Part 3) : if this value is greater than 2 percent, the soundness test shall be carried out on the material delivered to site as per IS : 383. For grading II and III materials, the CBR shall be determined at the density and moisture content likely to be developed in equilibrium conditions which shall be taken as being the density relating to a uniform air voids content of 5 percent.

401.3 Strength of sub-base.

It shall be ensured prior to actual execution that the material to be used in the sub base satisfies the requirements of CBR and other physical requirements when compacted and finished.

When directed by the Engineer, this shall be verified by performing CBR tests in the laboratory as required on specimens remolded at field dry density and moisture content and any other tests for the "Quality" of materials, as may be necessary.

401.4 Construction Operations:

401.4.1 Preparation of Sub grade:

Immediately prior to the laying of sub-base, the sub grade already finished to Clause 301 or 305 as applicable shall be prepared by removing all vegetation and other extraneous matter, lightly sprinkled with water, if necessary and rolled with two passes of 80-100 KN smooth wheeled roller.

401.4.2 Spreading and compacting:

The sub-base material of grading specified in the Contract 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.

When the sub-base material consists of combination of materials mentioned in Clause 401.2.1, of this item mixing shall be done mechanically by the mix in place method.

Manual mixing shall be permitted only where the width of laying is not adequate for mechanical operations, as in small-sized jobs. The equipment used for mix-in-place construction shall be a rotavator or similar approved equipment capable of mixing the material to the desired degree. If so desired by the Engineer, trial runs with the equipment shall be carried out to establish its suitability for the work.

Moisture content of the loose material shall be checked in accordance with IS:2720 (Part 2) and suitably adjusted by sprinkling additional water from a truck mounted or trailer mounted water tank and suitable for applying water uniformly and at controlled quantities to variable widths of surface of other means approved by the Engineer so that, at the time of compaction, it is from 1 percent above to 2 percent below the optimum moisture content corresponding to IS:2720 (Part 8). While adding water, due allowance shall be made for evaporation losses. After water has been added, the material shall be processed by mechanical or other approved means like disc barrows, rotators until the layer is uniformly wet.

Immediately thereafter, rolling shall start. 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 225 mm the compaction shall be done with help of a vibratory roller of minimum 80 to 100 KN static weight with plain drum or pad foot drum or heavy pneumatic tyred roller of minimum 200 to 300 KN weight having a minimum tyre pressure of 0.7 MN/ M² or equivalent capacity roller capable of achieving the required compaction. Rolling shall commence at the lower edge and proceed towards the upper edge longitudinally for portions having unidirectional cross fall and super elevation and shall commence at the edges and progress towards the centre for portions having cross fall on both sides 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 cross fall (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). 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.

Surface Finish and Quality Control of work:

The surface finish of construction shall conform to the requirements of Clause 902 of MORT & H specifications. Control on the quality of materials and works shall be exercised by the Engineer in accordance with Section 900 of MORT & H specifications.

401.6 Arrangements for Traffic:

During the period of construction, arrangement of traffic shall be maintained in accordance with Clause 112 of MORT & H specifications.

401.7 Measurements for Payment: Granular sub base shall be paid as finished work in position on cross sectional measurements and computing the volume of GSB work in cubic meters by average area method.

The protection of edges of granular sub base extended over the full formation as shown in the drawing shall be considered incidental to the work of providing granular sub-base and as such no extra payment shall be made for the same.

401.8 Rate:

The Contract unit rate for granular sub base shall be payment in full for carrying out the required operations including full compensation for:

- [i] Making arrangements for traffic to Clause 112 as above except for initial treatment to verges, shoulders and construction of diversions.
- [ii] Furnishing all materials to be incorporated in the work including all royalties, fees, rents where necessary and all leads and lift.
- [iii] All labour, tools, equipment and incidentals to complete the work to the specifications.
- [iv] Carrying out the work in part widths of road where directed, and
- [v] Carrying out the required tests for quality control.

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

Item No 59 Providing and laying wet mix macadam base course 150 mm thick using machine crushed B.T. chips as per required gradation mixing with required optimum quantity of water, conveying the mix to site of work, spreading in to grade and camber with mechanical paver and consolidation each layer with vibratory roller including cost of material labour plant and equipment etc. complete.

406.1 SCOPE

This work shall consist of laying and compacting clean, crushed, graded aggregate and granular material, premixed with water, to a dense mass on a prepared subgrade sub base/ base or existing pavement as the case may be in accordance with the requirements of these specifications. The material shall be laid in two layers to lines, grades and cross-sections shown on the approved drawings or as directed by the Engineer.

The thickness of a single compacted Wet Mix Macadam layer shall not be less than 75mm. When vibrating or other approved types of compacting equipment are used, the compacted depth of a single layer of the sub-base course may be increased to 20cm upon approval of the Engineer.

406.2 MATERIALS

406.2.1 AGGREGATES

406.2.1.1 PHYSICAL REQUIREMENTS :Course aggregates shall be crushed stone. If crushed gravel / shingle is used, not less than 90 percent by weight of the gravel / shingle pieces retained on 4.75 mm sieve shall have at least two fractured faces. The aggregates shall conform to the physical requirements set forth in Table 400-10 below.

TABLE 40-10 PHYSICAL REQUIREMENT OF COARSE AGGREGATES FOR WET MIX MACADAM FOR SUB-BASE / BASE COURSES

Test	Test Method	Requirements
1.*Los Angeles Abrasion value	IS : 2386 (Part-4)	40 percent (Max)
Aggregate impact value	IS : 2386 (Part-4) or IS : 5640	30 percent (Max)
2. Combined Flakiness and Elongation indices (Total)**	IS : 2386(PART-1)	30 percent (Max)

* Aggregates may satisfy requirements of either of the two tests.

** To determine this combined proportion, the flaky stone from a representative sample should first be separated out. Flakiness index is weight of flaky stone metal divided by weight of stone sample only the elongated particles be separated out from the remaining (non flaky stone metal. Elongation index is weight of elongated particles divided by total non flaky particles. The value of flakiness index and elongation index so found are added up.

If the water absorption value of the coarse aggregate greater than 2 percent, the soundness test shall carried out on the material delivered to site as per 2386 (Part – 5).

406.2.1.2 Grading requirements :

The aggregates shall conform to the grading given in Table 400-11

TABLE 400-11. GRADING REQUIREMENTS OF AGGREGATES FOR WET MIX MACADAM.

<i>Is Sieve Designation</i>	Percent by weight Passing the IS sieve
53.00 mm	100
45.00 mm	95-100
26.50 mm	-

22.40 mm	60-80
11.20 mm	40-60
4.75 mm	25-40
2.36 mm	15-30
600.00 micron	8-12
75.00 micron	0-8

Materials finer than 425 micron shall have plasticity index (P.I) not exceeding 6.

The final gradation approved within these limits shall be well graded from coarse to fine and shall not vary from the low limit on one sieve to the high limit on the adjacent sieve or vice-versa.

406.3 Construction Operation :

406.3.1 Preparation of base : Clause 404.3.1 as below shall apply.

404.3.1 Preparation of base: The surface of the subgrade/sub-base/base to receive the water bound macadam course shall be prepared to the specification lines and cross fall(camber) and made free of dust and other extraneous material. Any ruts or soft yielding places shall be corrected in an approved manner and rolled unit firm surface is obtained if necessary by sprinkling water. Any sub-base/base/surface irregularities, where predominant, shall be made good by providing appropriate type of profile corrective course(levelling course) to clause 501 of these specification.

As far as possible, laying water bound macadam course over an existing thick bituminous layer may be avoided since it will cause problems of internal drainage of the pavement at the interface of two course. It is desirable to completely pick out the existing thin bituminous wearing course where water bound macadam is proposed to be laid over it. However, where the intensity of rain is low and the interface drainage facility is efficient, water bound macadam can be laid over the existing thin bituminous surface by cutting 50 mm x 50 mm furrows at an angle of 45 degrees to the centre line of the pavement at one metre intervals in the existing road. The directions and depth of furrows shall be such that they provide adequate bondage and also serve to drain water to the existing granular base course beneath the existing thin bituminous surface.

406.3.2 Provision of lateral confinement of aggregates :

While constructing wet mix macadam arrangement shall be made for the lateral confinement of wet mix. This shall be done by laying materials in adjoining shoulders along with that of wet mix macadam layer and following the sequence of operations described in Clause 407.4.1 as below.

407.4 Construction Operations:

407.4.1 Shoulder: The sequence of operations shall be such that the construction of paved shoulder is done in layers each matching the thickness of adjoining pavement layer . Only

after a layer of pavement and corresponding layers in paved and earth shoulder portion have been laid and compacted, the construction of next layer of pavement and shoulder shall be taken up.

Where the materials in adjacent layers are different, these shall be laid together and the pavement layer shall be compacted first. The corresponding layer in paved shoulder portion shall be compacted thereafter, which shall be followed by compaction of earth shoulder layer. The adjacent layers having same material shall be laid and compacted together.

In all cases where paved shoulders have to be provided along side of existing carriageway, the existing shoulders shall be excavated in full width and to the required depth as per clause 301.3.7 under no circumstances, box cutting shall be done for construction of shoulders.

Compaction requirement of earthen shoulder shall be as per table 300-2 in the case of bituminous courses, work on shoulder (earthen/hard/paved), shall start only after the pavement course has been laid and compacted.

During all stages of shoulder (earth/hard/paved) construction, the required cross fall shall be maintained to drain off surface water

Regardless of the method of laying, all shoulder construction material shall be placed directly on the shoulder. Any spilled material dragged on to the pavement surface shall be immediately removed, without damage to the pavement, and the area so affected thoroughly cleaned.

406.3.4 Preparation of mix :

Wet Mix Macadam shall be prepared in an approved mixing plant of suitable capacity having provision for controlled addition of water and forced / positive mixing arrangement like pug-mil or pan type mixer of concrete batching plant.

Optimum moisture for mixing shall be determined in accordance with IS : 2720 (Part – 8) after replacing the aggregate fraction retained on 22.4 mm sieve with material of 4.75 micron to 22.4 mm size. While adding water, due allowance should be made for evaporation losses. However, at the time of compaction, water in the wet mix should not vary from the optimum value by more than agreed limits. The mixed material should be uniformly wet and so segregation should be permitted.

406.3.4 Spreading of mix :

Immediately after mixing, the aggregates shall be spread uniformly and evenly upon the prepared sub grade / sub-base / base in required quantities. In no case should these be dumped in heaps directly on the area where these are to be laid nor shall their hauling over a partly completed stretch be permitted.

The mix may be spread either by a paver finisher or motor grader. For portions where mechanical means cannot be used, manual means as approved by the Engineer shall be used. The motor grader shall be capable of spreading the material uniformly all over the surface. Its blade shall have hydraulic control suitable for initial adjustments and maintaining the same so as to achieve the specified slope and grade.

The paver finisher shall be self – propelled, having the following features :

- (i) Loading hoppers and suitable distribution mechanism
- (ii) The screed shall have tamping and vibrating arrangement for initial compaction to the layer as it is spread without rutting or otherwise marring the surface profile.
- (iii) The paver shall be equipped with necessary control mechanism so as to ensure that the finished surface is free from surface blemishes.

The surface of the aggregate shall be carefully checked with templates and all high or low spots remedied by removing or adding aggregate as may be tested by depth blocks during construction.

No segregation of larger and fine particles should be allowed. The aggregates as spread should be allowed. The aggregates as spread should be of uniform gradation with pockets of fine materials.

406.3.5 Compaction :-

After the mix has been laid to the required thickness, grade and camber the same shall be uniformly compacted, to the full depth with suitable roller. If the thickness of single compacted layer does not exceed 100mm, a smooth wheel roller of 80 to 100 KN weight may be used. For a compacted single layer up to 200mm, the compaction shall be done with the help of vibratory roller of minimum static weight of 80 to 100 KN or equivalent capacity roller. The speed of the roller shall not exceed 5 km/h. In portions having unidirectional cross fall / super elevation rolling shall commence from the lower edge and progress gradually towards the upper edge. Thereafter, roller should progress parallel to the center line of the road. Uniformly over-lapping each preceding track by at least one fourth width until the entire surface has been rolled. Alternate trips of the roller shall be terminated in stops at least 1 m away from any preceding stop.

In portions in camber, rolling should be at the edge with the roller running forward and backward until the edges have been firmly compacted. The roller shall progress gradually towards the center parallel to the center line of the road uniformly overlapping each of the preceding track by at least one – Fourth width until the entire surface has been rolled.

Any displacement occurring as a result of reversing of the direction of a roller or from any other cause shall be corrected at once as specified and / or removed and made good.

Along forms, Kerbs, walls or other places not accessible to the roller, the mixture shall be thoroughly compacted with mechanical tampers or a plate compactor. Skin patching of an area without scarifying the surface to permit proper bonding of the added material shall not be permitted.

Rolling should not be done when the sub grade is soft or yielding or when it causes a wave-like motion in the sub – base/ base course or sub grade. If irregularities develop during rolling which exceed 12mm when tested with a 3 meter straight edge, the surface should be loosened and premixed material added or removed as required before rolling again so as to

achieve a conforming to the desired grade and cross fall. In no case should the use of unmixed material be permitted to make up the depressions.

Rolling shall be continued till the density achieved is at least 98 per cent of the maximum dry the material as determined by the method outlined in IS : 2720 (Part-8)

After completion, the surface of any finished layer shall be well-close, free from movement under compaction equipment or any compaction planes, ridges, cracks and loose material. All loose, segregated or otherwise defective areas shall be made good to the full thickness of the layer and re-compacted.

406.3.6 Setting and drying :

After final compaction of wet mix macadam course, the road shall be allowed to dry for 24 hours.

406.4 Opening to Traffic :

Preferably no vehicular traffic of any kind should be allowed on the finished wet mix macadam surface till it has dried and the wearing course laid.

406.5 Surface Finish and Quality control of work

406.5.1 Surface evenness :

The surface finish of construction shall conform to the requirements of Clause 902 of MORT & H specifications.

406.5.2 Quality Control :

Control on the quality of materials and works shall be exercised by the Engineer in accordance with section 901 of MORT & H specifications

406.6 Rectification of Surface Irregularity :

Where the surface irregularity of the wet mix macadam course exceeds the permissible tolerances or where the course is otherwise defective due to subgrade soil getting mixed with the aggregates, the full thickness of the layer shall scarified over the affected area. Reshaped with added premixed material or removed and replaced with fresh premixed material as applicable and recomputed in accordance with Clause 406.3 of this item . The area treated in the aforesaid manner shall not be less than 5m long and 2m wide. In no case shall depressions be filled up with unmixed and ungraded material or fines.

406.6.7 Arrangement for Traffic :

During the period of construction, arrangement of traffic shall be done as per Clause 112 of MORT & H specifications

406.8 Measurements for Payment :

Wet mix macadam shall be paid as finished work in position on cross sectional measurements and computing the volume of WMM work in cubic meters by average area method.

406.9 Rate : The Contract unit rate for wet mix macadam shall be payment in full for carrying out the required operations including full compensation for all components listed below.

- i) Making arrangement for traffic to Clause 112 as above Except for initial treatment to verges, shoulders and Construction of diversions :
- ii) Furnishing wet materials to be incorporated in the work including all royalties, fees, rents where necessary and all leads and lifts ;
- iii) All labour, tools, equipment and incidentals to complete the work to the specifications ;
- iv) Carrying out the work in part widths of road where directed ; and
- v) Carrying out the required tests for quality control.

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

Item No 60 Supplying and erecting Fully Automatic hydro pneumatic booster system with cast iron housing Enclosure class IP44 minimum, with built in PTO motor protection and stainless steel impeller pump, pump model GRUNDFOS CMB 5-46 series or equivalent with 24 Liter hydro pneumatic pressurized tank capacity : 3.1 m³/hr, Rated head :25 mtr motor rating : 1 H.P. includes pressure switches, Non Return Valve, Pressure Gauge, 5 way Brass connector, with necessary Plumbing work of 25mm dia suction and delivery pipe which includes all required size of pipes which includes all required size of pipes, Joints valves, Bypass valve, labor all accessories required for installation of pressure pump (Foundation work and base stand cost included)

The item includes Supplying and erecting Fully Automatic hydro pneumatic booster system with cast iron housing Enclosure class IP44 minimum, with built in PTO motor protection and stainless steel impeller pump, pump model GRUNDFOS CMB 5-46 series or equivalent with 24 Liter hydro pneumatic pressurized tank capacity : 3.1 m³/hr, Rated head :25 mtr motor rating : 1 H.P. includes pressure switches, Non Return Valve, Pressure Gauge, 5 way Brass connector, with necessary Plumbing work of 25mm dia suction and delivery pipe which includes all required size of pipes which includes all required size of pipes, Joints valves, Bypass valve, labor all accessories required for installation of pressure pump (Foundation work and base stand cost included)

The Material Selection and consolidated item shall be carried out as directed by Engineer in charge

The item shall be measured and paid on Number basis.

Item No 61 Providing and fixing to wall ceiling and floor 10.0 Kg. F/Cm² working pressure poluthene pipes of the following outside Dia. Low density, complete with special falnge compression type fittings, wall clipsetc. including making good the wall ceiling and floor.(G)110 mm

The relevant specifications of Building Booklet It. No.23.8./ Page No.162 shall be followed expect use 110 mm Rain water pipe 10.00Kg F/CM² and other end socketed with rubber ring, & fittings conforming to ISI 14735-1999 of approved make

for drainage system pipe line, pipe shall be jointed with each other with rubber lubricant, pipe shall be fixed shall be concealed instead of 50mm dia & 6 kgs/sq.cm. working pressure polythene pipes

Item No 62 Providing and fixing to wall ceiling and floor 10.0 Kg. F/Cm² working pressure poluthene pipes of the following outside Dia. Low density, complete with special falnge compression type fittings, wall clipsetc. including making good the wall ceiling and floor.(G)160 mm

The relevant specifications of Building Booklet It. No.23.8./ Page No.162 shall be followed expect use 160 mm Rain water pipe 10.00Kg F/CM² and other end socketed with rubber ring, & fittings conforming to ISI 14735-1999 of approved make for drainage system pipe line, pipe shall be jointed with each other with rubber lubricant, pipe shall be fixed shall be concealed instead of 50mm dia & 6 kgs/sq.cm. working pressure polythene pipes

Item No 63 Providing junction for rain water juncton chamber of size 0.60x0.60x0.75m with excavation of size 1.66x1.66x m 1.05& 0.15m thick c.c.1:2:4 bed concrete including brick masonry wall in CM 1:6 of 0.75m height & 0.23m thick with 15mm thick cement plaster inside & outside & 1.06x1.06 RCC (1:2:4) slab of thickness 0.15m with CRS steel and 0.60mx0.45m cast iron manhole cover with frame weight not less than 35 kg as per directed by Engineer-in-charge.

General

Item including Providing junction for rain water juncton chamber of size 0.60x0.60x0.75m with excavation of size 1.96x1.96 m and 0.15m thick c.c.1 2 4 bed concrete including brick masonry wall in CM 1 6 of 0.75m height and 0.23m thick with 15mm thick cement plaster inside and outside and 1.06x1.06 RCC (1 2 4) slab of thickness 0.15m with CRS steel and 0.60mx0.45m cast iron manhole cover with frame weight not less than 35 kg as per directed by Engineer-in-charge

Material

Cement

Specification No M-3 of specification booklet for building work shall confirm for this Item

Sand

Specification No M-6 of specification booklet for building work shall confirm for this Item

Water

Specification No M-1 of specification booklet for building work shall confirm for this Item

Bricks

Specification No M-15 of specification booklet for building work shall confirm for this Item

Brick Bat aggregates

Specification No M-14 of specification booklet for building work shall confirm for this Item

4.0. WORKMANSHIP

Excavation

Specification Item No. 4.0.0 (A) Page 29 of specification booklet for building work shall confirm for this Item

Form Work

Specification Item No. Item. No. 1.9.1 (B) Page 64 of specification booklet for building work shall confirm for this Item

Concrete

Specification Item No. 5.3.8. (A) Page 39 of specification booklet for building work shall confirm for this Item

Brick work

Specification Item No. 6.12(B) Page 51 of specification booklet for building work shall confirm for this Item

Graded Stone Aggregate

Specification Material Item No. M-13 Page 12 of specification booklet for building work shall confirm for this Item

Plaster

Specification Item No. 17.58 Page 119 of specification booklet for building work shall confirm for this Item

Manhole Cover

Specification Item No. 23.0.0.6 Page 173 of specification booklet for building work shall confirm for this Item

For filling Brick bats and sand layers in chamber as filter Brick bats and sand shall be specification of Item no M-14 and M-6 on page 12 and 9 of specification booklet of Building specification shall be followed

Mode of Measurement and Payment

The Item shall be measured for its Number limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one square meter.

The payment will be made on Number basis of the finished work.

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

- Item No 64 Providing Filter chamber of Brick work in C:M 1:6 of size 2.06mx1.20m x1.20m & excavation dimension of 2.82mx 1.96x1.35m including C.C 1:2:4 bed concrete of 0.15m thick including brick work in c.m 1:6 for 23cm thick wall including 15mm thick cement plaster inside & outside with cement slurry & 10cm thick RCC 1:2:4 top cover with frame of minimum weight of 35 kg & filling filter material kapchi in layers (25-40mm & 10-20mm) & BT metal 40mm & sand as per directed by Engineer-in-charge.**

General

Providing Filter chamber of Brick work in C M 1 6 of size 2.06mx1.20m x1.20m and excavation dimension of 2.66mx 1.81x1.35m including C.C 1 2 4 bed concrete of 0.15m thick including brick work in c.m 1 6 for 23cm thick wall including 15mm thick cement plaster inside and outside with cement slurry and 10cm thick RCC 1 2 4 top cover with frame of minimum weight of 35 kg and filling filter material kapchi in layers (25-40mm and 10-20mm) and BT metal 40mm and sand as per directed by Engineer-in-charge.

Material

Cement

Specification No M-3 of specification booklet for building work shall confirm for this Item

Sand

Specification No M-6 of specification booklet for building work shall confirm for this Item

Water

Specification No M-1 of specification booklet for building work shall confirm for this Item

Bricks

Specification No M-15 of specification booklet for building work shall confirm for this Item

Brick Bat aggregates

Specification No M-14 of specification booklet for building work shall confirm for this Item

4.0. WORKMANSHIP

Excavation

Specification Item No. 4.0.0 (A) Page 29 of specification booklet for building work shall confirm for this Item

Form Work

Specification Item No. 1.9.1 (B) Page 64 of specification booklet for building work shall confirm for this Item

Concrete

Specification Item No. 5.3.8. (A) Page 39 of specification booklet for building work shall confirm for this Item

Brick work

Specification Item No. 6.12(B) Page 51 of specification booklet for building work shall confirm for this Item

Graded Stone Aggregate

Specification Material Item No. M-13 Page 12 of specification booklet for building work shall confirm for this Item

Plaster

Specification Item No. 17.58 Page 119 of specification booklet for building work shall confirm for this Item

Manhole Cover

Specification Item No. 23.0.0.6 Page 173 of specification booklet for building work shall confirm for this Item

For filling Brick bats and sand layers in chamber as filter Brick bats and sand shall be specification of Item no M-14 and M-6 on page 12 and 9 of specification booklet of Building specification shall be followed

Mode of Measurement and Payment

The Item shall be measured for its Number limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one square meter.

The payment will be made on Number basis of the finished work.

Item No 65 Drilling in soil with lowering of pipes concrete sealing including gravel packing clay breaking and development of bore with air compressor by required capacity vertical test etc. complete including the cost of benimeter 250mm dia.

GENERAL

The work shall consist of Drilling of 250 mm diameter bore hole for 250 mm diameter ERW UPVC pipe up to required depth in over burden strata (maximum up to 30 meters or up to the depth and further drilling of 165 mm diameter bore hole in remaining rocky or sandstone strata up to 100 mtr. Depth or as suggested by Geologist Hydrologist

Only trained personnel shall be employed for construction and supervision

1.0 DRILLING

1.1 Drilling shall be of 250mm diameter bore hole for 250 mm diameter ERW UPVC pipe up to required depth in over burden strata (maximum up to 30 meters or up to the depth as suggested by Engineer in Charge or Geologist Hydrologist) and further drilling of 165 mm diameter bore hole in remaining rocky or sandstone strata up to 100 meter Depth or suggested by Geologist Hydrologist. The drilling shall be done by the **down the hole hammer** type drilling Rig and lowering 165 200 mm diameter ERW UPVC Pipes, Bore cap shall have to be provided by the Contractor Free of Cost. The carting of pipes and other materials etc. shall be carried out by contractor with all lead and lift to the site of work at his own cost.

1.2. Drilling work shall be carried out at the sites directed by the Engineer in Charge. The diameter of the hole shall be 200 mm 215 mm in over burden strata and 165mm diameter in Rocky and Sandstone strata up to over all specified depth of 100 meters or as per suggested by Engineer in Charge or Geologist Hydrologist. The Drilling shall be carried out in over burden strata up to maximum 30 Meters or up to the depth as suggested by Engineer in Charge or Geologist Hydrologist. If further drilling can not be done due to overburden up to 30 meters, or in rocky and Hard or Sandstone strata due to Mechanical failure up to specified depth the drilling shall have to be stopped in consultation with Engineer-in- charge and no payment shall be made for such drilling carried out by the Contractor.

1.3. The 175 200mm diameter ERW UPVC pipes should be lowered by the contractor in over burden strata. Contractor as desired by the Engineer in charge will carry out the jointing of pipes. Necessary jointing materials, steel bended plates etc. should be provided by the Contractor at his own cost.

2.0 DRILLING OPERATION

2.1. The Drilling operation for drilling of Bores should be carried out by suitable rig to satisfy following.

2.2. For Drilling Through overburden

1. The diameter of the bore in the over burden shall be sufficient for insertion of 200mm diameter ERW UPVC casing pipes with the joints and leaving sufficient annular space for grouting the casing pipe with sticky clay or local soil etc. Annular space

between bore hole and casing pipe should be filled up with sticky clay or local materials etc

2. After completion of overburden strata, the bore should be drilled up to 0.15 meters. In rocky Hard Sandstone strata so that casing pipes can be properly embedded in the Rocky Hard Sandstone formation.

3. After the casing pipe is embedded in the rock, the same is to be ground with materials like sticky clay or local materials etc. so, as to avoid leaking of drain water in the bore.

4. Drilling of 250 mm diameter bore in overburden strata is compulsory up to 30 mtrs. Or as directed by Engineer in Charge or as suggested by geologist Hydrologist.

(A) For Drilling Through Rock

2.3. Bore through rocks shall be of 165mm diameter and the total depth from the ground level of the bore shall be up to 100 meters. or as per the recommendation of the Hydrologist Jr. Geologist.

3.0. LOWERING OF CASING PIPES

3.1. Casing pipes shall be properly socketed welded and forewelded so as to ensure a continuous length lowered through the overburden, so as to reach at least 0.15 meter. Inside the hard rock. The length of casing pipes should be kept such that at least 0.30 meters remains projected above the Ground Level. After completion of the work at site the top of the casing pipes shall have to be closed either by a screwed or by welded cap plug (if required for HP Installation) unless pump is fitted immediately after completion of the bore.

3.2. The casing pipe shall be lowered in such a manner so that it remains vertical so as to ensure installation of pump.

1. After completion of the bore the Contractor shall have to arrange for testing the yield of the bore by V notch at his own cost in presence of the Engineer in charge or his authorized representative. No extra payment shall be made for such testing.

2. The depth of bore to be drilled as per the recommendation of Jr. Geologist Hydrologist shall be less or more depth. If the bore required to be drilled beyond the specific depth 100 meters. The contractor shall be bound to carry out such work at the rate mentioned in Schedule B.

3. All the tools and tackles or plants and other suitable machinery required for work for drilling developing gauging etc. for the Tube well shall be provided by the Contractor at his own cost at the site of work.

4. In case of any item not covered by the specifications stated herein the Contractor shall carry out such work strictly, according to written instructions of Engineer in charge, which will be binding to the contractor and shall have to carry out such work at Departmental Schedule. The rate shall be mutually agreed upon, however the decision of the Engineer in charge will be final.
5. During the Drilling Operation, if the water bearing strata found at a depth lesser than estimated depth the Executive Engineer or his representative shall have authority to instruct the Contractor to stop the work for reduction in the quantity of the work, the Contractor shall not be eligible for any compensation.
6. If the bore is required to be drilled above the specified depth the Contractor shall be bound to carry out such additional work including drilling providing and lowering of casing pipes as may be necessary. The relevant specification regarding drilling providing and lowering pipe, taking yield test and strata sample etc. shall also apply in case of such additional work. The rates for additional work be paid as per the rate fixed.
7. Lowering and fixing of housing and casing shall be carried out in workman like manner. The contractor shall be responsible for workman compensation in case of any accident. In case of dispute or overlooked items the decision of the concerned Executive Engineer shall be final and binding to the Contractor.
8. No further drilling of bore wells is allowed, if more than two bores will remain untested at a time. This clause will be applicable without any prejudice (i.e. compensation for delay)
9. The contractor shall clear the site before of the work and after completion of the work and shall hand over the bore with final finishing of the work. As directed by the Engineer in charge which shall have to be done by the Contractor at his own cost.
10. The approach roads to site of work may be Kachha roads and contractor shall have to make his own arrangements for repairing of the road and maintain the same for transporting his materials and equipment at his cost which shall be utilized by the department for inspection etc. purpose.
11. The list of the locations, where bore well are to be drilled will be provided on finalization of Tender and Similarly, the actual site of work will be given to the contractor by the Geologist or Engineer-in – charge from the respective Mechanical division Sub Division.
12. If a well is rejected on account of faulty workmanship or negligence on the part of the Contractor as well as if the verticality is not within the permissible limit the bore shall be rejected and the Contractor shall have to drill a new bore including lowering pipes etc. at his own cost.

13. If, further drilling can not be carried out due to encountering the sticky clay or overburden beyond limits (i.e. beyond 30 meters.) or in rocky sandstone up to specified suggested depth in a such a case the decision of the Engineer in Charge or recommendation of Hydrologist will be binding to the Contractor as finalized by Engineer in Charge and or Geologist Hydrologist.

14. The Contractor will have to make arrangement at his own cost for cleaning of bore hole, if filled up by clay, sand, dust and boulders etc.

15. If bore is not completed up to design recommended depth due to Mechanical failure or any other reason, no payment shall be made for such abandoned bore.

16. On completion of drilling work up to the required depth, the bore is to be developed and cleaned by suitable capacity air compressor up to the sand free discharge or for minimum one hour.

17. The Contractor will have to make arrangement at his own cost for

(A) Rig Vehicles, Machineries etc.

(B) Facilities for moving bulky materials.

(C) Realizing the Transporting Materials.

(D) Keeping in custody Department Materials until finally taken over by the office –in-charge of the work.

(E) Repairing to the damages caused in the process of the executing works.

(F) Approach road to the site.

4.0. MODE OF MEASUREMENT and PAYMENT

4.1. Drilling work shall be measured in its depth for each class of strata, limited to the dimensions shown on the drawing or as directed by the Engineer-in-charge. Drilling over increased diameter or depth shall be deemed as convenience for the contractor in executing the work and shall not be measured and paid for separately.

4.2. The contract unit rate for the item shall be paid in full for carrying out the required operations including

4.3. Setting out and fixing bench marks and centre lines stones.

4.4. Removal of all logs, stumps, grubs and other deleterious matter and obstructions for placing the foundations including trimming of bottoms of excavations

4.5. Foundation sealing, dewatering including pumping;

4.6. All labour, materials, tools equipment, safeguards and incidentals necessary to complete the work to the specification.

- 4.7. The drilling work shall be measured for its depth, limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one Rmt

Item No 66 Supplying slotted PVC pipes of approved quality at site of work confirming to IS. 1239/1974 180mm dia.

The PVC pipes shall be of 180 mm dia and shall conform to the I.S. 4985. The pipes shall be lowered in the 250 mm dia. bore hole as slotted pipe and shall be properly socketed and forwarded so as to ensure a continuous length lowered through the over burden. The length of slotted pipe should be kept such that at least 0.30 meters. remains projected above the Ground Level. After completion of the work at site the top of the slotted pipe shall have to be closed either by a screwed or by welded cap plug

The item shall be measured as finished work in position in running meter.

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

Signature of Contractor

**Deputy Executive Engineer
Surat (R&B) Sub Division 1
Surat**

**Executive Engineer
Surat (R&B) Division 1
Surat**