

RANAVAV NAGARPALIKA, DIST. PORBANDAR

TENDER

CIVIL SPECIFICATION

TECHNICAL SPECIFICATIONS

GENERAL

In the specifications, "as directed" / "Approved" shall be taken to mean 'as directed' / 'approved' by the Engineer-in-Charge.

Wherever a reference to any Indian Standard appears in the specifications, it shall be taken to mean as a reference to the latest edition of the same in force on the date of agreement.

Approval to the samples of various materials given by the Engineer-in-charge shall not absolve the contractor from the, responsibility of replacing defective material brought on site of materials used in the work found defective at a later date. The contractor shall have no claim to any payment of compensation whatsoever on account of any such materials being rejected by the Engineer-in-charge.

The contract rate of the item of work shall be for the work completed in all respects.

No collection of materials shall be made before it is got approved form the Engineer-in-charge.

Collection of approved materials shall be done at site of work in a systematic manner. Materials shall be stored in such a manner as to prevent damage, deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work.

Materials, if and when rejected by the Engineer-in-charge, shall be immediately removed from the site of work.

No materials shall be stored before, during and after execution of structures in such a way as to cause or lead to damage of overloading of the various components of the structure.

All tools, templates, machinery and equipment for correct execution of the work as well as for checking lines, levels, alignment of the works during execution shall be kept in sufficient numbers and in good working condition on the site of the work.

The mode, procedure and manner of execution shall be such that it does not cause damage or over loading of the various components of the structure during execution of after completion of the structure.

Special modes of construction not adopted in general Engineering practice, if proposed to be adopted by the Contractor shall be considered only if the contractor provides satisfactory evidence that such special mode of construction is safe, sound and helps in speedy construction and completion of work to the required strength and quality.

Acceptance of the same by the Engineer-in-charge shall not, however, absolve the contractor of the responsibility of any adverse effects and consequences of adopting the same in the course of execution of completion of the work.

All installations pertaining to water supply and fixtures thereof as well as drainage lines and sanitary fittings shall be deemed to be completed only after giving satisfactory tests by the Contractor.

The contractor shall be responsible for observing the rules and regulation imposed under "Minor Minerals Act", and such other laws and rules prescribed by Government from time to time.

All necessary safety measures and precaution (including those laid down in the various relevant India Standards) shall be taken to ensure the safety of men, materials and machinery on the works as also of the work itself.

The testing charges of all materials shall be borne by the Contractor.

Approval to any of the executed items for the work does not in any way relieve the contractor of his responsibility for the correctness, soundness and strength of the structure as per the drawings and specification.

Item No: - 06

Providing FE-500 TMT (Code 1786-2008) reinforcement for RCC work including cutting bending, binding and placing in position for All floor (Ground and First Floor)

1.0. Materials:

- 1.1.** Cold twisted steel bars (high yield strength steel deformed bars) shall conform to M-16. Mild steel binding wires shall conform to M-18.

2.0. Workmanship:

- 2.1.** The work shall consist of furnishing and placing reinforcement to the shape and dimensions shown as on the drawings or as directed.
- 2.2.** Steel shall be clean and free from rust and loose mill scale at the time of fixing in position and subsequent concreting.
- 2.3.** Reinforcing steel shall conform accurately to the dimensions given in the bar bending schedules shown on relevant drawings. Bars shall be bent cold to specified shape and dimensions or as directed using a proper bar bender, operated by hand or power to attain proper radius of bends. Bars shall not be bent or straightened in a manner that will injure the material. Bars bent during transport or handling shall be straightened before being used on the work. They shall not be heated to facilitate bending. Unless otherwise specified, a 'U' type hook at the end of each bar shall invariably be provided to main reinforcement. The radius of the bend shall not be less than twice the diameter of the round bar and the length of straight part of the bar beyond the end of the 'U' curve shall be at least four times 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 splitting of the concrete.
- 2.4.** All the 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 stay blocks or metal chair spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals. Bars shall not be allowed to sag between supports nor displaced during concreting or any other operations of the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal supports shall not extend to the surface of concrete, except where shown on

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 blocks shall not be used. Layers of bars shall be separated by spacer bars, precast mortar blocks or other approved devices. Reinforcement after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement from corrosion, concrete cover shall be provided as indicated on drawings. All the bars protruding from concrete and to which other bars are to be spliced and which are likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout.

- 2.5.** Bars crossing each other where required shall be secured by binding wires (annealed) of size not less than 1 mm in such manner that they do not slip over each other at the time of fixing and concreting.
- 2.6.** As far as possible, bars of full length shall be used. In case this is not possible, overlapping of bars shall be done as directed. When practicable, overlapping bars shall not touch each other, but be kept apart by 25 mm. or 1.25 times the maximum size of the coarse aggregate whichever is greater by concrete between them. Where not feasible, overlapping bars shall be bound with annealed wires not less than 1 mm. thick twisted tight. The overlaps shall be staggered for different bars and located at points along the span where neither shear nor bending movement is maximum.
- 2.7.** Whenever indicated on the drawings or desired by the Engineer-in-charge, bars shall be joined by couplings which shall have a cross-section sufficient to transmit the full stresses of bars. The ends of the bars that are joined by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than normal cross section of the bar. Threads shall be standard, threads. Steel for coupling shall conform to I.S. 226.
- 2.8.** When permitted or specified on the drawings, joints of reinforcement bars shall be butt-welded so as to transmit their full stresses. Welded joints shall preferably be located at points when steel will not be subject to more than 75 per cent 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 all other special provisions for the work shall be accepted. Suitable means shall be provided for holding bars securely in position during

welding. It shall be ensured that no voids are left in welding and when welding is done in two or three stages, previous surface shall be cleaned properly. Ends of the bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before welding. Only competent welders shall be employed on the work. The M.S. electrodes used (or welding shall conform to I.S. 814. Welded pieces of reinforcement shall be tested. Specimen shall be taken from the actual site and their number and frequency of test shall be as directed.

The above specifications shall be followed except that the cold twisted steel bars shall be used with or without hooks at the ends. Deformed bars without hooks shall, however, comply with relevant anchorage requirements.

3.0. Mode of measurement and payment:

- 3.1.** For the purpose of calculating consumption, wastage shall not be permitted beyond 5percent. Excess consumption over 5% will be charged at penal rate.
- 3.2.** Reinforcement shall be measured in length including overlaps, separately for different diameter as actually used in the work. Where welding or coupling is resorted to, in place of lap joints, such joints shall be measured for payment as equivalent length of overlap as per design requirement. From the length so measured, the weight of reinforcement shall be calculated in tonnes on the same basis of as per M-18 even though steel is Supplied to the contractor by the department on actual weight. Length shall include hooks at the ends. Wastage and annealed steel wire for binding shall not be measured and the cost of these items shall be deemed to be included in the rate for reinforcement.
- 3.3.** The rate for reinforcement includes cost of steel binding wires its carting from Department a store to work site, cutting, bending, placing, binding and fixing in position as shown on the drawings and as directed. It shall also include all devices for keeping reinforcement in approved position, cost of joining as per approved method and all wastage and spacer bars
- 3.4.** The rate shall be for a unit of One Kg.

Item No. 25 : Providing and fixing 35mm thick shutter for doors, windows and clerestory windows including Indian teak wood frames 12cm x 7cm. Size including anodized aluminum fixtures and fastenings including primer coat of approved quality and two coats of oil painting etc., complete. (ii) Fully Panelled.

4.0 CARPENTER AND JOINTER:

4.1 TIMBER:

All timber shall be as per relevant specification mentioned in the section of materials.

The timber for frames and shutters for doors, windows, ventilators shall be of first class, sound, well-seasoned, Balsar teak wood / C.P. teak wood or other specified and approved quality wood and shall be free from knots, shakes, fissures, flaws, sun cracks and other defects.

All timber for carpentry and joinery in contact with masonry or concrete shall be coal tarred before fixing. All exposed faces of timber shall receive a primer coat before erection. The rate shall be inclusive of one coat of primer and three coats of approved quality and shade of flat enamel paint.

Unless otherwise specified all doorframes shall have six M.S. flat holdfasts and window frames shall have four holdfasts. Holdfast shall be provided to the ventilators, if directed.

When door/window frames are to be fixed to R.C.C. column or R.C.C. wall, holdfast shall be substituted by suitable arrangements such as coach screws, rowl bolts etc. to secure frames to R.C.C. column or R.C.C. wall, as directed by Architects.

Frames and shutters shall not be painted or erected before being approved by Architect.

4.1.1 CARPENTRY WORK:

The timber shall be properly planned and wrought in a workman like manner. Joints shall be true and properly fit, assembled accurately and clamped together so as to make square, flat, and close joints.

No timber shall be painted, tarred without the previous permission of the Architects / Engineer-in-Charge, no glue or wedges shall be allowed to be used and all woodwork before being erected shall be passed by Architects/Engineer-in-Charge.

In wrought timber, tolerance of 1.5 mm will be allowed for each wrought face of size specified except where described as "finished" in which case they shall have to be the full dimensions. The rate, for wood work, shall include the cost of all

sawing, planning, framing, labor and materials and fixing and supply of all traps, bolts, nails, spikes, keys, wedges, pins, screws, glues, etc. necessary for the framing and fixing joints, Portions inserted in the masonry / floor shall not be allowed for the measurements.

4.1.2 JOINERY:

Doorframe shall be of such dimensions as directed by the Architects/ Consulting Engineers. They shall be properly framed and mortised and tenoned together and set in masonry by means of M.S. / wrought iron holdfasts. The parts hidden in the masonry shall be well tarred or coated with solignum-paint. The frame shall be rebated by 13 mm up to the face thickness of shutters on one side if the shutter is on one side and to be molded as per design. The other side of the frame shall be rebated if there are shutters on both the sides.

4.1.3 T.W. DOOR OR WINDOW FRAME:

T.W. shall be of good quality as specified above. Frame size shall be of 150 x 63 mm or 127 x 76 mm as specified in Bills of Quantities. Rebate and grooves shall be made for receiving shutters, grills, plaster etc. as per drawing.

4.1.4 WOODEN FLUSH DOOR SHUTTERS (SOLID CORE TYPE):

Solid core flush shutters shall be of commercial or teak veneered type as specified in the item, of approved quality and manufactured by approved manufacturers. The finished thickness of the shutter shall be as mentioned in the tender items, Face veneer shall be of the pattern and color approved by Architects and as per approved sample, which shall be deposited in the office of Architects for reference, The shutters will be provided with T.W. lipping.

The framework shall be measured in Smt. from outside to outside of frame and shall be priced per unit of Smt. The rate shall include fixtures and fastening as required and specified in Table -4.1.

4.1.5 PANELLED SHUTTERS:

The exact shape for frame shall be as per Architects/Consulting Engineer's details. The styles-rails and panels shall be 37 mm thick and 25 mm thick respectively. Wood panels shall be of pattern and size as specified. The panel shall be joined continuous with 40 x 6 mm thick ply, inserted into grooves and glued together. The grains of solid Panel shall run along the longer dimension of the panel and Panel shall be framed into groove to the full depth of the groove

leaving an air gap, and the faces shall be closely filled to the sides of groove. The type and number of fixtures shall be as mentioned in the Table-4.1 given below. The fixtures and fastening shall be fixed rigidly to the shutter. If they get loosened within defect liability period, the contractor shall have to replace the shutters with better ones at his cost.

The rate is inclusive of providing and fixing. The measurement shall be in sq. meter and dimensions measured out to out of the frame. The rate is inclusive of one coat of primer and three coats of approved quality and shade of enamel paint.

4.1.6 TEAK GLAZED SHUTTERS:

These shall be similar to paneled shutter except that such parts as are directed shall be glazed with plain or ground sheet glass or plate glass or frosted glass as specified. Styles and rail in the glazed shutters shall be rebated 13 mm to receive glass. Such bars shall be mounted and rebated and mitered on side to receive the glass. Glass panels shall be fixed by means of teak beads painted with approved paint. The prices shall include supply and fixing of glazing and teak beads with screws, painting, polishing except where otherwise stated in the Bills of Quantities.

TABLE - 4.1

SCHEDULE FOR HARDWARE FITTINGS FOR WOODEN SHUTTERS

Sr. No.	Type of Shutters	S. S. Hinges		Tower Bolts Aluminum		Handles Aluminum		Wind Hook & Eye / Adjusters		Cleats		Aldrops Aluminum		Latches (For Toilet Doors)	
		No.	Size	No.	Size	No.	Size	No.	Size	No.	Size	No.	Size	No.	Size
1.	Glazed or Partly Glazed or Fully Paneled Double shutters size														
i)	1.20 m x 2.10 m x 40mm thick	6	10 cms.	3	25 cms	3	15 cms.	--	10 cms	--	15 cms	1	30 cms	--	--
ii)	(size exceeding 1.20 M x 2.10 M x 1.50 M x 2.45 M)	6	13 cms	2	45 cms	3	15 cms	-	15 cms	2	20 cms	1	30 cms	--	--
iii)	(Size exceeding 1.50 M x 2.50 M)	6	15 cms	2	60 cms	3	15 cms	--	20 cms	2	30 cms	1	45 cms	--	--
2.	Glazed or Partly Glazed or Fully Paneled Double shutter size														
i)	up to size 0.90 M x 2.0 M	3	13 cms	2	25 cms	2	15 cms	--	10 cms	1	15 cms	--	--	1	30 cms
ii)	Size exceeding 0.50 M x 2.0 M	3	15 cms	1	30 cms	2	15 cms	--	15 cms	1	20 cms	1	30 cms	--	--
3.	Doors with wire gauge panels														
i)	Double shutters all sizes	4	13 cms	3	25 cms	3	20 cms	--	15 cms	1	15 cms	1	30 cms	--	--
		2	Single action spring hinge												

			s												
ii)	Single shutter of all sizes	2	13 cms	2	25 cms	2	20 cms	--	15 cms	1	15 cms	1	30 cms	--	--
4.	Windows Glaze / partly glazed & fully glazed	4	10 cms	3	15 cms	3	15 cms	2	15 cm	2	15 cms	--	--	--	--
i)	Double shutter up to 11.50 mt. height														
ii)	-do- single shutter	2	10 cms	1	10 cms	1	15 cms	1	15 cms	1	15 cms	--	--	--	--
5.	Fan light & ventilator	2	7.5 cms	--	--	--	--	1	Sprin g hinge s	--					
		2	Pivot Hinge s												

Notes:

1. The top of tower bolt in closed position should be within a reach of 1.90 M.
2. Eye and hooks in places of hinged door stopper are to be used in case of window shutters when the operation cannot be done due to fixing of grills, wire mesh or expanded metal or wire netting on one side of opening.
3. For shutters exceeding 40mm thickness heavy type SS butt hinges of 125 mm x 90 mm x 40 mm shall be used.
4. Hardware of timber doors, windows etc. shall be as above, if not specified otherwise, and shall be of quality as approved by the Architect / Consulting Engineer.

4.1.7 TEAKWOOD LOUVERED SHUTTERS:

The specification shall be as per paneled shutter except that such part as are directed shall be louvered. In louvered shutter, the style shall have groove of 25 mm width and 15 mm depth, to receive teak wood louvers of 25 mm thickness. The louver shall be fixed at an angle as per drawing. The louver's width shall be 10 mm less than the slant groove width to finish with beading. The beading size shall be 15 mm x 15 mm and shall be fixed, as specified, with screw.

The work shall be measured in sq. mtrs inclusive of frames both ways. The rate includes providing and fixing, louvers, beading, fixtures and fastenings as required and specified in the Table – 4.1 or as directed.

4.1.8 FIXING GLASS LOUVERS:

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

4.1 STEEL WINDOWS:

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

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

Thickness of glass shall be as under (costs included in this item).

- (i) 24 Oz glazing for glass size not exceeding area 600 mm x 600 mm subject to any dimension not exceeding 1.0 meter.
- (ii) 26 Oz glazing for glass size not exceeding area 750 mm x 750 mm but any dimension not exceeding 1.20 meter.
- (iii) 32 Oz glazing for glass size not exceeding area 75 mm x 750 mm and 900 mm x 900 mm but any dimension not exceeding 1.20 meter.
- (iv) 6 mm thick plate glass for glass size more than 900 mm x 900 mm and any dimension not exceeding 1.00 meter.

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

The rate also includes a coat of primer (yellow zinc chromate) before erection and after erection, 3 coats of approved enamel paint of required shade to the windows. Fixed and open able window shall be paid separately. The measurement shall be square meter of overall size of the frame as per drawing.

4.2.2 HARDWARE:

Rates of doors and window include fixing of all hard wares of specified and approved quality and material.

4.2.3 SCHEDULE OF HARDWARE (UNLESS OTHERWISE SPECIFIED):

- (a) Steel windows (each shutter): 150 mm handle. - 1 No.
- 300 mm peg stay - 1 No.
- Project of friction hinges - 2 Nos.
- (b) Top or bottom hung ventilators:
- 300 mm peg stay arm - 1 No.

Projection or friction hinges.	- 2 Nos.
(c) Steel doors:	
Brass mortise lock with a pair of chromium handles.	- 1 No.
300 mm tower bolt (per leaf)	- 1 No.
Friction Hinges (per leaf)	- 3 Nos.

Measurement:

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

4.2.4 COLLAPSIBLE STEEL DOORS AND GATES:

Approved manufacturers shall fabricate these, from mild steel sections. The gates shall be double or single collapsible gates depending upon the size of the opening. These shall consist of vertical double channels 20 x 10 x 2 mm at 100 mm centers braced with flat iron diagonals 20 x 5 mm and with top and bottom rails of Tee section of size 40 x 40 x 6 mm with 38 mm dia pulleys or ball bearings in every 4th double channel, unless otherwise specified. Where collapsible gate is not provided within the opening and is fixed along the outer surface, Tee section at the top may be replaced by flat 40 x 10 mm. the collapsible gate shall be provided with necessary bolts and nuts, locking arrangements, stoppers and handles. Any special fittings like springs, catches and locks shall be provided as described in the Bills of quantities.

Rates include for making zari in floors and walls, holes in masonry of R.C.C and restoring the same including applying one coat of rust remover, one coat of zinc chromate and three coats of approved make and shade of flat/enamel paint or aluminum paint.

Measurement:

The gate shall be measured in sq. mtrs. The breadth and height shall be measured correct to a cm. The height shall be measured as the length of double channels and breadth from outside to outside of the end fixed double channels in open position of the gate.

4.2 ROLLING SHUTTERS:

Rolling shutters shall consist of 75 mm wide 18-gauge M.S. laths machine rolled and straightened with an effective bridge depth of 16 mm. The laths shall

be interlocked through their entire length and jointed together at the end with end locks. These shall be mounted on specially designed pipe shaft. Each lath section shall be a continuous single strip piece without any joint. The spring shall be prepared from unbreakable high tensile spring steel wire or strip of adequate strength to balance the shutter in all positions. The spring assembly shall be supported on strong mild steel or malleable cast iron bracket shaped to fit the lintels. The shutter shall be complete with door suspension shafts, guides, locking arrangements, brackets, pulleys with ball bearings, pushing hooks, handles, top covers etc. Fixing shall be done accurately in a workman like manner such that the operation of the shutter is easy and smooth.

Rate includes applying one coat of rust remover, one coat of yellow zinc chromate primer and three coats of approved make and shade of flat/enamel paint etc.

Rolling shutters shall be measured in square meters of the clear opening to which they are fixed and in no case top drum with cover and channels shall be paid extra or shall be calculated in area.

4.3 ALUMINIUM DOORS, WINDOWS, VENTILATORS ETC:

These shall be obtained from approved and established manufacturers and shall be of aluminum alloy conforming to IS: 733 and sections shall generally conform to IS: 1948. These shall be fabricated as per the drawings.

4.3.1 GENERAL:

(I) The unit assemblies shall be as per drawing or as directed by the Architects.

The unit assemblies shall be anodized finished. Anodizing shall be minimum 20 to 25 microns thick, of matt non-directional and non-specular. Anodized surface shall be suitably protected during transportation, storage and erection.

Sub units shall be together by concealed screws, Jamb member shall be self-mullion Ing type obtaining use of separate mullions, thus increasing clear height of each unit.

(II) Joints shall either be mitered or coped. All joints shall be neat, hair line, and sealed with epoxy to make them water proof.

(III) Open able shutters shall have a single row continuous neoprene or PVC weather strip to prevent air infiltration. Weather strips shall not be interrupted by any fittings.

- (IV)** All windows shall be glazed from inside with PVC rubber or approved "Shalimar" putty. Glazing beads shall snap fit and shall be fitted without use of screws. No screws other than those on some of the hardware shall be visible.
- (V)** Glazing shall be approved and specially selected quality glass of thickness as specified in the Bills of Quantities.
- (VI)** The rate shall include supplying and fixing with fittings and fixtures including approved locking arrangements.
- (VII)** Before handing over, the aluminum work shall be washed with mild solution of non-alkali soap and water.

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

Composite glazing units shall be supplied loose with necessary coupling transoms or mullions with machine screws and mastic compound and shall be coupled with box mullions. The mullions shall be embedded in mastic to make the joint watertight.

Measurement shall be in Smt. of net area fixed at site.

PLASTER WORK

1. EXTENT AND INTENT

The Contractor shall furnish all materials, labour, scaffolding, equipment, tools, plant and incidentals necessary and required for the completion of all plaster and wall finishes. The Contractor shall be responsible to take proper precautions to protect already installed work from damage.

2. GENERAL

Plaster as here in specified shall be applied to all internal and external surfaces where called for Glazed tile dado, terrazzo dado, and other wall finishes are to be provided as and where indicated on drawings and schedules. Areas called for on drawings and typical shall be considered to apply to appropriate, adjoining areas whether shown on same drawings or not and whether indicated or not. All plaster work and other wall finishes shall be executed by skilled workmen in a workman like manner and shall be of the best workmanship and in strict accordance with the dimensions on drawing.

3. PLASTER WORK

The primary requirements of the plaster work shall be to provide an absolutely water tight enclosure, dense, smooth and hard and devoid of cracks on the interior and exterior. The Contractor shall do all that is necessary to ensure this result. All plastering shall be finished to true plane, without imperfections and square with adjoining work and shall form proper foundations for finishing materials such as paint etc.

Masonry and concrete surfaces to which plaster is to be applied shall be clean, free from efflorescence, damp and sufficiently rough and keyed to ensure proper bond.

Wherever directed all joints between concrete frames and masonry in filling shall be expressed by a groove cut in the plaster. Said groove to exactly coincide with the joint beneath.

Where grooves are not called for the joints between concrete members and masonry in filling shall be covered by 245 gauges galvanized chicken-mesh strips 40mm wide or as shown, installed before plastering.

4. CHASING

All chasing, installation of conduits, boxes etc. to be completed before any plastering or other wall finish is commenced on a surface. Chasing or cutting of plaster or other finish will not be permitted. Broken corners shall be cut back not less than 150mm on both sides and patched with Plaster of Paris or rich cement paste as directed. All corners shall be rounded to a radius of 8 mm or as directed by the EIC.

5. SAMPLES

Samples of each type of plaster and other wall finishes shall be prepared for approval of the EIC.

6. MATERIALS

Cement	As specified under concrete work
Water	As specified under concrete work.
Sand	Washed fine sand and / or stone aggregate as called for sand and stone aggregate to conform to the requirements given under "concrete work"

7. PROPORTIONS

The materials used for plastering shall be proportioned by volume by means of gauge boxes.

8. PREPARATION OF SURFACE

The joints in all walls, both existing and freshly built shall be raked into a depth of 15mm brushed clean with wire brushes dusted and thoroughly washed before starting plaster work. Concrete surfaces shall be roughened by hacking over the entire surface shall be roughened by hacking over the entire surface as approved by the EIC to ensure proper key for the plaster.

9. MORTAR MIXING

Mortar shall be prepared as specified under "Brick Work" it shall be made in small quantities only as required and applied within 15 minutes of mixing

10. APPLIANCES

Plaster application shall be commenced only after the preparatory work is approved by the EIC. Correct thickness of plaster shall be obtained by laying plaster screeds gauges at intervals of 1.50 meters.

Mortar shall be firmly applied, well pressed into the joints, rubbed and finished as approved by the EIC to give a smooth and even surface.

11. CURING

Finished plaster shall be kept wet for 10 days after completion. In hot weather walls exposed to sun shall be screened with matting kept wet or any other approved means.

12. WATER PROOF CEMENT PLASTER:

Specifications are same as stated above but the waterproof compound like OCNFLOW SNW2, JK WATER PROOF or any other approved quality shall be mixed with dry cement at the rate specified by the manufacturer.

1. NORMAL CEMENT PLASTER (IN ONE COAT)

This plaster is to be laid in one coat of 12mm thick in Cement Mortar 1:4, 1 Cement: 4 fine sands, on the surface prepared for plaster and following all the norms as stated above in 1. PLASTER.

2. CEMENT PLASTER WITH NEERU + CEMENT FINISH

This kind of Plaster is normally for interior side or as specified location by consultant to be applied as above 2. NORMAL CEMENT PLASTER and the surface shall be rubbed smooth after coating it with a thick coat of pure Portland cement slurry while the base coat is still fresh. If Neeru plus cement finish is specified floating with neat cement will not be required.

3. SAND FACE PLASTER (CEMENT PLASTER IN DOUBLE COAT)

This plaster is to be laid in double coat in 20mm thick in cement mortar.

Rough and fine sand plaster in single coat on shall be 12mm thick backing coat made by mixing one part of cement to three parts of clean fine sand for coat the ingredients shall be workable mix is obtained. And 8mm thick finishing coat at of cement mortar made by mixing one part of cement & two parts of clean fine sand. The plastered surfaces will be completed by means of sponges to obtain an even and granular surface all over. The entire plasterwork shall be done to perfect plumb. The sides of windows, openings such as jambs, and reveal sun breakers, drop Paradis, fins, chhajjas and the like, around externally shall be finished as directed by the Consultant / Engineer- in-charge and shall be included in the rate of this item.

The plaster shall be thoroughly cured for 14 days as directed by Consultant / Engineer-in-charge. Any cracks which appear in the surface and all portions which sound hollow, when tapped or are found to be soft or otherwise defective, shall be cutout in rectangular shape and redone as directed by the Consultant / Engineer- in- charge.

FLOOR FINISHING

1. GENERAL

The Contractor shall furnish all labour, materials, and operations including fixing devices, equipment and incidentals necessary and required for the completion of all flooring work. The Contractor shall pave the areas indicated on the plans and Schedule of finishes with materials therein called for. All flooring shall be laid to the best practice known to the trade. The flooring shall be laid to the level except where slopes are called for on the drawings, in which case the slopes shall be uniform and arranged to drain into the indicated outlets. Particular care shall be exercised to ensure that all flooring and DADOS are perfectly matched for color and finish.

2. SAMPLES

The Contractor shall furnish for approval by EIC samples of each type of floor and dado finish.

3. DRESSING OF SLABS

Every slab to be cut to the required size and shape and fine chisel dressed on the sides to the full depth. The sides shall be table rubbed with coarse sand or machine rubbed before paving. All angles and edges of the tiles shall be true, square and free from chipping and the surface shall be true and plane.

4. LAYING

Lime Mortar 1:1.5 (1 Lime: 1.5 Coarse sand) shall be spread under the area of each slab to 20 mm depth. Washed clean slab shall be laid on top, pressed, tapped with wooden mallets and brought to level with adjoining slabs. It shall then be lifted and laid aside. The top surface of the mortar shall then be corrected by adding fresh mortar at hollows. The mortar is allowed to harden a bit and a coat of cement slurry shall be spread over at the rate of 1 bag of cement per 10m² of area, the slab shall then be with as fine a joint as possible. Subsequent slabs are laid in similar manner. After each slab is laid, surplus cement on the surface shall be cleaned off. The flooring shall be cured for a minimum period of seven days.

5. POLISHING AND FINISHING

Slight unevenness at the meeting edges of slabs shall then be removed by fine chiseling in slant. The surface shall then be polished and fished in the same manner as specified for "Terrazzo-in-situ floor".

6. JOINTS

The joints shall be uniform and as thin as possible and run in straight lines or to suit the required pattern.

Tiles that are fixed in the floor adjoining the wall shall enter not less than 13 mm under the plaster dado. The junction between wall plaster and tile work shall be finished neatly and without weavings. After the tiles have been laid surplus cement grout that may have come out of the joints shall be cleaned off.

7.13 BRICKS ON EDGE FLOORING:

7.13.1 BRICKS

Specifications of brickwork shall apply. Broken bricks shall not be used except for closing the line. The bricks shall be laid on edge.

7.13.2 MORTAR

The mortar used shall be as specified. In case of dry brick flooring, fine sand shall be filled in joints.

7.13.3 SUBGRADE:

If the sub-grade is of lean cement concrete the flooring shall commence within 48 hours, of laying of sub-grade, failing which, the surface, of sub-grade shall be roughened with steel wire brushes without disturbing the concrete. Before laying the flooring, the sub-grade shall be wetted and smeared with a coat of cement slurry at about 2 kg. of cement spread over and are of one Smt. so as to get a good bond between sub-grade and flooring.

Where sub-grade is not provided, the earth shall be properly sloped, watered, rammed and consolidated. Before laying the flooring, it shall be moistened.

7.13.4 SOAKING OF BRICKS:

Bricks required for flooring shall be soaked properly before use. In case, the joints are to be filled with sand, the bricks need not be soaked.

7.13.5 LAYING:

The bricks shall be laid on edge, in plain, diagonal, herring bone bond or other pattern as specified or directed by Engineer-in-Charge.

Brick shall be laid on edge on 12 mm thick mortar bed of specified proportion, and each brick shall be set by gentle tapping with hand trowel or wooden mallet, its inside faces shall be buttered with mortar, before the next brick is laid and pressed against it. On completion of a portion of flooring, the vertical joints shall be fully filled from the top with mortar. The surface during laying, shall be frequently checked with a straight edge at least 2 m. long, so as to obtain a true plane surface with the required slope. Finished work shall be cure for 10 days. In case of dry brick flooring, no curing shall be done.

7.13.6 MEASUREMENT:

Length and breadth shall be measured as laid and area shall be calculated in sq. meter correct to two places of decimal. Rate shall include cost of all material and labor including application of cement slurry on sub-grade and cleaning of sub-grade.

7. CURING, POLISHING AND FINISHING

The day after the tiles is laid all joints shall be cleaned with wire brush to the depth of 5 mm and all dust and loose mortar removed. Joints shall then be grouted with gray or white cement, mixed with or without pigment to match the shade of the topping of the wearing layer of the tiles. Pigment shall conform to IS 459.

The floor shall then be Kept wet of minimum period of 7 days. The surface shall thereafter be ground evenly to the satisfaction of EIC with machine grinders in 3 phases with grade stones from coarse to fine grade. The surface shall receive wash of neat cement mixed with or without pigment and cured before very grinding operation.

STEEL WINDOWS, RAILING & METAL WORK

1. EXTENT AND INTENT

The Contractor shall furnish all materials, labour, operations, equipment, tools, plant and incidentals necessary and required for the completion of all metal work in connection with railing and window and other items of metal work as called for in the drawings. The supplying of additional fastenings, accessory, features and other items not mentioned specifically herein but which are necessary to make a complete installation shall be part of this contract.

2. GENERAL

All structural steel shall conform to M-19. All metal work shall be free from defects impairing strength, durability and appearance and shall be of the best commercial quality for purposes specified. Made with structural properties to withstand safely strains, tresses to which they shall be normally subjected.

3. SAMPLES

Samples of all typical metal work, such as windows glazing, flashing railing etc., shall be fabricated, assembled and erected or submitted to the EIC as directed by him, for his approval.

4. APPROVED MANUFACTURERS

All floors, windows, railings and other work shall be manufactured by an approved manufacturer / fabricator. The entire work shall be carried out by workmen skilled in this kind of work in a shop fully equipped to carry out all phases of fabrication in accordance with the best accepted practices.

5. FITTINGS

Hinges, locks, handles, stays and other fittings shall be provided as called for in the schedule of hardware / drawings.

6. FIXING

The Contractor shall fix windows, etc., in prepared openings. Steel window frames, wherever possible, shall be fixed in place before erecting partitions. Where this is not possible, prepared openings shall be left for hold-fasts. Breaking of partitions or walls for fixed to column / wall faces they shall be fixed with raw bolts / expansion bolts of approved make in approved manner.

The Contractor shall be responsible for assembling composites, bedding and pointing with mastic inside and outside at the mullions and transoms, fixing lugs to the frames, placing the windows in their respective openings and bedding with mastic. The Contractor shall be responsible for all builder's work including all cutting out and making good, forming fixing holes for inserting loose lugs, bolts and clips and for stacking of windows, adjacent to the opening for necessary hoisting. The Contractor shall be responsible for the windows being set straight, plumb and level and for their satisfactory operation after operation after the fixing is complete.

7. FABRICATION AND RAILING

Mild steel and other types of fabrication & railing called for on the drawings shall be executed by craftsmen specially trained in the trade in a shop fully equipped to carry out all phases of fabrication in accordance with the best accepted practices and as shown on the drawings. All work, as far as possible shall be shop fabricated and brought on site for erection. The railings shall be assembled square true to proper plan or curved to the radius shown on the drawings. Joining methods shall be flush type designed to produce an adequately strong for a particular application, and approved by the EIC.

Welding shall be executed from the non-exposed side, as far as possible and in

each case the welds shall be ground smooth and finished with a texture matching the parent metal. All welds shall be finished smooth and square.

8. PAINTING

Painting of Steel Work/Metal workMaterials

- Red-oxide – zinc chrome primer shall conform to IS:2074.
- Synthetic enamel paint shall conform to IS: 2932.
- Aluminum paint shall conform to IS:2339.

All the materials shall be of the best quality from an approved manufacturer. Contractor shall obtain prior approval of the LOCAL BODY for the brand of manufacture and the colour/shade. All the materials shall be brought to the site in sealed containers.

Workmanship

Painting work shall be carried out only on thoroughly dry surfaces. Painting shall be applied either by brushing or by spraying. Contractor shall procure the appropriate quality of paint for this purpose as recommended by the manufacturer. The workmanship shall generally conform to the requirement of IS:1477 (Part 2).

The type of paint, number of coats etc. shall be as specified in the respective items of work.

Primer and finish paint shall be compatible with each other to avoid cracking and wrinkling. Primer and finish paint shall be from the same manufacturer.

All the surfaces shall be thoroughly cleaned of oil, grease, dirt, rust and scale. The methods to be adopted using solvents, wire brushing, power tool cleaning etc., shall be as per IS:1477 (Part – I) and as indicated in the item of work.

It is essential to ensure that immediately after preparation of the surfaces, the first coat of red oxide-zinc chrome primer shall be applied by brushing and working it well to ensure a continuous film without holidays. After the first coat becomes hard dry, a second coat of primer shall be applied by brushing to obtain a film free from holidays.

After the second coat of primer is hard dry, the entire surface shall be wet rubbed cutting down to a smooth uniform surface. When the surface becomes

dry, the undercoat of synthetic enamel paint of optimum thickness shall be applied by brushing with minimum of brush marks. The coat shall be allowed to hard-dry. The under coat shall then be wet rubbed cutting down to a smooth finish, taking adequate care to ensure that at no place the undercoat is completely removed. The surface shall then be allowed to dry.

The first finishing coat of paint shall be applied by brushing and allowed too hard-dry. The gloss from the entire surface shall then be gently removed and the surface dusted off. The second finishing coat shall then be applied by brushing.

At least 24 hours shall elapse between the application of successive coats. Each coat shall vary slightly in shade and this shall be got approved by the LOCAL BODY.

Item No. 3 : Providing and fixing pre-cast Rubber Dye / steel Dye inter locking concrete block 60mm thick with grade of concrete M 300 pneumatic compressed / vibrated mechanically and as per approved design Confirming to IS 15658: 2006 including 35 mm Sand layer for levelling and filling the joint with sand in proper line and level as per guidelines of IRC: SP 63-2018 etc. Complete.

1.0 Description:

The work shall consist of constructing a floor consisting of sub base layers, rubber die glossy finish C.C. paver blocks of required shape, size colour & shade and precast C.C. kerb stones to proper line and level to the requirements of these specifications.

2.0 Materials:

2.1 Excavation for Precast Block and floor shall be carried out as per Item No.4.0.0 (a)Page No.21 of G.T.S. for Building Works.

2.3 Paving Blocks.

The paving Blocks shall be precast 65mm thick in M-25 C.C. of shape and size and colouras directed by Engineer in Charge. The paver blocks should be rubber die glossy finish machine cast in appropriate plant having facility for applying high pressure and controlled vibration. For normal paving work, the length of a paving block should ordinarily be not greater than twice the mean width; the thickness is a minimum 65mm; the maximum length generally not exceeding

280mm; the width generally in the range of 75 to 140mm with a maximum chamfer of 10mm (preferably chamfer should be in the range of 3- 5mm). The sides of the block should be perpendicular to the top and bottom faces except that the top edge may be chamfered. The blocks should have the following dimensional tolerances:

Plan dimensions ± 2 mm Thickness ± 3 mm.

The Cement used shall be any one of the following:

- (a) 43 grade ordinary Portland cement conforming to IS 269
- (b) 53 grade ordinary Portland cement conforming to IS 8112.

Coarse aggregates shall comply with the requirements of IS 383. As far as possible crushed /semi crushed aggregates shall be used. For ensuring adequate durability, the aggregate used for production of blocks shall be sound and free of soft or honeycombed particles. The nominal maximum size of coarse aggregate used in production of paver blocks shall be 12 mm.

Fine aggregates shall conform to the requirements of IS 383. Both River/quarry sand and stone dust meeting the requirements can be used.

Pigments: Synthetic or natural pigments may be used in concrete mix to obtain paver blocks with desired shades of colors. The pigment used should result in durable colors of paver blocks. It shall not contain matters detrimental to concrete. Pigments, either singly or in combination, conforming to the following I.S may preferably be used.

- | | |
|-----------------------------------|-----------|
| (a) Black or Red or Brown pigment | IS: 44 |
| (b) Green pigment | IS: 54 |
| (c) Blue pigment | IS: 55/56 |
| (d) White pigment | IS: 411 |
| (e) Yellow pigment | IS: 50 |

The pigment should be finer than the cement. The pigment shall not contain zinc compounds or organic dyes.

The rubber die glossy finish paver blocks shall be of M-25 grade having compressive strength at 28 days of 25N/mm² and necessary testing shall be carried out to maintain the required compressive strength.

To ensure durability, the average water absorption in a block should not exceed 5%. In situations, where parts of blocks are to be used e.g. around manholes, the block should be purpose cut at site.

2.4 Bedding Sand /stone dust

The Bedding sand/stone dust should be free of deleterious materials. The thickness of the bedding layer should be as shown in the drawing and should be of uniform thickness. The grading of the bedding sand should be as under:

IS Sieve Size	Percent Passing
9.52 mm	100
4.75 mm	95-100
2.36 mm	80-100
1.18 mm	50-95
600 microns	25-60
300 microns	10-30
150 microns	0-15
75 microns	0-10

2.5 Joint Filling Sand

The gaps in between two paving blocks (not more than 3mm) shall be filled relatively finer than the bedding sand. The joint filling sand should be as dry as possible. The gradation for the joint filling sand is as under.

IS Sieve Size	Percent Passing
2.36 mm	100
1.18 mm	90-100
600 microns	60-90
300 microns	30-60
150 microns	15-30
75 microns	0-10

3.0 Construction

3.1 General

The construction of block pavement involves preparation of sub-grade, sub base and base course layers, bedding sand and finally the laying of blocks.

3.2 Preparation of Sub grade

This is the foundation layer on which the block pavement is constructed. The water table should be at a minimum depth of 600mm below the sub-grade should be compacted in layers of 150- or 100-mm thickness as per IRC: 36-1970. The prepared sub grade should be graded and trimmed to a tolerance of ± 20 mm of the design levels, and its surface evenness should have a tolerance of within 15 mm under a 3 m straight edge.

3.3 Base and Sub base Course

Base and Sub base courses are constructed in accordance with standard procedure contained in the relevant IRC specifications like IRC: 37-2001. The material shall be evenly laid in required thickness as specified in drawing and shall be watered, and consolidated to provide proper level and grade.

3.4 Placing and Screening of Bedding Sand

The thickness of the sand bed after compaction should not be more than 50 mm. Bedding sand should not be used to fill up local depressions on the surface of a base or sub base. The depressions should be repaired in advance before placing sand. Sand to be used should have uniform moisture content of 6 to 8%.

The processed sand is spread with the help of screed boards to the required thickness.

The Screed boards are provided with nails at 2-3m apart which when dragged gives the desired thickness. The sand is subsequently compacted with plate vibrators weighing 0.6 tons or more. Level checks shall be carried out on a grid pattern to establish that the desired level is achieved. Local correction can be done either by removing or adding extra sand followed by leveling and compacting the layer.

3.5 Laying of Blocks

Blocks should be laid commencing from the edge strip and proceed towards the inner side. The blocks can be placed to different bonds or patterns as directed by Engineer in Charge. With the help of gauges, the joint width specification (2 to 4mm) should be checked in the first few square meters, where it should be

ensured that the block alignment is correct. To start with, full blocks should be used; only subsequently, cutting and in filling at edges be permitted. Under no Circumstances should the blocks be forced or hammered into the bedding at this stage of lying. For cutting paving blocks, hydraulic or mechanical block cutters, or power saws are used. Cut units less than 50mm minimum dimension should not be used. Where space does not permit use of a larger segment, use premixed concrete or sand – cement mortar instead. The blocks shall be laid in line and level and to required camber.

3.6 Compaction

For compaction of the bedding sand and the blocks laid over it, vibratory plate compactors are used over the laid paving units; at least two passes of the vibratory plate compactor are needed. Such vibratory compaction should be continued till the top of each paving blocks is level with its adjacent blocks.

3.7 Joints filling

The joints should be completely filled with dry sand. The operation of joint filling comprises of spreading a thin layer of the joint filling sand on the block surface and working the sand into each joint by brooming. Following this, passes of heavy plate compactor are applied to facilitate fine sand to fill the joints. The sand should be broomed or spread over the surface with a small surcharge.

3.8 Opening for use

Until all the joints are completely filled, no usage should be permitted over the blockpavement. The block pavement should be inspected frequently, to ensure that any

incompletely filled joints, exposed by usage and/or weather are promptly filled. Such frequent inspection should be continued till dust and detritus from the roadway tightens the surface of the joints.

3.9 Arrangement for traffic

The Contractor shall at all times carry out work on the site in a manner creating least interference to the flow traffic and pedestrians, while consistent with the satisfactory execution of the work.

4.0 Measurements for payments:

The work of footpath shall be measured as finished work in position in square meters and the rate shall include leveling and preparation of sub-grade,

procuring, spreading and compacting of sub base and base material, supplying and fixing of precast paver blocks in required shape and pattern and filling the joints with sand and compacting using all tools, equipment's materials and labour. Payment for B.B.C.C & sand bedding shall be paid include under corresponding item of tender however filling the joints with sand shall not be paid separately but it is included in the payment of current item.

Rate shall be for a unit of one square meter.

Item No. 17 : Finishing wall with weather proof exterior emulsion paint on wall surface (Two coats) to give an required shape even shade after thoroughly brushing the surface to remove all dirt, and remains of loose powdered materials etc. complete

Item No. 18 : Applying Two coats of Birla or Asian Acrylic Lappy (putty) and two coats of primer of approved brand and manufacture on new wall surface to give an even shade including thoroughly brushing the surface free from mortar dropping and other foreign matter and sand papered smooth.

Item No. 19 : Wall painting (two coats) with plastic emulsion paint of approved brand and manufacture on undecorated wall surface to give an even shade including thoroughly brushing the surface free from mortar dropping and other foreign matter and sand papered smooth

Item No. 20 : Painting two coats (including priming coat) on new steel and other metal surface with enamel paint, brushing, interior to give an even shade including cleaning the surface an even shade including cleaning the surface of all dirt, dust and other foreign matter.

COLOR WORK

1. EXTENT AND INTENT

The Contractor shall supply all materials, labour, tools, ladders, scaffolding and other equipment necessary for the completion and protection of all painting / finishing work. Painting & finishing, as herein specified shall be applied to all surfaces requiring painting / finishing throughout the interior and exterior of the buildings as given in the schedule of finishes or elsewhere. The painting / finishing shall be carried out by a specialist sub- Contractor, approved by the

EIC.

2. STORAGE

Storage of materials to be used on the job shall be, only in a single place approved by the EIC. Such storage place shall not be located within any of the buildings included in the contract.

3. MATERIALS

Materials used in the work shall be of manufacture approved by the EIC, Ready mixed paints, varnishes, enamels, lacquers, stains, paste fillers, distempers and other materials must be delivered to the job site in the original containers, with the seals unbroken and labels intact. Each container shall give the manufacturer's name, type of paint, color of paint and instructions of reducing. Thinning shall be done only in accordance with directions & manufacturer's specification. Remove rejected materials immediately from the premises.

4. SHADES

All shades, as provided in the shade schedule, shall be approved by the EIC. The Contractor shall as far as possible use pre-mixed manufacturer's shades and shall prepare sample of the shades selected and submit same for approval by the EIC. No work is to proceed until the EIC has given his approval, preferably in writing, of the shade samples.

5. COMMENCEMENT OF WORK

Painting / finishing shall not be started until the surfaces to be painted / finished are in a condition fit to receive painting / finishing and so certified by the EIC.

Painting / finishing work shall be taken in hand only after all other civil work is completed. Buildings where painting / finishing work is to commenced shall be thoroughly swept and cleaned up before commencement of painting / finishing.

6. SCAFFOLDING

Only double scaffolding having two sets of vertical supports shall be provided for all, painting / finishing work. The supports shall be tied together with horizontal pieces over which the scaffolding planks shall be fixed. All the vertical and horizontal members of the scaffolding shall be placed sufficiently away from the surfaces to be painted to ensure proper and uniform application.

7. WORKMANSHIP

The workmanship shall be of the very best; all materials evenly spread and smoothly flowed as without running sags, using good quality tools, brushes, etc., as required. Only skilled painters / applicators shall be employed. A properly qualified foreman shall be constantly on the job whilst the work is proceeding. All surfaces to be painted / finished shall be cleaned free of all loose dirt and dust before painting / finishing is started. All work where a coat of material has been applied must be inspected and approved before application of the succeeding specified coat. Each undercoat shall be distinct shade of the approved color.

Before painting / finishing, remove hardware, accessories, plates and similar items or provide protection to all such items. Upon completion of each space, replace all fixtures removed. Remove doors if necessary to paint bottom edge. Use only skilled mechanics for the removal and replacement of above items.

8. CONCEALED SURFACES

All interior and exterior trim, door frames, doors, shelving, cabinet work shall be thoroughly and carefully back painted as all surfaces and edges which will be concealed when installed. Such surfaces shall be clean, dry, sanded and properly prepared to receive the paint. Tops, bottom and edges of doors shall be finished same as the rest of the door.

9. PROTECT AND CLEAN

The agency shall protect not only his own work at all times, but shall also protect all adjacent work and materials by suitable covering during progress of his work. Upon completion of his work, he shall remove all paint and varnish spots from floors, glass and other surfaces. Any defaced surfaces shall be cleaned and the original finish restored. He shall remove from the premises all rubbish and accumulated material and shall leave the work in clean, orderly and acceptable conditions.

10. PREPARATION OF SURFACES

PLASTER WORK: Fill all holes, cracks and abrasions with plaster of paris / cement slurry as directed, properly prepared and applied and smoothed off to match adjoining surfaces. Do not use sand paper on plaster surfaces. Plaster shall be allowed to dry for at least 12 (twelve) weeks before the application of paint / finishes.

STEEL AND IRON: All surfaces shall be washed with mineral spirits to remove any dirt or grease before applying paint. Where rust or scale is present, it shall be wire brushed and sand papered clean. All cleaned surfaces shall be given one coat of approved phosphate before prime coat in accordance with the manufacturers, Instructions. Shop coats of paint that have become marred shall be cleaned off, wire brushed, and spot primed over the affected areas.

11. APPLICATION

The paint shall be continuously stirred in the container so that its consistency is kept uniform throughout. The painting / finishing shall be laid on evenly and smoothly by means of crossing and laying off, the latter in the direction of the grain of the wood. The crossing and laying off consists of covering the area with paint, brushing the surface hard for the first time and then brushing alternatively in opposite directions, two or three times and then finally brushing lightly in a direction at right angles to the same. In this process no brush marks shall be left after the laying off is finished. The full process of crossing and laying off will constitute one coat.

Where so stipulated, the painting / finishing shall be carried out using spray machines suited for the nature and location of the work to be carried out. Only skilled and experienced workmen shall be employed for this class of work. Paints used shall be brought to the requisite consistency by adding a suitable thinner. Spraying shall be carried out only in dry conditions. No exterior painting / finishing shall be done in damp foggy or rainy weather. Surface to be painted shall be clean, dry, smooth and adequately protected from dampness. Each coat shall be applied in sufficient quantity to obtain complete coverage, shall be well brushed and evenly worked out over the entire surface and into all corners, angles and crevices allowed to thoroughly dry. Second coat shall be of suitable shade to match final color, and shall be approved by the EIC before final coat is started. Allow at least 48 hours drying time between coats for interior and 7 days for exterior work, and if in the judgment of the EIC more time is requested it shall be allowed. Finished surfaces shall be protected from dampness and dust until completely dry. Finished work shall be uniform of approved color, smooth and free from runs, sags, defective brushing and clogging. Make edges of paints adjoining materials of colors sharp and clean, without overlapping.

In order to achieve a superior finished surface, putty paste fillers shall be used on, all surfaces to be painted. To fill pores, dents, etc. The putty / paste fillers shall be approved quality and manufacture and shall be applied to the surface

with a knife or other sharp-edged tools after the priming coat as well as after each undercoat. The surface, after filling with putty / paste tiller, shall be rubbed down with fine sand paper and dusted off before the application of the subsequent coat.

Paste wood filler when set shall be wiped across the grains of the wood and then with the grain to secure a clean surface. Surface to be stained shall be covered with uniform coat of stain wiped off if required.

FINISH: The painted surfaces shall be finished to require texture. Matt finish shall be achieved by use of sponge rollers or stippling brushes as called for.

12. TYPES OF PAINT FINISHES

12.1 ENAMEL PAINTS:

Non-Galvanized Steel Surfaces: Coat of red oxide primer after phosphate followed by the three or more coats of synthetic enamel paint. Paste filler to be applied after every coat excepting final finishing coat and sanded.

12.2 WHITE WASHING

White Washing with lime on decorated wall surfaces (two coats) to have given an even shade including thoroughly booming the surface to remove all dirt, dust, mortar drops and other foreign matter.

12.3 MATERIALS:

The clear collie shall be made from glue and boiling water by Mixing 1 Kg. Mixture shall be suitably tinted where required for use under colored distemper if directed. Glue shall conform to I.S. 852-1969 (Specifications for animal glue). 1.2 Lime used shall be freshly burnt glass 'C' Lime (fat lime) and white in color conforming to I.S. 712-1973. Best quality of gum shall be used in the preparation of white wash. Ultramarine blue or Indigo: This shall conform to I.S. 55-1970 for points, and shall be used for preparation of white wash, Pigments: Mineral colors, not affected by lime shall be used in preparing color wash.

12.4 WORKMANSHIP:

Preparation of white wash solution:

Surface already white or color. The fat lime shall be slaked at site and shall be

mixed and stirred with about five liters of water for 1 Kg. Have unslaked lime to make a thin cream. This shall be allowed to stand for a period of 24 hours and then shall be screened through a clean coarse cloth, 4 Kg. of gum dissolved in hot water shall be added to each cubic meter of lime cream. Small quantity of ultramarine burnt *Up to 3 gms. Per Kg. Of lime) shall also be added to the last two coats of white wash solution and the whole solution shall be stirred thoroughly before use.

12.5 PREPARATION OF SURFACE:

The surface shall be thoroughly cleaned of all dust, dirt, mortar cropping and other foreign matter before white wash is to be applied.

The surface spoiled by smoke soot shall be scrapped with steel wire brushes or steel scrapers or shall be rubbed with over burnt surkhi or brickbats. The surface shall be then boomed to remove all dust, dirt and shall be washed with clean water.

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

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

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

12.6 SCAFFOLDING:

Wherever scaffolding is necessary it shall be erected in such a way that as far as possible on part of scaffolding shall rest against the surface to be white or color washed. A properly secured strong and well-tied suspended platform (Zoola) may be used for white washing. Where ladders are used, pieces of old gunny bags shall be tied at top and bottom to prevent scratches to the floors and walls. For white washing of ceilings proper stage scaffolding shall be reacted where necessary.

APPLICATION OF WHITE WASH:

On the surface so prepared the white wash shall be applied with "Moon" brush.

The first stroke of the brush shall be from top-down wards, another from bottom upwards over the first stroke and similarly one stroke from the right another from the left, over the first stroke brush before it dries. This will form one coat. Each coat shall be allowed to dry before next coat is applied. Number of coats as specified in item shall be applied. It shall present smooth and uniform finish free from brush marks and it should not come off easily when rubbed with finger.

Splashing and dropping if any on the doors and windows, ventilators etc. shall be removed and the surface cleaned.

Priming and Alkali resistant treatments, scraping of surface washing etc. surface spoiled by smoke soot removed of oil and grist spouts treatment for infection with efflorescence moulds moss, fungi algae and lichens and patch repairs to plaster wherever done shall not be paid extra.

12.7 WATER PROOF CEMENT PAINT

Water proof cement paint shall be of approved brand (like Snowcem etc.) and manufacture and of required shade, enlisted by the Consultant / Engineer-in-charge.

PREPARATION OF SURFACE:

For new work, the surface shall be thoroughly cleaned of all mortar dropping, dirt, grease and other foreign matter by rushing and washing. The surface shall be wetted by a sprinkling of water or water with fine spray. The surface shall be sprayed several times with a few minutes' intervals between each spraying to allow moisture to soak into the surface.

PREPARATION OF MIX:

Waterproof cement paint shall be mixed in such quantities as can be used up within an hour of its mixing as otherwise the mixture will set and thicken, affecting flow and finish. Waterproof cement paint shall be mixed with water in two stages. The first stage shall comprise of two parts of water stirred thoroughly and allowed to stand for five minutes, care shall be taken to add the water proof cement paint gradually to the water and not vice- e-versa. The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain a liquid of workable and in uniform consistency. In all cases the manufacturer's instructions shall be followed meticulously.

The lids of cement paint drums shall be kept tightly closed when not in use, as by exposure to atmosphere the cement paint rapidly becomes air set due to its hygroscopic qualities.

APPLICATION:

The solution shall be applied on the clean and wetted surface with hairbrushes or spraying machine. The solution shall be kept well stirred during the period of application. It shall be applied on the surface, which is under shadow of the building so that the direct heat of the sun on the surface is avoided. The method of application of waterproof cement paint shall be similarity to oil bound distemper. The completed surface shall be watered after the days work. After the first coat of paints has hardened, it shall be wetted again before the application of second coat, at least 24 hours should elapse between the two coats. The watering should be done at least for seven days till the paint gets required strength. For new work, the surface shall be treated with three or more coats of waterproof cement paint as found necessary to get a uniform shade.

Item No.04 : Providing and filling in foundation with ordinary Cement concrete M-100 mix and providing necessary vertical pin headers including formwork, vibrating, ramming and curing complete.

Item No. 05 : Providing and casting in situ controlled cement concrete M-250 for R.C.C. work in superstructure including centering, shuttering scaffolding, ramming, vibrating curing and finishing complete.

CONCRETE WORK (PLAIN & REINFORCED)

1. EXTENT AND INTENT

The Contractor shall provide all labour, materials, operations, equipment and incidentals necessary and required for the completion of all concrete work called for.

2. GENERAL

It is the intent of this specification to ensure that all concrete placed at various locations on the job should be durable and strong. It should wear well and be practically impervious to water. It should be free from such defects as shrinkage, cracking, honeycombing, all plain and reinforced concrete shall conform in all

respects to Indian standard 456-2000.

3. MATERIALS

Cement: Ordinary Portland Cement of 53 Grade conforming to IS: 12269-1976 shall be used. Cement shall have uniform color. Cement shall be fresh when delivered at site. Consignment shall be used in order of delivery. Admixtures (such as accelerators, retarders, waterproofing compounds, etc.,) shall be as far as possible avoided, where its use is considered unavoidable it may be used only if approved by the EIC and subject to IS: 456-2000.

Water: Water used for mixing concrete shall be in accordance with clause 4/3 of IS: 456- 2000. The Contractor shall produce Test Results for the mixing of water used on the job, when requested by the EIC.

Aggregates: Aggregates (fine and coarse) should be had and should not contain materials that are likely to decompose or change in volume when exposed to water or to affect the reinforcement. All aggregates shall be clean and free from organic impurities. The aggregates shall be free from coatings or dust and clay. Coarse aggregate shall be machine crushed hard stone and fine aggregate shall be coarse river or pit sand, and both obtained from approved source. Aggregates shall be screened and washed by mechanically operated equipment, if the deleterious materials content exceeds 5 percent by volume. All aggregates used shall conform to IS: 383-1979. If the aggregates are wet, due allowance shall be made for bulking in accordance with IS: 2386-1963 (Part III)

Unless otherwise specified, the size of coarse aggregates shall conform to clause 4.2 of IS: 456-2000.

All aggregates shall be suitably graded from the maximum certified gauge to the minimum. The Contractor shall submit a sieve analysis of the aggregates to be used on the works and maintain a regular record of sieve analysis during the currency of the work. The grading of the aggregates will be determined from these sieve analyses to produce maximum density of concrete. All expenses of sieve analysis, mix design and trial mix shall be borne by the Contractor.

4. STORAGE

Cement shall be stored in accordance with clause 5.1 of IS: 269V1967. Any cement, which has become wet, show any sign of caking, or deterioration, of contamination of any kind shall not be used, and shall be immediately removed from the site. Fine and coarse aggregates shall be stored in separate open bins

scoring to sizes. The bins shall have brick wall of adequate thickness and floor paved with flat bricks.

5. BATCHING

In the case of ordinary concrete, aggregates shall be measured by volume, cement by weight (density of cement assumed to be 1.44 kg/liter. (A. 50-kg bag of cement contains 35 liters). Mixing water shall be measured in graduated liter cans.

6. MIX PROPORTIONS

All concrete not specifically designated as controlled concrete shall be treated as ordinary concrete of nominal mix as specified. Where nominal concrete mixes are described as 1:11 / 2:3, 1:2:4, 1:3:6, 1:4:8, etc., the figures denote the relative properties of cement, dry sand and graded stone aggregate respectively. For example, concrete of nominal mix 1:2:4 shall mean a mix of 1 part cement, 2 parts of washed dry coarse sand and 4 parts crushed graded stone aggregate, the proportion being volumetric.

The cement shall be measured by weight, and aggregates shall be measured in properly constructed gauge boxes. If sand is wet, necessary allowance shall be made for bulking. The size of aggregates shall be 20 mm and downgraded suitably to achieve dense concrete.

All aggregates and cement shall be measured by weights in approved high-batching equipment and water shall be measured in graduated, liter cans.

Grade of Concrete	Minimum Compressive Strength Preliminary (Trial) Cubes	of 15 cm Cubes at 28 days Test Work Test Cubes
M 150	200 kg/cm ²	150 kg/cm ²
M 200	260 kg/cm ²	200 kg/cm ²
M 250	320 kg/cm ²	250 kg/cm ²
M 300	380 kg/cm ²	300 kg/cm ²
M 350	440 kg/cm ²	350 kg/cm ²

7. WATER-CEMENT RATIO

The water-cement ratio shall be carefully controlled throughout the work. This

calls for a regular check on the equipment used for measuring water. Only guaranteed liter-cans shall be used for this purpose.

In the case of 'ordinary' concrete, the maximum value of water-cement ration shall be 0.50 and in the case of 'controlled' the water-cement ration as determined by the mix design shall be strictly adhered to. While determining the amount of mixing water, moisture content of aggregates shall be taken into account. Additional water if water, moisture content of aggregates shall be taken into account. Additional water if used to improve to workability shall be accompanied by an equal volume of cement. In any case, such additional use of water shall be subject to approval of the EIC.

8. MIXING

All concrete, whether plain or reinforced, ordinary or controlled, shall be mixed in a standard type box mixer, having minimum drum speed of 60 peripheral meters per minute. The cement and aggregates shall be first mixed dry until all articles of aggregate are coated with cement. Mixing water shall be added and mixing continued for at least two to twelve minutes to form concrete of a uniform color and consistency.

9. TRANSPORTATION

Concrete shall be placed in its final position within 20 minutes of mixing. The Contractor shall arrange his mixer position and a method of transportation to ensure that this period is not exceeded under any circumstance. Transportation should be smooth and free from jolting, so that there is no segregation or loss of any of the ingredients.

10. PLACING CONCRETE

The forms shall be well wetted before placing concrete. Concrete should not be dropped from a height greater than 1 meter. Properly constructed chute shall be used in such cases where it is necessary to exceed this height. Concrete must be thoroughly worked into the forms so that they are entirely filled; reinforcing bars adequately and tightly surrounded and entrained air released from the mass of concrete. Placing shall be carried out by hand punning as well as vibrators in the manner directed by EIC. Concrete should not be moved any considerable distance in the molds, being consolidated as nearly as possible in the place where it is dumped. The full depth of any lift shall be replaced at one pouring. In casting beams or other deep sections, concrete shall not be placed

in layers.

11. CONSOLIDATION

All plain and reinforced concrete shall be consolidated by means of mechanical vibration. Adequate number of vibrators shall be used to ensure full compaction of concrete in about 10 minutes of placing. If immersion vibrators are used, these shall be inserted at places not exceeding half meter apart until it is immersed to the full depth of concrete. Wherever possible shutter vibrators shall be used and the Contractor shall design his shuttering so that this can withstand form vibration. Care shall be taken to ensure that concrete is not over-vibrated to avoid segregation. In addition to mechanical vibration, sufficient hand tools must be used to ensure full consolidation around reinforcement and at all edges and corners.

12. TESTING

Testing of Cube: Specimens of the concrete used in the work shall be taken at intervals for crushing strength and density measurements. Test cubes shall be made and tested strictly in accordance with IS: 456-2000 and IS: 516-1964. Three to six cubes should be made for each sampling, subject to minimum requirements specified in Table V of IS: 456-2000. However, cubes shall be taken for all important structural members as directed by the EIC regardless of the quantity of concrete involved in such members of volume of concrete laid on any particular day. They should be taken out of the moulds 24 hours after casting and stored in a moist condition until the time of test. The Contractor shall carry out the tests as described above under the direction of EIC and all expenses of cubes, testing and other incidentals shall be borne by the Contractor.

All concrete the test results of which fall below the "Acceptance Criteria for Concrete" listed under table V of IS: 456-2000 shall be classified as substandard concrete. All such substandard concrete shall be removed and replaced with concrete of specified strength at the Contractor's own cost and risk.

13. INSERTS

The Contractor shall fix all necessary inserts such as steel plates, pipe sleeves, bolts, etc., and make provision for holes, pockets, dowels, etc., in the shuttering of concrete work, to enable subsequent fixing of supports, brackets, ceilings, pro-cast members, etc., as indicated on the drawing or as required by EIC.

14. CURING OF CONCRETE

All exposed faces of concrete shall be covered with Hessian, sand or similar material, which shall be kept continuously, wet for a period of at least 15 days after costing. Horizontal surfaces shall be cured with the help of cement mortar bunds filled with water. After removal of Hessian or sand all concrete surface shall be kept well wetted by applying water at intervals for a further period of at least three weeks.

15. REINFORCEMENT

Steel Reinforcement shall be either mild steel quality conforming to Grade I of IS: 432- 1966 or High yield Strength Deformed Bars with a guaranteed minimum yield strength of 4250 kg or 5000 kg per m² as called for on the drawings, conforming to IS: 1786-1966 or IS: 1139-1966. Fabric reinforcement where called for in topping slab or precise concrete units shall be of hard drawn mild steel mesh conforming to IS: 1566-1967. The make of the reinforcement will be from the. Manufacturers listed herewith (1) Malhotra, (2) TATA, (3) Sirhind, (4) SAIL, (5) Vizag. Bars shall be free from mill scale, loose rust, oil or paint. The reinforcement bar-ending schedule shall be prepared by the Contractor and submitted to the Structural Designer for his scrutiny and his concurrence obtained before commencing minimum cover as shown on structural drawings. Steel shall be rigidly held in place with the help of 18-gauge annealed steel wire. Cement mortar (1:2) cover blocks of required shape, MS chairs and spacers bars shall be used in order to ensure accurate positioning of reinforcement. All joints in mild steel reinforcement upto and including 16- mm diameter shall be overlapped. The lengths of overlap for tension and compression joints shall be as indicated on structural drawings. Joints in mild steel reinforcement above 16-mm diameter may be welded if permitted by the EIC in writing.

16. COVER TO REINFORCEMENT

Care shall be taken to maintain the correct cover to reinforcement. Unless otherwise specified on the drawings, the following minimum cover (exclusive of rendering or other decorative finish) shall be provided in all reinforce concrete work.

- a. At each end of a reinforcing bar not less than 25 mm nor less than twice the diameter of bar.
- b. For longitudinal reinforcing bar in a beam neither less than 25 mm nor less

than the diameter of bar.

- c. For longitudinal reinforcing bar in a column not less than 40 mm in the case of columns less than 250 mm thick, minimum cover shall be 25 mm.
- d. For tensile, compressive shear reinforcement in a slab not less than 13 mm nor less than the diameter of bar.
- e. For Vertical or horizontal reinforcement in concrete walls not less than 25 mm nor less than diameters of bar.
- f. For main or subsidiary reinforcement in concrete footings and pile caps not less than 50 mm.
- g. The minimum cover for any reinforcement steel including stirrups and ties wire shall not be less than 13 mm under any circumstances.

For concrete members exposed to the atmospheric action or harmful chemicals (as in the case of concrete in contact with earth faces with such chemicals), acid vapor, saline atmosphere, sulfurous smoke, etc., covers given above shall be increased by 15 mm to 40 mm as directed by EIC. For concrete members of water retaining structures, covers for reinforcement shall be as stipulated in IS: 3370-(part II) - 1965.

17. FORMWORK

Formwork shall be rightly constructed of minimum 40 mm thick wrought, timer planking or steel plates or plywood. Timber used for shuttering shall be free from loose knots. Shuttering faces in contact with concrete shall be free from adhering grout, Projecting nails, splits or other defects that may mar the concrete surface. The shuttering shall be erected on battens, beams and steel props properly cross braced so as to make the form work rigid. Formwork shall be erected to line and levels and to the shapes required in the work and shall carry, without deformation, the full weight of wet concrete and other live loads. It should also withstand the effect of vibration without deflection, bulging, distortion or loosening of its component parts. The Contractor shall be responsible for sufficiency and adequacy of all formwork, centering and moulds.

Details of centering and formwork shall be subject to approval of the EIC. The completed formwork shall also be subject to approval by the EIC before placement of reinforcement. The formwork shall be designed so that the soffits of slabs and the sides of beams may be removed first leaving the formwork to the soffits of beams and their supports in position. Wedges shall be, so provided as to allow accurate adjustment of form works and its easy removal.

All joints shall be sufficiently tight to prevent leakage of grout. Chamfer fillets shall be provided at all corners wherever called for on the drawings. Clean-out holes shall be provided at the bottom of all column and pier formwork and care shall be taken to remove any rubbish, wood shavings or any other foreign materials before concreting. Temporary supports shall be provided as required and / or ordered by EIC.

Form work for water tanks, basements and other locations and facias, parapets and other similar vertical members shall be held tightly by means of firm ties of suitable length. The ties shall be approved design and type and have a minimum strength of 1500 kg. The ties shall be free of lugs, cones, washes, etc., which level a hole larger than 20 mm diameter or depressions back of exposed surface of concrete.

18. SURFACE TREATMENT OF SHUTTERING

The Surface of shuttering exposed to concrete shall be coated with shuttering oil of approved manufacture. Shuttering oil shall be applied before placing reinforcement. The shuttering shall be thoroughly cleaned and oiled before each use.

19. REMOVAL OF FORMWORK

All form shall be kept in position until expiry of a minimum Period after concreting as specified below:-

- | | |
|---|---------|
| i. Forms supporting sides of beams, walls and columns | 2 days |
| ii. Bottom of slab up to 4.50m span | 7 days |
| iii. Bottom of slabs above 4.50m span | 14 days |
| iv. Bottom of beam up to 6.00m span | 14 days |
| v. Bottom of beam above 6.00m span | 21 days |

20. SURFACE FINISH OF CONCRETE

All formwork, centering and shuttering used for unexposed concrete work shall be rigid and straight, so as to produce all concrete members true to line level and plumb within a tolerance of + 3 mm. Only cement mortar rendering of maximum thickness 6 mm may be permitted as finishing to concrete surfaces except where terrazzo, ceramic tile or other finish are specified. All concrete surfaces scheduled to receive either plaster or similar finish shall be chipped as

required if so directed by the EIC. Shuttering, centering and formwork to be used for all exposed concrete work (like exposed columns, beams, ribs, slabs chhajjas, facias, etc.) shall be of such finish and rigidity as to produce all faces fair and smooth true to line, level and plumb. No. rendering or touching up shall be permitted on these faces.

21. DEFECTS IN CONCRETE

Immediately on removal of formwork, the Contractor shall examine the surface of concrete, and any honeycombs or other defects shall be brought to the notice of the EIC. The acceptability or otherwise of such defective concrete shall be at the sole discretion of the EIC who may direct the Contractor to repair the defective work or ask for demolition and replacement of such defective work at the risk, and cost of the Contractor.

22. PROTECTION OF CONCRETE

All concrete shall be protected from damage by workers, equipment, overload or any other cause for a minimum period of 20 days from the date of casting.

All edges corners and projections of concrete members likely to be damaged shall be protected by means of wooden cover fillets.

23. ENGINEER

It is essential that the engineer who is in charge of the construction of all concrete work, whether plain or reinforced shall be well experienced in this class of work and shall work in relation to the permanent bench marks established at the site.

APPLICABLE CODES

C O N C R E T E

MATERIALS

- IS.269 Specification for 33 grade ordinary Portland cement. IS.455 Specification for Portland slag cement.
- IS.1489 Specification for Portland-Pozzolana cement (Part 1&2). IS: 8112 Specification for 43 grade ordinary Portland cement.
- IS: 12269 Specification for 53 grade ordinary Portland cement. IS: 12330 Specification for sulphate resisting Portland cement.
- IS: 383 Specification for coarse and fine aggregates from natural sources for concrete.
- IS: 432 Specification for mild steel and medium (tensile steel bars and hard-drawn steel)wires for concrete reinforcement. (Part 1&2)
- IS: 1786 Specification for high strength deformed steel bars and wires for concretereinforcement.
- IS: 1566 Specification for hard-drawn steel wire fabric for concrete reinforcement.
- IS: 9103 Specification for admixtures for concrete.
- IS: 2645 Specification for integral cement water- proofing compounds
- IS: 4990 Specification for plywood for concrete shuttering work.

MATERIAL TESTING

- IS.4031 Methods of physical tests for hydraulic cement (Parts 1 to 15)
- IS: 4032 Method chemical analysis of hydraulic cement.
- IS: 650 Specification for standard sand for testing of cement.
- IS: 2430 Methods for sampling of aggregates for concrete.
- IS.2386 Methods of test for aggregates for concrete (Parts 1to 8)
- IS: 3025 Methods of sampling and test (physical and chemical) for water used in industry.
- IS: 6925 Methods of test for determination of water-soluble chlorides in concrete admixtures.

MATERIAL STORAGE

IS: 4082 Recommendations on stacking and storing of construction materials at site.

CONCRETE MIX DESIGN

IS: 10262 Recommended guidelines for concrete mix design.

SP: 23 (S&T) Handbook on Concrete Mixes

CONCRETE TESTING

IS.1199 Method of sampling and analysis of concrete.

IS: 516 Method of test for strength of concrete.

IS: 9013 Method of making, curing and determining compressive Strength of accelerated cured concrete test specimens.

IS: 8142 Method of test for determining setting time of concrete by penetration resistance.

IS: 9284 Method of test for abrasion resistance of concrete.

IS: 2770 Methods of testing bond in reinforced concrete.

EQUIPMENT'S

IS: 1791 Specification for batch type concrete mixers.

IS: 2438 Specification for roller pan mixer.

IS: 4925 Specification for concrete batching and mixing plant.

IS: 5892 Specification for concrete transit mixer and agitator.

IS: 7242 Specification for concrete spreaders.

IS: 2505 General Requirements for concrete vibrators: Immersion type.

IS: 2506 General Requirements for screed board concrete vibrators.

IS: 2514 Specification for concrete vibrating tables.

IS: 3366 Specification for pan vibrators.

IS: 4656 Specification for form vibrators for concrete.

IS: 11993 Code of practice for use of screed board concrete vibrators.

IS: 7251 Specification for concrete finishers.

IS: 2722 Specification for portable swing weighs batchers for concrete (single and double bucket type).

IS: 2750 Specification for steel scaffoldings.

CODES OF PRACTICE

IS: 456 Code of practice for plain and reinforced concrete.

IS: 457 Code of practice for general construction of plain and reinforced concrete for dams and other massive structures.

IS: 3370 Code of practice for concrete structures for storage of liquids (Parts 1 to 4)

IS: 3935 Code of practice for composite construction.

IS: 2204 Code of practice for construction of reinforced concrete shell roof.

IS: 2210 Criteria for the design of reinforced concrete shell structures and folded plates.

IS: 2502 Code of practice for bending and fixing of bars for concrete reinforcement.

IS: 5525 Recommendation for detailing of reinforcement in reinforced concrete works.

IS: 2751 Code of practice for welding of mild steel plain and deformed bars used for reinforced concrete construction.

IS: 9417 Specification for welding cold worked bars for reinforced concrete construction.

IS: 3558 Code of practice for use of immersion vibrators for consolidating concrete.

IS: 3414 Code of practice for design and installation of joints in buildings.

IS: 4326 Code of practice for earthquake resistant design and construction of building.

IS: 4014 Code of practice for steel tubular scaffolding (Parts 1 & 2)

IS: 2571 Code of practice for laying inset cement concrete flooring.

IS: 7861 Code of practice for extreme weather concreting: Part 1

Recommended practice for hot weather concreting.

Construction Safety

IS.3696 Safety code for scaffolds and ladders. (Parts 1)

IS: 7969 Safety code for handling and storage of building materials.

IS: 8989 Safety code for erection of concrete framed structures.

BUILDING DETAILS

Applicable Codes and Specifications

The following codes and standards are included in this section, as part of these specifications. However, respective IS codes for the works not mentioned here shall also be applicable for those particular items of work.

- IS:110 - Ready mixed paint, brushing, gray filler, for Enamels for use over primers
- IS:269 - Specification for 33 grade ordinary Portland cement
- IS:280 - Specification for mild steel wire for general Engineering purposes
- IS:287 - Recommendations for maximum permissible Moisture content of timber used for different purposes
- IS:304 - High Tensile Brass Ingots and Castings.
- IS:337 - Varnish, finishing interior
- IS:348 - French polish
- IS:383 - Specification for coarse & fine aggregates from natural sources for concrete
- IS:412 - Expanded metal steel sheets for general purposes
- IS:419 - Specification for putty for use on window frames
- IS:428 - Distemper, oil emulsion, color as required
- IS:459 - Specification for unreinforced corrugated and semi- Corrugated asbestos cement sheet
- IS:702 - Specification for industrial bitumen
- IS:710 - Specification for marine plywood
- IS:712 - Specification for building limes

IS:730	-	Specification for hook bolts for corrugated sheet Roofing
IS:733	-	Wrought aluminum and aluminum alloys, bars, Rods and sections for general engineering purpose
IS:777	-	Specification for glazed earthenware tiles
IS:1003	-	Specification for timber paneled and glazed shutters (Parts 1 & 2)
IS:1038	-	Specification for steel doors, windows and ventilators
IS:1077	-	Specification for common burnt clay building bricks
IS:1081	-	Code of practice for fixing and glazing of metal (steel & aluminum) doors, windows and ventilator
IS:1124	-	Method of test for determination of water absorption, apparent specific gravity and porosity of natural building stone
IS:1237	-	Specification for cement concrete flooring tiles
IS:1322	-	Bitumen felts for water proofing and damp proofin
IS:1346	-	Code of practice for water proofing of roofs with bitumen felts
IS:1361	-	Specification for steel windows for industrial buildings
IS:1397	-	Specification for craft paper
IS:1443	-	Code of practice for laying and finishing of cement concrete flooring tiles
IS:1477	-	Code of practice for painting of ferrous metals in buildings (Parts 1 & 2)
IS:1542	-	Specification for sand for plaster
IS:1580	-	Specification for bituminous compounds for water-proofing and caulking purposes
IS:1597	-	Code of practice for construction of stone masonry: Part 1 Rubble stone masonry
IS:1659	-	Specification for block boards
IS:1661	-	Code of practice for application of cement and cement-lime plaster finishes
IS:1834	-	Specification for hot applied sealing compound for joint in concrete
IS:1838 Part 1	-	Specification for preformed fillers for expansion joint in concrete pavements and structures (non-extruding and resilient type)

Bitumen impregnated fiber

- IS:1948 - Specification for aluminum doors, windows and ventilators
- IS:1949 - Specification for aluminum windows for industrial buildings
- IS:2074 - Ready mixed paint, air drying, red oxide- zinc chrome, priming
- IS:2098 - Asbestos cement building boards
- IS:2114 - Code of practice for laying in-situ terrazzo floor finish
- IS:2116 - Specification for sand for masonry mortars
- IS:2185 - Specification for concrete masonry units
(Parts 1,2 & 3)
- IS:2202 - Specification for wooden flush door shutters (Solid core type)
(Parts 1 & 2)
- IS:2212 - Code of practice for brickwork
- IS:2250 - Code of practice for preparation and use of masonry mortars
- IS:2338 - Code of practice for finishing of wood & wood-based materials
(Parts 1& 2)
- IS:2339 - Aluminum paint for general purposes, in dual container
- IS:2395 - Code of practice for painting concrete, masonry and plaster surfaces (Parts1 & 2)
- IS:2402 - Code of practice for external rendered finishes
- IS:2571 - Code of practice for laying in-situ cement concrete flooring
- IS:2572 - Code of practice for construction of hollow concrete block masonry
- IS:2645 - Specification of integral cement waterproofing compounds
- IS:2690 - Specification for burnt clay flat terracing tiles : Part 1 Machine made
- IS:2691 - Specification for burnt clay facing bricks
- IS:2750 - Specification for steel scaffoldings
- IS:2835 - Flat transparent sheet glass
- IS:2932 - Specification for enamel, synthetic, exterior type (a) undercoating, (b)finishing
- IS:3007 - Code of practice for laying of asbestos cement sheets - corrugated

and(Part 1 & 2) semi-corrugated sheets

IS:3036	-	Code of practice for laying lime concrete for a water-proofed roof finish
IS:3067	-	Code of practice of general design details and preparatory work for damp-proofing and water- proofing of buildings
IS:3068	-	Specification for broken brick (burnt clay) coarse aggregates for use in limeconcrete
IS:3384	-	Specification for bitumen primer for use in water-proofing and damp-proofing
IS:3461	-	Specification for PVC-asbestos floor tiles
IS:3462	-	Specification for unbaked flexible PVC flooring
IS:3495	-	Method of test for burnt clay building bricks: Part 1 to 4
IS:3536	-	Specification for ready mixed paint, brushing, wood primer, pink
IS:3564	-	Specification for door closures (hydraulically regulated)
IS:3696	-	Safety code of scaffolds and ladders (Parts 1 & 2)
IS:4020	-	Methods of test for wooden flush door: Type test
IS:4021	-	Specification for timber door, window and ventilator frames
IS:4351	-	Specification for steel door frames
IS:4443	-	Code of practice for use of resin type chemical resistant mortars
IS:4457	-	Specification for ceramic unglazed vitreous acid resisting tile
IS:4631	-	Code of practice for laying epoxy resin floor toppings
IS:4832	-	Specification for chemical resistant mortars (Part II)
IS:4860	-	Specification for acid resistant bricks
IS:4948	-	Specification for welded steel wire fabric for general use
IS:5318	-	Code of practice for laying of flexible PVC sheet and tile flooring
IS:5410	-	Cement paint, colour as required
IS:5411	-	Specification for plastic emulsion paint (Parts 1 & 2)
IS:5437	-	Wired and figured glass
IS:5491	-	Code of practice for laying of in-situ granolithic concrete floor topping
IS:6041	-	Code of practice construction of autoclaved cellular concrete block

masonry

- IS:6042 - Code of practice for construction of light weight concrete block masonry
- IS:6248 - Specification for metal rolling shutters and rolling grilles
- IS:7193 - Specification for glass fiber base coal tar pitch and bitumen felts
- IS:7452 - Specification for hot rolled steel sections for doors, windows and ventilators
- IS:8042 - Specification for white Portland cement
- IS:8543 - Methods of testing plastics
- IS:8869 - Specification for washers for corrugated sheet roofing
- IS:9197 - Specification for epoxy resin, hardeners and epoxy resin composites for floor topping
- IS:9862 - Specification for ready mixed paint, brushing, bituminous, black, lead-free, acid, alkali, water and chlorine resisting
- IS:12200 - Code of practice for provision of water stops at transverse contraction joints in masonry and concrete dams