TENDER FOR CIVIL, STRUCTURAL & INFRASTRUCTURAL WORKS

FOR

MSME SHED AND COMPOUND WALL WORKS
AT MUDARDA VILLAGE,
MEHSANA,
GUJARAT.

VOLUME – 2 OF 2
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CIVIL SPECIFICATIONS

Generally Indian Standards Specifications (herein after referred as “IS”) shall apply for quality of materials, works and workmanship unless specified otherwise herein.

1.00 Excavation And Earthwork

.01 Nature of Excavation

The Contractor must examine and ascertain for himself as to the nature of the material to be excavated and price the work accordingly as no allowance will be made beyond the Contract Sum for any alleged ignorance or consequence of any misunderstanding or incorrect information or on the grounds of insufficient description or any ignorance, nor shall the Owner be under any obligation to pay the same.

.02 Excavations Generally

It is the responsibility of The Contractor to check and examine the Site and satisfied himself as to the nature of the existing levels and logistics prior to commencing of the work as no extra payment will be made in respect of any alleged excavations carried out due to levels being above that shown upon the drawings without the prior written Instruction of the Clerk of Works. Where such Instruction is given it is The Contractor's responsibility to record the levels and to agree these levels jointly with the Clerk of Works prior to commencement of the excavation.

.03 Site Clearances

The Contractor shall clear the construction areas within the site of all natural obstructions, rubbish and any other artificial obstructions, which would interfere with construction of building, roads, paths, and drains. In case The Contractor fails to comply with the requirements of this clause, the Engineer shall have the right to get the work done at the Cost of The Contractor. However the Engineer shall give notice before taking such action.

.04 Over-site Excavations

Over-site excavation over the areas of building has been measured in this section down to a general level. Removal of vegetable soil has been measured and is to be stock piled for disposal as directed by the Clerk of Works.

Excavated material suitable for backfilling around foundations and for making of levels under roads, floors etc. is to be kept separate from the vegetable soil and shall be used as directed or spread and leveled as per instruction of the Clerk of Works on the site at the end of excavation operations, if surplus.

.05 Excavations

Excavation for foundations and pipe, cable etc. trenches shall be as per drawing to width, depth, line, level, and gradient as specified.

Use of planking and strutting along foundation lines will not be considered as formwork.
The Contractor, while excavating shall not cause damage or destruction to the existing underground wire, pipelines, cable of RIICO, or other Industry or any other Authority.

.06 Inspection

When excavations are to the sizes and depths required, the Site-In-Charge shall be called to the Site immediately for an inspection. Only upon approval of the Site-In-Charge, shall The Contractor proceed with the work. The Contractor shall keep the excavation dry at all times. The excavations are to be left open until any variation in depth has been measured and agreed by the Engineer.

.07 Excavation below Required Depth.

Should any excavation be made below the levels or lines shown on drawings or otherwise required by the Site-In-Charge, The Contractor must fill up the resultant over-excavation to the proper levels or lines with Concrete Mix 1:4:8 at his own expenses. Should The Contractor excavate below foundation level to remove unsuitable material, upon instructions issued in writing from the Clerk of Works subsequent to making up of levels with concrete or other material payment shall be included in the re-measurement of the foundations.

.08 Protection of Pipes, Cables, etc.

The Contractor shall be liable for the cost of repairs to any services damaged as a result of carrying out the works and shall further be liable for any damage which may be shown during the period of maintenance, to have arisen through the execution of these works.

.09 Suitable Materials

Suitable material shall comprise all that which is acceptable in accordance with the Contract Documents for use in the Works and which is capable of being compacted in the manner specified to form a stable fill having side slopes as indicated on the Drawings and to the specified densities.

.10 Unsuitable Materials

Unsuitable material shall mean material from swamps; marshes or bogs, peat, logs, stumps and perishable material, material susceptible to spontaneous combustion, clay of liquid limit exceeding 80 and/or plasticity index exceeding 55 and materials having moisture content greater than the maximum permitted for such materials in the Contract, unless otherwise permitted by the Clerk of Works.

.11 Rock

Rock shall mean those geological strata and individual boulders, exceeding 0.5 m3 in size which, necessitate the use of burning and splitting with wedges or approved pneumatic tools for their removal. Material removed by ripping shall not be considered as Rock.
.12 Rock fill

Rock fill shall consist of hard material of suitable size for deposition and compaction and may comprise rock as defined in this sub clause 1.13, broken stone, hard brick, concrete or other comparable hard inert fill.

Note:
(1) No explosives shall be used on the site without the written consent of the Clerk of Works.

(2) No excavated material shall be removed from the site unless authorized in writing by the Clerk of Works.

.13 Filling

Filling to make up levels under floors shall be of approved granular material arising from excavations, which has been separated from other excavated material for its suitability. Filling shall be placed in layers not exceeding 200 mm thick and shall be rolled with a power/vibrating roller of at least 700 kg mass. The rolling process shall be continued for every layer until the specified density is achieved.

Payment for return, fill and supply, fill and ram shall be made on compacted quantity only. No extra payment will be allowed for subsequent excavation through the filling, replacing and re-compacting.

.14 SPECIFICATION FOR EARTHFILLING & COMPACTION:

Material:

Material shall be cohesive in nature.

Sampling from Borrow Pit:

Sampling shall be done for each strata of earth with proper demarcation of borrow pit and minimum three number of samples shall be taken for each borrow pit for each strata of soil and subsequent testing shall be carried out if borrow pit changes.

Testing for Borrow Pit Material:

Proctor test shall be conducted in laboratory for borrow pit material to obtain Maximum Dry Density and Optimum Moisture Content as per method described by IS: 2720 (Part VII & VIII).

Field Testing Criterion:

Each layer of earth shall be compacted for a thickness not more than 300 mm and second layer shall be started only after field testing of existing layer completed.

Field testing shall be done for percentage compaction achieved in each layer having frequency of 1 samples in 1000 m² area. Field testing shall be carried out by Sand Replacement Method as per procedure mentioned by IS: 2720 – Part XXVIII.

Field Test Results:

Percentage compaction achieved for each layer shall not be less than 95% of proctor density test results.
Required test for filling material:

- Gradation test based on wet sieve analysis test confirming to IS 2720(part-4)-1985.
- Liquid limit & plastic limit confirming to IS 2720 (part-5)-1985.
- Standard proctor density & optimum moisture content confirming to IS 2720 (part-7)-1980.
- Deleterious constituents (only in salt infected areas where presence of salt is suspected confirming to IS 2720 (part-27)-1977.

.15 Leveling

The ground shall be leveled before concreting. No extra payment for leveling shall be allowed.

.16 Disposal of Surplus Excavated Material

The Contractor shall include transporting and dumping of surplus excavated earth and all other rubbish arising out of construction anywhere within 1 (one) km as directed by Clerk of Works.

.17 Earthwork to be kept free of Water.

Earthwork shall be kept free of water coming from any source. This water shall be removed and discharged into permanent drains. Adequate precaution should be taken for trapping of silt. Wherever necessary, temporary watercourses should be provided with sufficient gradient and depth to avoid ponding.

.18 Planking and Strutting

Sides of all excavations must be supported to prevent falls or collapse of the earth face. The term "planking and strutting" is deemed to include any methods which The Contractor adopts to uphold, protect and maintain the sides of excavations. The Contractor will be responsible for any consequences of his failure in this respect or any other damage thereof, including clearing away fallen material and any extra concrete or other works including formwork ordered by the Site-In Charge due to such failure. An item has been included in these Bills of each relevant section.

.19 Hardcore

Hardcore shall consist of broken stone, concrete or other similar materials. It shall be substantially free from dust, earth, mortar, timber, easily crushable materials and rubbish of any kind and shall be "all-in" material passing a 150 mm sieve. The proportion of material passing a 6 mm sieve shall not exceed 10%. The material proposed by The Contractor shall be approved by the Engineer in writing before being brought to Site.

2.00 Concrete

.01 Any requirement for concrete work under other sections of this specification shall be governed by the requirements of this section.
Each stage of construction of plain or reinforced concrete work, including the making and testing of the cubes and the maintenance and calibration of mixing and measuring plant is to be supervised continuously by competent and responsible members of The Contractor's staff.

The Engineer shall be given ample opportunity to inspect and approve all formwork and reinforcement before the concrete is poured. Such approval given by the Engineer will not absolve The Contractor from his responsibility for maintenance of the quality, lines and levels, dimensional accuracy and strength requirement of the work.

No concrete shall be prepared or placed in position except in presence of the Engineer, unless he has instructed in writing to carry out the work in his absence.

.02 Except where they are varied by the requirements of these Specifications the requirements of the following Indian Standard Specifications (herein after referred to as “IS) and / or codes of Practice shall form part of these Specifications.


IS-3370 Code of Practice for concrete structures for the storage of liquids.

IS-516 Methods of Tests for strength of concrete.

IS-4082 Recommendations on stacking and storage of construction Material at site.


3.00 Mortar

.01 General

Mortars for masonry shall be prepared in accordance with I.S. 2250-1965. Cement used for brick Masonry work shall be ordinary or rapid hardening Portland cement (I.S.269-Latest revision). Lime shall confirm to requirements of I.S.712-1956 Field slaking of lime shall be done in accordance with I.S. 2116-1968 and shall be free from shale clay, alkali and organic matter. Water used for masonry mortar shall be clean and free from injurious amount of deleterious material.

.02 Cement Mortar

a. Cement mortar shall be preferably mixed in Mechanical Mixer. If done by hand mixing the operation shall be carried out on a clean watertight platform.

b. Cement and sand shall be mixed dry in required proportion to obtain uniform colour. The required quantity of water shall then be added and the mortar mixed to produce workable consistency.

c. In the case of mechanical mixing the mortar shall be mixed for at least 3 minutes after addition of water.

d. In case of hand mixing the mortar shall be hoed back and forth for 10-15 minutes with addition of water.
e. The mortar so mixed shall be used within 25 minutes of mixing. The mortar left beyond a specified period shall be rejected. Waterproofing of mortar shall not be permitted.

f. Re-tempering of Mortar: In case of mortar using cement, the mortar that has stiffened because of evaporation of water from the mortar may be re-tempered by adding water as frequently as needed to restore the requirements of consistency but this re-tempering shall be permitted only within two hours from the time of addition of cement.

.03 LIME MORTAR

a. Lime mortar shall be prepared by mixing and grinding lime putty, sand, or cinder in the specified proportions.

b. The ingredients shall be mixed on watertight masonry platforms or in troughs. This shall then be sprinkled with requisite quantity of water and ground in a masonry lined mortar mill.

c. The mortar shall be ground for not less than 180 revolutions. It shall be raked up continuously during the process, particularly at the angles of the mill. Water shall be added as required during grinding. Care shall be taken not to add more water than what is actually needed to bring the mortar to the consistency of a stiff paste.

4.00 Brick Masonry

.01 General

All brick work shall confirm to I.S.2212.

.02 Workmanship

a. Every brick shall be thoroughly soaked in clear water (for at least 24 hours before use). The surface on which the brick work is to be started shall be thoroughly cleaned and wetted (hacked in case of concrete) and a thin coat of cement slurry shall be applied over the entire surface. If fresh masonry is to be stretched on old masonry, it shall be thoroughly cleaned with wire brush and washed to remove all loose deposit, loose set mortar, mud or dirt.

b. The first course itself shall be made horizontal by providing enough mortar in bed joints to fill up any undulation in bed course. For laying bricks, layer of mortar shall be spread on the full width of suitable length of lower course. Each brick shall be pressed into mortar and shoved in final position so as to embed the brick fully in mortar. Brick shall be laid with indentation uppermost.

c. Brick work 230mm thick and over shall be in English Bond; and 102mm thick (half brick) work shall be built in Stretcher or Running Bond.

d. Broken brick shall not be used, except as closers. The course shall be truly horizontal and the work strictly in plumb. Joints shall be broken vertically and the lap not less than half width of brick. They shall not exceed 12mm in thickness. All joints vertical and horizontal shall be well filled with mortar. When the mortar is green the joints in brick work shall be raked out 12mm deep to afford a good key for plaster.
e. Fixing of timber and frame work shall be done in accordance with relevant I.S. and shall be fixed simultaneously as masonry work proceeds to ensure proper bond.

f. Brick work shall not be raised more than 12 single courses a day. No portion of the work shall be left more than 90 cm lower than the other. Where masonry of one part is delayed the brick shall be raked back suitably at angle not exceeding 45 degrees according to Bond/but not toothed.

g. The brick work shall be carried out with all necessary setbacks, projections, cuttings and toothings in conformity with the drawings.

h. If necessary The Contractor shall have to provide wooden plugs, etc. for his own work and for which there will be no special payment on that account by the Owner.

i. The brick work shall be cured by watering at least three times a day for 10 days commencing from 24 hours after the course is laid and the work shall be well protected with gunny bags or tarpaulin during the rainy season to prevent mortar from being washed.

j. All uneven, irregular and bad brick work poor in workmanship shall be demolished when directed by the Engineer and shall be rebuilt by The Contractor at The Contractor's expenses.

5.00 Plastering

.01 Mortar

Mortar proportions specified on Drawings and / or Bills of Quantities shall be used.

.02 Scaffolding

Scaffolding for carrying out plastering work shall be double scaffolding having two sets of vertical supports so that the scaffolding is independent of the walls.

.03 Preparation of Surface

All putlog holes in brickwork and junction between concrete and brickwork shall be properly filled in advance. Joints in brickwork shall be raked about 10 mm and concrete surface hacked to provide the grip to the plaster. Projecting burrs of mortar formed due to gaps at joints in shuttering shall be removed.

The surface shall be scrubbed clean with wire brush/coir brush to remove dirt; dust etc. and the surface thoroughly washed with clean water to remove efflorescence, grease and oil etc. and shall be kept wet for minimum of six hours before application of plaster.

The Contractor shall prepare test specimens for different types of plaster at his own cost for approval by the Engineer.

.04 Application

a. For external plaster the operation may be started from top and worked downwards. For internal plaster plastering may be started wherever the building
frame and dado work are ready and temporary supports on wall and floor are removed. Ceiling plaster shall be completed before commencement of wall plaster - all wall plaster shall be started from top and worked downwards.

b. Gauges of plaster 75 x 75mm shall be first applied horizontally and vertically at not more than 2m intervals over the entire surface to serve as guides for plastering and to ensure even thickness and a true surface. The surfaces of these gauged areas shall be truly in plane of the finished plaster surface. In suspending the work the plaster shall be left cut clean of line both horizontal and vertical. The work shall be closed on body of wall and not nearer than 15 cm. to any corner of arises. When recommencing, the edge of the old work shall be scraped or rubbed down with the carborundum stone and wetted before plaster is applied to adjacent areas.

c. The finished plaster surface shall not show any deviation more than 4mm when checked with a straight edge of a length placed against the surface. Any cracks which appear in the surface and all portions which sound hollow when tapped or are found to be soft or defective shall be cut out in rectangle shape and redone as directed.

d. Curing shall be started 24 hours after finishing the plaster and the plaster shall be well cured for at least 7 days. No paint, colour wash or white wash shall be applied to plastered surfaces for at least two months or until the Contractor has satisfied the Engineer that the walls and plaster are thoroughly dry.

.05 Cement plaster with smooth cement finish

a. Cement and fine sand will be thoroughly mixed dry in 1:4 proportions. Only minimum water shall then be added and the mortar mixed until homogenous and required consistency obtained.

b. Only that mortar which can be used in 1/2 hour shall be mixed.

c. It shall be used in two coats and on prepared surface the scratch coat 12 mm thick applied and leveled with a wooden trowel. This surface shall be cross-stretched horizontally to provide a mechanical key for final coat. The surface shall be kept continuously damp for minimum 3 days.

d. The finish coat shall be 6 mm thick. Before application the scratch coat shall be dampened evenly by spray and the surface rubbed smooth after floating it with a coat of pure Portland cement.

e. The use of dry cement shall not be permitted. All plaster work shall be cured for a period of 10 days after the finishing coat.

.06 Cement Plaster with Neeru (Lime Putty) finish

a. The same specification of cement plaster is applicable except that plaster is applied in single coat to specified thickness and instead of cement slurry Neeru shall be applied as thin as possible to avoid surface cracking and rubbed over to an even smooth finish. The plaster shall be kept wet for 10 days and shall receive one coat of white wash finally.

b. Neeru shall be prepared as follows:
The lime for preparing Neeru shall be from approved sources and shall be slaked lime powder.

Slaked lime powder shall be added to water in preparation tanks to form slurry. The slurry shall be sieved through a fine mesh sieve (5 mesh per linear cm) and thorough slaking for a period not less than twenty days. The surplus water in the slurry shall be drawn off or allowed to evaporate before use. The slaked lime paste thus formed shall be used for preparing Neeru.

Neeru shall be prepared by mixing together 10 M3 of slaked lime paste, 0.01 M3 of Portland Cement, 0.03 CM of fine sieved sand and 4 Kg. of finely chopped jute fiber, thoroughly mixed with sufficient water to form a paste of the desired consistency.

c. The finishing coat of Neeru prepared as above shall be applied with steel trowels to a uniform thickness in a thin layer and finished smooth by steel trowelling.

.07 Sand Faced Plaster

a. The external plaster shall be in two coats of an overall thickness of 20 mm.

b. On a prepared surface backing coat of 12mm thickness and in cement mortar (1:4) shall be applied smooth and even. It shall be combed when wet to give a good bond for the finishing coat. The backing coat shall be cured for 7 days before applying of the finishing coat.

c. For finishing coat only sand screened through 3mm mesh shall be used. It shall be 6mm thick and in cement mortar (1:3) and applied smooth and even.

d. The entire surface should be rubbed with approved sponges to expose sand grains and cured for 10 days. Curing shall start after 24 hours.

e. All external plaster shall be waterproofed with approved waterproofing compound added to cement in proportion of 1.5 kg/50 kg of cement as per Manufacturer's specifications.

.08 Rough Cast Cement Plaster

a. Follow general procedure for surface preparation for plaster; vis. close hacking of concrete surfaces, raking of joints in masonry to a depth of 12 mm minimum, and cleaning and wetting of all masonry.

b. Rough cast cement plaster shall be done in two coats, backing coat 16mm thick in cement mortar 1:4 shall be applied, finished with wooden floats and left rough. Waterproofing compound at 2 percent by weight of cement shall be added to the backing coat at no extra cost.

c. As soon as the backing coat is slight set the finishing coat shall be applied 16mm thick and in a mix of 1 part of cement: 1 parts of sand: 1 part of pea gravel. This mixture shall be dashed by means of trowel against the backing coat. The gravel should be seen prominently on the surface. the distribution of gravel should be uniform over the surfaces.

d. Plaster to be well cured for at least 10 days.
.09 Vineratex Finish

a. Follow general procedure for surface preparation for plaster; vis. close hacking of concrete surfaces, raking of joints in masonry to a depth of 12mm minimum, and cleaning and wetting of all masonry.

b. Apply cement plaster backing coat 12 to 16 mm thick in cement mortar 1:4 backing, finished with wooden floats and left rough. Allow to cure.

c. Apply one coat of ready mixed decorative textured Vineratex as Manufactured by Vemera Industries, Madras, India, or approved equal. Mix shall be in custom colour and selected aggregate as approved by the Engineer.

6.00 Floor And Wall Finishes

.01 Scope and General Requirement

All flooring, skirting, etc. shall be executed strictly as per relevant IS Specifications and in workmanlike manner.

.02 Indian Patent Stone

Method of mixing, placing and compacting shall generally confirm to the Specifications under plain and reinforced cement concrete described earlier. A stiff mix consistent with workability shall be used.

(a) Preparation of Surface

Before the operation for laying topping is started the surface of base concrete shall be thoroughly cleaned of all dirt, loose particles slacked mortar, droppings and laitance if any, by scrubbing with coir or steel wire brush. When the concrete has hardened so much that roughening of surface by wire brush is not possible, the surface shall be roughened by chipping or hacking at close intervals. The surface shall then be cleaned with water and kept wet for 12 hours and surplus water shall be removed by mopping before the topping is laid.

(b) Laying

The screed strips shall be fixed over the base concrete dividing it into suitable panels. Before placing the concrete for topping neat cement slurry shall be thoroughly brushed into the prepared surface of the base concrete just ahead of the finish.

Concrete of specified proportion and thickness shall be laid in alternate panels to required level and slope and thoroughly tamped.

(c) Finishing the Surface

After the concrete has been fully compacted it shall be finished by trowelling or floating with neat cement rendering. Finishing operations shall start shortly after the compaction of concrete and the surface shall be trowelled three times at intervals so as to produce a uniform and hard surface. The satisfactory resistance of floor to wears depends largely upon the care with
which trowelling is carried out. The time interval allowed between successive trowelling is very important. Immediately after placing cement rendering, only just sufficient trowelling shall be done to give a level surface. Excessive trowelling in the earlier stages shall be avoided, as this tends to bring a layer rich in cement to the surface. Sometime, after the first trowelling, the duration depending upon the temperature, atmospheric conditions and the rate of set of cement used, the surface shall be re-trowelled to close any pores in the surface and to bring to surface and to scrape off any excess water in concrete or laitance.

No dry cement shall be used directly on the surface to absorb moisture or to stiffen the mix. The final trowelling shall be done well before the concrete has become too hard but at such a time that considerable pressure is required to make any impression on the surface.

.03 Ironite Topping

Instead of finishing the top with rendering coat of 1:1 cement mortar, the top shall be finished with 10 mm thick Ironite topping. Unless otherwise directed, one part of Ironite and four parts of ordinary cement by weight shall be mixed dry thoroughly. This dry mixture shall be mixed with stone grit 6mm (1/4") and down size or as otherwise directed in the ratio of 1:2 by volume and well turned over. Just enough water shall be added to this dry mix and mixed thoroughly well and laid to uniform thickness of 10 mm and compacted. After initial set has started the surface shall be finished as directed.

.04 Terrazzo in Site Work in Flooring, Skirting etc.

The terrazzo finish shall be laid on an under layer of thickness as specified in the respective items. The topping shall consist of a layer of marble chips of selected sizes, colour and design approved by Clerk of Works mixed with desired shade of pigment.

The proportion of terrazzo mix shall be three parts of cement and one part of marble powder by weight. For every part of cement marble powder mix, the proportion of marble aggregate by volume shall be 1.5 parts unless otherwise specified.

The topping shall be mixed and laid in panels as described in IS: 2114 and as per decorative designs approved by Site-In-Charge. The dividing strips for panels shall be of Aluminium or as specified in the Schedule of Quantities. It shall be polished as specified in IS: 2114.

.05 Glazed Tiles, Ceramic Tiles and Marble Tiles in flooring and Dado:

White glazed tiles shall be of specified size and thickness. All specials viz. coves, internal and external angles corners, beads etc. shall be used wherever directed. Under layer of specified thickness and mortar of stipulated proportion shall be laid as described in marble mosaic flooring. Tiles shall be washed clean and set in cement grout and each tile being gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern. After the tiles have been laid, surplus cement grout shall be cleaned off.

The joints shall be cleaned off the grey cement grout with a wire brush or trowel to a depth of 5 mm (3/16") and all dust and loose mortar removed. Joints shall then be flush pointed with white cement. The floor shall then be kept wet for seven days. After
curing, the surface shall be washed with clean water. The finished floor shall not sound hollow when tapped with a wooden mallet.

.06 Marbles in flooring and dado

Under laying of specified thickness and mortar of stipulated proportion shall be laid as described in marble mosaic flooring marble shall be set in cement grout and being gently tapped with a wooden mallet fill it is properly bedded. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern. After the marble has been laid, surplus cement grout shall be cleared off.

The joints shall be cleaned off the grey cement grout with a wire brush or trowel to a depth of 5mm (3/16") and all dust and loose mortar be removed. Joints shall then be flush pointed with white cement. The floor shall then be kept wet for seven days. After curing, the surface shall be washed with clean water. The finished floor shall not sound hollow when tapped with a wooden mallet.

7.00 Doors And Windows

The construction and installation of doorframes, shutters and ironmongery shall follow relevant Indian Standard Specifications and Codes of Practice. The following IS Specifications and Codes of Practice shall form part of these specifications.

IS-1003 Specifications for Timber Paneled and Glazed shutters - Part I, Door Shutter.
IS-2202 Specifications for Wooden Flush Door Shutters (Solid Core Type) Part I, Plywood Face Panels
IS-2202 -do- Part 2, Particle Board and Hardboard Face Panels
IS-4021 Specifications for Timber Door, Window and Ventilator Frames
IS-1081 Code of Practice for Fixing and Glazing of Metal Doors, Windows and Ventilators.
IS-1038 Specifications for Steel Doors, Windows and Ventilators
IS-4351 Specifications for Steel Door Frames
IS-419 Specifications for Putty, for Use of Window Frames
IS-420 Specifications for Putty, for Use on Metal Frames.

.01 Installation of Pressed Steel Door Frames

Procedure outlined in Appendix-A, IS-4351 shall be followed.

.02 Handling and fixing of Metal Doors, windows and Ventilators.

Procedure outlined in various clauses of IS-1081 shall be followed.

.03 Timber door frames and shutters
Procedure outlined for Handling, fixing in position and alignment given in IS 1003' 2202 and 4021 shall be followed.

.04 M.S. Rolling Shutters

M.S. Rolling shutters shall be made out of 18 gauge black lath either mechanically operated from both inside and outside or manually operated. It shall be fitted with two self-aligning ball bearing with locking arrangement including G.I. housing, hooks, M.S. Pressed side guides and bottom rails brackets, door suspension shafts, top rolling springs pressed etc. complete.

The rolling shutter shall be painted with two coats of approved paint over coat of primer.

In case, the fixing of rolling shutters is to be carried out by an agency other than The Contractor, The Contractor shall provide all facilities to the Erection Contractor.

.05 Aluminium Doors and Windows

The fixing of Aluminium doors and windows shall be carried out by the agency appointed by the Manufacturers. The Contractor shall provide all facilities to the Erection Contractors.

8.00 Painting

.01 Scope and General Requirement

Wherever scaffolding is necessary, it shall be double scaffolding.

The surface shall be thoroughly brushed free from mortar, droppings and foreign matter. All steel work shall be cleaned of loose rust, mill scales etc. so as to expose the original surface. All broken edges, creaks, loose plaster and wavy surface shall be brought up either by patch plaster work or by plaster of paris.

.02 Materials

All materials viz. dry distemper, oil bound distemper, oil paint, synthetic enamel paint, cement primer, red lead and other primers and metallic paints shall be supplied by The Contractor as per the specification prescribed herein or the standard fixed by the Engineer in writing.

.03 White Washing

White wash shall be prepared from lime slaked on spot, mixed and stirred with sufficient water to make a thin cream. This shall be allowed to stand for 24 hours and shall be screened through clean cloth. Four kg of gum dissolved in hot water shall be added to each cubic meter of the cream. Glue shall be added to give required whiteness. The approximate quantity of water to be added in making cream shall be five liters per kg. of lime.

White wash shall be applied in specified coats by using flat brushes or spray pumps. Each coat shall be allowed to dry before next coat is applied. If additional coats than what have been specified, are necessary to obtain uniform and smooth finish, it shall be given at no extra cost.
The finished dry surfaces shall not show any signs of cracking and peeling nor shall come off readily on the hand when the material is rubbed.

.04 Cement Wash

Exposed concrete surfaces shall be thoroughly cleaned, rubbed and shutter marks removed before applying wash, unless specified otherwise.

Cement shall be mixed with water to form slurry to the consistency of good ready mixed oil paint and the slurry applied with flat brushes to form smooth bodied opaque surfaces. Two coats of cement wash shall be applied. Adequate time interval shall be allowed between the applications of successive coat for hardening.

.05 Colour Wash

Colour wash shall be prepared by adding mineral colours not affected by cement to cement slurry as prepared in "Cement Wash". No colour wash shall be done until a sample of the colour wash to the required tint or shade has been got approved from the Site-In-Charge.

Colour wash shall be applied as specified under "Cement Wash".

.06 Oil bound Distemper

The surface shall be prepared as specified above. A primer coat of either cement primer or an approved distemper primer shall be applied. After the primer coat has dried, the surface shall be lightly sand-papered and dusted to make it smooth to receive distemper.

Distemper shall be prepared as per the directions of the Manufacturer and conforming to shade approved by the Engineer. It shall be applied in specified coats, taking care to allow for drying of each coat before subsequent coats are applied.

.07 Waterproof Cement Paint

The surface shall be prepared as specified above and thoroughly wetted with clean water before waterproof cement paint is applied.

The paint shall be prepared strictly as per Manufacturer's specifications and in such quantities as can be used up in an hour of its mixing, as otherwise the mixture will set and thicken, affecting the flow and finish.

The paint thus prepared shall be applied on clean and wetted surface with brush or spraying machine. The solution shall be kept stirred during the period of application. It shall be applied on the surface which is on the shady side of the building so that the direct heat of the sun on the surface is avoided. The completed surface shall be watered after the day’s work. Number of coats shall be as specified in the item.

.08 Enamel Paint

The surface shall be prepared as specified above and a coat of approved primer shall be applied. After 24 hours drying, approved or specified quality paint shall be applied evenly and smoothly. A filler putty coating may be given to give a smooth finish. Each coat shall be allowed to dry out thoroughly and then lightly rubbed down with sand paper and cleaned of dust before the next coat is applied. Number of coats shall be as specified in the item and if the finish of the surface is not uniform, additional coats as
required shall be applied to get good and uniform finish at no extra cost. After completion no hair marks from the brush or clogging of paint puddles in the corners of panels, angles or moldings etc. shall be left on the work. The glass panes, floor etc. shall be cleaned of stains. Thinner if required, shall be of approved brand and used as per Manufacturer’s recommendations.

9.00 Water Supply

.01 Execution of work

The work under this section shall be executed only by a licensed plumber. The Contractor shall take prior approval of the Engineer while selecting plumbing agencies as per the Article 9 of the General Contract Condition

.02 Cross connection

There shall be no cross-connection whatsoever between the distribution system for drinking water supply and any pipe or fitting containing unwholesome water, or water liable to be contaminated. The provision of non return valves or closed and sealed stop valves shall not be constructed as a permissible substitute for complete absence of cross-connection.

.03 All pipe work shall be so laid, connected and fixed so as to remain completely water tight, thereby avoiding wastage, damage to property and the risk of contamination.

.04 To reduce frictional losses, the method of joining shall be such as to avoid internal roughness and projection at the joints. No bend or curve in piping shall be made when is likely to materially diminish or alter the cross-section.

.05 Laying of Pipes

The relevant IS Codes of Practice for laying of pipes shall be followed and shall form part of this specification. The different Codes of Practice are IS-783 Code of Practice for Laying of Concrete Pipes

<table>
<thead>
<tr>
<th>IS-783</th>
<th>Code of Practice for Laying of Concrete Pipes</th>
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<tbody>
<tr>
<td>IS-5822</td>
<td>Code of Practice for Laying of Welded Steel pipes</td>
</tr>
<tr>
<td>IS-7634</td>
<td>Code of Practice for Laying of Plastic pipes</td>
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</tbody>
</table>


.06 Excavation and Refilling

The bottoms of trench excavations shall be so prepared that the barrels of the pipes when laid are well bedded for their whole length on a firm surface and are true to line and gradient. In refilling the trenches, the pipes shall be surrounded with fine selected material, well compacted so as to resist subsequent movement of the pipes.

.07 The pipes shall be carefully cleared of all foreign matter before laying

.08 Cleaning and Disinfection of the Supply System.
The procedure outlined in National Building Code of India Part IX, Section I, Clauses 14 shall be followed.

10.00 Sanitary Installation

.01 General

a. All pipe and accessories shall be handled in such manner as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken not to injure pipe coating. If coating or lining of any type of pipe or fitting is damaged, repair shall be made prior to installation. No other pipe or material shall be placed inside of a pipe or fitting after coating has been applied. Pipe shall be carried into position and not dragged. Rubber gaskets that are not to be installed immediately shall be stored in a cool, dark place and out of the sun. Installation procedures shall provide for safe conduct of the work, careful removal and disposition of materials, protection of property, which is to remain undisturbed, coordination with other work in progress, and protection of utility services.

b. Where the location of the sewer is not clearly defined by dimensions on the drawings, the sewer shall not be laid closer horizontally than 10 feet to a water main or service line. Where sewer lines pass above water lines, the sewer shall be encased in concrete for a distance of 10 feet on each side of the crossing.

c. Where sewer lines pass below water lines, no joint in the sewer line shall be closer than 3 feet horizontal distance to the water line. Where sewer lines cross power or communication lines, a minimum separation of 6 inches shall be maintained with a minimum cover of 30 inches above the power or communication lines.

.03 Pipe laying and jointing

a. Each section of pipe shall be inspected for defects before being lowered into the trench. Defective, damaged or unsound pipe shall not be used. Trenches shall be kept dry during bedding and laying operations. Pipe that has the grade, alignment or joint disturbed after laying shall be taken up and re-laid. If the maximum width of the trench specified is exceeded, concrete cradling, pipe encasement or other bedding as may be required to support the added load of the backfill shall be installed. Trenches shall be kept free from water until the joints have been properly coupled. Pipe shall not be laid when the conditions of the trench or weather are unsuitable. When work is not in progress, open ends of pipe and fittings shall be securely closed so that no trench water, earth, or other substances can enter the pipe or fittings.

b. Joints shall not be covered until approved. Pipe, pipe fittings, or appurtenances found defective after installation shall be replaced. Pipe shall be laid true to line and grade to form a close concentric joint with adjoining pipe and to prevent offsets of the flow line. Sections of pipe shall be so laid and fitted together that when complete, the sewer shall have a smooth and uniform invert. As the work progresses, the interior of the sewer shall be cleaned of all dirt and superfluous materials. Where cleaning after laying is difficult because of small pipe size, a suitable swab or drag shall be kept in the pipe and pulled forward past each joint immediately after the jointing has been completed. Pipe cutting where necessary shall be done neatly, without damage to the pipe. Unless otherwise authorized, cutting shall be done by means of an approved type of mechanical cutter.

c. Each pipe and fitting shall be carefully inspected before and after installation and those found defective shall be rejected. Proper facilities shall be provided for lowering sections
of pipe into trenches. Any pipe or fitting that does not allow sufficient space for proper caulking or installation of joint material shall be replaced by one of the proper dimensions. Open ends of pipe at the end of each day's work shall be closed temporarily with wood blocks.

.04 Tests

a. Tests of completed piping systems shall be conducted in strict accordance with testing procedures and requirements of ASTM C828 or AWWA C600, as applicable.

b. Do not backfill piping (more than minimum required to hold in place for testing) prior to receipt of acceptance from Owner's Representative for results of tests.

c. Conduct repairs and retests when required due to unaccepted test results at no cost to Owner.

11.00 Road Work

In general, all the Works specified under this Section shall be governed by “Specifications for Road & Bridge Works”, Fifth Revision – published by Ministry of Shipping, Road Transport & Highways – Unless noted otherwise.

.01 Earthwork

Earthwork in cutting, filling, embankment, compaction and disposal of surplus earth shall be as mentioned in specification of "EXCAVATION AND EARTHWORK" here before.

.02 Consolidation of Sub-grade

The subgrade shall be consolidated with power road roller of 8 to 12 tone or vibrating roller. The roller shall run over the subgrade till the soil is evenly and densely consolidated and behaves as an elastic mass (Roller shall pass minimum of five runs on the subgrade). All undulations in the surface that develop due to rolling shall be made good with earth or quarry spoils as the case may be and the subgrade rerolled.

.03 Soling Course

The stones in soling shall be hand packed with greatest length across the road. All interstices between stones shall be wedged in with smaller stones of suitable size, well driven in, to enable tight packing and complete filling of interstices. Such filling shall be carried out simultaneously with the placing in position of soling stone and shall not lag behind. The soling shall then be thoroughly consolidated with power roller of minimum 8 tone weight, starting at edges and working towards the center. The roller shall run over the same surface of rolling for at least eight times till the soling course is well consolidated.

25mm thick or as specified, layer of murrum as directed by the Engineer shall be laid on top of soling course. This shall be watered and rolled before the wearing course is laid.

.04 Wearing Course (W.B.M.)

One or two as specified wearing courses of stone aggregate each 7.5 cm thick or as specified, shall be provided. The first course shall be consolidated and thrown open to
traffic at least for a period of 2 to 6 weeks, depending upon the intensity of traffic and the period available for completion of the work. The surface of the first course shall then be scarified undulation filled up and the second course then laid accordingly to profile and consolidated. The procedure of consolidation as given below should be repeated for both the courses separately.

a. Consolidation

The stone aggregate shall be consolidated by dry rolling and wet rolling with power roller of 8 tones minimum weight. In case of straight reach of the road, the rolling shall be commenced at the edges and worked towards the center. In case of super elevated curve the rolling shall commence from the inside edge of the curve to the outside edge.

b. Dry Rolling

The stone aggregate shall first be rolled dry and then lightly sprinkled with water of just sufficient quantity to moisten the earth cushioning below and to facilitate interlocking of aggregates. Rolling shall continue till the aggregate has become well consolidated and do not get displaced. During the process of rolling, camber and grade of the aggregate surface shall be checked. All undulations shall be loosened by hand racking or racking tools surplus material removed from high spots and depressions filled with surplus and fresh material and the surface rolled again, small quantities of aggregate having been kept in stock for this purpose. When all the surface defects are removed dry rolling shall be stopped, as otherwise the edges of the aggregate may get crushed, which is not desirable.

c. Wet Rolling

After the dry rolling has been completed as described above, the road surface shall be watered copiously so as to keep the water level up to the top of the aggregate and rolling with power roller preceded with, till the roller makes no visible impression on the surface and the interstices between the stone have been filled up by consolidation of aggregate and a piece of 25 mm size stone placed on surface gets crushed under the roller without being driven in.

d. Rolling with Blinding Materials

After wet rolling of the wearing surface course, the surface shall be tested with a 3m straight edge laid parallel to the center line of the road and any irregularity exceeding 12 mm shall be corrected by loosening the surface and re-compacting the same after adding or removing materials as required. If further required by the Engineer, the surface shall be checked with long string also.

Kankar murrum red bajri in specified ratio shall then be spread evenly over the surface to a 6mm to 12mm thickness copiously watered and rolled till the slurry, after filling all voids, shall form a wave before the wheels of the moving roller. Wet bajri sticking to the wheel shall be removed simultaneously when the roller is moving, by spades and sprinkling water on the wheels. The rolling shall be done a minimum of four passes or till a hard smooth solid surface is obtained.

Finished surface shall give a uniform appearance and the road shall be closed to traffic till next day or lapse of 24 hours.
.05 Edging

Edging shall be done 225 mm wide and 110 mm deep or as specified with first class bricks.

.06 Dense bitumen Macadam (Premix) surfacing

a. Tack Coat

Cleaning: Prior to the application of tack coat, all dust, dirt, mud, animal dung, loose and foreign material etc. shall be removed to 30 cm on either side beyond the full width to be treated by means of wire brushes, small picks, brooms, etc. The material so removed shall be disposed of as directed by the Engineer.

The paving bitumen (cut back bitumen) as mentioned in the specification shall be heated in a boiler to a temperature specified above and maintain at that temperature.

This paving bitumen shall then be applied evenly to the already prepared dry surface by means of pressure sprayed at the rate of 0.75 kg/sq.mts of the road surface.

The binder shall be applied longitudinally along the length of the road and never across it. The edges of tack coat shall be defined by wire or other cord lines stitched in position.

b. Base course (Premix)

Preparation of Mix and Laying

The stone aggregate of 10 mm nominal size as defined later shall be surface dry and contain no more than 2% moisture before use. It shall be screened of dust and measured in boxes and then loaded into a drum mixer according to the capacity of this drum. The aggregate shall be heated to facilitate mixing with the paving bitumen in cold weather, where so directed by the Engineer. The stone aggregate will be used at the rate of 3 cubic meters for 100 square meters of the surface area.

The paving bitumen (cut back bitumen) will be heated to a temperature as mentioned in a boiler. This heated bitumen shall be poured over the aggregate in the drum mixer at the rate of 64 kg per cubic meter of aggregate and mixing started and continued till aggregate is uniformly coated with bitumen.

This hot mix shall be spread on the road surface immediately after the application of tack coat to a thickness sufficient to achieve a thickness of 25 mm after consolidation.

c. Consolidation of Pre-Mix

When the mix is sufficiently tacking and stiff and has not become hard or brittle, the carpet shall be compacted by a 6-8 tone roller until no impression is made thereby on the newly laid surface. The rolling shall progress gradually from each side towards the center. To prevent the pre-mix from adhering to roller wheels
the wheels shall be dampened by means of gunny bags soaked in water. Any high spots or depressions, which become apparent, shall be corrected by addition or removal of pre-mix material. The finished surface shall be thoroughly compacted true to the correct levels and grades. Permissible tolerance will be as under:

Longitudinal section +6mm for every 6 meters
Cross section +3mm from the entire designed section
d. Seal Coat (Premix)

In this paving bitumen (cut back bitumen) as specified earlier will be used at the rate of 1.5kg/square meter of the surface area and stone aggregate 10 mm nominal size conforming to IS:383 shall be used at the rate of 1.1 cu. m for 100 sq. meter of the surface area.

The paving bitumen shall be heated as described earlier and applied on the surface. Over this stone grit will be spread uniformly when the bitumen is still hot. The surface will be rolled as described earlier.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Temperature to which it shall be heated</th>
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<tbody>
<tr>
<td>1</td>
<td>Cut back bitumen. 163 degree C to 171 degree C.</td>
</tr>
<tr>
<td>2</td>
<td>Paving asphalt 30/40 or 80/100 heated and then mixed with solvent atmospheric temperature at the rate of 70 gm/kg of asphalt. 149 degree C to 177 degree C.</td>
</tr>
<tr>
<td>0.07</td>
<td>Demolition shall be carried out in such a manner as to cause as little inconvenience as possible to the workers and flow of work. The Contractor shall take all safety measures for the people working on site. Demolition shall not affect the stability of the adjoining structural elements. The Contractor must provide all requisite shoring, strutting, needling or other supports to wall, roof etc. The Contractor shall alter, adopt and maintain all such necessary temporary works as may be necessary from time to time and finally clear away and make good all disturbed. Sound old bricks arising from demolition, if cleaned and approved by the Consultant shall be reused in foundations and walls below ground level. If approved by the Engineer, steel structural members shall be reused after straightening. The Contractor shall also comply with Sub Clause 18.10 of the General Contract Conditions. The Contractor shall be solely responsible for the safety of its labourers and shall be liable for all deaths and damage at site. Failure of The Contractor to comply with any of safety and regulatory matter shall not pass the liability upon the Owner. Should the Owner have to pay any money in respect of claims or demands as aforesaid, pursuant to an order of a court/tribunal or any Government or local authority the amount so paid and the costs incurred by the Owner shall be charged to and be paid by The Contractor to the Owner and The Contractor shall not be at liberty to dispute or question the right of the Owner to make such payments. However, intimation of any such payments made by the Owner shall be made to The Contractor.</td>
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</table>
CEMENT CONCRETE PAVEMENT

1. Proportioning of Concrete

1.1 Proportioning on the basis of strength:

The concrete shall be made of materials accepted for the work and of the proportions specified by the Engineer. The proportions shall preferably be determined after laboratory test on materials proposed to be used unless other established data is available and the mix that will produce a durable concrete of the desired consistency and workability together with following specified strength shall be adopted.

Where thickness of the pavement is calculated on the basis of flexural stresses in concrete, a mix that will develop a modulus of rupture on field specimens of not less than the permissible flexural stress multiplied by the factor of safety assumed in design shall be adopted with a minimum of 40 kg/cm² (550 Psi) at 28 days. Where however the thickness from the IRC Table of recommended thickness given in appendix C are adopted (IRC:15-1970), a mix that will develop a field compressive strength of 280 kg/cm² (4000 psi) at 28 days or a corresponding modulus of ruptures (where data of their proportionality for local material is available) shall be adopted. In other cases, this information should be determined by prior laboratory test with adjustments for variations in the field.

Where, a heavy duty wear resistance is desired, such as for manoeuvring and storage areas of tracked vehicles or for anticipated concentrations of steel tyred traffic, a concrete with a minimum field compressive strength of 420 kg/cm² (6000 psi) at 28 days or its equivalent modulus rupture shall be adopted for wearing course of concrete.

1.1.1 Approximate proportions

The approximate proportion by weight (or by volume, only in unavoidable cases) necessary to produce concrete satisfying the strength conditions using aggregates from the sources designated, if furnished in the tender documents, are for guidance only, it being expressly understood that this information is only for the convenience of the Tenderer.

1.1.2 Field Mix

After the award of the contract, the proportions that are the field mix determined by the laboratory for the particular aggregates approved by the Engineer shall govern. These proportions will be corrected and adjusted by the Engineer to compensate for moisture content in the aggregate or fluctuations in the grading of coarse and fine aggregate at the time of use.

Where fine aggregate is permitted to be measured volumetrically, due allowance shall be made for its bulking.

1.1.3 Water-Cement Ratio

The water content per batch of concrete shall be maintained constantly except for suitable allowances to be made for free moisture and absorption by aggregates determined from time to time during construction. Adjustments for workability shall be made by variations in the ratio of the coarse to fine aggregate or improving upon their
grading without change in cement content or water-cement ratio. The slump of the concrete mix for pavements compacted by vibration should not be more than 50 mm (2”). No price adjustment would be permissible for variations in the ratio of coarse to fine aggregates necessitated from adjustment at site.

2. Equipments

2.1 General

All equipments necessary for the proper preparation of the sub-grade sub-base, and hatching, mixing, placing, finishing and curing of the concrete pavement shall be on the project in good working condition and shall have been inspected by the Engineer-in-Charge before the paving operations are permitted to start. Throughout the construction of the project, the construction agency shall maintain adequate equipment in first class working condition to ensure proper prosecution of the work.

2.2 Mixer

Concrete mixer of adequate capacity shall be provided and it shall be of the batch type, conforming to the requirement of IS: 1991-1968 “Specification for Batch Type Concrete Mixer (First Revision)” and shall have a rated capacity of not less than 200 litres (7 cu. ft) of mixed concrete.

The mixer shall be equipped with an approved water measuring device capable of accurate measurement of water required per batch. The mixer shall preferably be equipped with a mechanically operated pump for filling the mixed tank.

The mixer, if specially specified, shall be equipped with an approved timing device which will automatically lock the discharge lever during the full time of mixing and release it at the end of mixing period; the device shall also be equipped with a bell, adjusted, to ring each time the lock is released. If the timing device gets broken or out of order, the mixer will be permitted to be used while the same is being repaired, provided an approved time piece equipped with minute and second hands, is provided and that each batch is mixed for one and half minutes.

Pick-up and throw-over blades in the drum of the mixer which are worn out 20 mm, (3/4”) or more in depth shall be replaced with new blades.

2.3 Water-supply equipment

The water supply equipment shall be of such capacity and nature as to ensure at all times ample supply and adequate pressure for all the requirements of sprinkling subgrade, making sub-base, mixing and curing of concrete etc. and all other requirements of the work.

2.4 Subgrade Template or Strike Board

The subgrade template or strike board shall be of a rigid construction, approximately 100 mm (4”) wide, and shall weigh at least 45 kg. (100 lb)

2.5 Hand Tamper

The tamper shall be shaped to the cross-profile of the slab and shall weigh not less than 10 kg/m (7 lb/ft). It shall be durably constructed of 75 mm. (3”) thick timber or of steel of channel cross-section two feet longer than the proposed width of pavement.
slab and sufficiently strong and rigid to retain its shape under all working conditions. If it is of timber it shall be shod with steel. The timber shall be provided with handles which are resilient and sufficiently long to enable tamping operations to be performed by men in standing position.

2.6 **Screed Board Concrete Vibrator**

Screed board vibrator used for compaction and finishing of concrete shall comprise of a wooden or mild steel screed with suitable handles. The screed shall be driven by vibrating units mounted thereon either electrically or by compressed air or by a petrol engine and propelled or made to travel on side forms. It shall conform to IS: 2506-1964 “Specification for Screed Board Concrete Vibrators”.

2.7 **Immersion Vibrator**

Immersion Vibrator shall comprise of a vibrating head with suitable motive power either of compressed air, electricity or of petrol driven engine, rigid enough to ensure proper control and manipulation in the mass of concrete. It shall conform to IS: 2505-1968 “Specification for Concrete Vibrators, Immersion type (First Revision)”. They shall be employed to ensure compaction of concrete along the forms and to avoid any tendency in honey combing at the edges of the slab. In case of road slabs exceeding 125 mm (5") thickness, they shall also be employed at suitable spacing for compacting the concrete over the entire width of the slabs in addition to screed board vibrator.

2.8 **Longitudinal Float**

The longitudinal float shall not be less than 3.7 m (12") in length and 150 mm. (6") wide and shall be properly stiffened to prevent flexing and warping.

2.9 **Bridges**

The bridges shall be so designed that when placed straddling the forms, no parts shall come in contact with the pavement. They shall be sufficiently rigid.

2.10 **Long-handled Wooden Flat**

The blade of the float shall be at least 1500 mm (5’) long and 150 mm (6") wide. A minimum of two floats shall be provided.

2.11 **Belts**

The belts of canvas shall not be less than 150 mm (6") wide and shall be at least 600 mm (2’) longer than the width of the slab. A minimum of two belts shall be provided.

2.12 **Push Brooms**

The push brooms shall not be less than 450 mm (18") wide and be made from good quality base fibre. The handle shall be at least 300 mm. (1 ft.) longer than half the width of the slab. A minimum of four push brooms shall be provided.

2.13 **3.0 m (10 ft.) Straight Edge**

The straight edge shall remain true and rigid under working conditions and shall be swung from suitable handles.
2.14 Edging Tool

The edging tool shall have a radius of 6 mm. (1/4"). The vertical limb shall extend to the required depth. A minimum of two edging tools shall be provided.

2.15 Master Straight Edge

The material straight edge shall be of known accuracy so that it may be used for checking other straight edges. It shall be made of steel or other suitable material, of sufficient length and of sufficient rigidity to maintain its accuracy.

2.16 Other Small Tools

Other small tools and equipment such as spades, shovels, iron pans, water pots, rods etc., necessary to complete the work in accordance with the intent and meaning of these specifications shall also be provided.

3. Forms

3.1 Steel Forms

All side forms shall be of mild steel unless use of wooden sections is specially permitted. The steel forms shall be M.S. channel sections and their depth equal to the thickness of the pavement.

The sections shall have a length of at least 3.0 m (10') except on curves of less than 45.0 m. (150 ft.) radius, where shorter sections may be used. When set to grade and staked in place, the maximum deviation of the top surface of any section from a straight line shall not exceed 3 mm. (1/8") in the vertical plane and 55 mm. in the horizontal plane. The method of connection between sections shall be such that the joint formed shall be free from play or movement in any direction. The use of bent twisted or worn out forms will not be permitted. At least three stake pockets for bracing pins or stakes shall be provided for each 3.0m (10') of form and the bracing and support must be ample to prevent the springing of the forms under the pressure of the concrete or the weight or thrust of machinery operating on the forms.

The supply of forms shall be sufficient to permit their remaining in place not less than 12 hours after the concrete has been placed or longer if, in the opinion of the Engineer, it should be necessary.

3.2 Wooden Forms

Wooden forms may be used only when specifically provided for on the plans or in special provisions with the exceptions that their use is herein approved for all curves having radius of less than 45.0 m (150 ft.) Wooden forms shall be dressed on one side, these shall have minimum base width of 100 mm. (4") for slab thickness of 200 mm. (8") thick and equal in depth to edge thickness of the work prescribed. These forms when used on straight shall have a minimum length of 3.0m. (10'). Forms shall be held by stakes set at intervals not exceeding 2.0m (6'), two stakes to be placed at each joint. The forms shall be firmly nailed or secured to the side stakes, and securely braced at points, where necessary so that no movement will result from the pressure of the concrete or the impact of the tamper and during finishing work. Wooden forms shall be capped along the inside upper edge with 50 mm (2") angle iron, well recessed and kept flush with the face of the wooden forms.
3.3 Setting of Forms

The forms shall be jointed neatly and shall be set with exactness to the required grade and alignment. After the forms are placed and set, the earth under the base of the forms shall be thoroughly tamped in approved manners. Sufficient rigidity shall be obtained to support the forms in such a position during the entire operation of compacting and finishing that they will not at any time deviate more than 3 mm. (1/8") from a straight edge 3.0 m (10') in length. Forms which show a variation from the required rigidity or the alignment and levels shown on the plans shall be reset or removed, as directed to maintain the forms at the correct line and grade. All forms shall be cleaned and oiled each time before they are used. Forms shall be set, as herein specified, for at least 150.0 m. (500 ft.) ahead of the mixer or in advance of the actual placing of concrete.

4. Construction

4.1 Mixing

The mixing of concrete shall be done in a batch mixer of approved type which will ensure a uniform distribution of the materials throughout the mass, so that the mix is uniform in colour and homogeneous. All concrete shall be mixed in quantities for immediate use.

Spilling of the materials at either end of the mixer shall be corrected by reducing the size of the batch and in no case shall the volume of the mixed material per batch exceed the Manufacturer’s guaranteed capacity of the mixer.

The drum of the mixer shall rotate at a peripheral speed of approximately 600.0 m (200 ft.) per minute.

The batch of cement, fine aggregate and coarse aggregate shall be fed into the mixer simultaneously and in such a manner that the period of flow of each is about the same. The water for mixing shall be introduced into the drum within the first 15 seconds of mixing, and the entire contents of the drum shall be discharged before any materials are placed therein for the succeeding batch.

The skip shall be so maintained and operated that each batch will be completely discharged into the mixing drum at the loading of the mixer. The mixer shall be cleaned at suitable intervals while in the use.

4.1.1 Time of Mixing

The mixing of each batch will continue not less than one and half minute after all the materials are in the mixer.

4.1.2 Retempering

The retempering of concrete or mortar, that is, remixing with or without additional cement, aggregate or water will not be permitted.

4.1.3 Correction for Bulking
In volume batching, suitable allowance shall be made for the bulking of fine aggregate due to the presence of water. For this purpose the bulking shall be determined as directed by the Engineer conforming to standard methods.

4.2 Transporting and Placing of Concrete

The concrete shall be mixed in quantities required for immediate use and shall be deposited on the subgrade or sub-base to the required depth and width of the pavement section, in successive batches and in continuous operation without the use of intermediate forms or bulkheads between joints. Care shall be taken to see that no segregation of materials results whilst the concrete is being transported from the mixer to the place where it is deposited. The usual method of transport of concrete in India is in pans as head loads or in small wheel barrows. The spreading shall be as uniform as possible to avoid rehandling of the concrete. Where however a certain amount of redistribution is necessary, it shall be done with shovels and not with rakes. While being placed, the concrete shall be rodded with suitable tools so that the formation of voids or honeycomb pockets is prevented. The concrete shall be particularly well placed and tapped against the forms and along all joints. As an alternative, an internal vibrator may be employed in lieu of rodding of the concrete. Any portion of the batch of concrete that becomes segregated in depositing it on subgrade shall be thoroughly mixed with the main body of the batch during the process of spreading. In case of unavoidable interruption a full depth transverse joint shall be placed at the point of stopping the work provided the section on which the work has been suspended shall be at least 3.0 m (10') long. Shorter section shall be removed.

4.3 Placing of Load Transfer Devices - Dowels

Transverse expansion joints shall be equipped with dowels of the dimensions and at the spacing and location indicated on the plans. They shall be firmly supported in place, accurately aligned parallel to the subgrade and the centre line of the pavement by means of dowel support, which will remain in the pavement and will ensure that the dowels are not displaced during construction. One half of each dowel shall be painted and oiled and equipped with a tight fitting sleeve of the dimensions shown on the plans to provide space for the dowels when pavement expands and the joint closes. This sleeve shall be equipped with stop which will prevent it being pushed too far on the dowel during construction. The sleeves are not required on dowels, if used, in dummy construction or construction joints.

4.4 Water-proofing paper

The waterproofing paper when necessary, (see clause 5.2) shall be laid by unrolling the roll) prior to the placement of concrete. The paper shall be unrolled with an overlap of not less than 10 cm.

4.5 Compaction and Finishing

4.5.1 Compaction

The surface of the pavement shall be compacted either by means of a power-driven finishing machine or by a vibrating screed. For areas where the width of the slab is very small as the corner of street junctions, etc. hand compaction and finishing may be adopted subject to the approval of the Engineer-. In no case, however, hand compaction shall be permitted for slab thickness beyond 10 cm. in the normal course. All compaction and finishing shall be done in accordance with the following requirements.
Where hand tamping is permitted as a special case:

i) Concrete, as soon as placed, shall be struck of uniformly and screeded to the crown and cross-section shown on the plans and to such level above the base that when compacted and finished, the pavement shall conform to the grade and cross-section indicated by the plans. The entire surface shall then be tamped and the tamping operation continued until a close knit dense surface is obtained.

ii) The tamper shall rest on the side forms and shall be drawn ahead with a sawing motion, in combination with a series of lifts and drops alternating with lateral shifts, the aim of this operation being compaction and screeding to the approximate level required. Subsequent tamping should advance about 75 mm (3") at a time in the direction in which the work is proceeding, and in the final stages tamping should be closer, about 12 mm (1/2") at a time until a level and dense surface is obtained.

Other Cases

iii) Hand-operated vibrating screed consisting of a normal type of hand tamper to which are attached pneumatic or electric vibrating units shall be used for compaction. It shall rest on side forms. Such screed when used shall be lowered vertically on to the concrete surface, evenly spread to the required level above the base, making due allowance for compaction, allowed to remain in position for a few seconds until compaction is complete, then lifted vertically and lowered on the adjacent strip of uncompacted concrete. The screed shall again be taken slowly over the surface sliding, with its axis slightly tilted away from the direction of sliding and the operation repeated until the required dense, close knit textured surface is obtained. Compaction of concrete slabs up to 12.5 cm. (5") thickness may be done by means of vibrating screed alone, while for thicknesses greater than 12.5 cm (5") thickness, internal vibrators and vibrating screeds shall be used with advantage for compacting the slab corners and edges. The working of the vibrators shall be regularly checked and standbys shall always be maintained for emergency use.

iv) Segregated particles of coarse aggregate which collect in front of the tamper of screed shall be thrown outside the forms or thoroughly mixed by hand with the mass of concrete already on the base. Under no circumstances shall such segregated particles be carried forward and pushed on to the base in front of the mass.

v) Compaction by tamping or screeding shall be carried on till the mortar in the mix just works up to the surface. Care shall be exercised and the operation of tamping so controlled as to prevent an excess of mortar and water from being worked on to the top. Repeated operation other than to secure the necessary compaction and to eliminate voids shall be avoided.

vi) Immediately after the tamping or screeding has been completed and before the concrete has hardened, i.e. while the concrete is still in a plastic stage, the surface shall be inspected for irregularities with a profile checking template and any needed correction made by adding or removing concrete followed by further compaction and finishing.
4.5.2 Floating

As soon as practicable after the concrete has been struck off and compacted it shall be further smoothened and compacted by means of a longitudinal float 1,200 mm. (4 ft.) long and 75 mm (3") wide, operated from a foot bridge. The longitudinal float shall be worked with a sawing motion, while held in a floating position parallel to the carriageway centre line and passed gradually from one side of the pavement to the other. Movements ahead along the centre line of the carriageway shall be in successive advance of not more than one half the length of the float.

4.5.3 Straight-edging

After the longitudinal floating has been completed and excess water has disappeared, but while the concrete is still plastic, the slab surface shall be tested for trueness with a 3.0 m (10') straight edge swung from handles 1m (3') longer than one-half width of the slab. The straight edge shall be held in successive positions parallel to the road central line in contact with the surface and the whole area gone over from one side of the slab to the other. Advance along the road shall be in successive stages of not more than one-half length of the straight edge. Any depressions found shall be filled immediately with freshly mixed, concrete, struck compacted and refinished. High areas shall be cut down and refinished. The straight edging and refloating shall continue until the entire surface is found to be free from observable departures from the straight edge and the slab has the required grade and camber.

The slab surface shall be retested for trueness, before the concrete begins to set, with the 3.0 m (10') straight edge and the wedge gauge. The straight edge shall be placed on the surface, in successive positions, parallel to the carriageway centre line. Irregularities shall be measured with the help of the wedge moved transversely at various points until it touches both the straight edge and the concrete surface. At any point tested, the concrete shall not show a departure from the true surface, greater than 3 mm (1/8") If at any place, the tolerance is greater than this, not more than 3 phases of the vibrating machine shall be allowed and the surface tested again in the specified manner. If the irregularity still exceeds the limit aforesaid, the concrete shall be removed to a depth of 50 mm (2") or to the level of the top surface of the reinforcement, if any.

The area to be removed shall be that represented by the length of the straight edge in the position of measurement across the full width of the slab. Where the point of measurement in default is less than 4.5 m (15') from the transverse expansion joint, the whole area up to the joint shall be removed to the required depth. The concrete so removed shall not be re-used in the carriageway.

Fresh concrete shall be placed, compacted and finished in the manner already described in these specifications and shall again be subjected to test for accuracy finish.

The foregoing procedure shall be adopted at each shifting of the straight edge and the whole area shall be gone over from one side of the slab to the other. The straight edge shall advance longitudinally in successive stages of not more than one-half of the length of the straight edge.

No extra payment shall be made for the removal of the rejected concrete and for laying fresh concrete.
Although the concrete may be removed immediately following measurement of the irregularity and while it is still wet, this shall not mean any waiver from complying with the requirements of this clause, if for any reason the concrete to be removed has hardened.

After straight edging of the surface, it shall be finished by belting or brooming or by the combination of both, in the manner described in the following paragraphs.

4.5.4 Belting

Just before the concrete becomes non-plastic, the surface shall be belted with a two-ply canvas belt not less than 200 mm (8") wide and at least 1.0m (3') longer than the width of the slab. Hand belts shall have suitable handles to permit controlled uniform manipulation. The belt shall be operated with short strokes transverse to the carriageway centre line and with a rapid advance parallel to the centre line.

4.5.5 Brooming

After belting and as soon as surplus water, if any, has risen to the surface, the pavement shall be given a broom finish with an approved steel or fibre broom not less than 450 mm (18") wide. The broom shall be pulled gently over the surface of the pavement from edge to edge. Adjacent strokes shall be slightly overlapped. Brooming shall be perpendicular to the centre line of the pavement and so executed that the corrugations thus produced will be uniform in character and width, and not more than 1.5 mm (1/16") deep. Brooming shall be completed before the concrete reaches such a stage that the surface is likely to be torn or unduly roughened by the operation. The broomed surface shall be free from porous or rough spots, irregularities, depressions, and small pockets, such as may be caused by accidentally disturbing particles of coarse aggregate embedded near the surface.

4.5.6 Edging

After belting and/or brooming have been completed, but before the concrete has taken its initial set the edges of the slab shall be carefully finished with an edger of 6 mm (1/4") radius, and the pavement edge shall be left smooth and true to line.

4.6 Curing of Concrete

Immediately after finishing operations have been completed, the entire surface of the newly laid concrete shall be covered against rapid drying and cured in accordance with the following methods. Failure to provide sufficient cover material of whatever kind required, or inadequate supplies of water to take care of both curing and other requirements shall be adequate cause for immediate suspension of concreting operations.

4.6.1 Initial Curing

Immediately after completion of the finishing operations, the surface of the pavement shall be entirely covered with wetted burlap, cotton or jute mats. The mats used shall be such length (or width) that as laid they will extend at least 450 mm (18") beyond the edges of the slab. The mates shall be placed so that the entire surface and both edges of the slab are completely covered. This covering shall be placed as soon as, in the judgement of the Engineer, the concrete has set sufficiently to prevent marring of the surface. Prior to being placed the mats shall be thoroughly saturated with water and shall be placed with the wettest side down. The mats shall so placed and
weighed down as to cause them to remain in intimate contact with the surface covered and the covering shall be maintained fully wetted and in position for 24 hours after the concrete has been placed or until the concrete is sufficiently hard to be walked on without suffering damage. Water shall be gently sprayed so as to avoid damage to the fresh concrete. If it becomes necessary to remove a mat for any reason, the concrete slab shall not be exposed for a period of more than half an hour.

Worn burlap or burlap with holes will not be permitted. Burlap reclaimed from previous use other than curing concrete shall be thoroughly washed prior to use for curing purposes. If burlap is finished in strips shall be laid to overlap at least 150 mm (6”).

Burlap shall be placed from suitable bridges. Walking on freshly laid concrete to facilitate placing burlap will not be permitted.

4.6.2 Final Curing

Upon the removal of the burlap the slab shall be thoroughly wetted and then cured by one of the following methods of final curing.

a) Curing with Wet Earth: Exposed edges of the slab shall be banked with a substantial berm of earth. Upon the slab shall then be laid a system of transverse and longitudinal dykes of clay about 50 mm. (2”) high immediately covered with a blanket of sandy soil free from stones to prevent the drying up and cracking of clay. The rest of the slab shall then be covered with sufficient sandy soil so as to produce a blanket of earth not less than 37 cm. (1.5”) depth after wetting. The earth covering shall be thoroughly wetted while it is being placed on the surface and again with water for 14 days and thoroughly wetted down during the morning of the 15th day and shall thereafter remain in place until the concrete has attained the required strength and permission is given to open the pavement to traffic. If such permission is granted, the covering shall be removed and the pavement cleaned and swept. If the earth covering be displaced during the curing period, it shall be replaced to the original depth and re-saturated.

b) Impervious membrane method: The membrane shall consist of a practically colourless impervious liquid of a type approved by the Engineer. The use of any membrane material which would impart a slippery surface to the pavement or alter its natural colour will not be permitted. Liquid shall be applied under pressure with a spray nozzle in such a manner as to cover the entire surface with a uniform film, and shall be of such character that it will harden within 30 minutes after application. The amount of liquid applied shall be ample to seal the surface of the pavement thoroughly. The liquid shall be applied immediately after the finishing of the surface and before the set of the cement has taken place, or, if the pavement is first covered with burlap, it may be applied upon removal of burlap.

The impervious coating used shall be such that when applied to the surface of mortar test slabs in the manner prescribed for the use of the materials in the field, the mortar shall retain at least 90 per cent of the mixing water when exposed for 144 hours to temperatures between 32 to 38 degree C. (90 degree F and 130 degree F) at a relative humidity of 30 per cent to 50 per cent.
The mortar test slab used shall be composed of one part Portland cement, 1.71 part fine aggregate and 0.346 parts of water by weight. The slab shall be cast in non-absorbent watertight mould, and shall remain in the mould throughout the test. The slab shall be approximately 380 mm (15") long by 380 mm (15") wide by 50 mm (2") deep. The coating shall be applied to the exposed surface of the slab within 2 hours of the time the slab is cast.

Materials for use as impervious coatings will be approved by the Engineer on the basis of tests outlined above. The rate of application of such coatings will be prescribed by the Engineer on the basis of the same tests.

This method of curing shall be carried out in locations where there is scarcity of water and in what sections as directed by the Engineer.

4.7 Final Surface Test

The final surface test shall be made after the curing period and after the removal of the material used for curing. The surface shall be of correct alignment, grade and contour specified. Any spots higher than 3 mm (1/8") and not higher than 6 mm (1/4") above the correct surfaced, as shown by 3.0m (10') straight edge and the wedge in the manner prescribed above, shall be ground down with an approved grinding tool to the required level. When deviation exceeds the foregoing limits, the slab shall be removed to full depth and replaced. The area of pavement to be removed and replaced shall be that represented by the transverse joints, immediately adjacent to the deviation, across the full width of the slab.

4.8 Removing Forms

Forms shall not be removed from freshly placed concrete until it has set at least 12 hours. They shall be carefully removed and in such a manner that no damage will be done to the edge of the pavement. After the forms have been removed, the ends of all joints shall be cleaned and the sides of the slab shall covered with earth to the level of the top of the slab. All ditches and drains shall be so placed as to provide effective drainage.

4.9 Concreting during Monsoon Months

When concrete is being placed during monsoon months and when it may be expected to rain, sufficient supply of tarpaulin or other waterproof cloth shall be provided along the line of the work. Any time when it rains all freshly laid concrete which has not been covered for curing purposes shall be adequately protected by means of tarpaulins or other waterproof cloth. Any concrete damaged by rain shall be removed and replaced.

4.10 Concreting in Hot Weather

As placing of concrete at temperature above 40 degree C (140 degree F) is attended with defects like loss of workability through accelerated setting, formation of plastic shrinkage cracks, etc. It is recommended that unless adequate precautions as detailed below were arranged, no concreting shall be done in temperatures exceeding 40 degree C. (140 degree F).

Aggregates, cement and water shall be protected from the direct sun, and mixing operations shall also be carried out in shade. In addition portable shelters shall be provided to protect the concrete during placing and finishing operations. This may be
in the form of frames to cover at least a length of 12.0 m (40') of the roadway. The surfaces of the forms and sub grade coming in contact shall be treated to prevent absorption of mixing water. Since the setting time of concrete is considerably reduced under such temperatures, reinforcements to labour shall be made to minimise the time between mixing and placing of concrete. The protective cover shall be adequate to exclude exposure of the concrete directly to the sun and also eliminate contact with drying winds. Prior to removal of the portable shelters, the hardened concrete shall be covered with wet hessian followed by one of the usual methods of curing like ponding, wet earth cover etc. In addition the moist curing period shall be extended to a minimum of 2 to 3 weeks depending upon the temperature.

4.12 Work on Gradients

The progress on gradient of all operations of placing, compacting and finishing of concrete should proceed from the lower to the higher reaches. The concrete mix shall be stiffer than used on level reaches.

4.13 Protection of Concrete

Suitable barricades shall be erected and maintained and watchmen employed to exclude traffic from the newly constructed pavement for the period herein prescribed, and these barriers shall be so arranged as not in any way to interfere with or impede traffic or any lane intended to be kept open and necessary signs and lights shall be maintained clearly indicating any lanes open to the public. Where as shown on the plans or indicated in the special provisions, it is necessary to provide for traffic across the pavement, suitable and substantial crossings to bridge over the concrete shall have to be provided. Such crossings, as constructed, shall be adequate for the traffic and satisfactory to the Engineer.

Any part of the pavement damaged by traffic or other causes occurring prior to its final acceptance shall be repaired or replaced in a matter satisfactory to the Engineer. The pavement shall be protected against all traffic usage including that of construction traffic.

4.14 Sealing of Joints

After the curing period is over and before the pavement is opened to traffic, the temporary seal or other intruded materials of all transverse expansion and contraction joints shall be removed completely and the slots filled with the approved joint sealing compound. The joint opening shall be thoroughly cleared of all foreign matter before the sealing material is placed. If necessary, the foreign matter shall be blown out. All contact faces of the joint shall be cleaned with a wire brush to remove loose material and shall be surface-dried when the sealing compound is poured.

The edges of joints shall be printed with a thin bituminous paint which shall be allowed to dry before the sealing compound is applied. The primer shall be applied with a brush.

The composition of the primer shall be as follows:-

Percentage by weight

i) 200-penetration bitumen 66 (Blended hot)
ii) Light Creosote Oil 14 (Blended hot or cold)
iii) Solvent Naphtha  20 (Blended cold)

The bitumen shall be melted and fluxed with the oil when cold, solvent naphtha shall be added. Bituminous emulsions shall not be used as primers. Care shall be taken to ensure that the sealing compound is not heated above 200 degree C (392 degree F) and the temperature does not exceed 180 degree C (356 degree F) for long periods (or other temperatures specified by the Manufacturer of the compound). Sealing compound shall be poured into the joint opening in such a manner that the material will not be spilled on the exposed surface of the concrete. Any excess filler on the surface of the concrete pavement shall be removed immediately and the pavement surface cleaned.

When required to prevent tackiness or pick up under traffic, the exposed surfaces of the sealing compound shall be dusted with hydrated lime. Other methods of preventing pick up under traffic may be used when approved by the Engineer.

4.15 Opening to Traffic

Traffic shall be excluded from the newly constructed pavement for a period of 28 days where ordinary Portland cement, Portland Blast Furnace Slag Cement and Portland Pozzolana Cement are used or for a period of 7 days where rapid hardening cement is used. In all cases before the pavement is opened to traffic it shall be cleaned and the joints shall be filled and trimmed or topped out as required. The joint or line of separation between adjacent strips or slabs of concrete, when the pavement is constructed in lanes or strips shall be cleaned and filled with bituminous sealant as prescribed.

SPECIAL DIRECTIONS TO THE TENDERERS FOR RIGID PAVMENT ROAD WORKS

1. Contactor must have a laboratory at site at his cost for performing various tests at his costs and the following machines and equipments at least shall be provided at site.

   a) Crushing strength machine (for cube tests)
   b) Apparatus for testing flexural tests of concrete
   c) Aggregate testing machine
   d) Set of sieves for finding fineness modulus and for aggregate grading.
   e) Laboratory weighing balance
   f) Aggregate drying equipment
   g) Equipment for testing of silt content in sand
   h) Aggregate impact value test machines
   i) Other machines as required by the Engineer

   All the test records shall be meticulously maintained in the site laboratory and made available as and when required.

2. The concrete cubes shall be tested for seven and twenty eight days strength as and when directed as a cross check or as directed. The Contractor should possess adequate CUBE MOULDS. No charges for such surprise checks will be paid.

3. Mix design of adequate strength as required and specified by the Engineer shall be done by The Contractor and checked by the Engineer after every fresh lot of aggregates is brought at site by The Contractor. For this purpose gradation analysis
of coarse and fine aggregate shall be performed and shall be maintained within prescribed limits. The results shall be displayed on graph paper and meticulously preserved.

4. The mix design should confirm to one of the methods specified in SP/23/1982.

5. Tenderers must submit detailed account of the various concrete roads constructed by them with controlled concrete in the past along with the cost of the work and the years in which they were constructed.

6. The joints should be cut by mechanical means within 24 to 48 hours after the road slab is cast. Spacing of VATAS for CURING shall have to be done accordingly.

7. The Contractor’s Engineer should be qualified and experienced and well versed with concrete mix design and he should be thoroughly acquainted with the construction of concrete roads.

8. Plate vibrators should be used for compaction of concrete mix in addition to needle and screed vibrators and as such the Contractor should have sufficient equipments of minimum two numbers of each machine such as mixers, plate vibrators, needle vibrators, screed vibrators and one extra number of each as stand by, for each site of work.

9. In case the cube test for 28 days period fails, Core Test of the concrete slab at the risk and cost of The Contractor will be taken of up to 15 cm. Dia. cores for requisite depth as per IRC Code No. SP-11 of 1988 immediately and if it fails, no payment will be made till expiry of maintenance period and repair measures will be carried out by The Contractor to the satisfaction of the Engineer at his own cost.

10. The distance between bottom concrete layer and top layer during concreting operation shall not exceed 2.5 meters, or 20 minutes whichever is lesser so as not to have cold joint.

11. The apparatus for keeping the dowel bars in straight and perpendicular conditions to the concrete cross sectional surface shall be provided and used to give the alignment as directed by the Engineer, by providing additional bulkhead at a specified distance. The bars should be straightened exactly perpendicular to finished concrete surface by means of adequate device to be approved by the Engineer.

12. Dowel bars should be painted with bitumen and wrapped with water proof paper and provided with expansion cap with glass wool backing as directed by the Engineer.

13. The concrete road panels must be in proper cross profile as per camber prescribed by the Engineer.

14. Whenever the needle vibrator is used in vertical or horizontal position the mason must follow with a trowel and punch frequently the portions of concrete from where the needle vibrator is withdrawn so as to ensure that no hollow portion remains in the stiff mass of concrete, plate vibrating shall also follow thereafter.

14. The machine cut joints and expansion joints must be air blown with forceful air jet so as to blow out complete dust, sand particles and foreign matter from the slots of the joints, before filling these with the filler material.
15. Necessary traffic signs and boards including provision of traffic cones, etc. for traffic
diversion, closure of road, road work in progress, etc. as directed by the Engineer
shall be provided by The Contractor at their cost.

16. The Contractor shall go through I.R.C. - 43-1972 “Recommended practice for Tools,
for their guidance in executing concrete road works. They will have to abide by these
specifications.

17. The dressing of joints should be maintained throughout Guarantee period of the
work.

18. Sand shall be of approved quality of fineness modulus between 2.4 to 3. In case of
course sand the same will have to be screened and washed to reduce the silt content
to the level of less than 4% by weight and bring it within the range of fineness
modulus referred to above. Blending of sand of fine and coarse quality may be
permitted if it is found to give desired qualities referred to above. In case stone dust
is required to be used for mixing up with the sand for bringing the admixture within
the desired range of fineness modulus, such stone dust shall be of approved quality
with fines passing through 75 micron sieve limited to 15% or less. In case percentage
of fines in stone dust is found to be more than 15% prescribed under I.S. Code 383
of 1970 the same will have to be washed and screened so as to bring it within the
range of approved quality stone dust. The fine aggregate will be tested and retested
as directed by the Engineer, till it satisfies required norms as per I.S.I. and as per
specifications referred to above.
SECTION – KA PREAMBLE:

General

The description of items in accompanying Bill of Quantities (herein referred as BOQ) is kept short. A brief description of these items along with the specification for which the rates are required and mode of measurement (where called for) are given here under which should be read with corresponding item in Bill of Quantities. (Number given here under in this Preamble refers to the number for a trade or item in the Bill of Quantities).

A CD containing soft copies of all the Bills of Quantities is being issued to all the Tenderers as part of the Tender documents. **The tenderer is required to fill in the rate and amount of all items of the Bills of quantities in the hard copy as well as in the soft copy.** Duly filled CD shall be returned together with the priced bid. Rates quoted in both the hard copy as well as soft copy shall be same. In case of discrepancy between the rate quoted in the soft copy (i.e. in CD) and the hard copy, the rate quoted in the hard copy shall be considered final , either for scrutinizing and deciding upon the Tender or during the Contract period.

**Consistent Unit Rates**

Tenderer shall take care to insert one unit rate against an item appearing in different bills. In case of discrepancy in item rate inserted for a particular item in different bills, the lower value of rate shall be considered for all the bills and Contract Sum shall be corrected accordingly.

**Basic Rates**

The Contractor will be required to procure all materials for the Works and any advance payment for the same shall not be paid. However, he will consider Basic rates for the following materials while quoting his rates in Bills of Quantities –

<table>
<thead>
<tr>
<th>Materials</th>
<th>Rate</th>
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<tbody>
<tr>
<td>Cement</td>
<td>Rs.250/ per bag</td>
</tr>
<tr>
<td>Reinforcement Steel</td>
<td>Rs.38000/ tone</td>
</tr>
<tr>
<td>Structural Steel</td>
<td>Rs.40000/ tone</td>
</tr>
<tr>
<td>Ceramic Tiles</td>
<td>Rs. 450 / Sqm</td>
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</table>

The above mentioned rates are inclusive of transportation, loading, Unloading etc. as received at Site. For any variation in the rate of these materials during the tenure of this Contract, the Contractor’s rates for only those items, where these materials are used, shall be adjusted (either increased or reduced) by working out the difference between the rate specified above and the rate at which material shall be received at Site. No other factor for profit, over heads, or any other item whatsoever shall be considered over & above this difference, to calculate the adjustment in the rate of the relevant item. **Taxes are separate as applicable.**

The Contractor shall intimate the Owner/ Engineer prior to the procurement of such materials and shall subsequently submit invoices for the approval of the Engineer. Owner/ Engineer shall have the right to independently check the rates claimed in the invoices and adjustment in the Contractor’s rates for relevant items shall be made only thereafter.

Rates for all the items, other than those requiring use of above mentioned materials, shall remain fixed as mentioned in article no. 3 of the Section D.

**Tenderer to Notify mistake**
If Tenderer notices any mistakes in these Bill of Quantities he shall draw attention to the mistake in his tender letter to the Owner, but the Tender price shall be based on these Bill of Quantities as they exist and not amended Bill of Quantities.

**Item to be priced individually**

All items of the Bill of Quantities shall be priced individually and not grouped together. Rate for each and every Item shall be workable and self-supporting. The price shall, in addition, equal the sum filled in the schedule of price for Civil Works.

**Unit Rate to Include**

Rates indicated in the Bills of Quantities shall be for finished items. Generally it shall include for material, plant & tools, scaffolding, labour, incidental materials, fixing media, fixing, conveying, delivery, unloading, storing, returning, packing, handling, hoisting, lowering, waste, cutting, establishment costs, temporary works, tests, preliminaries, overheads, royalties, excluding GST and, profit and any other costs to complete the item in its final form and state.

**NOTE: GST should be included in price summary (section KC of volume-2) as a separate amount.**

Also the unit rate indicated by the Tenderer in this Bill of Quantities shall include for all the obligations to be fulfilled by the Contractor as stated in various sections of the Contract Document.

In case of discrepancy between Unit Rate and the Amount, Unit Rate of the Item shall prevail over the Amount and shall be considered as valid and correct. The Amount shall be arithmetically modified and considered accordingly, either in scrutinizing and deciding upon the Tender or during the Contract period.

**Quantities**

The quantities set out in the Bill of Quantities are the estimated quantities for the works, and they are not to be taken as the actual and correct quantities of the works to be executed by the Contractor in fulfillment of his obligations under the Contract. The Owner reserves the right to increase or decrease any of the quantities to any extent or to totally omit any item of work and The Contractor shall not claim any extras or damages on these grounds.

**Method of Measurement**

The works shall be measured net, notwithstanding any general or local custom, except where otherwise provided for in the Contract.

**Plinth Level should be considered as Finished Floor Level.**
IMPORTANT NOTES FOR EARTHFILLING WORKS

As the works covered under this contract mainly involve earth filling and related compaction, it shall be mandatory for the contractor to submit detailed test reports of the compaction tests carried out at site / laboratory during the relevant period together with each R.A. bills. Submission of R.A. bill without these detailed test reports of the compaction tests (if earth filling is claimed in the particular R.A. Bill) shall not be valid.

Contractor has to submit documents of royalty payment with each R.A. Bill.

SPECIAL INSTRUCTION:

Before commencing work, contractor will be required to verify correctness of contour drawing issued to him with this tender and submit his working of quantities of item 106C to the Consultant. Upon verification of these probable quantities by the Consultant, such quantities will be thus finalized and shall form quantum of item 106C. In no case, any additional quantity for achieving the desired level with required compaction shall be entertained.
LIST OF APPROVED MAKE / MANUFACTURER

GENERAL NOTES

a) The list of approved makes/ Manufacturers is to guide The Contractor to a high quality of construction. The Consultant reserves the right to select the Manufacturer or approved make from the List,

b) The Owner / Consultant reserves the right to decide on any of the approved make / Supplier/Manufacturer listed herein & also reserves their rights to add any particular make which is to be acceptable to the Owner / Consultant.

c) Manufacturer’s specifications not meeting the requirements of tender items / specifications shall not be considered, even though they are listed herein.

d) In case of materials, in the list, which cannot be made available at site, alternative Supplier / make / Manufacturer conforming to IS / BS, shall be suggested for approval of the Owner / Consultant.

FOR CIVIL WORK MATERIALS

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<tbody>
<tr>
<td>1.</td>
<td>Coarse Aggregates 6mm to 40 mm sizes</td>
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<tr>
<td>2.</td>
<td>Stone, Rubbles &amp; Gravels</td>
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<tr>
<td>3.</td>
<td>Reinforcement</td>
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<td>4.</td>
<td>Structural Steel</td>
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<td>5.</td>
<td>Shuttering plywood</td>
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<td>6.</td>
<td>Marine plywood</td>
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<td>7.</td>
<td>Commercial plywood</td>
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<td>8.</td>
<td>Laminate sheet</td>
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<td>10.</td>
<td>Flush door</td>
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<td>11.</td>
<td>Pressed steel door frames</td>
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<tr>
<td>12.</td>
<td>Z-Section steel window &amp; Ventilators</td>
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<tr>
<td>13.</td>
<td>MS &amp; GI seamless flush door shutters including door frames</td>
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<td>14.</td>
<td>Locks</td>
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<td>15.</td>
<td>Float Glass</td>
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<tr>
<td>16.</td>
<td>Mirror</td>
</tr>
<tr>
<td>17.</td>
<td>MS Rolling shutter</td>
</tr>
<tr>
<td>18.</td>
<td>Precast terrazzo tiles &amp; skirting (Mosaic)</td>
</tr>
<tr>
<td>19.</td>
<td>Polished Kotah stone slab</td>
</tr>
<tr>
<td>20.</td>
<td>Glazed tiles</td>
</tr>
<tr>
<td>21.</td>
<td>Ceramic tiles</td>
</tr>
<tr>
<td>22.</td>
<td>Construction chemicals / concrete and Mortar</td>
</tr>
<tr>
<td>23.</td>
<td>Admixtures, Plasticizers water proofing, Compound &amp; coating, floor hardeners, sealant, Non-shrunk Grout &amp; fillers, water repellent treatment</td>
</tr>
<tr>
<td>24.</td>
<td>Joint Filler</td>
</tr>
<tr>
<td>25.</td>
<td>Pre-coated steel roofing/walling sheets</td>
</tr>
<tr>
<td>26.</td>
<td>Paints</td>
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<tr>
<td>27.</td>
<td>Polish</td>
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<tr>
<td>28.</td>
<td>Water stopper</td>
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<tr>
<td>29.</td>
<td>Hardware</td>
</tr>
<tr>
<td>30.</td>
<td>Adhesives</td>
</tr>
<tr>
<td>31.</td>
<td>Aluminium sections</td>
</tr>
<tr>
<td>32.</td>
<td>Cement (OPC)</td>
</tr>
</tbody>
</table>

**LIST OF APPROVED MAKE / MANUFACTURER FOR ALUMINIUM WORK MATERIALS**

<p>| | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>Aluminium sections</td>
<td>Indal, Jindal</td>
</tr>
<tr>
<td>2</td>
<td>1” series sliding window sections</td>
<td>Minimum 3 mm thickness (as specified in drawing)</td>
</tr>
<tr>
<td>3</td>
<td>Aluminium finish</td>
<td>25 micron colour anodised – The Contractor should provide the micron thickness measuring equipment at site throughout the work progress for checking the anodising thickness. Visibly should looks uniform as per standards.</td>
</tr>
<tr>
<td>4</td>
<td>Glass</td>
<td>Modi float or Saint gobain</td>
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<tr>
<td>5</td>
<td>Pre-laminated Particle board</td>
<td>Novapan Exterior grade, Both side pre-laminated used with teak wood beading of 6 mm x 12 mm on all edges</td>
</tr>
<tr>
<td>6</td>
<td>BW Ply</td>
<td>Anchor, Kitply, Conswood or Equipment</td>
</tr>
<tr>
<td>7</td>
<td>Hydraulic Door closer</td>
<td>Ozone or Godrej</td>
</tr>
<tr>
<td>8</td>
<td>Pre-laminated Bison Panel</td>
<td>Anchor, Kitply or Equivalent</td>
</tr>
<tr>
<td>9</td>
<td>Pre-laminated Compact Sheets</td>
<td>Alfaica, Bloom Décor</td>
</tr>
<tr>
<td>10</td>
<td>Concealed dead locks</td>
<td>Dorset or Kitch</td>
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<tr>
<td>11</td>
<td>Concealed cylindrical locks</td>
<td>Yale, Dorset or Kitch</td>
</tr>
<tr>
<td>12</td>
<td>Hinges</td>
<td>Adjustable SS Friction stays of Kitch, Dorset or dunex</td>
</tr>
<tr>
<td>13</td>
<td>Window locks cum handle</td>
<td>Dill or equivalent</td>
</tr>
<tr>
<td>14</td>
<td>Silicon sealant</td>
<td>Packing in form of 300 ml cartridge GE, Wacker or DOW brand of neutral grade. Application shall be done through authorised dealer only</td>
</tr>
<tr>
<td>15</td>
<td>Filter rubber of glass panel</td>
<td>EPDM quality</td>
</tr>
<tr>
<td>16</td>
<td>Roller for sliding window</td>
<td>Casted from dearlean of Nylon 66 material &amp; bearing should be of Japan / Singapore make double Z type</td>
</tr>
<tr>
<td>17</td>
<td>Wool felt/weather strip</td>
<td>Shall be imported of Italy make or equivalent</td>
</tr>
<tr>
<td>18</td>
<td>Hydraulic Floor spring</td>
<td>Dorma, Ozone or Godrej</td>
</tr>
<tr>
<td>19</td>
<td>Perforated Aluminium sheets</td>
<td>Anodised, 2mm thick, 10mm dia. holes creating @ 40% to 50% opening area</td>
</tr>
<tr>
<td>20</td>
<td>Exhaust fan</td>
<td>300 mm size Alstom</td>
</tr>
</tbody>
</table>
100 **Excavation**

101 Excavation in any kind of soil for foundations of walls, columns, piles, pile caps, raft, ducts, lift pit, basement, and plinth beams, pipe trenches, etc. The rate to include shoring, strutting, refilling the trenches, foundation pits, plinth filling with selected excavated soil, ramming, watering, consolidating with mechanical roller in 15 cm layers, removing and stacking simultaneously the excavated stuff as directed and/or for filling up pits, trenches, plinths, etc. within the site, spreading spoils in layers on site as directed and compacting to achieve 95% Proctor density. Payment on the basis of net dimensions shown on drawing. Rates shall include extra space for shuttering or working. Plinth filling for an average height less than or equal to 75 cm shall be measured under this item.

101E Removal of Top soil with cutting depth not more than 300mm including carting and spreading excavated earth within the plot premises as directed, Watering, ramming, leveling in 250 mm – 300 mm layers, etc complete.

101F Deleted.

102 Same as item 101 for excavation in disintegrated and soft rock. On encountering such excavations, which The Contractor intends to claim under this item, he shall immediately inform the Clerk of work about his intention to do so and take the Engineer's prior approval.

103 Same as item 101 for excavation in hard rock. Excavation in hard rock requires blasting. The rate to include blasting with required tools, plants, explosives and accessories and breaking large rock pieces to suitable sizes staking etc. as directed.

104 Rate to include for carting away surplus materials/debris from site including loading & unloading & deposing off from the plot premises up to any lead. Payment on the basis of m3 measurement. For soil actual excavated soil is considered for measurement & payment. Rate to include transport including loading, unloading and stacking etc. complete & disposed items are to be dumped outside of the plot premises as per local regulation.

105 Filling for average height more than 750 mm in plinth, in plot, embankments, etc. with selected excavated earth (from other areas included in this Tender) brought from within the site including ramming, watering to optimum moisture content, compacting in 20-25 cm layers using mechanical vibro-rollers, etc. complete. Compaction shall be carried out up to 95% Proctor density. Actual measurement of compacted fill for the total depth shall be considered.

106 Filling in plinth, in plot, embankments or any other area within the site with approved, selected earth / selected quarry waste brought from outside site, including freight, transportation, loading, unloading, taxes, royalty, screening, etc. The approved, selected earth / quarry waste shall be as per the requirements specified for embankment construction in “Specifications for Road & Bridge Works” Revision 5 of Ministry of Shipping, Road Transport & Highways. Actual measurement of compacted fill shall be considered.

106A As per item 106 but filling including for ramming, watering, consolidating in 250-300 mm layers.
106B As per item 106 but filling includes for ramming, watering to optimum moisture content, compacting in 250-300 mm layers using mechanical vibro-roller of 8-10 t. capacity, etc. complete. Compaction shall be carried out up to 95 % as per table 300-2 of “Specifications for Road & Bridge Works” Revision 5 of Ministry of Shipping, Road Transport & Highways.

106C As per item 106 but for plot filling / earthwork including ramming, watering to optimum moisture content, compacting in 250-300 mm layers using mechanical vibro-roller of 8-10 t. capacity, etc. complete. Compaction shall be carried out up to 95 % as per table 300-2 of “Specifications for Road & Bridge Works” Revision 5 of Ministry of Shipping, Road Transport & Highways.

107 As per item 106 but for sand.

108 Rate to include supply of rubble as per General Specifications and of approved quality, lay rubble packing with interstices filled with approved murrum or stone dust, or sand watered and rolled to compaction in line, level, gradient, etc. complete. Finished dimensions shall be measured.

109 Pre construction anti-termite treatment to buildings shall be with emulsified insecticides as per IS: 6313 (part II) (latest revision). The Contractor shall carry out the work through an approved agency and provide a guarantee for seven years on a stamp paper from an approved agency. Only plinth area shall be measured for payment.

110 Bailing out of storm water normally is assumed to be included in the excavation rate. Rate in this item is to include use of pumps continuously as required for bailing out of underground seepage water and discharge through pipes up to a lead of 100 m or otherwise as directed. Payment will be on the basis of horse-power rating of the pump/pumps, multiplied by the no. of hours in use. A record of the use of pump/pumps with respective rating and hours of operation will be maintained. Authorization of the pumping shall be obtained from the Clerk-of-Works to avoid unnecessary expense and damage to the soil structure.

111 As per item no. 110 but using a complete well point system for bailing out of underground water.

112 Excavation in any kind of soil to reduce levels as shown on drawing and where directed. The rate to include mechanical/manual excavation and carting, spreading, watering and compacting the excavated material within a radius of 500 m. Spreading and consolidation shall be in 250-300 mm layers. Compaction shall be carried out up to 95 % as per table 300-2 of “Specifications for Road & Bridge Works” Revision 5 of Ministry of Shipping, Road Transport & Highways. Payment shall be made on the basis of net dimensions shown on the drawing.

113 Boring for under-reamed piles as per drawings and specifications. Reinforcement, Concrete and bulb making shall be measured separately.

114 Making bulb for under reamed piles as per drawings and specifications. Reinforcement, Concrete and boring for the pile shall be measured separately.

115 Excavation in any kind of soil for depth up to 1.50m to reduce levels in borrow areas, pits, ponds etc. as shown on drawing and where directed. The rate to include mechanical / manual excavation and carting and spreading surplus excavated material. Payment shall be made on the basis of net volume of excavation.
116 Cutting & stacking of trees including removal of roots up to minimum 1.0mt below existing ground level and refilling the pits with approved soil and compaction in layers, all as per MORTH&H specifications. Include for cutting of trunks/ branches and stacking of serviceable material and disposal of unserviceable material within a lead of 1000 m as per Engineer’s direction. Girth of tree shall be measured one meter above existing ground level. Trees which are more than 1.2m high shall be considered for payment.

117 Filling in plinth, in plot, embankments or any other area within the site with approved quality coarse aggregates of size 20mm - 40 mm, including freight, transportation, loading, unloading, taxes, royalty, screening, etc. Actual measurement of fill shall be considered.

151 Excavating existing bund / mound of earth above ground level. The rate to include for filling with selected excavated soil, ramming, watering, consolidating in 20-25 cm layers, removing and stacking simultaneously the excavated stuff as directed and/or for filling up pits, trenches, plinths, etc. within a radius of 100M. Rate to include for dismantling any electrical / water supply / other services lines buried within the existing Bund. Payment on the basis of net dimensions excavated.
Concrete

Generally all Concrete work shall be as per IS 456 and measured in M3. No allowance is made for thickness of members. Characteristic concrete strength (28 days) for items in 204 shall be M20 or 200 kg/sq cm. For higher strengths such as M25 (210), M30 (211), etc., additional rate over the rate for M20 is required. The rate shall also include mix design for various strengths and cubes shall be taken from fresh concrete and tested as per the relevant IS code. No extra amount will be paid for admixtures to improve workability or to influence setting time or gain early strength, except for water proofing admixtures for which item is separately mentioned. The rates shall include for providing of all materials, mixing, placing, forming pockets for holding down bolts, placing inserts as shown in drawing at correct location, level, necessary changes in formwork, reinforcement, etc. complete with curing. All concrete shall be machine mixed and machine vibrated. Formwork and Reinforcement measured separately.

The Contractor shall use minimum cement content of 240 kg, 280 kg, 340 kg, 380 kg and 410 kg per m3 of M10, M15, M20, M25 and M30 concrete respectively for designed concrete mix. Above minimum cement content is for 20mm nominal size aggregate and medium workability (i.e. limit of slump shall be 25-75mm).

It is mandatory for The Contractor to employ weigh batching plant / plants of adequate capacity at Site throughout the Contract period. All concrete of grade M20 and above shall be produced by Weigh Batching only. Conversion to volumetric system of concrete manufacturing shall NOT be allowed.

However, The Contractor will be permitted to use Ready mix concrete (RMC) by establishing automatic batch mixing plant on site or procuring it from such a plant from the vicinity of the plot. In such a case, he shall be allowed to replace maximum 20% cement (by weight) with fly ash (as per IS. 3012). The minimum cement content mentioned above shall be considered as total of cement and fly ash for RMC. Design mix of the Concrete shall be approved by the Engineer prior to usage of concrete at Site. The Contractor shall be required to get all ingredients tested as per relevant IS Codes at intervals as specified by the Engineer. Apart from the test certificates of RMC Supplier, Cube tests & slump tests shall be performed at site. Such cubes shall be sampled & tested as per relevant IS Codes in the laboratory established at site by The Contractor. All batches of RMC supplied to the Site shall be accompanied by Manufacturer’s certificate containing time of mixing, time of leaving the Manufacturer’s site and mix proportion of that particular batch. The Owner / the Engineer shall have right to visit and inspect the concrete Manufacturer’s premises at any stage of the Work. Rate to include for all equipments like pumps, concrete carrying trucks, etc., materials, labour, etc. complete. Measurement shall be on the basis of net quantity of concrete worked out from the dimensions/ details given in the drawing.

The rate to include providing and laying plain cement concrete with 20mm and down size graded stone aggregate, machine mixed, consolidation, finishing, curing, etc. complete, as base or sub base for masonry walls, piers, R.C.C. foundations, base for concrete floor, etc. The proportion of the mix for concrete shall be by volume.

Brickbat cement concrete will be as per 201 except that 40mm and down size broken brickbats of well-burnt bricks are used as aggregates in place of stone aggregate.

DELETED
M20 concrete in Raft, pedestals foundation, columns, beams, brackets, walls, fins, pardis, gutters, pile, pile caps, floor slabs, weather sheds, lintels, trenches, shelves, stair/steps etc.

M20 concrete in machine foundations comprising footings, rafts, pedestals, columns, walls, beams, slabs, stairs, brackets, etc. complete below plinth or above plinth at any level.

Supply and lay precast concrete pavers 600 x 600 x 75 mm as aprons. The rate shall include for forming pavers in M15 concrete, 50mm thick sand bed lay in proper line and level, jointing with 1:3 cement sand mortar, curing, etc. complete.

The rate to include for non-shrink cement grout in 1:2 cement mortar under steel column bases, machinery bases, around foundation bolts, holding down bolts, etc. and including forming sides wherever necessary.

M15 concrete in Raft, pedestals foundation, columns, beams, brackets, walls, fins, pardis, gutters, pile, pile caps, floor slabs, weather sheds, lintels, trenches, shelves, stair/steps etc.

M25 concrete in Raft, pedestals foundation, columns, beams, brackets, walls, fins, pardis, gutters, pile, pile caps, floor slabs, weather sheds, lintels, trenches, shelves, stair/steps etc.

M30 concrete in Raft, pedestals foundation, columns, beams, brackets, walls, fins, pardis, gutters, pile, pile caps, floor slabs, weather sheds, lintels, trenches, shelves, stair/steps etc.

M35 concrete in Raft, pedestals foundation, columns, beams, brackets, walls, fins, pardis, gutters, pile, pile caps, floor slabs, weather sheds, lintels, trenches, shelves, stair/steps etc.

Providing and fixing factory made precast RCC perforated drain covers, having concrete of strength not less than M-25, of specified sizes, reinforced with T.M.T. bars, including providing perforations, including providing edge binding with M.S. flats of size 50 mm x 1.6 mm complete, all as per direction of Engineer-in-charge.

Extra for use of plasticizer or other additive of approved make as per Manufacturer's proportion over item No 204, 206 and 258.

The rate to include for supplying and fixing in position approved make PVC water stoppers of Caliplast or equivalent make for expansion & construction joint etc. as directed.

M20 concrete for shaft of water tank up to plinth.

M20 concrete for shaft, stair, columns, tie beams, slab, parapet etc. complete up to 15 m height from plinth. Rate to include for changing in formwork and reinforcement for necessary opening as per the drawings.

Same as item No 217 but, for every additional 5m lift.
219 M20 concrete for water tank container of any shape having bottom height of up to 30 m. from plinth.

220 Same as item No 219 but, for height of 30 m to 55 m from plinth.

221 Extra over item No. 216, 217 and 218 for M25 concrete.

222 Extra over item no. 204 for Providing and laying reinforced cement concrete structural slab using Tremix system or equivalent including Poker vibration, Surface vibration, Vacuum de-watering, Power floating, trowelling, topping, making concrete joints (if required), etc. complete. Reinforcement/shuttering will be measured separately.

223 Extra over the rate of concrete for supplying and using Concrete Penetrating Corrosion Inhibitor (CPCI) as admixture. CPCI shall be used as admixture into wet concrete along with batch water during the mixing of cement, sand and aggregates. The CPCI shall be both a Cathodic & anodic inhibitor & free from toxic nitrites / chromates and shall migrate over a distance in concrete to prevent corrosion of steel re-bars. **Non-migrating contact inhibitors are excluded.** The CPCI shall be non-toxic with minimum pH value of 9.5.

The dosage & method of usage shall be as per the specifications of the approved Manufacturer. The CPCI shall be FerroGard-901 of Sika Qualcrete Ltd., or other such approved equivalent having minimum 2 years' proven performance & field validation history in Indian conditions.

224 Providing and placing ready Mix Concrete (RMC) at all floors for RCC elements of the building including vibrating, curing, cleaning the site etc complete confirming to relevant standards specifications. The rate of item is inclusive of cost of cement. RMC process shall be fully automatic and computerised. Proportion of the ingredients shall be approved by Engineer in-charge before placing of the concrete. Testing of all materials and produced concrete shall be done as per the relevant IS standards of the concrete. Rate shall be excluding the cost of form work and reinforcement.

251 Dismantling the R.C.C. (plastered or unplastered) beams, slabs, lintels, columns, pardis, walls, platforms, etc. at any level/depth including finishing the broken surface to match with the surrounding, disposing the debris including cutting the reinforcement if any, etc. complete as directed by the Engineer.

251a Chipping of pile with Mechanical Means like Pneumatic breaker or Hilti breaker or approved equivalent for required depth as specified in the drawings. Rate to include the Labour, Equipment for chipping, disposing of the debris outside the plot etc. complete as directed by Engineer.

252 Same as item No.251 but dismantling and disposing machine foundations only.

253 Chipping and removing of concrete cover for exposing reinforcement including cleaning the exposed reinforcement and concrete surfaces and making necessary arrangement for tying new reinforcement with exposed reinforcement at any level. Rate to include for removing the debris as directed up to lead of 1 km.

254 The rate to include for providing and laying M20 cement concrete with 20mm and down size graded stone aggregates, machine mixed, consolidation, immediate finishing, curing, etc. complete at basement level of around 8.0m from plinth level. The
concrete shall be laid over dry and clean surface. It also includes necessary shuttering for forming drain, sump, etc. as shown on drawing.

255 DELETED.

257 Providing gunniting treatment to ribs, slabs, beams, column etc. at any height including removing spalled concrete from members by light hammering, chiselling etc. cleaning the reinforcement of loose scale, rust etc. by means of wire brush, applying rust remover and rust convertor such as Rusticide SS or approved equivalent, tying additional reinforcement if required (measured separately), gunniting with 1:3 cement sand mortar (up to 40 mm thickness) in two course if required with air pressure of 40 to 50 psi in the nozzle, including scrapping of undulations of gunited surface using mason's trowel.

258 Repairing RCC members like fins, slabs, columns, beams etc. at any height including removing cracked / worn out concrete cleaning of reinforcement by means of wire brush, applying rust remover, preventer, tying additional reinforcement (measured separately) applying bond coat ‘Conbond’ or equivalent, concreting with M20 grade concrete using suitable plasticizer, necessary formwork and finishing to match with the adjoining surface, curing with curing compound etc. complete as per instructions of Engineer.

259 Providing and applying ‘Conbond’ or other approved equivalent epoxy based bonding agent on chipped / exposed surfaces of concrete/ brickwork at any height. Include for cleaning of existing surface with blower and applying bonding agent as per Manufacturer's instructions. Measurement shall be on the basis of width x height of the area over which the bonding agent is applied.

260 Same as item No.251 but dismantling and disposing PCC only.

261 Supply and fix at any height precast concrete spiral stair of approved shape. The rate shall include for forming steps in M20 concrete, lay in proper line and level, formwork, joining with 1:3 cement sand mortar, curing, reinforcement (measurement separately) etc. complete.

262 Integrity testing of Pile using Low Strain/ Sonic Integrity Test/ Sonic Echo Test method in accordance with IS 14893 including surface preparation of pile top by removing soil, mud, dust & chipping lean concrete lumps etc. and use of computerized equipment and high skill trained personal for conducting the test & submission of results, all complete as per direction of Engineer-in-charge.
Formwork

Rate to include for formwork, centering, boxing, shuttering, propping, including special nuts, bolts etc; in perfect line, level, plumb and, if required, to provide camber, slope and removal thereof. Forms shall be watertight and thoroughly cleaned before placing concrete. Colourless oil or grease of approved quality shall be applied to forms before placing steel. Rate to include for any shape including chamfers, residues, grooves, drip moulds etc; as directed. Mode of measurement shall be in \((m^2)\) sq. m regardless of shape, size and thickness of members.

Rate to include for sawn timber or steel or plywood of approved make formwork and preparation of concrete surfaces to receive plaster or any other finishes. Concrete members for which formwork is to be provided under this items are columns, foundations, pedestals, beams, pards, fins, gutters, stairs, lintels, walls, shelves, weather shed, slab, etc.

These items are for elements having 'exposed' RCC finish. Since there will not be any plaster to cover concrete members for which formwork is to be required under this item and since no correction or patch work can be done, work shall be more precise to yield accurate dimensions of members in line, level and plumb. The surfaces shall be neat, clean and smooth and free from any blemish. No definite texture or pattern is required for fair finish in 302, whereas for 303 such will be the case. Formwork shall be in laminated shuttering plywood (plastic coated) or steel - as required. Same shuttering material shall be used for standard sizes as well as for residual sizes. Only new material shall be used. Include for neat cleaning and rendering of the exposed concrete surface after de-shuttering as directed by the Engineer.

Extra rate for circular shuttering of any radius is to be required over item no. 301 at any height. No extra for lift shall be paid.

Extra rate for providing staging to form work for slab of more than specified height more than 4.5m

(a) For each stage

Fair finish form work shall be in plywood, sawn timber or steel as required for shaft, container walls, stairs, slab, beams, columns, parapets, etc for all concrete work including staging, scaffolding, etc. either using slip form or lift form or any other method approved by the Engineer, to get more precise and accurate dimensions of members in line, level and plumb.

Forming pockets, cut-outs to receive foundation bolts, anchor bolts, railing post, etc. in RCC work and the same shall be filled with sand.

Supplying and fixing in position approved quality pre-moulded joint filler or Shalitex / capcell HD 100 / Armacell board or other approved equivalent confirming to IS 1838 in expansion joints between beams, columns, slab, machine foundations, etc. Rate to include for cutting, fixing, keeping in position, wastage, etc.

Supplying and laying polysulfide sealant in expansion joint, around door and window frames, etc. at any height - of approved make like GE/ PIDILITE / Choksi Chemicals or other approved equivalent. Include for proper cleaning of the joint, primer, edge tape, backer road etc. as per Manufacturer’s instructions.
310 Providing and laying 175 mm wide 1.2 mm thick aluminium strip to cover vertical / horizontal expansion joint with fixing screws at fixed end and sliding end with slotted holes, etc. complete as per drawing or as directed.

311 Providing and laying 150 mm wide 1 mm thick strip of SS-304 to cover vertical / horizontal expansion joint with fixing screws at fixed end and sliding end with slotted holes, etc. complete as per drawing or as directed.
400 Reinforcement

The rate shall include for Supply, cutting, straightening, bending, lapping, placing, binding, fixing in proper position, at any height with 16 gauge annealed binding wire, necessary chairs for keeping the reinforcement in position and wastage, cement mortar cover blocks at proper positions to maintain necessary cover as shown in drawings. As the length of reinforcement required in various structural members may be more than the standard length of reinforcing bars available in the market, The Contractor shall carry out the lapping / welding of reinforcement as specified by the Engineer at no extra cost. Welding rods, labour and machine shall be The Contractor’s supply. Reinforcement shall be bent in accordance with the procedure stipulated in IS: 2502. Standard weight shall be measured and paid for the net length of the bar. **Material and Labour cost of laps & chairs will not be paid.**

401 Mild steel reinforcement conforming to Grade I of IS: 432 or equivalent having minimum characteristic strength \( f_y = 250 \text{ N/mm}^2 \).

402 TMT High yield strength deformed bars conforming to IS: 1786 and IS: 1139 with a minimum 0.2% proof stress of 415 N/mm2.

403 TMT High yield strength deformed bars conforming to IS: 1786 and IS: 1139 with a minimum 0.2% proof stress of 500 N/mm2.

404 Rate to include for supply, cut and lay in position, supporting where necessary, welded wire mesh for concrete work. Include for lap of 150 mm net and wastage.
**500 Brick Masonry**

The rate shall include for supply of all materials, labour, necessary scaffolding and plant etc. and for embedding electrical conduits, boxes, holdfasts of doors, windows, sanitary and water supply pipes, toothings, forming opening, racking out joints, curing etc. complete.

The rate shall include for masonry work of any shape e.g. wall, pilaster, projection, columns, steps, curved or tapered walls, drip courses, parapet, load walls, etc. as per drawing. All materials, joints, bond, mortar, sampling, testing, placing, scaffolding and curing etc shall conform to IS: 1905 IS: 5454, IS: 3495 & IS: 13757. Minimum crushing strength for burnt clay brick shall be 35 kg/cm² and for fly ash bricks shall be 75 kg/cm² for fly ash bricks unless otherwise specified. Bricks shall be procured from an approved supplier only.

501 Brick masonry in 1:6 cement mortars with well burnt locally available good approved quality bricks having strength of 35 kg/cm² as per drawing in true line, level and plumb. Brick masonry under this item shall be measured in M³.

502 Same as item no. 501, but brick masonry in 1:4 cement mortars.

503 As per 501 but half brick masonry in 1:4 cement mortars in partition walls reinforced with two 6MM dia. M.S. bar placed at every 4th layer. No extra for lift shall be paid. Brick masonry under this item shall be measured in M².

504 As per 503 but partition wall with brick on edge.

505 As per 501 but brick masonry filling beneath A.C. roof with 1:6 cement mortar. Brick masonry under this item shall be measured in M.

506 Rate to cover additional cost for providing bricks with a minimum crushing strength of 70 kg/cm² in 501 & 502. No extra for lift shall be provided.

507 Rate to include for Random Rubble masonry in walls, pilasters, projections, steps, etc. in 1:6 cement sand mortar with locally available good approved quality Rubbles as per drawing in true line, level and plumb up to plinth level including dressing of stone, wherever required, curing, scaffolding, wastage, etc. complete. Provide bond stone of fill width of the wall for every 0.5m² area of wall. Minimum wall thickness will be 300 mm. Measurement shall be on the basis of average wall thickness.

508 Solid concrete block masonry in 1:6 cement mortar as per drawing in true line, level and plumb. Solid concrete block masonry under this item shall be measured in M³. Solid concrete block shall be of either 65mm or 150mm or 200mm thickness.

509 Same as item no 501 but using Fly ash bricks having minimum crushing strength of 75 kg/cm².

510 Same as item no. 509 for masonry work using 1:4 Cement mortar.

511 Same as item no 503 but using fly ash bricks having minimum crushing strength of 75 kg/cm².

512 Same as item no 508 but using hollow concrete block.
Providing & constructing Autoclaved Aerated Concrete Block masonry with AAC Block of approved make having dry density of 551-600 kg/m³ & compressive strength of 3 to 3.5 N/mm² in cement mortar 1:4 as per drawing in true line, level and plumb etc. complete as per manufacturer’s specification. AAC Block masonry under this item shall be measured in M³. AAC Block shall be got approved from owner/Architect/consultant before commencement of work.

Providing and fixing 190 x 190 mm line light glass bricks as per approved sample with PVC spacer. The white cement sand mortar in joint in 1:2 (Cement: Sand) proportion shall be used as per the drawings and direction of Architect or Engineer-in-charge, etc. for all floors, levels, heights, shapes etc. complete. Glass brick shall be of good quality, manufactured by “KIG brand – Indonesian” or equivalent as approved and specified in the item. The size of the block shall be 190 x 190 x 80 mm or otherwise specified in the drawing. Sample shall be approved by the Architect or Engineer-in-charge.

Providing & Fixing 148mm thick Gypsum Board partition of Saint Gobain or Boral which includes two layers of tapered edge 15mm thick Gyproc® Fireline (conforming to IS:2095 – Part-I - 2011) is screw fixed at dry area side and single layer 15mm thick Gyproc® Fireline Gypsum Board and 15mm thick Gyproc® FRMR Gypsum Board (conforming to IS:2095 – Part-I - 2011) is screw fixed at wet area side with drywall screws of 25mm & 50mm at 300mm centres to either side of 70mm Gypsteel Ultra™ C stud (0.5mm thick having one flange of 34mm and another flange of 36mm made of GI Steel) placed at 610mm centre to centre in 72mm Gypsteel Ultra™ floor and ceiling channel (0.5mm thick have equal flanges of 32mm made of GI steel), which is anchored to the floor & true ceiling using suitable anchor fasteners. The boards are to be fixed to the framework with joints staggered to avoid leakage through joints. A Gypsteel Ultra Noggin Channel of 70mm width (0.5mm thick having two flanges of 40mm each) has to be provided at the horizontal joints of the one side of boards screw fixed to the studs using metal to metal flat head screws. Gyproc® Resilient bar has to be provided at horizontal every 610mm c/c other side of boards screw fixed. Finally square and tapered edges of the boards are to be jointed and finished so as to have a flush look which includes filling and finishing with Gyproc Jointing compound and Gyproc Joint Paper tape (as per recommended practices of Saint- Gobain Gyproc India). The junction of the partition with masonry & all penetration through the partition has to be treated with a intumescent fire sealant of equivalent fire rating. 48mm Rockwool slab of density 48Kg/m³ shall be provided in the cavity. Gyproc® Angle bead has to be provided at every ‘L’ junction and external angle and Gyproc® shadow line stopping bead has to be provided at column and wall end partition.

Dismantling brick masonry walls and partitions, plastered or unplastered, brick soling at any height/depth as per instructions including finishing the broken surfaces to match with the surroundings, disposing the debris including cutting the reinforcement, if any, etc. complete as directed by the Engineer.

Same as item No.551 but dismantling and disposing only.

Same as item No.551 but dismantling and disposing rubble masonry.

Same as item No. 551, but dismantling and disposing Reinforced brickwork.
600 Water Proofing

Unless otherwise specified, The Contractor shall carry out water proofing treatment in basements, terrace, water retaining structures, sunken portion/ floors of bath, W.C. and kitchen etc. through an approved firm like India Water Proofing Company.

The Contractor shall provide a guarantee for Ten years on a stamp paper in an approved form. While tendering, The Contractor should specify the type of treatment proposed to be provided and the details of the specialist agency, which will carry out the treatment.

Any defects/leakages noticed during the guarantee period shall have to be rectified within a week time free of cost by the Contractor including reinstating the surface to its original condition and finish.

The rates shall include drying and cleaning the surface free of dust. The rates shall include for providing water proof lime/cement concrete terracing of adequate thickness to give desired slope for drainage of rain water from terrace. The actual area treated shall be measured and paid for. No extra shall be paid for any fillets, grooves or rounding.

601,602 Water proofing for basement including walls, floors, lift pits, etc. to prevent ingress/dampness from outside water.

603 Providing & laying cement water proofing of average 125mm thickness for terraces using cement mortar 1:5, arranging brickbats according to the slope, adding suitable water proofing chemical for water tightness and again providing on top cement mortar 1:4 including addition of water proofing chemical, finishing the top with neat cement @ 2.75 kg/ m² and preparing the rough surface as per the direction. The treatment shall be carried out up to 300 mm height of parapet wall (75 mm. deep groove to be provided for this purpose in the parapet wall) with 75 mm round fillet at junction of terrace and the parapet wall.

604 Rate to include supply and use of water proofing additive Accoproof or equivalent of approved make in cement concrete or cement mortar as directed.

605 Supplying and laying damp proof treatment using bitumen felts in accordance with IS: 1609 (latest edition).

606 Supplying and applying water proofing treatment for basement including walls, floors, lift pits, etc. at any depth and also on walls above plinth by using acrylic based polymer modified cementitious material like “Tapcrete – 151” of CICO or other approved equivalent coating in two coats as per Manufacturer's requirements and as directed by the Engineer. Include for preparation of surface, wastage, curing, etc. as specified by the Manufacturer. Measurement shall be on the basis of net area water proofed.

607 Providing & laying Chemical Water proofing in sunken slabs of bath, W.C., terrace etc. Provide 15 mm thick 1:3 cement mortar plaster with acrylic based water proofing compound 'Hydro shield' of ConTech Chemicals or other approved equivalent on vertical surfaces. Provide 40 mm thick IPS using 1:2:2 cement : sand : grit with acrylic based water proofing compound 'Hydro shield' of ConTech Chemicals or other approved equivalent on floor of the Sunk with a 75 mm fillet at junction of vertical surface and the floor.
Providing and laying Tar felt water proofing treatment over sloping roofs (AC/GI/Timber) as per IS: 1346(1976) or latest. The rate shall also include covering bolts using bitumen felt washers.

Providing and laying Box Type Water proofing outside furnace foundation as per following specifications.

Horizontal surface:
About 20 mm thick layer of cement mortar 1:4 mixed with approved waterproofing compound to be spread over good quality lean concrete. 6 mm down stone aggregates to be spread at random and to be embedded in the layer already provided. Rough quarry finished Kotah stones (450mm x 300 mm, 25 mm thick) shall then be laid over the bed mortar leaving a gap of Approx. 10 to 12 mm between stones. The joints so formed shall be grouted manually with cement slurry mixed with approved quality water proofing compound and coarse material. A final layer of approx. 18 mm thick cement mortar 1: 5 shall then be laid. Raft to be cast over this layer.

Vertical Surface:
Kotah stone slabs (20 mm thick) shall be placed on the face of wall leaving a gap of about average 12 mm between wall and inside face of the stone. The outer of the stone to be covered with 1:5 cement mortar (12 mm thick) after the gaps are filled with cement slurry and mixed with water proofing compound and coarse aggregate. Rough plaster shall be finished smooth.

Joint at intersection of horizontal and vertical surface will be finished with vata in rich mortar with coarse aggregates.

Filling in sunken slabs of toilets, kitchen, terrace or any other area with approved quality light weight material in layers, watering, ramming, etc. as directed. Include for freight, transportation, loading, unloading, taxes, royalty, screening, mixing, etc. Actual measurement of compacted fill shall be considered.

Supplying and laying chemical water proofing treatment to the sloping / flat floor at any height with product of Krishna Concare / CICO/ Choksi Chemicals as per Manufacturer's instructions & having layers -

A. A seal coat of acrylic resin based emulsion like “Sealer"
B. Self priming coat of acrylic emulsion polymer modified cementitious material like Hydracrete - ACR
C. A polypropylene mesh of 0.5mm to 1.0 mm thickness
D. Two coats of Hydracrete - ACR

include for preparation of surface, backing, curing and making fillets at the edges /corners, grooves, etc. Net area water proofed shall be measured.

Same as item no.611 above but at sloping / vertical walls and without polypropylene mesh.

Providing and laying 4 mm thick APP modified polymerized bituminous membrane at any height with mineral finish by gas torching. Rate to include bitumen primer coat at 0.25 kg/m2, minimum overlaps of 100 mm on sides & ends etc. as per
Manufacturer’s Specifications. Rate to include 50 mm thick screed 1:2:4 (1 cement :2 coarse sand: 4 graded stone aggregate) as protective layer. Rate shall be paid on the basis of net surface area applied.

614 Supplying and applying integral penetrating crystalline waterproofing treatment like “Penetron by Penetron USA” or other approved equivalent having speed of penetration of 31 cms in 56 days and resistance to 16 bar hydraulic water head for basement including walls, raft, lift pits, etc. at any depth as per Manufacturer's requirements and as directed by the Engineer. Complete work shall be carried out by the authorized applicator as per the manufacturer's approved method of waterproofing. Rate to include cleaning of surfaces by water jet, preparation of surfaces, Providing and Sprinkling Penetron Plus (dryshake) @ 0.5 kg./ smt. on mud mat before casting raft, treating cold joints, wastage, curing, plugging existing cracks & surface damage etc. as specified by the Manufacturer. Measurement shall be on the basis of net area water proofed.

651 Removing existing water proofing layers including bitumen, brickbat coba etc. from terrace, stair cabin etc. lowering the dismantled materials, stacking and storing the reusable materials, removing the debris as directed up to a lead of 1 km., if any, etc. complete as directed by the Engineer.

652 Removing filling from sunk portion of toilet block.
Flooring

Rate shall include for supply of all material, labour, plant, fixing in position, providing falls for proper drainage, bedding, scaffolding, compacting, polishing if required, curing etc; complete. The rate shall include for work in any position, height and floors. The rates shall include for cutting, fitting and making good up to desired satisfaction of the Engineer. Work under this item shall be measured in M2.

All tiles/ flooring material shall be for first grade quality.

Providing and laying 50 mm thick I.P.S. flooring with under layer of 38 mm thick 1:2:4 cement concrete with 20 mm graded stone aggregate in alternate panels not more than 10 sq. m area and 12 mm thick 1:1 cement mortar with a suitable mineral pigment, as directed. The topping shall be mixed and laid in panels conforming to IS: 2114. The rate to include for forms, machine mixing, curing, preparing grooves and finishing etc; complete.

As per item 701 but for replacing mineral pigment in top 12 mm layer by metallic floor hardener (Dosage – 4 kg/sqm) (Ironite or approved equivalent) as per Manufacturer's specifications.

Rate to include for providing 20mm thick grano topping over freshly laid R.C.C. slab as per IS:2571 with mixing of improved Rockite or equivalent in cement as per Manufacturer's specification and compacting, finishing, curing, etc. complete as directed.

Rate to include for supplying and laying 25mm thick mosaic tiles in flooring in average 30/50mm thick 1:2 lime mortar and in skirting or dado in average 20MM thick 1:2 Cement mortar bedding. Rate for desired size and colour make from good quality marble chips in grading No.3, 4 and 5 in desired proportion. Include for bedding topped with cement slurry closed joints and joints pointed with matching, colour cement slurry, including curing, machine polishing, washing and wax polishing as directed. Rate to include wastage also.

As per item 705, but providing on walls as dado/skirting including making jari and finishing the same. Dado/skirting shall not be projecting more than 12mm from plastered surface.

40 mm thick marble chips flooring rubbed and polished to granolithic finish of approved colour under layer 31 mm thick cement concrete 1:2:4 (1 cement, 2 coarse sand, 4 graded stone aggregate 12.5 mm nominal size) and top layer 9 mm thick with white, brown or white and brown marble chips of size from 4 mm to 7 mm nominal size laid in cement marble powder mix 3:1 (3 cement, 1 marble powder) by weight in proportion of 4:7 (4 cement marble powder mix: 7 marble chips) by volume including cement slurry rounding of edges and glass/pvc strips (treads) (40 mm x 4 mm) nosing of steps etc. complete. Rate to include for using white cement only.

Same as per item 705, but supplying and laying marble flooring with ordinary polish.

Same as per item 708, but with mirror polish.

Providing and laying in position 6 mm thick glazed tiles of first quality Johnson or Somani Pilkinton or approved equivalent ceramic tiles or marble tiles in floors, skirting, dado, sills, jambs and channel in cement slurry over minimum 12 mm thick 1:4 cement mortar bedding. Rate to include for laying in proper position, slope and level, closed
jointed and painted with white cement including curing, acid cleaning etc. complete as directed.

711 Providing and laying 25 mm thick rough Kotah stone of approved quality with selected and sorted for uniform colour in floors, platforms, ottas, sills etc. as directed. Rate to include for 1:6 cement mortar bedding, properly jointed and curing etc. complete.

712 Providing and laying green polished kotah stone of approved quality having size not larger than 600 mm, selected and sorted for uniform colour in floors, dado, ottas, jambs, parapet top, etc. as per design with nominal pattern, edge moulding and as directed. Rate to include for necessary bedding in 1:6 cement mortar, jointing, polishing with oxalic acid (3 or more coats as required), curing, daily mopping with water & kerosene for at least 15 days, etc. complete.

713 Same as per item 712 but for providing 25 mm thick polished Kotah stone skirting on walls including making jari and finishing the same. Include for making 8 mm size groove in plaster just above the stone and finishing the skirting flush with the wall plaster.

714 Providing and laying in position 25 mm thick polished Kotah stone of uniform color and sorted out for green colour in single piece for steps, risers and landing of staircase and window sills as per drawing including providing necessary cement mortar 1:2 bedding with cement slurry, forming grooves as per details, rounded edges, curing, polishing with oxalic acid (3 coats or more as required), daily moping with water & kerosene for at least 15 days, etc. complete.

715 Providing and fixing 25 mm thick green single polished kota stone of uniform size and colour in single pieces for platforms, sinks, shelves (double polished), morry, etc. in dado or fascia including necessary edges machine cut (uniform thickness), rounded edges, necessary cement mortar bedding, cement slurry, cement jointing, polishing with oxalic acid (3 coats or more as required), daily moping with water & kerosene for at least 15 days & providing hole for sink etc. complete.

716 Same as per item 708, but supplying and laying granite in flooring and walls.

717 Providing and laying dressed and single polished "Agra" red stone 40 mm thick in flooring, skirting in required sizes, shapes as directed. Rates to include for necessary cement slurry, 1:4 cement mortar bedding, jointing in cement slurry mixed with pigment of approved shade, forming grooves, pointing, curing etc. complete.

718 Rate to include for immediate finish with Cement slurry and Steel trowel to concrete surfaces of slabs, lofts, shelves etc in line and level complete.

719 Supplying, laying and fixing well burnt first quality Manglore tiles on slopping slab with 12mm bedding of C:M 1:2. Rate to include ridge pieces, wastage laps valley piece etc. complete. Rate shall be paid on the basis of surface area of basic element.

720 As per item No. 707 but using grey cement.

721 Marble chips skirting/dado 21mm thick with under layer 15mm thick cement plaster rubbed and polished to granolithic finish of approved colour, top layers 6mm thick with white, brown or white & brown marble chips of sizes from smallest to 4mm nominal size laid in cement marble powder mix 3:1 (3 cement, 1 marble powder) by weight in proportion of 4:7 (4 cement marble powder mix: 7 marble chips) by volume (including risers). Rate to include for using white cement only.
722  As per item no. 721 but using grey cement.

723  As per item 715 but using polished cuddappa stone.

724  As per item 715 but using polished Chittoor stone.

725  Providing and laying over well compacted ground, 50 mm to 65 mm thick rough red stone of approved quality as directed. Rate to include for compaction of soil and 1:6 cement mortar bedding, properly jointed and cured etc. complete.

726  Brick on edge paving with 1:6 cement mortar as sub base of flooring in line and level including curing, providing falls for proper slop etc. complete as per drawing and design.

727  P.V.C. Tiles - Supply and lay P.V.C. tiles of approved make, colour and pattern with thickness not less than 1.6mm. Use adhesive in accordance with Manufacturer's recommendations. Remove undulations in screed before laying tiles. Include for all cutting and fitting around socket outlets and other fittings. Also include two coats of water/wax emulsion polish as per Manufacturer's recommendations.

728  Supplying, laying and fixing well burnt first quality Manglore tiles on sloping structural steel roof. Rate to include for ridge pieces, valley pieces, wastage, laps etc. complete. Rate shall be paid on the basis of surface area of basic element. Structural steel members measured separately.

729  Providing & fixing in position at any height 6 mm. thick broken glazed tiles in size 12 mm to 20 mm, of odd sizes and shapes laid in approved crazy pattern (with one or more color in pattern, as directed) for floor/ dado having plain or curved surfaces, in cement mortar 1:3 proportion with cement, floating, joints finished with white or approved colour cement including tamping, watering, curing, cleaning with oxalic acid, etc. complete as per the Engineer's instructions.

730  Providing and fixing double polish kota flooring 25 mm to 40 mm thick over 25 mm cement mortar (1:2) bedding and cement slurry, size of kota stone 60 cm x 60 cm using 25 mm white marble/jaislemer stone strip or as detailed drawing or as per direction of the Engineer's, joining with gray cement slurry mixed with pigment for matching the shade of the stone, curing, rubbing, machine polishing, wax polishing etc. complete as directed.

731  Providing and fixing double polish green kota stone flooring 25 mm to 40 mm thick over 25mm cement mortar (1:2) bedding and cement slurry, size of kota stone 60 cm x 60 cm as per detailed drawing or as per direction of the Engineer's, joining with gray cement slurry mixed with pigment for matching the shade of the stone, curing, rubbing, machine polishing, wax polishing, etc complete as directed.

732  Providing & fixing rough dressed kota stone of 25 mm to 40 mm thick over 25 mm cement mortar 1:2 bedding and cement slurry, size of kota stone of not exceeding 600 mm as directed, joining with gray cement slurry mixed with pigment.

733  Providing and laying 38 mm to 50 mm thick cc (1:2:4) for Indian Pattern Stone flooring as and where directed, with 50 mm kota stone strip as joint, with top smooth or checkered finish with necessary construction joints, curing etc. complete.

734  As per item no 701 but using white cement of approved make.
As per item no 701 but 60mm thick with two layers of 24 gauge chicken mesh.

Providing and fixing single polished Jaisalmer yellow stone combined with marble stripes with pattern as per drawing or as per direction of the Engineer's, (Approximate area of Jaisalmer 80% and marble 20%) in flooring, dado 25mm thick over 25mm cement mortar (1:2) bedding and cement slurry, joining with gray /white cement/ slurry mixed with pigment for matching the shade of the stone, curing, rubbing, polishing and finish as directed.

Same as per item 736 but for skirting including making jari and finishing the same.

Providing and laying Paver blocks (Rubber Molded) of Alcock or other approved equivalent (minimum Comp. Strength 300 kg/cm2 or as per BOQ or as mentioned in BOQ) of approved shape and colour as per architectural pattern. (25% Coloured and 75% gray). Special pieces to make straight edges at corners / edges shall be provided and laid. No cutting / in-situ concrete shall be allowed at site. Rate to include for 50mm thick sand bedding below the paver and filling the joints between paver block with sand filling by light duty vibrator plate roller. Measurement shall be on square meter basis of the finished paved area.

Providing and laying in position average 9 mm to 10 mm thick homogenous, full body vitrified tiles of first quality with polish first grade finish (P-1), Bell, Johnson or Restile make, in floors, sills, jambs, of approved make, color and size, in cement slurry over minimum 15 mm thick 1:4 cement mortar bedding. Tiles shall be without any chamfer at the edges (joint less type), shall have scratch hardness of min. 7 on Mho's scale and shall meet chemical resistance standards of relevant ASTM/ DIN. Rate to include for laying in proper position, slope and level, grouting / painting of joints with white cement and matching pigment, curing, acid cleaning etc. complete as directed.

Same as per item 740 but providing on walls with 6 mm thick backing, including making jari and finishing the same. Include for making 8 mm size groove just above the tiles and finishing flush with the wall plaster.

Same as item 740 but for 75 to100 mm high skirting. Rate to include for 8 mm groove in the plaster just above the skirting and making the skirting flush with the plaster.

Extra over for providing mirror finish polish on kota / marble flooring using 500 to 2000 grit emery, polishing in six stages and final finishing with 2000 emery grit, tin oxide and felt pads. Work to be carried out with vibration free polishing machine having rubber mounted wheels.

Extra over for providing mirror finish polish to kota / marble skirtings using 500 to 2000 grit emery, polishing in six stages and final finishing with 2000 emery grit, tin oxide and felt pads.

Same as item 715 but with approved quality 20 mm thick Granite.
Providing & laying 3 mm thick 4 pack self-leveling Epoxy floor such as Nitoflor SL 2000 of Fosroc or approved equivalent over R.C.C. floor as per Manufacturer’s instructions. Include for preparing the surface, application of primer and epoxy resin, base and hardener, quartz filler material, making groove in the joints of R.C.C. floor and sealing them with epoxy, etc. complete. Measurement shall be on the basis of plan area covered.

Providing & making coving with epoxy mortar and finishing with three coats of epoxy paint applied over prepared surface by applying primer & epoxy putty – all of Fosroc or other approved make and as per the Supplier’s instructions. Measurement shall be on the basis of actual length of coving provided.

Supply and lay Acid Resistant tiles of approved make and of thickness not less than 10mm. confirming to IS 4457 -1967. Tiles to be laid over completely cleaned surface, free from dirt and dampness and over a back-coat of Potassium silicate based mortar as per Manufacturer’s instruction. After the bedding mortar is properly set, the joints shall be completely filled up with Epoxy mortar as per Manufacturer’s recommendations. Include for all wastage, cutting and fitting around socket outlets and other such fittings, cleaning of tiled surface after joint filling etc. complete.

Providing, making & fixing polished Kota stone coving of specified height and breadth, machine cut from Kota stone cube. The farthest point of coving’s height and breadth shall be connected by an arc of circle having radius 30 mm to 35 mm, jointed with epoxy mortar, corner pieces, mirror polishing, etc. complete. Measurement shall be on the basis of actual length of coving provided.

Removing existing flooring including polished Kota stone / IPS / tiles, bedding etc. complete. Include for removing the debris as directed by the Engineer up to a lead of 200m.

Providing and laying glass mosaic tiles “BISAZZA” or other approved equivalent having colour and design as approved. Lay over smooth plaster (measured separately) with “BAL” or other approved adhesive as per Manufacturer’s instructions. Include for Jointing with white cement slurry mixed with pigment of approved shade, forming grooves, pointing, curing, wastage etc. complete. Measurement as the basis of net area of tiles laid.

Providing and fixing “SUPER TILES” or other approved equivalent 25mm thick Paving tiles with desired shade and pattern including cement mortar bedding of 30mm average thickness in CM 1:6, floating of cement slurry mixed with pigment to match shade of tiles, jointing, curing, cutting to match required dimensions at site, finishing, transportation, wastage, etc. complete. Measurement as the basis of net area of tiles laid.

Supply and lay HDF (High density Fiber Board) AC5 / IC3 series laminate flooring and skirting of Pergo / Tarkett or other approved equivalent make for Use class 33/23 and having inbuilt sound proof backing and thickness of 9mm. Include for laying the wooden floor over alkali resistant PVC Film of 1000 gauge and 2 to 3 mm thick armour of approved brand as per Manufacturer’s instructions. The edge of tongue and groove of planks shall be duly impregnated with paraffin. Rate shall also include for PVC capping at skirting, all wastage, cutting and fixing all layers, cleaning etc.
complete. Measurement shall be on the basis of net area of wooden floor / skirting laid.

763  Same as item no. 714 but using ‘Jailemer’ yellow stone.

764  Extra over item no. 716 & 745 for “rivers wash” finish to the Stone.

768  Providing and laying in position PALLADIO Ceramic tiles in floors, skirting, dado, sills, jambs and channel in cement slurry over minimum 20 mm thick 1:4 cement mortar bedding. Rate to include for laying in proper position, slope and level, closed jointed and filled with pigmented cement/grout of matching colour including curing, etc. complete as directed.

769  Providing and fixing 100 mm wide Jailemer stone for window sill in cement slurry over minimum 20 mm thick 1:4 cement mortar bedding.

770  Supplying & installing false flooring (raised access flooring) over the sub floor including all panels, stringers, pedestals, fixing hardware, cutting, wastage, labour, etc. complete for finished floor height up to 400 mm above sub floor. Floor tile / panel shall be 600 mm x 600 mm x approximately 35 mm thick (100 % interchangeable) having in fill of lightweight cementitious materials / phenol bonded particle board, with factory pressed high pressure antistatic decorative laminate of 1 mm thickness. The pedestals/ jacks shall be of 25 mm dia. Zinc plated M.s. pipe with top & bottom plates, threaded top and 2 nuts for level adjustment. Jacks / pedestals shall be securely fixed with the sub floor with steel screws & adhesive. The stringers supporting the panels shall be of MS rectangular pipes. General arrangement shall be made as per drawings and complete floor adjusted to suit the room dimensions. Payment shall be on the basis of net plan area of the floor.

771  Providing & laying Nitoflor Hardtop (at 4 kg/m2) of Fosroc /sika, chapdur or other approved equivalent non metallic monolithic surface floor hardening compound over fresh concrete (vacuum dewatered surface) as per the manufacturer’s instructions. Moh’s hardness of the aggregates of the compound shall not be less than 8. Include for all labour, wastage, curing, finishing, etc. complete.

772  Providing & applying Lithium Silicate based concrete densifier such as “Ashford Formula” or approved equivalent over concrete surface as per the manufacturer’s instructions. Include for all labour, wastage, curing, finishing etc. complete in all respect. Payment shall be on the basis of net plan area of the floor.

773  Providing & laying 2 mm thick ESD (Anti-static) flooring such as Floorkote ESD of Cipy or approved equivalent over floor as per manufacturer’s specifications & instructions. Rate to include for the following –
   - Cleaning of surface – Scrubbing, Acid itching, alkaline wash & water wash. Remove all residues by using the solvent / degreaser.
   - Measuring dampness of the grade slab, over which the anti static flooring is being applied.
   - Priming - Apply two component, low viscous epoxy primer having 1:1 volumetric ratio of resin and hardener to provide a DFT of around 200 microns.
   - Copper tape – supply & fix 50-100 microns thick, self adhesive (conductive type) copper tape to ensure quick transfer of charge.
   - Conductive primer – Supply & apply epoxy based conductive coat, Floorkote ESD having a volumetric ratio of resin and hardener in 4:1, to yield a DFT of 100 microns, Self leveling top coat: Providing and applying EPU based
conductive self leveling top coat containing anti stats to yield a thickness of 1700 microns.

- Testing: After completion of the application, test the surface resistivity of the floor to achieve a range of $1 \times 10^5$ Ohms to $1 \times 10^8$ ohms.

Include for all labour, treating the construction joints of the floor, wastage, tools, tackles, etc. complete. Measurement shall be on the basis of plan area covered.
800 Doors And Windows

801 Providing and fixing in position composite door and window frames in finished 120 x 63 mm size section from best approved quality seasoned "Teak Wood" including double grooves on both sides, two rebates for shutters / grill, plaining, sand papering, making the edges rounded, hold fast, screw, nails, gluing materials, concrete lugs all as per drawing and direction. Rate to include for painting all timber faces in contact with wall surfaces with applying two coats of approved wood preservative and anti insecticide paint before fixing in position and one under coat and two coats of enamel paint of approved make to exposed faces. Rate shall be paid on the basis of area of opening.

802 As per 801 but for Teak Wood door shutters with styles 100 mm wide and 35 mm thick, lock rail 175 mm x 35 mm, bottom rail 150 mm x 35 mm and top rail 100 mm x 35 mm and T & G boarding of 100 mm wide x 20 mm thick with oxidized steel hinges 3 nos. of heavy quality of 4" size per leaf, aluminium fixtures, fitting and lock of heavy quality as directed, including teak wood panels with necessary moulding in rails and styles as per drawing. Rate shall be paid on basis of area of opening. Rate shall also include for one undercoat and 2 coats of enamel paint of approved make.

803 As per 801 but with Teak Wood window shutters with 75 mm x 30 mm thick styles, intermediate top and bottom rails of 75 mm x 30 mm including moulding in rails and styles as per drawing and 4 MM thick clear transparent glass of approved make, oxidized steel hinges minimum 2 nos. of 3" size per leaf with aluminium oxidized fixtures, fittings of best quality as per drawing. (Grill measured separately). Rate shall be paid on basis of area of opening. Rate shall also include for one undercoat and two coats of enamel paint of approved make.

804 Rate to include for 40 mm thick solid cored approved quality flush door faced with 4 mm thick water proof plywood of approved make to receive paint with 16 mm teakwood lipping tongued into door edges all round, single or double leaves. Also include for three 100 mm butt hinges and necessary fixtures like rubber door stop, stopper, and mortise lock with two keys, etc. complete. Include for one under coat and two coats of enamel paint of approved make.

805 Providing and fixing Teak Wood first quality hand rail in position including plaining, tappering, moulding, gluing, screwing in position. Rate shall be paid for visible finished section in cubic metre. Rate shall also include for one undercoat and two coats of enamel paint of approved make.

806 Steel openable glazed windows and ventilators of 'AGEW' make or equivalent make conforming to IS:1361 with standard "Z" steel frame and shutter with 4 mm thick clear glass, fixing, screws, lugs, hinges, stays, holders etc. with all necessary approved fixtures complete. Rate to include for 10 mm square M.S. burglar bars at spacing not exceeding 125 mm welded with window frames and two coats of enamel paint over one coat of Zinc Chromate primer.

807 As per 806 but for fixed glass louvers windows and ventilators.

808 Supplying and fixing in position glazed, openable, double or single leaf anodized aluminium doors with aluminium frame of Indal/ Jindal / Hindalco make, having weight of aluminium sections as approximately 8 kg/ m² of opening area (excluding the weight of beading for glass/ panel fixing), size and shape as per details, including supplying and fixing necessary hold fasts, all fixtures and fastenings of anodized aluminium as per requirement with 6 mm thick MODI/Saint Gobain float glass, EPDM special gasket.
felt and aluminium beading, with all accessories like SS handle, 125 mm long SS hinges, flush tower bolts, concealed cylindrical lock (Dorset/Kitch make), etc., labour and materials complete as per details and direction of the Engineer. Include for rough ground on top and sides of the door and approved quality silicone sealant at joints and on all sides. (Measurement on the basis of out to out dimensions of the frame).

809 As per item no. 808 but with exterior grade Novapan for infill panels (6 mm thick compact panel)

810 Supplying and fixing openable, sliding anodized aluminium windows with aluminium frame of Indal/ Jindal / Hindalco make, having weight of aluminium sections as approximately 4 kg/ m2 of opening area (excluding the weight of beading for glass/ panel fixing) , size, shape and design as per details including all fittings and fixtures with 6 MM thick plate glass fixed with special EPDM gasket and wool felt (Include for rough ground on top and sides of the window and approved quality silicone sealant at joints) on all sides. Aluminium beading of approved make with all materials and labour etc. complete.

811 Supplying and fixing 40 mm thick cement concrete jali made from 1:3 cement mortar, weld mesh and having at least 25% openings.

812 Push and pull type rolling shutter made of 18 gauge black lathe, with providing and fixing M.S. pressed side guide, door suspension shaft, rolling spring, enclosing hood, brackets, bearings, locking arrangement and other necessary accessories for proper working etc. complete with hand operated system. Rate to include for one coat of Zinc Chromate primer and two coats of approved enamel paint. Rate shall be paid for opening size only in sq.mt.

813 Same as item no 812 but, for providing mechanically / electrically operated rolling shutters.

814 Providing and fixing of General Purpose Hollow metal steel door (Two Hours fire rated) with vision panel made of Pressed Galvanized steel Single /Double leaf to required sizes of “Shakti Met-dor” or approved equivalent which consists of frame, shutter, infill and finish as detailed below and conforming to IS 277. Door frame shall be Single rebate profile of size 100 x 57 mm made out of 1.65mm thick galvanized steel sheet (18 gauge). Frames should be mitered and field assembled with self-tabs. Frames should be provided with back plate bracket and anchor fasteners for installation on a finished plastered masonry wall opening. Once frame installed should be grouted with cement slurry if recommended on the clear masonry opening. Door leaf should be 46mm thick fully flush double skin door with vision lite. Door leaf shall be manufactured from 1.2mm minimum thick galvanized steel sheet. The internal construction of the door should be rigid with steel stiffeners/ pads and reinforcement. The infill material shall be resin bonded honeycomb core. All doors should be factory prepped for receiving appropriate hardware and provided with necessary reinforcement for hinges, locks, and door closers. The edges should be interlocked with a bending radius of 1.4mm. For pair of doors astragals has to be provided on the meeting stile for both active and inactive leaf. Vision lite wherever applicable should be as per joinery details with a screw on glass beeding on the inside. The glass should be 5mm clear Fire rated toughned glass. All doors and frames shall be finished with etched primer coating, stove zinc phosphate primer and thermosetting polyurethane aliphatic grade paint of approved colour. The door leaf and frame shall have passed minimum 250 hours of salt sprey test. Rate should include supply and installation of door and hardware such as door closer, SS Hinges, 1 nos of SS Handles-outside, Panic Bar-Inside, one Mortice
lock (Single side key operation Cylinder)-outside etc. complete as per manufacturer’s specification and as directed by engineer in charge.

815 Supplying and fixing teak wood double or single leaf doors including bedding/moulding as per detailed drawings. Shutter made of 12mm thick particle board (IS: 3097) fixed in 35mm thick teak wood frame having 100 mm wide top rail and stile with bottom rail of 200 mm width and lock rail of 150 mm width including painting 2 coats with enamel paint of ISI approved specifications cover one coat of approved primer so as to give an even shade after making the surface clean and smooth. Rate shall also include for one number anodized aluminum tower bolt of best quality having 10 mm dia. rod of minimum 225 mm long, one no. Anodized aluminum Aldrop without locking arrangement to be fixed inside of the door, one number anodized aluminum aldop of 250 mm length and 15mm thickness or rod of best quality, two numbers anodized aluminum handles of 150 mm length, three numbers ISI approved iron butt hinges 100 mm size for one leaf, one number anodized aluminum door stopper and six numbers M.S. hold fast of size 150 mm x 40 mm x 6mm embedded in cement concrete blocks of 175 mm x 100 mm and width as per the thickness of wall in ratio of 1:3:6 complete in all respects.

816 Supplying and fixing PVC doors “SINTEX " brand or equivalent made from plastic family for use in bath rooms/toilets etc. posses water proof, weather proof, termite proof, etc. properties. Rate shall include for PVC door frame, non-corroded hinges, handle, locking arrangement, etc. complete in all respects.

817 Supplying and fixing of an approved quality “Z” section steel frame for door confirming to IS: 1361. Rate shall include for one under coat and two coats of enamel paint of approved make. Rate shall be paid on the basis of area of opening.

818 Fabricating and fixing of M.S. sliding gate as per drawing made from M.S. C.R. sheet (gauge as shown on drawing) welded with frame work of angles, flats etc. Rate shall include for M.S. pipe guide, brackets for hanging gates, rails, pulleys, ball bearings, nuts, bolts, washers etc. complete. Rate shall include for one under coat of Zinc Chromate primer and two coats of enamel paint. Measurement shall be on the basis of length of section as per drawings and standard weight as per IS. Pulley and bearing weight shall be considered as per Manufacturer/actual data.

819 Same as item no. 806 but, for supplying & providing 5mm thick clear glass in place of 4mm thick clear glass.

820 Same as item no. 806 but, for supplying & providing 4mm thick toughened glass in place of 4mm thick clear glass of ordinary quality.

821 Supplying and fixing 10mm square M.S. burglar bars and welded with steel window frame as shown on the drawing.

822 Only fixing Doors, Windows, ventilations.

823 Providing & fixing 4mm thick clear glass, fixing, screw, lugs, hinges, stay, holders etc. with all necessary approved fixtures complete. Window frame, shutters with two coats of enamel paint over one coat of Zinc Chromate primer.

824 Supplying and fixing fixed glazed, aluminium anodized windows of Indal/ Jindal / Hindalco make, having weight of aluminium sections as approximately 5 kg/ m2 of opening area (excluding beading for glass/ panel fixing), size, shape and design as per details including all fittings and fixtures with Double glass (insulated glass unit made of
5 mm thick float glass + 12 mm air gap with aluminium spacer frame duly molecular sieve + 6 mm thick heat reflected glass) fixed with special EPDM gasket felt and aluminium beading of approved make with all materials and labour etc. complete. Include for rough ground on top and sides of the window and approved quality silicone sealant at joints and on all sides externally and internally.

825 Supplying and fixing fixed type glazing of 8 mm thick clear float glass with anodized aluminium framing of Indal / Jindal / Hindalco make, having weight of aluminium sections as approximately 5 to 6 kg/ m² of opening area (excluding beading for glass/ panel fixing), size, shape and design as per details including all fittings and fixtures. Include for fixing of glass with special EPDM gasket felt and approved aluminium beading with all materials and labour. Include for rough ground on top and sides of the framing and approved quality of fire proof silicone sealant at joints of glass and on all sides externally and internally.

826 Same as item no. 825 but for fixed type aluminium louver frame with 4 mm. thick glass louvers.

827 Providing and fixing hydraulic door closure of required size and approved make, conforming to IS 3564.

828 Providing and fixing aluminium floor mounted hydraulic spring type door closure of approved quality and make. Rate to include cutting of floor for fixing the spring, making it good, etc. complete.

829 Supplying and fixing 50 micron thick Polyester films such as Sun Control Garware films over glazing (measured separately) as per Manufacturer's instructions. Film shall be such that it will reject about 70 % solar energy shall reduce harmful UV radiation by 97 % and shall eliminate 70 % of sun glare.

830 Same as item no. 826 but for aluminium louver frame with aluminium louvers of Jindal or Hindalco.

831 Providing 50 mm thick Heavy duty aluminum Flush door with 18 SWG powder coated Aluminum sheet on each face and with high density Puff insulation in the hollow space between. The frame work of door shutter shall be fabricated from 2mm tk. powder coated aluminum sections & door frame shall be of 2.75mm thick powder coated sections having rounded edges as per Pharmaceutical industry's requirements. Rate to include for 200 mm long x 10 mm dia. S.S. handle, heavy duty cylindrical door lock (Yale or equal), heavy duty door closer (Dorma or equal), tower bolt, special EPDM gasket, S.S. heavy ball type hinges and all necessary accessories, etc.

832 Same as 831 but having view panel above sill level of two 4 mm thick clear float glasses flush on both side and fixed with 3 M or St. Gobain adhesive tape and silica gel between two glasses for moisture entrapping.

833 Supplying and fixing flush, fixed double glazed powder coated aluminum windows with minimum 2 mm thick sections formed to double rebate profile of 50 mm thickness and to be flush with plastered wall. Design as per details including provision of perforations in the frame & silica gel between the two glasses to prevent absorb the moisture. Glass shall be fixed with 3 M or St. Gobain adhesive tapes. Include for rough ground on top and sides of the window, special EPDM gasket and approved quality silicone sealant at joints and on all sides externally and internally.
Supplying and fixing anodized aluminium fixed windows with aluminium frame of Indal/ Jindal / Hindalco make, having weight of aluminium sections as approximately 4 kg/ m² of opening area (excluding the weight of beading for glass/ panel fixing) , size, shape and design as per details including all fittings and fixtures with 5 MM thick reflective glass fixed with special EPDM gasket and wool felt (Include for rough ground on top and sides of the window and approved quality silicone sealant at joints) on all sides. Aluminium beading of approved make with all materials and labour etc. complete.

Deleted.

Providing & Fixing automatic door seal of standard make at bottom of door shutter.

Same as 831 but 24 SWG Powder coated GI sheet flush door

Same as 832 but 24 SWG Powder coated GI Sheet flush door having view panel above sill level.

Same as 824 but with fix single glass windows.

Same as 803 with PVC Mosquito proof zali in place of glass and making shutter using 50 mm x 30 mm timber section.

Supply & fix fixed / openable/ slide glazed windows and ventilators at any height with steel frame of rectangular / square hollow sections of approved make and with 5 mm thick clear glass, fixing, screws, lugs, hinges, stays, holders etc. with all necessary approved fixtures complete. Rate to include for two coats of enamel paint over one coat of Zinc Chromate primer.

Same as 841 but using existing window / ventilator frame dismantled (dismantling measured separately) from existing locations, including minor repairing of frame, if necessary. Only frame will be used from the existing window / ventilator. Include for all other materials including supply of 5mm thick glass, paint, etc. and labour required to complete the item.

Same as 817 but using rectangular / square hollow steel sections of approved make in place of Z section.

Adjustment in rate of item nos. 808, 809, 810, 824, 825, 826, 830 & 839 for variation in weight of aluminium section ( including anodizing) per m² of opening area – as compared to the weight of aluminium section mentioned in a particular item.

As per item no. 808 but with 3 mm thick aluminium composite panel fixed with 3M on each side of the shutter, in place of glass.

Dismantling existing doors/ windows of any type at any level. Rate to include for carefully removing the shutters of door/windows and dismantling of the frame and grill of the door / window thereafter. Include for minor dismantling of wall / floor required to dismantle the frame, repairing the damaged surface of wall /floor good again to make it match with the existing surrounding surface, cleaning of debris, etc. complete. Dismantled frame, shutter and grill shall be the property of Owner and the Contractor shall deposit the same to Owner’s store. Measurement on the basis of out to out dimensions of the frame dismantled.
852 Supply and Installation of wooden door of duly sandwiched type filled with 75 mm thick fiber glass wool of CR – 300 density 48 kg/m3 with hinge and of stoppers.

862 Providing and fixing in position Shakti-Met or equivalent hollow metal with powder coated fire resistant door (two hour fire resistance) of 46 mm thickness and confirming to IS 3614 (Part 2) having frame made from 1.6 mm thick galvanized iron sheet and having fully flush type single/double shutters of pressed G.I. sheet, 1.25 mm thick confirming to IS 277. Shutter/s to be provided with fire rated 6 mm thick clear vision glass. The vision glass to be provided in rectangular standard dimensions of 200 mm X 300mm. The stile edges of frame and shutter/s to be lock seamed with no weld marks. The infill material in shutters shall be resin bonded honey comb Kraft paper with thermal insulation. Door frames and shutters shall be finished with etched primer coating, stoved zinc phosphate primer and thermosetting polyurethane aliphatic grade paint of approved colour. Rate to include for pre punched hinge plates, 3 nos., 100 mm long SS butt hinges per shutter, fixing the frame with holdfast/anchor fasteners, SS 304 ‘D’ type handles, tower bolt, Dorset cylindrical lock, vision panel, panic bar etc. complete as per manufacturer’s recommendation and as directed.

863 Same as item No. 862 but general purpose steel door of “SHAKTI-MET” or equivalent with epoxy paint instead of polyurethane paint on the frame & the door shutters.

864 Same as item No. 830 but aluminium louvers fixed over M.S. frame. M.S. frame shall be measured separately.

865 As per item no. 808 and 809 but for aluminium door partly glazed and partly paneled.

866 Supplying and fixing in position partly glazed partly paneled, anodized aluminium partitions with aluminium frame of Indal/ Jindal / Hindalco make, having weight of aluminium sections as approximately 8 – 10 kg/ m2 of surface area (excluding the weight of beading for glass/panel fixing), size and shape as per details, including supplying and fixing necessary fixtures and fastenings of anodized aluminium as per requirement with 6 mm thick MODI/Saint Gobain float glass, EPDM special gasket felt and aluminium beading, with all accessories, labour and materials complete as per details and direction of the Engineer. Include for approved quality silicone sealant at joints and on all sides. Measurement on the basis of out to out dimensions of the frame.

867 Providing & supplying Aluminum frame with pre-laminated exterior grade 30 mm thick flush door with aluminum with 16 mm thick teak wood leaping on all sides, S.S. hinges, bolts, SS handle, mortise lock, SS door stopper of Dorma/Doreset make or approved equal etc complete. Aluminum anodized section of Jindal or hindalco brand having weight of aluminum sections as approximately 4 kg/m2 of opening area (excluding beading for glass/panel fixing) size shape and design as per detail. Rate to include all fittings and fixtures, silicon sealant, sheet metal screw with PVC roll plug at 450 c/c for aluminium frame for fixing with RCC/Brick/cement board partition/cement blocks etc complete as per direction of engineer in charge.

868 Providing and fixing aluminum louvers of HUNTER DOUGLAS Sun Louvre 84R panel Exterior (86 X 16) with Stringer SL 4 (86 X 33) (combined) with finish 7063 trance silver colour installed in vertical manner including the carrier rail & any other material like, s. s. screws, nuts etc required to attach to the surface.

869 Providing & installing 12 mm thick toughened glass with Patch fitting for any open area with ozone glassage series patch fitting panels. Dorma patch fitting solution or any other equivalent including the price of all materials like screws, fire proof silicon sealant
to join glass etc complete. Rate is also included for drilling in any surfaces like masonry or r.c.c etc

870 Supply and installation of 20 mm double skinned Insulated PUF (48 kg/m3 density) Galvanised Steel (0.5 mm TCT) Motorized Industrial rolling shutter supplied from M/s Gandhi or M/s NHIVA, with external/internal colour matching with the Cladding sheet and standard accessories etc. complete all as per manufacturers specifications etc. complete. The rolling shutter with automation system comprising Electric Motor (Direct Drive Motor) with inbuilt limit switches, control panel, Hood Cover & manual chain override in case of power failure and push button. Rate shall be paid for opening size only in sq.mt.

876 Supplying and fixing fixed anodized aluminium windows with aluminium frame of Indal / Jindal / Hindalco make, having weight of aluminium sections as approximately 4 kg/m2 of opening area (excluding the weight of beading for glass/ panel fixing), size, shape and design as per details including all fittings and fixtures with 6 MM thick clear float glass fixed with special EPDM gasket on all sides. Rate to include 6 mm thick clear glass, all fittings and fixtures, silicon sealant, sheet metal screw with PVC roll plug at 450 c/c for aluminum frame for fixing with RCC/Brick etc complete as per direction of engineer in charge.

877 Supplying & Fixing Motorised Pre colour coated GI Rolling Shutter of “Gandhi Automation, Spanker, NHIVA” or approved equivalent with top cover, made from non-perforated G.I. strips (1.0mm) with interlocking lath sections, complete with side guides, bottom, brackets made from M.S. sheet, with strong suspension and fitting accessories in best workmanship with two coats of polyurethane paint of approved colour over one coat of grey epoxy primer. The rolling shutter with automation system comprising compact Gear operator (Direct Drive Motor) with inbuilt limit switches, control panel & manual chain override in case of power failure and push button. Rate shall be paid for opening size only in sq.mt.

878 Supplying & fixing aluminium fixed louver frame with aluminium louvers of Indal / Jindal / Hindalco (Up to 8 kg/m2). Rate to include all fittings and fixtures, silicon sealant, SS Mosquito net, sheet metal screw with PVC roll plug at 450 c/c for aluminum frame for fixing with RCC/Brick etc complete as per direction of engineer in charge.

879 Providing & Fixing 25 mm thick PVC foam sheet door of "Excel brand of Jain Irrigation" as per manufacturer's specification. Rate to include Cutting in required size & shape, Pasting if required with suitable adhesives, fixing with aluminium frame etc. complete all as per specification.
900 **Plastering**

Rates to include for supply of labour, materials, plant, necessary scaffolding, compacting, curing etc. complete as directed at any level, height, position and floor. Rates shall also include for racking and/or brush hammering to form key for plaster and for spatter dash treatment as and where necessary. Rates also include for rounded angles, chamfered angles, grooves and for making good after all trades. The Contractor shall get the approval of sample plaster (1m x 1m) from the Engineer before proceeding for the work.

901 Providing and laying 15 mm to 20 mm thick steel trowelled cement finish plaster in 1:4 cement mortar with neeru (Lime putty screened and then gauged with minimum 60% cement by volume evenly applied and trowelled smooth to produce a perfectly smooth and even surface gray in colour) finishing and corners/jams in cement finish including scaffolding, curing, making grooves, pattas, drip moulds etc. complete as directed.

902 Providing & laying 20 mm thick double coat sand faced plaster with backing coat of 1:4 cement mortar with rough finish and second coat in 1:2 cement mortar evenly applied and trowelled of uniform grains and shade of coarse sand in two coats, including drip moulds, pattas, grooves, watering etc. complete as directed.

903 Providing and fixing hexagonal chicken mesh at the junction of concrete and brick work or at junction of two different materials. Rate to include for cutting the mesh in width of 150mm or more, wastage etc. complete.

904 20 mm thick smooth steel trowelled waterproof plaster in 1:4 cement mortar with waterproofing agent as per Manufacturer's instructions to the surfaces as directed.

905 Flush and ruled pointing on rubble uncoursed stone masonry with mortar 1:3 (1 cement: 3 fine sand) including cleaning the surrounding surface of rubble, curing, wastage, etc.

906 Flush and ruled pointing on concrete block walls with cement sand mortar 1:3 (1 cement: 3 fine sand).

907 Flush and ruled pointing on brick masonry walls with cement sand mortar 1:3 (1 cement: 3 fine sand).

908 Providing and laying 20 mm thick steel trowelled cement finish Mala plaster in two coats. First coat in 1:4 cement mortar with rough finish and second coat in 1:2 cement mortar evenly applied and trowelled smooth (to produce a perfectly smooth and even surface gray in colour) with finishing at corners/jambs including scaffolding, curing, making grooves, pattas, drip moulds etc. complete as directed.

909 Providing and fixing single polished Jaisalmer yellow stone of uniform and stored out for colour in single piece for name plate for as per drawing including providing necessary cement slurry, cement mortar (1:2) bedding, jointing in cement slurry mixed with pigment of approved shade, curing, rubbing, polishing and also including required adhesives, fixtures like bolts, screws etc. as directed.

910 Providing & laying Bansi Pahadpur stone in cladding for plain and curved surfaces, laid over cement mortar bedding of 1:3 proportion, having required adhesives, fixtures like bolts, screws etc. to plain or slope. The tiles tamped to bring mortar cream up to
surface, including rounding of junctions, any pattern or design as per drawing and direction, including curing, cleaning with water, wastage, etc. complete.

911 Providing & laying Red Dholpuri stone in cladding for plain and curved surfaces, laid over cement mortar bedding of 1:3 proportion, having required adhesives, fixtures like bolts, screws etc. to plain or slope. The tiles tamped to bring mortar cream up to surface, including rounding of junctions, any pattern or design as per drawing and direction, including curing, cleaning with water etc. complete.

912 Providing & laying Khantu stone in cladding for plain and curved surfaces, laid over cement mortar bedding of 1:3 proportion, having required adhesives, fixtures like bolts, screws etc. to plain or slope. The tiles tamped to bring mortar cream up to surface, including rounding of junctions, any pattern or design as per drawing and direction, including curing, cleaning with water and 2 coats of silicon mixed with water in 1:9 shall be applied with brush on Khantu stone after finishing etc. complete.

913 Providing and making coving at junction of wall and floor with M15 concrete with fine polished finish. Measurement shall be on the basis of actual length of coving provided.

914 Providing and making coving at wall to wall junctions with cement mortar 1:4 and finished smooth as directed. Measurement shall be on the basis of actual length of coving provided.

915 Providing and making coving at wall to ceiling junctions with plaster of paris with PVC fiber reinforcement and finished smooth as directed. Measurement shall be on the basis of actual length of coving provided.

916 Same as item no. 908, but single coat Mala plaster (steel trowelled finish) in 1:4 cement mortars and having thickness of 12 mm to 15 mm.

918 Same as Item No. 910 but with slate stone.

919 Providing and fixing 15 mm thick Universal NI plaster substitute to both cement sand and POP plaster, to be applied directly on brick/ blocks/RCC surface in one coat conforming to IS: 2542 part-1(1976) to obtain a smooth silky finish. The rate shall be inclusive of expanded metal mesh to be provided at the junction of wall and RCC columns and beams. The rate shall also be inclusive of 1mm thick aluminium angle bead to be used at external angle to get straight line finish and protection from normal impact.

920 Providing and fixing at any height dry cladding system with 30mm thick gang saw cut red sand stone with (machine cut edges) of uniform colour and size upto 1mX1m, fixed to structural steel frame work and/or with the help of cramps, pins etc. and sealing the joints with approved weather sealant as per Architectural drawing and direction of Engineer-in-charge. (The steel frame work, stainless steel cramps and pins etc. shall be paid for separately.)

921 Providing and fixing structural steel framing on walls at all heights using M.S. square / rectangular tube in the required pattern as per Architectural drawing including cost if cutting, bending, welding etc. The frame work shall be supported in wall with the help of MS brackets/lugs of angle iron/flat etc. which shall be welded to the frame and embedded in the brick wall with cement concrete block 1:2:4 (1 cement : 2 coarse sand :4 graded stone aggregate 20mm nominal size) of size 300X230X300mm including cost of necessary centring and shuttering and with approved expansion hold fasteners on CC/RCC surface including drilling necessary holes. Approved cramps/ pins etc.
shall be welded to the frame work to support stone cladding, the steel work will be given priming coat Zinc primer as approved and painted with two or more coats of epoxy paint. The frame work shall be fixed in true horizontal & vertical lines/planes. (Only structural steel frame work shall be measured for the purpose of payment, stainless steel cramps shall paid separately and nothing extra shall be paid.)

922 Providing and fixing adjusting stainless steel cramps of approved quality and of required shape and size adjustable with nut bolts and washer (total weight not less than 260 gms) for dry stone cladding fixed on frame work at suitable location including making necessary recesses in stone slab, drilling required holes etc. complete as per direction of the Engineer-in-charge.

951 Removing the existing cement plaster from RCC surface and brick walls carefully of any thickness and at any height without creating dust nuisance and removing the debris etc. complete as directed.

952 Providing and laying stone pitching composed of sound igneous rock having rocks firmly wedged with stone chips driven into joints, so that finished surface presents an even face with joints of a nominal width of 25 mm over compacted sand bedding and filling joints with cement mortar (1:4) including curing etc. complete.

953 Providing & apply stonecrete plaster on vertical surface in line level as per requirement of “Vyara” make or approved equivalent. The plaster is to be cleaned by mild acid wash if necessary and then coated by two coats of approved, water based UV resistant coating after sufficient curing and drying. The coating must be done in a manner that no patchiness is seen on the surface. Rates to include for supply of labour, materials, plant, necessary scaffolding, compacting, curing etc. complete as directed at any level, height, position.
1000 Painting

Rate shall include for supply of materials, equipments, skill labours, necessary scaffolding and removal thereof, supply of brushes etc. as required. The work shall include for cleaning of surfaces, removal of dirt, dust, filling in crevices at any level to complete the work as directed. Samples shall be got approved before execution of work. Even though the number of coats specified against item of work, any additional coat shall be given without any extra cost to bring surface to the desired finish. Only net area is to be measured & considered for payment, no factors in quantity will apply.

1001 Providing and applying two coats of white or colour wash to walls, ceiling etc. at any level include for adding glue of Pidilite co. or equivalent as per their specifications with brush as directed.

1002 Providing and applying two coats of oil bound distemper of approved make and shade over a coat of cement primer including scaffolding etc. complete at any level.

1003 As per 1001 but applying two coats of white wash to A/C roofing sheets, cladding etc. as directed. The measurement shall be on the basis of net roof area painted, irrespective of the corrugations.

1004 Providing and applying three coats of flat enamel paint of I.C.I. or equivalent approved make over primer coat on ceilings, false ceiling boards, plastered surfaces, etc. Rate to include for preparing surfaces by applying putty where required etc. complete at any level as directed.

1005 As per 1004 but for wood work surfaces.

1006 Providing and applying oil water polishing for solignum polish with necessary pigment including finishing and making the surfaces smooth at the required degree of fineness and matness etc. complete at any level as directed.

1007 Providing and applying three coats of cement based paint "Snow-cem" or equivalent approved make and shade over a coat of cement primer including scaffolding, watering etc. complete at any level as directed.

1008 Providing and applying three coats of approved make enamel paint to the steel sections of doors and windows with one coat of metal primer, one under coat and two finishing coat.

1009 Providing three or more finishing coats of premium plastic emulsion paint of (ICI -velvet touch or ASIAN-Royale) approved make and shade to walls and ceilings applied evenly to give approved uniform finish. Allow for preparation of surface and a coat of primer as specified by the Manufacturer.

1010 Providing and applying three coats of acrylic based exterior paint “Snowcryl” or equivalent approved make and shade including scaffolding, watering etc. complete at any level and any surface as directed.

1011 Same as item 1007 but with three coats of acrylic based weather proof exterior paint like ‘APEX’ or equivalent.

1013 Providing and applying aliphatic acrylate coating for anti-corrosive & anti – carbonation application over concrete surface at any level. No. of coats, method of surface preparation & usage of the coating system etc. shall be as per the
specifications of the approved Manufacturer. The coating to be Monopol – 456 of Krishna Conchem Products Pvt. Ltd. or other such approved equivalent having approved shade and minimum 2 years’ proven performance & field validation history in Indian conditions. Measurement for the payment purpose shall be on the basis of net area painted.

1014 Providing and applying aliphatic acrylate coating for anti-corrosive & anti-carbonation application over concrete surface at any level. No. of coats, method of surface preparation & usage of the coating system etc. shall be as per the specifications of the approved Manufacturer. The coating to be Polycon S 100 of Caltech India or other such approved equivalent having approved shade and minimum 2 years’ proven performance & field validation history in Indian conditions. Measurement for the payment purpose shall be on the basis of net area painted.

1015 Providing and applying solvent based colourless Silicone paint ‘Nitocote SN522’ of Fosroc or other approved equivalent make over exposed concrete surfaces with minimum 5 years’ guarantee as per Manufacturer’s instructions at any height. Measurement shall be on the basis of net area painted.

1016 Providing and applying two coats of Heritage surface texture – lacquered / granuled / flaked, of desired shade of Bakelite Hylam or other approved equivalent on exterior surfaces at any height. Finish giving an even shade, including thoroughly brushing the surface free from mortar droppings and other foreign matters, applying a coat of primer and putty and sand papered smooth. The surface texture shall be applied on mala finish plaster (measured separately).

1017 Providing and applying two coats of low solvent based epoxy resin coating Sikafloor®-105 or other approved equivalent as per approved shed over a primer coat as per the Manufacturer’s instructions at concrete floors. Rate to include for labour, wastage, preparation of surface as per Manufacturer’s instructions, etc. Complete. Payment shall be made on the basis of net plan area painted.

1018 Providing and applying Two coats of Acrylic based anti-fungal paint ‘APEX’ or equivalent for interior surfaces using two coats of wall putty and two coats of primer (all of Asian or other approved equivalent make) as per Manufacturer’s specifications including scaffolding, wastage, etc. complete at any level as directed.

1019 Extra over item no. 801,802,803 for lacquer polishing in place of enamel paint.

1020 Providing and applying two coats of epilux No.4 (BERGER or Equivalent) epoxy paint with powder coating epoxy paint with as per the Manufacturer’s specifications and as directed.

1021 Providing & applying min 1.5 mm thick white cement Putty of Birla or other approved make to achieve a smooth surface to serve as base for the paint on plastered surface, including cleaning, staging, and necessary tools and make the surface as per manufactures specifications etc complete.

1022 Providing and applying 2.5 mm thick road marking strips (retro-reflective) of specified shade/color using hot thermoplastic material by fully/semi automatic thermoplastic paint applicator machine fitted with profile shoe, glass beads dispenser, propane tank heater and profile shoe heater, driven by experienced operator on road / r.c.c surface including cost of material, labour, transport, cleaning the road surface of all dirt, seals, oil, grease and foreign material etc. complete as per direction of Engineer –in charge and accordance with applicable specifications.
1023 Providing and applying two coat of Acrylic body Texture Coat of DURA SHIELD – DURA STONE of approved shade to walls & ceilings applied evenly by means of trowel / brush application to give approved uniform finish at any height. Allow for surface preparation, one coat of primer & one coat of clear lacquer, scaffolding complete as per manufacturer’s specifications. Rate shall be paid on the basis of surface area applied.

1024 Providing & applying gangway marking strips with aromatic PU coating such as FK 666 of Cipy or approved equivalent on surfaces including cost of material-Primer & Putty, labour, transport, cleaning the surface of all dirt, seals, oil, grease and foreign material etc. complete as per direction of Engineer in charge and accordance with applicable specifications.

1025 As per 1004 but using Glossy Enamel paint (Solvent Based).

1026 Providing and applying Textured paint of Asian or equivalent approved make and shade including scaffolding, wastage etc. complete at any level as directed by engineer in charge.
1100 Roofing And Cladding

1101 Supplying, laying and fixing of 6 mm thick gray corrugated asbestos "Everest Brand" or equivalent sheets in roof with G.I. "J" or "U" or cranked bolts of 8 mm dia. with G.I. and bitumen washers, nuts including cutting, lap, wastage, breakage etc. complete. Measurement shall be on net area. The Contractor shall carry out the work for laying and fixing of roofing/cladding sheets as per Manufacturer's instructions. Side lap shall be 1.5 times the dimension of corrugation.

1102 As per 1101 but for side cladding and louvers.

1103 Supplying, laying and fixing of 1.6 mm thick (approx) fiber reinforced plastic (FRP) translucent corrugated sheets in roof with G.I. "J" or "U" or cranked bolts of 8 mm dia. with G.I. and bitumen washers, nuts including cutting, lap, wastage, breakage etc. complete. Measurement shall be on net area. The Contractor shall carry out the work for laying and fixing of roofing/cladding sheets as per Manufacturer's instructions. Corrugations to match with A.C. corrugated/ Trafford sheet or G.I. corrugated sheet or Aluminium corrugated or profile sheets.

1104 Supplying and fixing in proper position of asbestos cement ridges corner pieces, apron pieces etc. including cutting, lap, wastage, breakage etc. complete as directed. Measurement shall be on net length.

1105 Supply and fix A.C. half round gutter including fixtures, nozzles, drop-end with spigot or sockets, stop end, union clips, clamps etc. complete as directed. Rate for using Everest Brand or approved equal.

1106 As per item 1105 but for A.C. boundary wall or Eaves gutters.

1107 As per item 1105 but for A.C. valley gutters.

1108 Supply and fix A.C. rain water pipe including fixing brackets, clamps, collar, shoe etc. complete.

1109 Supply, fabricate and fix in proper position, galvanized iron 18 gauge sheet gutter as per drawing include for drop end, stop end, clamps, two coats of bitumen paint (inside) etc. complete.

1110 Rain water pipes formed from 18 gauge galvanized iron sheet. Include for fixing, brackets, clamps, splay cut at end, etc. complete. Also include for bending or diverting in case pipe fouling with steel member while bringing down from gutter.

1111 Rate to include for supply, fabricate and erect in proper position, with required slope of 3mm thick Black iron sheet Rain water gutter as per the Section shown in the drawing. Rate to include for supplying and applying one coat of Zinc Chromate primer and two coats of enamel paint on outer surfaces and two coats of bitumen paint on inner surface. Also include for stop ends, drop ends, clamps, etc. complete.

1112 Supplying, cutting, laying and fixing in position 0.71mm (22 gauge) industrial troughed aluminium sheets "JINDAL" Brand or equivalent (Stucco finish) for roofing including bolting, riveting, temporary scaffolding, if required, etc. complete as per specifications and as directed. Rate shall also include for laps, wastage, aluminium fasteners such as hook bolts, seam bolts, washers, nuts, pressure sensitive butyl sealing tape on all the joints to assure water tightness. Measurement shall be on net area. The Contractor
shall carry out the work for laying and fixing of roofing/cladding sheets as per Manufacturer's instructions.

1113 Rate to include for supply & fixing in position GRAVENT ventilation system having throat size 200 mm type RGV200 of 2500 long Manufactured in m.s. plates with approved epoxy anti-corrosive paint. Rate to include for providing and fixing its valances and mounting strips etc. as complete installation with end caps.

1114 Fixed wire glass glazing, supply a fix 6mm thick wire glass in north light trusses. Include for fixing screws, lugs, special metal sash putty of approved make, wastage etc. structural steel T bars, runners etc measured separately.

1115 Supplying, laying & fixing of 22 B.W.G. galvanized corrugated iron sheets of approved quality and make in roof with 8mm dia. in G.I. J or U bolts with G.I. limpet, bitumen washers, nuts, laps, wastage, including cutting, etc. complete as per ISI specifications. Measurement shall be on net area.

1116 As per item 1115 but for side cladding.

1117 Supplying, making, laying and fixing in proper position of 22 B.W.G. galvanized iron sheets in ridges including cutting, laps, wastages, etc. complete. Measurement shall be on net length.

1118 As per item 1117 but for apron piece, corner piece, flashings, louvers etc.

1119 Extra over item 1101/1115 & 1103 for providing & laying asphalt impregnated hessian cloth 100 mm wide interposed in the overlapping of sheets. Extra rate shall include for cost of over lapping of sheets by one and half corrugations.

1120 As per item no. 1112 but using 0.56mm (24 gauge) for side claddings.

1121 Supplying, making, cutting, laying and fixing in proper position 0.71mm (22 gauge) aluminium sheets in ridges, north light curve, apron piece, corner piece, flashing, louvers etc. including laps, wastage, etc. complete as directed. Measurement shall be on net length.

1122 Providing and fixing of G.I. 40mm x 5mm flat (as wind tie) over Galvalume sheeting at ridge level and eaves level as shown in drawing. Include for drilling holes, cutting, bolting, wastage, etc. Measurement shall be on the basis of net length of the tie provided.

1123 Providing, laying and fixing of uPVC Supreme / Astral make or equivalent rain water down take pipe line of 6 kg/cm² pressure rating (Class-5 Rating), as per lay-out, details and requirement including all necessary specials such as bends, Ys, Ts, offsets, plugs, reducers, pipe clamps, backing pieces, etc. and jointing with solution as per Manufacturer's instructions etc. complete.

1124 Removing existing A.C./FRP/G.I / Galvalume sheet roofing/ cladding sheets from its original position from any height and stacking the same as directed by the Engineer.

1125 Removing existing A.C./FRP/G.I / Galvalume sheet ridges, corner pieces, apron pieces, gutters, etc. from its original position from any height and stacking the same as directed by the Engineer.
1126  Supplying and fixing in proper position asbestos cement Extractor in roof including fixtures complete. Rate for Everest Brand or approved equivalent.

1127  Providing and fixing P.V.C pipelines of best quality including necessary bends, joints, hinged clamps inspective plugs leads joints, with necessary test etc. complete.

1128  Supplying, laying and fixing at any height of 0.5MM thick Pre coated colour G.I Corrugated sheets (hi-rib) of approved make in roof with G.I. "J" or "U" or cranked bolts or self-tapping screws of 8MM dia. with G.I. and bitumen washers, nuts, including cutting, lap, butyl tape sealer, wastage, breakage etc. complete. Sample and shade of the sheets shall be got approved from the Engineer prior to the procurement. Measurement shall be on net area covered. The Contractor shall carry out the work for laying and fixing of roofing/cladding sheets as per Manufacturer's instructions.

1129  Supplying, laying and fixing at any height of 0.5mm thick Pre coated colour G.I. sheet in proper position of ridges, corner pieces, apron pieces etc. including cutting, lap, wastage, breakage etc. complete as directed. Measurement shall be on net length.

1130  Supplying and fixing 2 mm thick clear Translucent polycarbonate sheet of GE, Lexan, Sabic or other approved make and design (corrugations to match with roofing/cladding sheets) in skylights/ roof at any height with step flange including fixing with brass screws / self tapping screws / GI J bolts of 8 mm dia. with G.I. & EPDM/ neoprene washers & nuts as per Manufacturer's instructions, neoprene gaskets, silicone neutral grade sealant, etc. complete. Measurement shall be on the basis of net area of the polycarbonate sheet.

1131  Supplying & fixing ‘vergola’ type natural Air vent turbine ventilator (Roof Extractors) along with the FRP base frame suitable for mounting on the BlueScope corrugated sheet / Pre coated GI sheet/ GI sheet/ Galvalume sheet. The Exhauster shall have rigid roll formed curved vanes mounted on rotor shaft & bearing assembly. It shall be weather proof and storm proof and corrosion protection design. Throat size –32 dia. to deliver 4300CFM (7310CMH) at wind velocity of 10kM/HR.

1132  Supplying, laying and fixing at any height 50mm thick (24kg/m3 density) glass fiber insulation of ‘KIMMCO’ or other approved equivalent make ( bonded with thermosetting resins) having single side facing of reflective vapour barrier of Kraft laminate( FSK) below the roofing sheets ( above the purlins) OR on the sides of the cladding sheets. Include for providing G.I.mesh (1.6 mm x 75 mm x 75 mm) below the entire area of insulation. Fixing as per manufacturer's instructions.

1133  Fixing only of Roofing / cladding using any kind of sheets such as A/C, Alum. GI, FRP, etc.

1134  Fixing only of Roofing / cladding accessories such as ridges, apron piece, corner piece, flushing, louvers etc. as directed using any kind of material.

1135  Removing existing wire/ plane glass from its original position at any height and stacking the same for re-use (re-fixing measured separately) as directed by Engineer-in-Charge. Include for disposing the breakage / wastage out of the Site. Measurement shall be on the basis of net area of the Glass dismantled.

1139  Supplying, laying and fixing at any height Hi-rib silicone modified polyester coated (RMP Coated) galvalume sheets of min. 550 MPa yield strength steel in roof or wall cladding with G.I. “J” or “U” or cranked bolts or self tapping screws of 8 mm dia. with
G.I. and EPDM/ neoprene washers, nuts, including cutting, laps, butyl tape sealer, wastage, breakage etc. complete.

The sheets shall be of AZ150 class (aluminum zinc coating of 150 grams per sq. metre) with coated alloy of 55% Aluminium, 43.5% Zinc and 1.5% Silicon and of approved color with top surface coated with 20-25 microns of coating (including 5 micron epoxy primer) and bottom service coat with 10-15 microns. Sheet material & painting shall confirm to ASTM standards ASTM A 792 & ASTM A 755. Sample and shade of the sheets shall be got approved from the Engineer prior to the procurement.

The contractor shall carry out the work for laying and fixing of roofing / cladding sheets as per Manufacturer’s instructions. Length of the sheets shall be so supplied that the laps along the length of the sheet are minimized. All Lapping of sheeting panels at sides & ends shall have 6 mm wide x 5 mm thick butyl tape sealer having non toxic, non shrinking, non drying and non asphaltic properties. Solid or closed cell Ethylene Polypropylene Terpolymer type Foam filler/ closures having same profile as sheeting panels shall be provided at eaves, ridge & other locations.

Measurement shall be on net area covered.

1140 Supplying, laying and fixing at any height of 0.5 mm thick Pre color coated Galvalume sheet accessories as per the properties described in item 1140 above in proper position of ridges, corner pieces, apron pieces etc. including cutting, lap, wastage, breakage, butyl sealer, neutral curing silicone rubber sealant, etc. Complete as directed. Measurement shall be on net length.

1141 Providing and fixing of 600 mm x 600 mm Concealed Perforated Panel False Ceiling System of “Supersil” (www.supersil.co.in) or approved equal at any height. Panels shall have circular / square perforations to have opening of 20% to 30% of total area approximately, as per the design. The panel shall be of 600mm x 600mm size, fabricated from 0.71 mm thick (TCT) aluminium alloy and shall be square edged. Panel shall be powder coated on external surface (subsequent to the perforations) with 60 microns thick powder coating of exterior grade with 15 years warranty against corrosion resistance, colour fastness, water resistance and dullness resistance against sun rays. Suspension system shall consist of GI carriers at max. 600 mm c/c GI pressure clips along the length of the panels. Powder coated 0.5 mm thick GI edge profile shall be fixed on the perimeter of walls and columns. Rate to include for scaffolding, wastage, cutting, etc. Complete. Measurement shall be made on the basis of net plan area of the ceiling provided.

1142 Providing and fixing of 150F Concealed perforated Panel False Ceiling System of “Supersil” (www.supersil.co.in) or approved equal make at any height. Aluminium plain panel shall be of 150 mm wide x 17 mm deep x 0.71 mm thick having length up to 5000 mm. The panel shall have circular perforations as per design. The panel shall be powder coated on a continuous paint line (subsequent to the perforations) with 60 microns thick powder coating of exterior grade with 15 years warranty against corrosion resistance, colour fastness, water resistance, and dullness resistance against sun rays. When two panels are to be lapped along their length, they shall be joined together by means of panel coupler. The panels shall be fixed to the panel carrier, which in turn shall be suspended from the roof / truss by means of GI suspension angle and GI T leveler for fine adjustment of height. Panel carrier shall be roll formed out of 0.60 mm thick galvanized steel strip to hold the panel in the module of 150 mm and shall be spray painted / stove enameled black. When two or more carriers are to be joined, they shall be joined together by means of carrier coupler and hold them firmly in place while maintaining the module of 150 mm. Edge profile of
standard L-shape roll formed out of 0.5 mm galvanized strips with powder coating shall be provided at edges. Rate to include for scaffolding, wastage, cutting, etc. Complete.

1143 Providing and fixing aluminium panel type cladding system of “Supersil” (www.supersil.co.in) or approved equal make on curved surfaces at any height. Panels shall be fabricated from 1 mm thick (TCT) aluminium alloy in the curved shape and / or required taper / trapezoid, as per the design. Panels shall be maximum 1200mm long x 600 mm wide and shall be plain on the sides and square edged at top & bottom. Panels shall be powder coated on external surface only with 60 microns thick powder coating of exterior grade with 15 years warranty against corrosion resistance, colour fastness, water resistance and dullness resistance against sun rays. Vertically, panel shall be snapped in to 0.45 mm thick GI carrier / 1.2 mm thick pressure clip. Carrier / Clip will be installed in proper vertical curvature with the help of T leveler, spring steel suspension clip and GI hold on hanger. Joints, wherever required, shall be filled with silicone sealant of approved make & shade. It may be necessary to measure “as built” dimensions of the roof structure before taking up the execution of this work. Rate to include for scaffolding, wastage, cutting, etc. Complete.

It is mandatory that a sample (Mock up) of at least 30 sq. m. area shall be made exactly as per the design for approval by the engineer before taking up the actual work. Measurement shall be made on the basis of net area of the cladding provided.

1144 Same as 1128 but, using approved quality PUF insulated sandwiched roof/ cladding panel. Roof/ cladding panel shall have 50 mm thick PUF (40 kg/m3 density) insulation sandwiched between 0.5 mm thick pre colour coated G.I. sheet of approved corrugation as exterior face and 0.5 mm thick pre colour coated G.I. sheet of approved corrugation as interior face.

1145 The technical specifications, Scope of supply & Installation given below are for the general guidance of the Vendor and shall not be considered as exhaustive. Details/ specifications not appearing in the list, but required to complete the work, shall be considered as part of the Scope and Vendor’s offer shall be considered to include the same. If the Vendor has contemplated any variation in specifications/ scope described below, the same shall be clearly mentioned in a separate statement attached with his offer.

1. Designing, Supplying, fabrication & Installation of Self-Supported roofing system like Proflex or Spider or equivalent comprising of profiled sheets that are fixed to supporting structure without any intermediate supports, purlin, girts thus giving a unobstructed clear span, with GI Anchor faster of required size & number only using 1.5" Neoprene/Rubber & Galvanised visals.

2. The roofing system should be designed to withstand the wind load as per IS 875 part-3, Earthquake / seismic load as per ISI 893, require dead load & live load.

3. All roofing sheets shall be produced out of TATA Bluescope made coils. The sheets shall be of AZ 150 class (Aluminium zinc coating of 150 grams per sq. meter,) with coated alloy of 55% Aluminium, 43.5% Zinc and 1.5% Silicon and of approved color with top surface coated with 20-25 microns of coating (including 5 micron epoxy primer) and bottom service coat with 10-15 microns. Sheet material & painting shall confirm to ASTM standards ASTM A 792 & ASTM A 755. Sample and shade of the sheets shall be got approved from the Engineer prior to the procurement.

4. All roofing sheet panels shall be of Super Durable Paint (SDP coated) galvalume profiled sheet with min. of 25 microns Top coating and 12 microns Bottom coating having 340 Mpa yield strength. The thickness of roofing sheet shall be as per design done by vendor.

5. Complete responsibility of the designing of the roofing system shall remain with the Supplier. The Supplier shall submit design basis report for the approval of the Owner.
prior to taking up the fabrication & Installation works. The Vendor shall submit the support reactions for RCC Structure design.

6. Accessories:
   • Light Hangers: Light Hangers should be installed to support Cables & Light Fixtures as per approved design.

7. The Vendor shall give a guarantee against leakages through roof for a minimum period of 10 years.
1200 **Structural Steel Work**

1201 Supplying, fabricating, erecting, aligning and fixing in proper position mild steel portal frames, plate girder, gantry girder, trestles, trusses, columns, purlins, ties, bracing, sag bars, grills, etc. complete made of plates, angles, I / C beam and such other hot rolled sections confirming to IS 2062 and of approved make at site. Rate shall include for splices and supplying all ISI mark materials such as welding rods, bolts, nuts, etc and like labour for the work of straightening, cutting, drilling holes, necessary plants/equipments for assembling, bolting, welding, erecting, etc. complete as directed. Rate shall include for one coat of Zinc Chromate primer and two coats of approved enamel paint after thorough cleaning of surfaces with wire brush / sandpaper and as per the Paint Manufacturer's instructions, removing all loose rust, dust and other such foreign materials before application of Paint.

Fabrication shall be in a perfectly workmanship like manner and as provided in Section V and VI of IS 800 and IS 7215. Welding shall be carried out by qualified & approved welders. Electrodes for welding, the procedure, selection, test and inspection shall conform to provisions in IS 816, IS 822, and IS 833. Erection / hoisting shall commence only after passing of fabricated parts by the engineer-in-Charge.

Measurement of steel shall be on the basis of length of the sections as per drawings and standard weight as per IS code. Weight of bolt / welding shall not be considered for payment.

1202 Rate to include for supplying, fabricating, welding, aligning, and fixing insert in positions, etc. complete as per drawings. Include for necessary changes required in form work. Other details same as per item no. 1201.

1203 Supply and fix in position holding down bolts with 70 mm threaded portion with nuts, washers and M.S. plate complete as shown in drawing. Bolts shall be fixed in the pockets in position. Include for 100 dia. M.S. pipe sleeve having half of the bolt length. Bolt together with sleeve shall be placed and fixed securely in position and level as shown while pouring of foundation/pedestal concrete.

1204 As per 1201 but for chequered plate.

1205 As per 1201 but for grill over compound wall.

1206 As per 1201 but for sliding gate including rollers, guide rails etc. complete. Rate shall include for M.S. pipe guide, brackets for hanging gates, rails, pulleys, ball bearings, nuts, bolts, washers, one under coat of Zinc Chromate primer and two coats of enamel paint, etc. complete. Measurement shall be on the basis of length of section as per drawings and standard weight as per IS. Pulley and bearing weight shall be considered as per Manufacturer/actual data.

1207 As per 1201, but for wicket gate as per drawing including hinges etc. complete.

1208 As per 1201, but for window grills as per drawing including all necessary fittings and fixtures.

1209 As per item no. 1201 for providing composite aluminium-pigmented metal primer and two finished coats of aluminium paint over the mild steel surfaces where there is direct contact with aluminium roofing/cladding sheets likewise purlins, cladding runners, etc.
Other surfaces of purlins, runners, etc; which are not in contact with aluminium sheets, shall be painted as per item no. 1201.

1210 As per item no. 1203 but with 75mm dia. M.S. pipe sleeve as shown on drawing. Bolt fixing while pouring of foundation concrete.

1211 Supplying, cutting and fixing in proper position welded wire mesh as shown on drawing including spot welding to structural steel members complete. Rate shall include for one coat of Zinc Chromate primer and two coats of approved enamel paint. Item shall be measured in Sq.mt. Structural steel members measured separately.

1212 Supplying, fabricating, bending, erecting, aligning and fixing in proper position M.S. black sheet (H.R.) for the purpose of rain water gutter, cladding, flashing, apron, etc. as shown on the drawings. Rate shall include for supplying all materials such as ISI mark welding rods, bolts, nuts, etc. and like labour for the work of straightening, cutting, drilling holes, necessary plants/equipments for assembling, bolting, welding, erecting, laps, wastage, etc. complete as directed. Rate shall include for one coat of Zinc Chromate primer and two coats of approved enamel paint after thorough cleaning of surfaces. Measurement of sheet shall be on net area (sq. m) basis.

1213 As per item No.1201 but for roof ventilation work at ridge level as shown on drawing.

1214 Supplying, cutting, fixing in proper position medium class M.S. pipe as shown on drawing.

1215 Removing existing fabricated structural steel like portal frames, trusses, gantry girders, trestles, storage bins/silos, stairs, railings, columns, purlins, ties, bracing, sag bars, grills, fabricated girders, welded wire mesh, etc. having welded/bolted/riveted joints from any height and handling/stacking the same as directed by the Engineer. Rate shall include for using necessary plants/equipments for cutting the sections and like labours, etc. Dismantling scheme shall be got approved from the Engineer prior to taking up this particular work.

1216 Item same as 1201 but for supplying, fabricating, erecting, aligning, fixing in position etc. complete for furnace grillage and other furnace steel work as shown on the drawings. Rate does not include any Zinc Chromate primer or enamel paint.

1217 Providing & applying one coat of Zinc Chromate primer primer over structural steel work after thorough cleaning of surface.

1218 Providing & applying two coats of approved first quality synthetic enamel paint over structural steel work.

1219 Providing & applying two coats of heat resistant Shalimar or equivalent paint after applying required primer over structural steel surfaces.

1220 As per Item no.1201 but with Cold rolled sections like Z / C section, Hollow sections etc. conforming to IS: 811.

1221 Erecting, aligning and fixing in proper position mild steel portal frames, plate girder, gantry girder, trestles, storage bins, trusses, columns, purlins, ties, bracing, sag bars, grills, etc. complete at site. Rate shall include for supplying all materials required for erection such as ISI Mark welding rods, bolts, nuts, etc and like labour for the work of straightening, cutting, drilling holes, necessary plants/equipments for assembling, bolting, welding, erecting, etc. complete as directed. Rate shall include for one coat of
Zinc Chromate primer and two coats of approved enamel paint after thorough cleaning of surfaces with shifting, loading, unloading, and transporting the sections within a lead of 15 km radius from site.

Measurement of steel shall be on the basis of length of the sections as per drawings and standard weight as per IS code.

1222 Strengthening of existing framed/ unframed structural steel members like trusses, ties, beams, columns, gussets, battens, lacings, bracings, brackets, etc. at any height by welding / bolting additional steel sections/ plates with the existing members as per details. Rate to include for supplying all fasteners & consumables such as bolts, welding rods, nuts etc., necessary plants & equipments, cleaning of existing corroded surfaces etc. complete.

Measurement shall be made on the basis of unit weight of new sections/ plates used in the strengthening.

1223 Strengthening work same as item no.1222 but using standard tubular sections like pipes, etc. of approved make.

1224 Structural steel work same as item no.1201 but using standard tubular sections like circular pipes, rectangular/ square hollow sections, etc of approved make and confirming to IS 1161/ IS 4923.

1225 As per item no 1201 but Epoxy paint instead of enamel paint.

1226 Item same as 1201 but for supplying, fabricating, erecting, aligning, fixing in position etc. complete for Storage bins, silos steel work as shown on the drawings. Rate does not include any Zinc Chromate primer or enamel paint.

1227 Painting to structural steel – Providing & applying one coat of Epilux 610 Epoxy primer (Berger make) and two coats of Epilux 4 chemical resisting paint (Berger make) over the structural steel members, framed/ unframed at any height. Include for complete cleaning of the surface with wire brush / sandpaper and as per the Paint Manufacturer's instructions, removing all loose rust, dust and other such foreign materials before application of Paint. Standard weight as per IS code shall be considered for payment purpose. Weight shall be calculated as per relevant IS code.

1228 Providing and fixing in position anchor fasteners in concrete of ‘HILTI’ or other approved make and fixing them in position at correct locations, lines and levels as per Manufacturer’s specifications and as directed and instructed by the Engineer. Include for drilling hole in concrete with drilling machine and making good the surface of concrete / masonry after inserting the fasteners. Rate to Include for necessary drilling, cleaning, scaffolding, tools/ tackles, wastage, etc. complete.

1229 Providing and Fixing Chemical rebar ‘HILTI’ or other approved equivalent. Rate shall include for drilling hole in concrete / masonry with drilling machine, cleaning, grouting and fixing reinforcement for required length, injecting the hole by approved epoxy resin hardener etc. complete and making good the surface of concrete / masonry after inserting the rebar. Rate shall also include for necessary drilling, cleaning, scaffolding, tools/ tackles, removal of wastage, etc. complete. ‘HILTI’ or other approved equivalent. Reinforcement will be measured separately. No additional payment shall be made for extra drilling at location where reinforcement is encountered.
1230 Taking core from existing concrete beam/column/slab/wall etc. at location specified by the Consultant. Before drilling reinforcement shall be located by rebar locator. No. Reinforcement should be cut unless approved by the Consultants. Rate shall include for diamond core machine HILTI or approved equivalent, required scaffolding, water, etc. complete.

1231 As per 1201, but for G.I. gratings. Providing and fixing grating as per IS specifications over internal drainage or external drainage work (i.e. Storm water drain) or on cable trench etc. complete as per drawing and specification and as directed by Engineer in charge.

1232 As per item no 1224 but Epoxy paint instead of enamel paint.

1233 Extra over item no. 1201 & 1224 for providing two coats of aliphatic polyurethane paint of ASIAN 1K PU or other equivalent with zinc phosphate primer, in place of enamel paint over Zinc Chromate primer.

1234 Providing, laying & installing composite metal deck sheet of 0.6 mm thick (minimum yield strength of $F_y = 350$ N/ sq mm). Rate to include cutting to required size securing to floor beams with appropriate SDST screws, shear connectors / studs etc complete as per specification and as directed by Engineer in charge. Actual measurement of plan area should be considered for payment.

1235 FRP Gratings: Providing and fixing 1-1/2” thick FRP gratings (HLC Gratings by Kemrock or equal) over internal drainage or external drainage work (i.e. storm water drain) or on cable trench etc. Rate to include cutting to required size, wastage complete as per specification and as directed by Engineer in charge. Actual measurement of plan area shall be considered for payment.

1237 Fixing of Foundation/Anchor Bolts in RCC Pedestal at any level including maintaining the accuracy towards line, level & position. Foundation Bolts will be supplied by PEB Vendor including template. Contractor will take due care for its threads and rusting by applying Greece and cotton waste / PVC Cap.
1300  Water Supply - Sanitary & Misc.

All fittings/ fixtures like bib taps, flush cocks, stop cocks, towel rails, shower rose, paper roll holders, sensors, etc. for toilets, kitchens and other areas shall be of below Specified Make or equivalent. (UNLESS NOTED OTHERWISE IN THE BILL OF QUANTITY) as given below –

Rates for all items of water supply and sanitary works shall be for ‘center point’ type installation.

1301  Rate to include supplying, laying, jointing and testing of C-class G.I. pipes TATA brand or equivalent for water supply distribution system including wastage, all ISI marked fittings such as bends, tees, elbows, unions couplings etc. with spun yarn for pipes and Teflon tape for fittings and fixtures, cutting, making holes and chasing wall, floors etc. and making good the same to original condition etc. complete as directed and specified. Include for two coats of anti corrosive bitumastic paint of approved quality.

1302  Rate to include supplying, laying, jointing and testing of First grade quality salt glazed stoneware pipe in line, level and proper slopes including all fittings, specials, hydraulic test, excavation and refilling the trenches, spreading the surplus earth, watering etc. complete as directed.

1303  Rate to include supplying, laying and jointing Heavy duty C.I. pipe line for water supply or waste water or anti syphonage pipe or soil waste pipe including necessary C.I. specials like plain bends, door bends, collars junctions with hinged clamps, inspection plugs, cowl with mica flap valve, etc. including jointing with spun yarn and cement mortar, M seal sealant, necessary excavations, chasing and restoring to original condition, testing etc. complete as specified and directed.

1304  Rate to include supplying and fixing of approved make C.I. Nani trap, having at least 75 mm waste seal with C.I. Zali on top including necessary cement for bedding, finishing etc. complete as directed.

1305  Rate to include providing and fixing in position 150mm x 150 mm clear inside best quality approved salt glazed stone ware gully trap including embedding trap in cement concrete, C.I. grating, and C.I. cover, housing the trap in brick masonry chamber 230mmx 230mm with 150 mm thick in cement mortar 1:3 over a bed of 100 mm thick 1:4:8 B.B.C.C., plastering both side and necessary excavation, curing etc. complete.

1306  Rate to include providing and fixing of 150 mm dia. sewer trap as directed.

1307  Rate to include supplying and laying heavy C.I. cowl at top of with mica flap valve ventilating pipe complete as directed.

1308  Rate to include supplying and fixing first quality wash basin PARRY / CERA / HINDUSTAN brand or equivalent comprising white glazed earthenware’s basin, 32 mm dia. c.p. waste coupling, c.p. bottle trap, chain with plug, c.p. stop cock, PVC connection, ISI Mark approved C.P. pillar cock and supporting brackets etc. complete with 32mm dia. GI waste water pipe up to 900 mm long.

1309  Rate to include supplying and fixing of first quality Indian style w.c. Pan 510 x 400 mm size PARRY / CERA / HINDUSTAN brand or equivalent including set of foot rest, trap and all necessary specials etc. complete.
1310  As per item 1309, but for orissa type w.c pan.

1311  Rate to include for supplying and fixing of first quality Anglo Indian Type W.C. PARRY / CERA / HINDUSTAN brand or equivalent including trap, seat & cover, concealed stop cock with jet and all necessary specials etc. complete but without flushing tank.

1312  Rate to include supplying and fixing first quality European type w.c pan PARRY / CERA / HINDUSTAN brand or of an equivalent brand, wall hung / floor supported, including low level ceramic flushing cistern, black seat & cover, concealed stop cock with jet, C.P. cock & PVC connection trap and all necessary specials etc. complete.

1313  As per item 1312, but with high level cistern.

1314  Rate to include for supplying and fixing of first quality ceramic recessed type soap dish PARRY / CERA / HINDUSTAN equivalent brand.

1315  Rate to include supplying and fixing first quality 450 x 360 x 290 mm size PARRY / CERA / HINDUSTAN or equivalent urinals including 12 mm dia. G.I. pipe (C-class) connection at top with C.P. stop cock and waste water couplings and G.I. pipe connection at bottom, bottle trap, etc. complete.

1316  Rate to include providing and fixing heavy ISI Mark approved quality 15mm c.p. water taps with washer etc. complete as specified and directed.

1317  Providing and fixing heavy approved quality gun metal 'ZOLOTO' brand or equivalent sluice valve.

1318  Providing and fixing 25MM dia. C.P. turning type flush cock (weight not less than 1.5 kg) of an ISI Mark approved quality including washer etc. complete as specified and as directed.

1319  Providing and fixing good quality MODI/Saint Gobain or equivalent mirror with approved PVC or Timber framing in position. Rate to include necessary screws and fixtures.

1320  Providing and fixing approved quality chromium plated shower rod of 125 mm size with chromium plated disc, bend, etc. complete.

1321  Providing and fixing approved quality chromium plated hot and cold mixer assembly for shower including shower.

1322  Providing and fixing C.P. brass towel rail 600mm x 20mm complete with C.P. brass brackets fixed to wooden cleats with C.P. brass screws.

1323  Rate to include construction of Inspection chamber of 600 x 600 x 600 mm deep with 230 mm thick brick wall with foundation in 1:4 cement mortar over a bed of 1:4:8 p.c.c. 150 mm thick, plastering both side with 1:3 CM with smooth cement finish internally, forming, benching, channeling, Providing & fixing medium duty precast drain cover of 600 x 450 mm in top 100 thick R.C.C. slab. Include for necessary excavation and back filling etc. complete in all respect as directed.

1324  Rate to include construction of Manhole of 1200 x 900 mm and up to specified depth with 230 mm thick brick wall with foundation in 1:4 cement mortar over a bed of 1:4:8 P.C.C. 150 mm thick, R.C.C. top cover slab, plastering of 12-15 mm thick both side
with 1:3 CM with smooth cement finish internally, forming, benching, channeling, providing & fixing C.I. / concrete frame and cover of 600 x 600 mm heavy duty and PVC rungs. Include for necessary excavation and backfilling etc. complete in all respect as directed.

1325 Rate to include construction of septic tank in brick walls plastered both side with bottom 1:2:4 P.C.C. 100 mm thick over 75mm thick B.B.C.C. and top slab (R.C.C) with heavy duty C.I. manhole cover and frames M.S. rungs, central divider walls, baffle walls, 75mm C.I. vent pipe (3m long) with cowl & mica flap valve. Include for necessary excavation, backfilling and spreading of earth as directed.

1326 Rate to include construction of soak well 2000/2500 mm dia. 4000/5000 mm deep internally from 350mm thick honeycombed brick wall for bottom 3m/4m depth, 1:4:8 concrete base, R.C.C. top slab, medium duty C.I. manhole cover and frames 600 x 600 mm and 75mm dia. C.I. vent pipe (3m long) with cowl & mica flap valve at top. Include for necessary excavation, blasting if necessary, backfilling and spreading of surplus earth, brick bat filling as directed.

1327 Same as item no. 1308 but, for providing Pillar cock with sensor of ‘JAQUAR ‘ or equivalent make having automatic operation by alkaline batteries.

1328 Deleted.

1329 Providing and fixing in position 75 mm dia. outlet type Amul trap of stainless steel make including embedding trap in cement concrete, S.S. grating and housing the trap in brick masonry chamber 450mm x 450mm with 300 mm deep in cement mortar 1:3 over a bed of 100 mm thick 1:4:8 B.B.C.C., plastering both side and necessary excavation, curing etc. complete

1330 Providing and fixing Pharma drain trap of S.S. make as per the attached sketch. Rate to include for fixing the trap in concrete.

1331 Providing and fixing Soap dispenser of ‘toshi’ or equivalent make having SS body and transparent look. Soap storage capacity to be more than 500 ml.

1332 Providing and fixing chromium plated Paper roll holder of Jaquar or equivalent approved make. Rate to include for all materials, labour, fixing, etc. complete.

1333 Providing and fixing Stainless steel single bowl Kitchen sink of ‘Nirali’ / ‘Krishna’ or other approved equivalent make with side drain board. Bowl size to be not less than 15” x 18”. Rate to include for fixing of the Sink over platform (measured separately), 32 mm dia. c.p. waste coupling, c.p. bottle trap, etc. complete.

1334 Supplying, laying, jointing, welding, aligning, testing (at 1.5 times the rated pressure) and commissioning High Density Polyethylene (HDPE) pipes of Dutron / Nocil or approved equivalent including specials and fittings, excavating trenches in soil up to 1000mm depth, shoring, dewatering (if required), back filling with excavated earth in layers not exceeding 300mm with watering and ramming of each layer, final dressing and leveling at ground level. HDPE pipes shall be of PE80 grade virgin material and shall conform to IS-4984 - 1995. Rate to include for connection with G.I. / pipes of any other material, requisite specials, jointing, wastage, supplying & laying fine sand bedding of minimum 100mm thickness below the pipe, etc. Measurement shall be as per net actual length of pipe laid at site. Rate to include disposal of excess earth within 1.0km as directed by the Engineer.
1335  Providing and fixing stainless steel male Chilly traps of square / round shape with necessary HDPE nani trap and joining the same with araldite with HDPE pipe at top of required size complete in wash rooms, passages and other area as drain trap as per same and as shown and instructed by the Engineer. The rate is inclusive of cost of HDPE nani trap and chilly trap and joining the same with each other, necessary bedding and fixing it in floor, etc. complete.

1336  Providing, fixing HDPE “Sintex” or other approved equivalent tank. Include for manhole cover, necessary plumbing for connection of the tank with inlet, outlet, overflow and washout pipes and installing tank over the supporting platform (measured separately)

1337  Same as 1301 but with co-extruded polyethylene composite pressure pipes having welded aluminium tube reinforcement between inner & outer polyethylene layers - of Kitec PR PL make or equivalent. Rate to include for all connections, jointing, fittings, connection with HDPE/ GI lines /C.P brass fittings, testing, wastage etc. Jointing shall be with composite compression fittings. Measurement shall be as per net actual length laid at site

1339  Providing and fixing 600 mm dia. C.I. (64kg wt for cover & 64 kg wt for frame) manhole cover with its. C.I. frame at any height / depth etc. complete as directed by the Engineer.

1340  As per item no. 1324 but for 1400 mm. inner dia. circular Manhole as per the attached drawing.

1341  As per item no. 1324 but for Valve Chamber of inner dimensions 900 mm x 900mm.

1342  Providing, Fixing & testing double acting Kinetic type Air valve with isolating valve (10 kg/cm² pressure rating), including supply of all hardware materials to connect the valve with HDPE / GI / Kitec pipes as per supplier's specifications.

1343  Providing, Fixing and testing Sluice valve (10 kg/cm² pressure rating) in working pressure, with flanged ends, including supply of all hardware materials such as nuts, bolts etc. complete as per specification to fix with HDPE pipes.

1344  Same as 1303 but PVC SWR pipe As per IS 13592 of “Supreme” Brand or other approved equivalent make including jointing, PVC fittings / specials, etc.

1345  Same as 1304 but PVC Nani trap of Supreme or other approved equivalent make.

1346  Same as 1324 but for storm water Catch pit of 900 mm x 1200 mm including supply and fixing of RCC precast perforated cover as per the attached drawing.

1347  Same as 1307 but for PVC vent cowl over PVC ventilating pipes. PVC vent pipe measured separately.

1348  Provisional sum for Civil, Electrical, Mechanical piping and Instrumentation works of 45m³/day to 55m³/day sewage treatment plant and disposal of treated water.

1349  Providing and fixing water level indicator of wood with steel framing at the outer surface of RCC shaft for showing water level of Elevated service reservoir including necessary pulley and roller arrangement etc. complete as directed by the Engineer.

1350  Same as item no. 1301 but for laying the pipes below ground. Include for excavating trenches in soil up to 1000mm depth, shoring, dewatering (if required), supplying &
laying fine sand bedding of minimum 100mm thickness below the pipe, back filling with excavated earth in layers not exceeding 300mm with watering and ramming of each layer, final dressing and leveling at ground level. Measurement shall be as per net actual length of pipe laid at site. Rate to include disposal of excess earth within 1.0km as directed by the Engineer.

1351 Supplying & fixing electrically operated, heavy duty Hand dryer, “Elektra” or other approved equivalent at toilets with stainless steel hood. Include for fixing in position, necessary wiring, etc. complete.

1352 Supply, Install & Commission on-line magnetic flow meter (pulsed DC type) of Krohne Marshall or other approved equivalent, having electrodes of SS 316, measuring tube & grounding rings of SS 304, polypropylene liner, IP 68 protection and steel flanges together with suitable flow transmitter / converter having back lighted LC Display for actual flow rate, totalizer, etc. Rate to include for all related civil works like excavation, modifications in water distribution line, testing, provision of a suitable brick masonry chamber (plastered internally & externally) with lockable cover.

1353 Providing and fixing in position laboratory sink of “CERA” make (catalogue no. 4002, size 600 x 400 x 200 mm) or equivalent make including C.P. brass waste coupling, PVC waste pipe of “Supreme” or equivalent make, C.I. brackets for fixing etc. complete as directed.

1354 Dismantling of GI / CI / PVC or any type of pipes including excavation & refilling trenches after taking out the pipes manually/ mechanical means including stacking of pipes within 100 meters lead as per direction of engineer in charge

1355 Dismantling existing Toilet block having brick masonry walls with plaster / tiles, floor, doors & windows, all internal plumbing & drainage lines in the walls & in the floor, all sanitary hardware like WC pans, urinals, dividers, wash hand basins, etc. including taps, bib cocks, valves, etc. attached to them. The RCC slab of this block (which is not supported on the brick walls of the Toilet) is not to be dismantled. Rate to include for dismantling of all drainage lines up to & including gully trap / inspection chamber nearest to the Toilet block and removing all the debris from the site

1356 Same as Item no 1350 but for UPVC Pipe (as per ASTM D-1785) of SCH-40 grade

1357 provisional sum for Supply & Installation of Hydro Pneumatic System.

1358 Grease trap chamber: Same as item no. 1325 septic tank, but for grease trap chamber as per details.

1359 Same as 1303 but RPVC Class-3 pipe As per IS 4985 of “Supreme” Brand or other approved equivalent make including jointing, PVC fittings / specials, etc.

1361 Same as 1301 but for UPVC pipe of Grade P-40.

1362 Providing, supplying & fixing Divisional Plates for Urinals of (CERA CAT NO 5011) 700 X 320 x 140 of First quality including.

1363 Providing & fixing ZMS series of “Merino Besco” Cubicles or approved equal in toilet (Toilet partitions) using 12 mm thick compact laminate for cubicles with maximum size of 1.6m x 1.2 m and door size of 700 mm x 2100 mm. Rate to include for top rail, adjustable legs with bottom cap, gravity hinges, privacy thumb turn with occupancy indicator, door knob, coat hook, adjustable pedestal, aluminium U channel, aluminium
door stopper channel, screws & wall plugs, etc. in place. The contractor shall provide 5 years warranty for complete system.

1364 Supplying, fabricating and fixing custom made Stainless steel sink made out of 1.6 mm thick SS 316 grade steel, having drain bowl at every 750 mm c/c with pillar cock (Catalogue no. 031 of Jaquar prismatic), necessary bottle trap, making hole for pillarcock, etc. for drinking water area. Rate to include cutting, bending, wastage, drilling, welding, supporting brackets, etc. complete

1365 Providing & fixing R.O. water purifier of “Excel R.O. / Rainbow / Surewaterteck” or approved equivalent brand with all necessary accessories including piping, connection with angle valve and pipe up to water taps, raw inlet pipe & waste water pipe, rate is also including cutting & making walls good.

1366 Providing & fixing drinking water cooler of “Voltas / Bluestar” or approved equivalent brand with all necessary accessories like angle valve, ball valve, connection piping up to water taps, r.o. water inlet pipe connection, electrical connections & waste water pipe outlet. Rate is also including cutting of wall & making it good. It must be equal to normal cooling capacity & of Stainless steel body.

1367 Providing & fixing float valve (ball cock) of Poly propylene or synthetic metal, float & rod of approved make with all necessary accessories like connection with uPvc pipe & Teflon tape. Rate is including for complete work as per specification / drawings and direction of engineer incharge.

1368 Supplying & installing gun metal/brass ball valve conforming to IS: 1703. Ball valve must be having screwed ends. The ball valve should be with stand with maximum pressure up to 16 Kg/cm2. Complete in all respect

1369 Supplying and laying Foam core SN 4 pipes of any dia. (Astral or equivalent) below ground with all required tools, and consumables like, tee, couplers, solvent etc. Rate to include for testing as per manufacturer’s specifications excavating trenches in soil up to 1000mm depth, shoring, dewatering (if required), supplying & laying fine sand bedding of minimum 100mm thickness below the pipe, back filling with excavated earth in layers not exceeding 300mm with watering and ramming of each layer, final dressing and levelling at ground level. Measurement shall be as per net actual length of pipe laid at site. Rate to include disposal of excess earth within 1.0km as directed by the Engineer.

1370 Same as 1324 but for chamber with sewer trap of size 900 mm x 900 mm with depth up to 1.5 m including supply and fixing of RCC precast perforated cover as per the attached drawing.

1371 Providing & fixing Y-Type mechanical Strainer ISI marked conforming to Indian Standards of approved make with Stainless steel mesh of perforation range 0.5mm to 1.5mm having body cover Bronze/C.I and end connection threaded/flanged. Rate is inclusive for specials, nuts, bolts, rubber rings, tail pieces, extra pipes, flanges, clamps, couplers and washers etc all complete including labor and material with applying two coat of red oxide paint and three coat of enamel paint of specified colour. Testing of strainer and fixing with main supply pipe line in masonry chamber as specified and directed.

1372 Providing and fixing Chlorinated Polyvinyl Chloride (CPVC) pipes with “Armacell” Insulation as per IS15778 for above ground open or concealed, having thermal stability for hot and cold water supply including all CPVC plain & brass threaded fittings
including fixing the pipe with clamps at 1.00 m spacing. This includes jointing of pipes and fittings with one step CPVC solvent cement and cost of cutting chases and making good the same including testing of joints complete as per direction of engineer-in-Charge etc. Rate to include making holes and chiseling of walls, making the same to original conditions etc. complete as directed. Measurement & payment shall be on the basis of net actual length of pipe fixed.

1373 Providing and fixing PVC SWR "P" trap of approved make having 50mm water seal including jointing, cutting, making good the walls, floors, all complete as directed by the engineer in charge. Rate to include SS 316 Gratings of Chilli Brand for “P-Trap” with frame and cover embedded in floor with white cement mortar etc. complete as per manufacturer’s specification. Rate to include clams/hanger support for hanging plumbing, PCC 1:2:4 bedding below floor & all connection to soil & waste water from traps etc. complete as directed.

1374 Providing and laying “ACO or approved equivalent” modular drain for Load class “C” of EN-1433 (Klassikdrain-K200 grates model) made of polymer concrete of 8” internal width in scope having GI perforated top cover etc. complete in all respect as per manufacturer’s specification. Rate to include laying in slope, labour, Material, specials if require etc. Measurement & payment shall be on the basis of net actual length of drain fixed.

1375 Providing and fixing Handicapped toilet fixtures consisting of EWC with cistern, washbasin, Grab bars, etc., of Hindware or equivalent approved make with all accessories. The quote shall include for the Grab rail & hinged rail as per design & specification and as directed by Engineer-in-charge.

1376 Providing and fixing Soap dish of 'Jaquar' or equivalent make. Rate to include for all materials, labour, fixing, etc. complete.

1377 Providing and fixing Paper Dispenser of ‘Euronics' or equivalent make. Rate to include for all materials, labour, fixing, etc. complete.

1378 Provisional sum for supply & installation hot water system.

1379 Supplying, fabricating, delivering & Fixing at desired locations, MS Pipe of required length and thickness with puddle flange, grouting around the pipe with CM 1:1 wherever required, including painting with two coats of red oxide zinc chromate primer, etc. complete as directed By Engineer In Charge. (Maximum of 750 mm length)

1380 Supplying & fixing Epoxy Power coated Eye wash (Corrosion resistant cycolac material made florescent color) Fountain Hand Operated of ABC Brothers – Model No. SSEH having G.I. “C” Class heavy duty pipes and fittings made IS10592 Marked and Approved Push Plate operated Eyewash Unit. Rate to include material & labour, accessories, SS ball valve of ½" Dia etc. complete as per manufacturer's specification. The technical data as per followings.
1400 Roadwork

Generally, all the Road work shall be as per the “Specifications of Road & Bridge Works”, 5th Revision, of Ministry of Road Transport & Highways unless specified otherwise in the relative item description. These specifications are called MORT&H specifications hereafter. The rate for individual item shall include for making temporary alternative arrangements for traffic during execution of that particular item, carrying out the work in part widths / part lengths as directed, all the required tests for quality control, establishment of a fully equipped Laboratory at Site for testing, all royalties, fees, leads and lifts for all the materials.

1401 Same as Item no.101 but for/in roadway (i.e. in carriageways and / or footpath) in soil of any types, including hard murrum up to specified depths. Any excess excavation shall be backfilled with suitable, approved material and thoroughly compacted in an approved manner. Payments to be made on net measurement.

1402 Sub-grade Compaction

Compact subgrade by power driven road roller of 8 to 12 tone or 2 to 4 tone vibrating roller with minimum 5 passes. Relative compaction required at subgrade is 98% of maximum compaction at optimum moisture content as per IS-2720(Part-8). Rates to include for trimming subgrade to the levels, watering, longitudinal and cross falls as specified, making good any undulation developed during rolling by earth and rerolling of that particular part.

1403 Supply, lay and pack stones shoulder to shoulder with the grater dimension vertical and the flatter short side at bottom, to form a layer not less than the specified thickness. Rates to include for placing smaller stones in the interstices and hammering house until voids are filled sufficiently for compaction, rolling with 8 to 10 t roller until stones are thoroughly keyed and no further movement takes place, spreading, brushing and compacting stone screening etc. complete. The specified thickness shall be attained after compaction.

1404 Supply, lay and pack coarse aggregate 53mm size and downgrade as per Grading III of Table 400-7 of MORT&H Specifications, to depth of 110mm thick (loose) and consolidating the same to 75mm thickness by means of 8 t to 10 t rollers. Include for placing screening / good murrum/smaller sized aggregate as per the requirements in the interstices until the layer is thoroughly keyed and no further movement takes place on movement of compaction equipments and making the layer water bound macadam all as per MORT&H requirements.

1405 Supply, lay and pack coarse aggregate 63mm size and downgrade as per Grading II of Table 400-7 of MORT&H Specifications, to depth of 110mm thick (loose) and consolidating the same to 75mm thickness by means of 8 t to 10 t rollers. Include for placing screening / good murrum / smaller sized aggregate as per the requirements in the interstices until the layer is thoroughly keyed and no further movement takes place on movement of compaction equipments and making the layer water bound macadam all as per MORT&H requirements.

1406 Supply, lay and pack coarse aggregate 90mm size and downgrade as per Grading I of Table 400-7 of MORT&H Specifications, to depth of 145mm thick (loose) and consolidating the same to 100mm thickness by means of 8 t to 10 t rollers. Include for placing screening / good murrum / smaller sized aggregate as per the requirements in the interstices until the layer is thoroughly keyed and no further movement takes place
on movement of compaction equipments and making the layer water bound macadam all as per MORT&H requirements.

1407  Bitumen Base Course - Provide minimum 50 mm thick base course with 25 mm single size aggregates coated with 4% to 5% by weight, of straight run bitumen having penetration grade 80/100. Contractor to include in his rates drying of aggregates, mixing with bitumen at 140 to 160 degree C until mix of uniform composition is achieved spreading while hot and rolling to provide specified thickness.

1408  Bitumen Wearing Course - Provide minimum 25 (compacted thickness) mm thick wearing course with 12 mm single size aggregate coated with 5 to 6% by weight, of straight run bitumen having penetration grade 60/70. Include drying of aggregates, mixing with bitumen at specified temperature, spreading while hot, and rolling by 8 to 10 t roller to provide specified thickness.

1409  Edging - Supply and lay stone/brick /Concrete edging of specified height and shape at the edges of road surface. Include excavation, backfilling, compaction, bedding of 75mm thick PCC 1:2:4, cutting and jointing in 1:4 cement mortar, curing, wastage etc. complete.

1410  Providing, laying and jointing NP2 grade concrete hume pipe conforming to IS-458 in line and level as shown on drawings.(or as directed) at any depth. Rate shall include for 75 mm thick sand bedding, laying in slope, jointing with cement mortar (1:2), collar, curing etc complete. Only excavation in pipe trenches and backfilling/spreading surplus material and PCC at top of pipe shall be measured separately.

1411  Providing and laying paver quality cement concrete M35 (flexural strength of 40 kg/cm2) in unreinforced, dowel jointed pavement with broom finish in accordance with item no. 602 of MORT&H specifications including form work, compacting by internal and surface vibrators, finishing, curing, etc. complete as specified and as directed. Minimum cement content shall be 350 kg/m3 of concrete. The Contractor will be permitted to use Ready mix concrete (RMC) by establishing automatic batch mixing plant on site or procuring it from such a plant from the vicinity of the plot. In such a case, he shall be allowed to replace maximum 20% cement (by weight) with fly ash (as per IS. 3012). The minimum cement content mentioned above shall be considered as total of cement and fly ash for RMC. Rate to include cost of admixtures, if required, to improve the workability. Design mix of the Concrete shall be approved by the Engineer prior to usage of concrete at Site.

1412  Dressing the transverse & longitudinal joints of concrete slabs with polysulfide sealant confirming to BS 5212 (Part 2) including cleaning the joints and ramming, backer rod etc. all as per item no. 602.2.8 & 602.11 of MORT&H specifications.

1413  Providing and fixing in position premoulded joint filler board 20 mm thick confirming to I.S. 1838 for expansion joints, put to the required depth and 25 mm below the camber and as directed including punching of holes to accommodate the dowels, etc. all as per item no. 602.2.7 of MORT&H specifications.

1414  Providing and fixing in position high yield strength deformed steel in tie bars of 12 mm dia. and 70 cm long, wherever directed including applying bitumen, handling, fixing straightening, necessary cutting, wastage, saddles to keep bars firmly in position etc. complete in all respect as per item no. 602.6.6 of MORT&H specifications.

1415  Providing and fixing in position mild steel in dowel bars of 25 mm dia. 50 cm long and placed as directed including handling, fixing, straightening, necessary cutting, and
wastage saddles to keep bars firmly in position etc. complete as per item no. 602.6.5 of MORT&H specifications. No extra payment will be made for applying bitumen / grease to dowel bars, warping waterproofing paper etc. as per drawing of expansion joint complete as directed.

1416 Providing and laying minimum 125 micron thick polythene sheet as per item no.602.5 of MORT&H specifications, including overlaps (to be not less than 30 cm) etc. complete as specified and as directed.

1417 Cutting construction and dummy joints of the concrete slabs by mechanical saw cut means up to 75 mm depth and 5 mm width as directed by the Engineer.

1418 Providing 100 mm long PVC pipe around the dowel bars (25mm dia. approx length 500 mm coated with bitumen paint), left at the end of expansion joints, duly greased inside the pipe and around the pipe and the pipe duly worked with glass wool/ compressible sponge at the end, End Cap as directed.

1419 Supply, lay and compact well graded material on prepared sub grade for granular sub base as per grading III of table 400-1 of MORT&H specifications and consolidating the same to specified thickness. Include for placing screening / good murrum / crushed stone as per the requirements in the interstices, watering, rolling, etc. complete as per item 401 (granular sub base) of MORT&H specifications to achieve a surface which is well closed, free from movement under compaction equipment and free from ridges, cracks or loose materials. The measurement shall be on cubic meter basis of the net area executed.

1420 Same as 1419 but granular sub base as per grading I of table 400-1 of MORT&H specifications.

1421 Supply, lay and compact clean, crushed, graded aggregates & granular material, premixed with water to a dense mass over prepared sub-base and consolidating it to specified thickness in accordance with item 406 (wet mix macadam) of MORT&H specifications. Include for spreading, compaction and drying to achieve a surface which is well closed, free from movement under compaction equipment and free from ridges, cracks or loose materials all as per MORT&H requirements. The measurement shall be on cubic meter basis of the net area executed.

1422 Tack coat – Supply and apply evenly a tack coat of rapid setting bituminous emulsion as per IS-8887 over the prepared sub base at the specified rate and as per item 503 of MORT&H specifications. Include for preparation of the surface by removing any dirt, loose and foreign materials etc. all as per MORT&H requirements. The measurement shall be on square meter basis of the net area executed.

1423 Provide base course of Dense Graded bituminous macadam with grading 1 of table 500-10 having specified thickness and as per item 507 of MORT&H specification. Provision of paving bitumen (penetration grade 60/70) in the mix shall be at minimum 4.5% of the weight of the total mix. The measurement shall be on cubic meter basis of net area executed.

1424 Supply, lay and compact lime stabilized soil over prepared surface to improve the sub grade. Addition of lime shall be at the rate of 5% of the dry weight of the soil. CBR value of the lime stabilized soil shall not be less than 10 for seven days curing & four days soaking. Rate to include for pulverization of excavated sub grade (excavation measured separately), mixing, watering, rolling, curing for 14 days, etc. complete, generally in accordance with item 402 of MORT&H specifications.
Supply & lay Bituminous Concrete of specified thickness on previously prepared bituminous course with modified bitumen confirming to PMB 40 as per item 509 of MORT&H specification. Provision of bitumen in the mix shall be at 5% to 7% of the weight of the total mix. The measurement shall be on cubic meter basis of net area executed.

Providing and laying 20mm thk premix asphalt carpet (Close-graded premix surfacing) Type B including using aggregate size 15 down size, bituminous binder material 60/70 grade @ 2 Kg per Sqm and rolling etc complete as per clause no 512 of MoRTH specifications.

Provide & apply prime coat with approved bitumen emulsion having kinematic viscosity of 30-60 centistokes over prepared sub base at the rate of 0.75kg per square meter and as per item no. 502 of MORT&H specifications. Include for preparation of the surface by removing any dirt, loose and foreign materials, etc, all as per MORT&H specifications. The measurement shall be on square meter basis of net area executed.

Providing and laying 75 mm thick (compacted) premixed asphalt carpet using asphalt for tack coat at the rate of 3 kg / 1 sq. m. using crushed stone aggregates as per the gradation and bitumen at the rate of 3.28% by weight of total mix for plant and laid by paver finisher including consolidation by Power road roller and providing and operation plant, machineries and equipment, cost of fuel, oil, lubricant and labour charges etc. complete.

Providing and laying concrete kerb constructed with suitable kerb casting machine and of specified height, shape & size as per attached drawing, over 100 mm thick PCC in 1:4:8 at the edge of road surface. Rate to include for excavation, backfilling, cutting for gap/recess, providing precast element at the gap for outlet of road side water, immediate cement finish on cast in situ kerb, curing, etc. complete.

Same as item no, 1410 but for NP3 pipes.

Providing & laying dry lean concrete sub base over previously prepared surface as per item no. 601 of MORT&H specifications and as per specified thickness. Include for spreading, compaction, curing and drying to achieve a surface which is well closed, free from movement under compaction equipment and free from ridges, cracks or loose materials all as per MORT&H requirements. The measurement shall be on cubic meter basis of the net area executed.

Same as item no, 1410 but for NP4 pipes.

Dressing the transverse & longitudinal joints of concrete slabs with Polyurethane sealant of approved make like CIPY/Fosroc or approved equivalent confirming to BS 5212 ( Part 2) including cleaning the joints and ramming, backer road etc. all as per item no. 602.2.8 &602.11 of MORT&H specifications.

Supplying and laying 50mm thick Bituminous macadam course including using aggregate size 45 down size, bituminous binder material 60/70 grade @ 5 Kg per Sqm and rolling etc complete as per clause no 505 of MoRTH specifications.
1500  Miscellaneous

1501  Providing and fixing 12 mm thick nova teak ceiling boards in panels of approximate 1.2 m x 3.0 m with V joint all round. Boards shall be fixed on 50 mm x 50 mm sawn timber runners @ 0.6 m c/c & 50 m x 150 mm @ 0.5 m c/c. Runners and battens shall be painted with three coats of plastic emulsion paint. Rate shall also include the cost of 25MM x 50MM splayed cedar cornice as per details.

1502  Providing & fixing of 2.10M high wooden partition with 75 x 50 mm sag framing, 0.9 m high plywood panel of approved quality, 1.20 m high wire mesh jali of approved quality, polishing etc. complete, doors & door closers shall be considered separately.

1503  Providing cement grit vata, quarter round concave / triangular in cement concrete 1:2:4 including neat cement finishing, curing, hacking the RCC surface, etc. complete.

1504  Supplying and fixing built in steel cupboard in given recess in wall of approximate size 2000 mm high x 1050 mm width x 500 mm depth including 20 gauge steel frame fixing on wall. Rate to include for providing 20 gauge steel double shutter doors, 22 gauge steel horizontal or vertical shelves, with one built-in locker, hanging rod, a tie bar, necessary locking arrangement, etc. complete. Rate to include for one coat of Zinc Chromate primer and two coats of approved enamel paint. Rate shall be paid on in to in size of frame.

1505  Providing and fixing Lightening arrester on the top of the tank as per IS: 2309 Code of Practice for the protection of the building and allied structures against lightening. Position and height of lightening arrester shall be such that the whole structure shall be enclosed with in cone having its apex at top end of the arrester and generated by a line inclined at 60 degree to the vertical. The arrester shall be suitably earthen.

1506  Providing and fixing "U" type air vent 450 mm long made out of 80mm dia. G.I. ‘C’ class pipe including welding at the junction of two bend and pipe and fixing the same with wire mesh in top slab of water tank with making the hole in the slab and filling the outlet gap with (1:4) cement mortar. Rate shall include for one coat of Zinc Chromate primer and two coats of approved enamel paint.

1507  Supplying and erecting barbed wire fencing with M.S angle 50x50x6 post at every 3 m centres and G.I. barbed wires weighing 9.38 kg per 100m (minimum) strained and fixed to the post. Rate shall be for unit length of fence having number of horizontal wires and number of diagonals as specified/shown. Rate shall also include for excavation of posthole 450 x 450 x 500 mm embedding angle post in concrete 1:2:4 in bottom three fourth depth of the hole, curing, backfilling and spreading of surplus excavated material, applying one coat of Zinc Chromate primer and two coats of enamel paint to angle post, etc. complete.

1508  Provisional sum for electrical installation for lighting in offices, laboratory, canteen, time office, toilets, housing flats, etc.

1509  Supply and lay 50 mm thick bitumen-sand (1:5) in line and levels as specified. Include for drying sand, mixing with hot bitumen, spreading, compacting by hand rammers and cleaning of surfaces before laying.

1510  Provisional sum for laboratory platforms and racks.

1511  Brick soling - Supply and lay bricks on wide edge on prepared subgrade. Include for jointing with 1: 6 cement mortar, curing etc. complete.
1512 Provisional sum for demolition of General Store, canteen, time office, workshop, house over cane cutter, offices, etc. etc.

1513 Laying and jointing of concrete non pressure pipes. Rate to include for trimming of trench bottom, jointing with 1:4 mortar, curing, etc. complete in line and level as shown on drawing. (Concrete pipes and collar shall be supplied by the Owner; pipe shall be in pieces 2500 mm long x 1500 mm internal dia.).

1514 Providing and fixing chain link fencing as per following details.
   (a) Providing and fixing 50 x 50 x 6mm angle post 2000 mm long at 3m c/c, 500mm length of angle shall be grouted in cc 1:2:4 block of size 450 x 450 x 500 mm below finished G.L.
   (b) Necessary excavation for grouting of angle post.
   (c) Chain link of 50 x 50 mm of 10 gauge and 3 numbers 3mm dia. horizontal standard wires fixing with & vertical angle with bolts etc. complete. Height of chain link shall be 1500 mm from finished ground level.
   (d) Painting the chain link and angles with two coats of enamel paint over a coat of primer.

1515 Forming of 75 mm x 75 mm groove in brick work in line and level as shown on drawing. Include for fixing of tar felt with cement mortar (1 cement, 1 sand and 2 grit). Include for finishing of exposed surface of cement mortar to match with wall finishing in line and level.

1516 Supplying, fabricating and erecting M.S. railing fabricated from M.S. pipes or angles, flats, plates, square bars etc. Rate shall include for cutting, bending, drilling holes, bolts, nuts, welding etc. complete with one coat of Zinc Chromate primer and two coats of enamel paint. Measurement shall be on the basis of actual length of members and weight as per IS.

1517 Rate to include supply and erect horizontal and diagonal lines of galvanized steel barbed wire weighing 9.38 kg per 100 m (minimum) strained and fixed to the posts. Each strand of barbed wire shall be measured.

1518 Provisional sum for external drainage works to include inspection chambers, manholes, septic tanks, soak pits, sewerage line etc.

1519 Provisional sum for external water supply to include for water supply main, valves, over head water tank etc.

1520 Provisional sum for approach roads and other site developments works.

1521 Providing and fixing 12mm/10mm dia. bar in RCC slab/beam, etc. for fan hooks.

1522 Providing & applying Tractor oil primer ASIAN brand or equivalent and two finished coats of polyurethane water proof coating (TECHCOAT - 61P) ASIAN brand or equivalent shall be applied inside the M.S. gutters.

1523 Provisional sum for Misc. works like repairs of existing drains etc. complete.
1524 Provisional Sum for bore well.

1525 Provisional sum for Cane yard development.

1526 Supply and lay 1000 gauge black heavy duty single layer of polythene sheet of approved make. Include for sealing joints by thermal welding (heat sealing) or adhesive tapes with minimum over lap of 150mm. Measurement shall be on the basis of net area covered.

1527 Providing and applying 3 coats of approved quality modified epoxy based molasses resisting anticorrosive paint to footings, columns and plinth beams below ground. Include for any additional excavation, preparation of surface etc. complete. The paint shall be stored, mixed and applied as per the Manufacturer's instructions.

1528 Provisional sum for water supply system from Over Head Tanks

1531 Removing barbed wire fencing including removal of angle post, barbed wire etc. complete and stacking the same as directed by the Engineer. The removed fencing and posts shall be the property of the Owner.

1532 3mm dia. x 50 mm mesh galvanized chain link fencing to 2.1 m above ground level having 3 nos. 3mm dia. galvanized tension wire and wire strainers including angle iron posts of 65mm x 6mm thick. Size at 2.8m centers having holes for tension wire, one end fish tailed and embedded in concrete (concrete measured separately) other end cranked 450mm holed and provided with 3nos. barbed wire (2 ply – 12 gauge) including intermediate posts, corner posts and struts. Also include for 1 coat of Zinc Chromate primer and 2 coats of enamel paint to the posts struts.

1536 Dismantling existing doors/ windows of any type at any level. Rate to include for carefully removing the shutters of door/windows and dismantling of the frame and grill of the door / window thereafter. Include for minor dismantling of wall / floor required to dismantle the frame, repairing the damaged surface of wall /floor good again to make it match with the existing surrounding surface, cleaning of debris, etc. complete. Dismantled frame, shutter and grill shall be the property of Owner and the Contractor shall deposit the same to Owner’s store. Measurement on the basis of out to out dimensions of the frame dismantled.

1537 Dismantling existing false ceiling of any type at any level. Rate to include for carefully removing the ceiling material and supporting members. Include for minor dismantling of wall required to dismantle the false ceiling, repairing the damaged surface of wall /floor good again to make it match with the existing surrounding surface, cleaning of debris, etc. complete. Dismantled material shall be the property of Owner and the Contractor shall deposit the same to Owner’s store. Measurement on the basis of out to out dimensions of the plan area of false ceiling dismantled.

1538 Brick soling - Supply and lay bricks on wide edge on prepared subgrade below the mud mat, grade slab etc., Include for joint filling with silver sand, etc. complete.

1539 Providing and fixing 6 mm thick gypsum boards in false ceiling in panels of approximate 1.2 m x 0.6 m with V-joint all round. Boards shall be fixed on 40 mm x 40 mm sawn timber runners @ 0.6 m c/c & 50 m x 150 mm @ 0.6 m c/c. Runners and battens shall be painted with three coats of plastic emulsion paint. Rate shall also include the cost of 25 mm x 50 mm splayed teakwood cornice as per details.
Dismantle the existing stores (No. 1 to 6 & shown in the attached drawing). The rate shall be for dismantling of the existing structure on “as is where is” basis. In this regard the Tenderer is advised to visit the site and obtain his own particulars of the type of structure prior to submission of his offer. It is understood that Tenderer has visited the site and acquainted himself with the site conditions, type of structure, total area to be dismantled, etc, prior to submission of his offer and no claims and /or time extension shall be entertained in this regards. Rate to include –

a) Dismantling of complete structure up to 300mm below the existing G.L.

b) Removal of dismantled structural steel and storing it in a proper manner within the site. All dismantled steel members and roofing sheets shall be the property of the Owner.

c) Removal of all debris (other than structural steel and roofing sheets) from site.

Removing at any height broken glasses in existing doors/windows and Supplying and fixing 6mm thick wire glass to the same. Rate to include putty, battens etc. complete

Same as 1543 but 4mm clear glass

Painting to structural steel - apply one coat of Zinc Chromate primer and two coats of approved enamel paint to the existing structural steel members, framed/ unframed at any height. Include for complete cleaning of the surface with wire brush / sandpaper, removing all loose rust, dust and other such foreign materials before applying the Zinc Chromate primer. Standard weight as per IS code shall be considered for payment purpose. The Contractor to make a sketch of the structure painted showing all the members with respective length. Weight shall be calculated as per relevant IS code.

Providing and fixing Gypsum board false ceiling suitable for 60 Pascal pressure made up of 12.0 mm thick Gypsum Board as per QED Type. The rate to include SISCO make G.I. perimeter channel of size 0.55 mm thick having size of 28 x 18 x 26 mm along the perimeter of ceiling fixed to brick wall / RCC face with the help of nylon sleeves and screws, at 610 mm c/c. Suspending G.I. intermediate channel’s of size 45 mm, 0.9 mm thick with two flange of 15 mm each from the soffit at 900 mm c/c fixed with MS flat of size 50 x 3 mm. (two nut bolts fixed with MS flat to soffit cleat and with intermediate channel). MS flat suspenders should be with one coat of Zinc Chromate primer. Ceiling section of 0.55 mm thickness having knurled web of 50.0 mm and two flanges of 26 mm each with lips of 10.5 mm are to be fixed to the intermediate channel by using connecting clip at right angle to the intermediate channel at 600 mm c/c. Above this framing, fix 12.0 mm thick square edge QED board (conforming IS – 2095 – 1982) with 25 mm dry wall screw at 230 mm c/c. Screw fixing to be done mechanically either with screw driver or drilling machine with suitable attachment. Finish joints with stucco compound so as to have a flush look. Rate to include three coats of plastic emulsion paint, making cut outs for light fittings, grills diffusers, etc with necessary G.I. framing around the cut outs to make it strong & stable (Heavy Duty type).

Same as 1546 but false ceiling with Calcinated gypsum reinforced boards.

Providing and fixing 150 wide PVC/ CI rungs in RCC / brick walls in staggered fashion as per drawings. Rate to include for placing, keeping in position, breaking wall, embedding in wall and making good, etc. complete.

Providing & fixing ‘Garden green net of “Netlon” or other approved equivalent at any height as temporary barricade over the steel structure (measured separately)
1550  Providing and fixing over deck insulation of 75 mm thick layer of perlite, Conlite or other approved equivalent, in the ratio of 1 cement to 4 perlite by volume over any surface at any height. Density of dry mix shall not be more than 480 kg/m3. The cement shall be mixed with the perlite at dry stage and then necessary water shall be added. After screeding the ready material in required thickness, curing shall be carried out for 7 days. Rate to include cleaning the base surface thoroughly, finishing at the top, compaction, etc. complete as per Manufacturer's instructions.

1551  Same as 1550 but in 20 mm thick double coat plaster over walls, ceilings or any other surface at any height. 12 mm thick first coat of the plaster shall be carried out over the thoroughly cleaned surface and shall have rough texture for proper bonding of subsequent coat. Second coat of 8 mm thickness shall be then carried out over the first coat after 3 days curing of the first coat as per Manufacturer's instructions and finished smooth.

1552  Providing and applying silicone sealant of approved shade and of approved make at isolation joints, around windows or other such surfaces at any height. Include for cleaning the surface prior to application, finishing the sealed surface in proper line, removing excess sealant, etc. complete.

1553  Providing and fixing 75 mm thick partition with one layer of 12.5 mm thick tapered edge Gypsum board (conforming to IS 2095 and 2542) screw fixed with 25 mm drywall screw at 300 mm centres to either side of 48 mm studs (0.55 mm thick having one flange of 34 mm and other flange of 36 mm made of G.I. steel) placed at 610 mm centre to centre in 50 mm floor and ceiling channel (.55 mm thick having two equal flanges of 32 mm each made of G.I. steel) with joints staggered to avoid through joints. Square and tapered edges of the boards are to be jointed and finished to have a flush look. Include for filling and finishing with joint compounds, joint paper tape and two coats of approved quality flat enamel distemper. Measurement shall be on the basis of finished area (One side) of partition.

1554  Same as 1553 but 100 mm thick partition with two layers of tapered edge 12.5 mm thick Gypsum board fixed on either side of studs.

1555  Providing and fixing 74 mm thick partition with one layer of 12 mm thick tapered edge HILUX board (conforming to IS) screw fixed with 25 mm drywall screw at 200 mm centres to either side of 48 mm studs of 0.6mm thick and having unequal flanges of 50mm x 48mm placed at 640mm center to center in 50mm floor and ceiling channel of anchored to floor and ceiling at 600mm center where height of partition greater than length of the board. The edges of the board are to be backed by horizontal bracing members bridging the vertical studs. The facing boards are to be staggered to avoid coinciding on the same stud. Include for filling and finishing the square edges of the boards with Lime and PVA based material with Fibre tap and two coats of approved quality flat enamel distemper. Measurement shall be on the basis of finished area of partition.

1556  Providing and fixing HILUX brand false ceiling 10.0 mm thick Moisture Resistance calcium silicate board as per specification. The rate to include HILUX make G.I. perimeter channel of size 0.55 mm thick one flange of 20mm and another flange of 30mm and a web of 27mm along with perimeter of ceiling, screw fixed to brick wall / RCC face with the help of nylon sleeve and screw, at 610 mm c/c. Suspending G.I. intermediate channel’s of size 45 mm, 0.9 mm thick with two flange of 15 mm each from the soffit at 1220 mm c/c with ceiling angle of width 25 mm x 10 mm x 0.55 mm thick fixed to soffit with G.I cleat and steel expansion fasteners. Ceiling section of...
mm thickness having knurled web of 51.5 mm and two flanges of 26mm each with lips of 10.5 mm are then fixed to the intermediate channel with the help of connecting clip and in direction perpendicular to the intermediate channel at 457mm center. Screw fixing to be done mechanically either with screw driver or drilling machine with suitable attachment. Finish joints with stucco compound so as to have a flush look. Rate to include making cut outs for light fittings, grills diffusers, etc with necessary G.I. framing around the cut outs to make it strong & stable (Heavy Duty type).

1557 Supplying and erecting hot dipped galvanized, barbed razor type concertina coil fencing of approved make, with ‘Y’ shape M.S angle 65x65x6 post at every 3m centers as per details given below -

A) 3nos 14 gauge GI barbed wire fixed by quarter pin over ‘Y’ shaped M.S. angle for supporting concertina coil fencing.
B) Concertina coil having barbed razor strip of 0.5mm thick hot dip galvanized strip with a width 19mm (before wrapping on central core (Wire) wound over a central core of 12 SWG Hot dip galvanized spring steel high tensile wire.
C) Fixing with GI Clips of 1.66mm thick Measurements shall be for unit length of completed fence. Rate shall also include for Angle post hole of 230x230x300mm in brick wall, embedding angle post by 250 mm in concrete 1:2:4, applying one coat of Zinc Chromate primer and two coats of enamel paint to angle post, etc. complete.

1558 Providing and fixing 4mm thick Exterior grade Aluminium Composite Panel of Euro bond or other approved equivalents include.

A) Base Frame – Aluminium section 50 mm x25 mm – 0.6kg/m fixing with Galvanised clamp 50 mmx25 mmx3 mm with 8mm dia. 50mm long Anchor fastener bolt.
B) Aluminium Composite panel fixing with Tray system with 10 mm groove. Groove filling with silicone sealant 789 grade of Dow or other approved equivalent.
C) The measurement shall be on square meter basis of net area executed.

1559 Same as 1516 but providing powder coating of approved shade to railing members in place of Zinc Chromate primer and enamel paint.

1560 Sedimentation tank as per attached Drawing

1561 Percolation well as per attached Drawing

1562 Providing & fixing acoustic insulation on walls consisting of 65 mm thick glass fibre (48 kg/m3 density) insulation of ‘KIMMCO’ / ‘TWIGA’ or other approved equivalent make. Glass fibre to be fixed with GI framing at 600 mm c/c over the wall and shall be provided with 600 mm x 1200 mm x 15 mm thick “MAT-BSB” acoustic tiles of “anutone” or other approved equivalent. Rate to include for acoustic sealing of joints, adjustments around switch boxes/ openings, etc. Complete. Payment shall be on the basis of net area of wall covered with tiles.
1563 Providing & fixing acoustic insulation on ceilings consisting of 50 mm thick glass fibre (48 kg/m3 density) insulation of ‘KIMMCO’ / “TWIGA’ or other approved equivalent make. Glass fibre to be fixed with GI framing at 600 mm c/c with intermediate/ peripheral channels and hanged from the ceiling/ soffit and shall be provided with 600 mm x 1200 mm x 18 mm thick “MAT-BSB” acoustic tiles of “anutone” or other approved equivalent. Rate to include for acoustic sealing of joints, adjustments around beams, etc. complete. Payment shall be on the basis of net area of ceiling covered with tiles.

1564 Providing and installing in position DITEC (Model QIK 7EH), Italy make boom barrier having standard boom length 6 M including all civil works.

1565 Provisional sum for 15 KLPD STP plant with mechanical & electrical process equipment.

1566 Provisional Sum for Automation of Sliding Gate.

1567 Provisional Sum for proposed Tensile Structure at Pavilion area.

1568 Providing and fixing false ceiling having 600 X 600 mm grid of Armstrong make consisting of frame work of pre-coated hot dipped galvanized steel with a primer and finish coat of Standard Global White Polyester baked paint. The frame work shall comprise of main runner of size 15x32x3000 mm spaced at 1200 mm centers securely fixed to the structural soffit by approved hangers at 1200 mm maximum centres. Hangers (GI Wire of 2.0 mm dia.) shall be fixed by approved roof plug, level adjusters and screw etc. The last hanger at the end of each main runner should not be greater than 450 mm from the adjacent wall. Flush fitting 1200mm long cross tees of size 15x32x1200 mm to be interlocked between main runners at 600 mm centers to form a 1200 mm x 600 mm module. Cut cross tees longer that 600 mm to be supported independently. 600 mm x 600 mm modules to be formed by fitting 600 mm long flush fitting cross tees of size 15x32x600 mm centrally between the 1200 mm cross tees. Perimeter Wall Angle of size 19x19x300 mm secured to walls at 450 mm maximum centers. Finally lay Armstrong plain tiles of size 600x600 mm in the frame work.

1569 Providing and fixing 25 mm thick thermocole sheet around machine foundation with necessary arrangement for fixing sheet on r.c.c. surface finished with polysulfide sealant.

1570 Providing and fixing of colour anodised aluminium sections of approved colour (special) of Indal or Jindal make of required sections in structural glazing wall cladding as per the design approved by Engineer In Charge in verticals and horizontals in semi unitized system to form grids of required size and securely fixing the basic frame work on to the masonry/RCC/Steel with adequate nos. of properly designed anchor fasteners of Fisher / Hilti make, nut and bolts etc; The frame work has to be finished in true line and level, to facilitate structural glazing, packing with suitable aluminum angle section etc. including all items and contingencies described above complete. The aluminium section shall be properly pre-treated and colour anodised with a minimum 25 microns coating thickness with pure polyester interpon / Jotun paint of approved shade all as per drawing, manufacturers specifications and as per directions of EIC.

Supplying and fixing Heat strengthened (Toughened) hard coated glass of temperable 6mm thick heat reflective glass of approved colour placed over anodised aluminium frame work for structural glazing work in fixed panels with suitable
aluminium angle section to meet the same glass in line with spacer foam tape Norton and applied with architectural grade silicone construction sealant (UV resistant) of Dow coming 1995/795/Slika/ equivalent with requisite structural bite applied along the perimeter of each glass pane properly cured as per the sealant manufacture's specifications. Cured Glass panes align with sub-frame may be fixed on to the mainframe work with necessary thermal gaskets and adequate fasteners to line and level. Space for thermal expansions between glass modules shall be restricted to 12mm and baker rod placed between glass panes and weather sealant "Dow corning 789" or "GE silicon - USA" or "WACKER-Germany" or approved equivalent as per the design requirement shall be applied between the glass panes to make it absolutely water tight. Structural glazing in required sizes of heat strengthened, (Toughened) hard coat 6mm thick heat reflective glass of Modi Guard, Indo Asahi or Saint Gobain make.

The Work shall be got executed through a specialized agency having minimum 3 years experience. The specialised agency to be approved by Engineer-in-charge. Rate to include structural design of all aluminium & other sections including providing support to suspended canopies, fixing arrangement fastners etc, complete. The design shall be got approved from Engineer-in-charge in advance. This job is to be carried out along with structural glazing work. Rate to include making profile in required shape, all materials required for fixing glass on sub-frame as per the specifications - no extra is admissible on account of any of the material required for proper fixing of glass in any shape, cost of profile bending, required wastage etc. shall be considered in the rate, no extra payment will be made. Contractor shall provide detailed drawing & KG/m2 of aluminium considered along with tender document.

Measurement & Payment shall be on the basis of net area covered with Structural Glazing. Refer Volume-I for special conditions.

1571 Stainless steel Cladding around structural steel columns at any height with 1.6 mm thick, SS 316 grade steel, having square / circular shape with scotch bright finish and including necessary supporting structure, fasteners, sealants, cutting, bending, wastage, etc. Complete S. S. Cladding.

1572 Provisional Sum for R O plant capacity 200/Litre per Hour.

1575 Weep holes: Providing & fixing 110 mm dia. PVC pipe having Mosquito net / wire mesh at both ends in RCC / Brick walls as per drawings. Rate to include for placing, keeping in position, breaking wall, embedding in wall and making good, etc. Complete.

1576 As per 1516 but for Stainless steel pipe railing of grade 316 of 1 no 50 mm dia. for handrail, 40mm dia. for vertical (including baluster) at every 1.0 m c/c, 25 mm dia. 1no & 16 mm dia. 2 nos. below handrail with all necessary fixtures etc complete. Measurement shall be applied for the inclined length of handrail.

1577 Supplying & fixing RCC M30 Prestressed precast panels of 2.11 m x 0.3 m x 50 mm thick & prestressed precast post of 150 mm x 150mm. Rate to include fixing panels between two columns, filling gaps with cement & between two planks & post etc. complete. Measurement & Payment shall be on basis of net length covered with precast panels. No extra payment will be considered. The work shall be carried out by approved agency.
Supplying and erecting in position Galvanised Chain linked Fencing of minimum 3 mm dia of mesh size 50 mm x 50 mm. The Galvanised chain link will be stretched by clips at 0.5 m internal to 3 strands of galvanised high tensile spring steel ire (HTSSW) of 2.5 mm dia. Interwoven with chain link wire mesh which turn are attached to fence post with security nuts and bolts. Rate to include making & fixing gate & all nuts, bolts, fasteners, clamping strips, clamps, clips, cutting in required size, all fittings & fixtures required for gate etc. (all galvanised) complete in all respect as per drawing, specification and direction of Engineer-in Charge. **Steel & Concrete measured separately in respective items.**

Supplying, fabricating & fixing Aluminium (Hindalco/Indal or equivalent) curtain wall structural glazing in fixed panel (weight of aluminium approximately 7 kg/sqm) with anodized aluminium of approved colour & shade, Mullions fixed to R.C.C. beams/columns with adequate M.S. anodized clamps, brackets, fasteners, (hilti or equivalent) including providing & fixing of 5mm thick heat reflective float glass as per approved colour and tint toughened as per manufacturers specification, glass fixed with necessary EPDM gaskets, weather silicone sealant, structural silicone sealant, necessary adhesive tapes, spacer packing tapes, masking tapes, etc. as required for completion of the job ensuring complete protection against water penetration/ seepage as well as air tightness of the glazing system also inclusive of cleaning the glazed facade with necessary cleaning chemicals etc. contractor shall prepare necessary shop drawings and get it approved from Engineer in charge before procurement and fabrication, all complete as directed. All the paints adhesives / sealants to be Low- voc.

The scope covers Design, Manufacturing, Inspection, Testing, packing, forwarding, painting, supply, obtaining certification from statutory bodies and providing Performance Guarantee of Pit type Weigh Bridge of 50 T Capacity. 1 No Pit Type Weigh Bridge system of Capacity 50 T Complete with all necessary equipment like Load cells, Junction Box, Controller, Communication Cord, Computer, Printer, Display Unit, necessary controllers in all respect. 1 No. Pit type Electronic weigh bridge of Capacity 50 Tons Platform size 16 X 3 meters complete in all respects.

Construction, drilling, developing 400 X 200 mm dia., 125 mtr. or Completion of last Aquifer System, deep tube well along with installation of M.S pipes of 200mm dia., gravel packing, cement sealing for Artificial rain water harvesting & water management system as per following:

a. A bore hole drilled to 125 meter depth or up to completion of last aquifer system in all sorts of soil, kankar, boulder, soft or hard rock. The nature of formation viz. kankar, soft or hard rock shall be classified by the Consultant and in case of dispute either for maximum desired depth of soil or rocky formation, the decision of the Consultant shall be final and binding to the contractor. The estimated depths are approximate and the contractor may have to go to higher or lower depths as per actual conditions or strata generally available in the locality. If hard strata, which are quite difficult for drilling, are met with and if they can be classified as soft or hard rock the same will be paid as per item rate.

b. The installation of blank pipes, complete with strainer or slotted pipes including bail plug, reducer, clamp and well top.

c. The placing of gravel pack & clay ball. All gravel & clay ball packing will be done as per specification & instruction of consultant Supply of gravel & clay ball will be done by contractor. Gravel size shall be decided on the basis of drill cutting samples, analysis of drill cutting samples & analyzing the character of the water bearing formation tapped. Normal Gravel sizes are 3 to 5mm for fine sand & 5 to 8mm for coarse sand.
d. All the three process viz. breaking-loosening, grinding and removal shall be well co-ordinate i.e carried out simultaneously.

e. The contractor must employ the Direct Rotary Drilling method (by direct rotary drilling rigs fitted with heavy duty reciprocating mud pump). The drills shall be diamond drills or shot drills. In firm formation either a fish tail bit or a diamond shaped bit shall be used.

f. In rotary method compressed air may also be used to blow the material to the surface.

g. In case of sandy soil, at the time of drilling required quantity of BANTONITE to be used added in mud removing circulation water to prevent collapse of wall without charging any extra cost for BANTONITE.

h. Slot size & Slotted pipes shall be made of either corrosion resistant material or steel pipes having sufficient thickness to guard against the effect of corrosion and to ensure reasonable life of tube well. Tube well pipe shall be of M.S ERW plain end pipe, 200mm dia. and 5.40 mm thick confirming to IS : 8110-1976.

i. The shape and size of the slot shall be such that the gravel or aquifer material is not allowed to block the open space. Based on the sieve analysis of the aquifer material, the size of the slot opening shall be determined. Normal standard slot sizes are 1.6 & 3.13mm.

j. The slotted pipes and screen shall be given anticorrosive protective treatment.

k. In rotary method, the pipe assembly is lowered into position and gravel packing may be done up to a suitable depth below the bottom of housing pipe in the first instant. Thereafter, the gravel packing up to required depth is completed after keeping the housing pipe in vertical limits.

l. Contractor has to follow all the instruction of Geo hydrologist & Consultant appointed by Client. In addition to this contractor shall inform construction stages of activates to geo hydrologist & consultant well in advanced

m. Development of Tube well :-
   After the tube well has been fully gravel packed, as much as possible mud mixture from the well shall be brought out by backwashing through mud pump with clean water.
   Initial development shall be carried out by means of compressed air, air compressor to be used shall be of adequate capacity (not less than 1100 CFM to 450 CFM) and developing pressure not less than 150 to 600 PSI.
   Well development shall be done zone wise. All water aquifer shall be developed with air compressor. At the development stage water samples will be collected for all water bearing zones/strata by contractor in consultation with consultant.

n. Grouting & Sealing :-
   Grouting & sealing of tube well shall be done if required as per site condition, quality of discharge of the strata encountered and Consultants instruction by contractor. Cement shall be used for sealing and grouting operations with lowering of airline thickness of 5 mtr. ideal for 72 hrs.

o. All the work shall be carried out as per the specification/scope of work mentioned in above point a to q, or as directed by consulting engineer.
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<td>EXTRA OVER ITEM 204, 224 &amp; 225 FOR USING TREMIX OR EQUIVALENT (ONLY ADDITIONAL COST FOR TREMIX FLOORS SHOULD BE CONSIDERED, CONCRETE IS INCLUDED IN ITEM 204)</td>
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### MSME Shed Compound Wall

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## KB: BOQ FOR CIVIL, STRUCTURAL & INFRASTRUCTURAL WORKS FOR MSME SHED AND COMPOUND WALL WORKS

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**TOTAL AMOUNT**
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**TOTAL AMOUNT (A+B)**
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SECTION - KC PRICE SCHEDULE:

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**TOTAL AMOUNT**

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</thead>
</table>

**TOTAL**
SECTION – L DAYWORK SCHEDULE:

1.00 GENERAL

The Contractor shall be paid in accordance with this day works schedules for Works that cannot be properly measured. Such works shall be valued at the rates for labour, plant and materials as filled by him in the schedules of basic prices in following section. Percentages for profit shall be added in accordance with those given in Section 2.00 below.

2.00 Percentages for profit, etc.

The following percentages will be added to the basic net cost of labour, plant and material to take into account cost of fuel, oil, grease, drivers’ and turn boy’s wages, operational and maintenance costs, standing and idle time, use of tools and plants (other than power driven), sharpening tools, wastage, consumable stores, supervision, transport, handling, establishment, watching, lighting, overheads, taxes, profits and any other man material or plant required to complete the day works. Percentage indicated by the Tenderer shall include for any increase and escalation cost up to the time of execution of contract.

A) Labour  %
B) Plant    %
C) Materials %

3.00 Schedule of Basic Prices

The Tenderer must insert against each item the basic price as defined hereunder.

The basic price is defined as the market price or rate prevailing on the day of submission of Tenders and applicable for **MSME Shed and Compound Wall Works at Mudarda Village, Mehsana, Gujarat, for Fanidhar Mega Food Park Pvt. Ltd.**

The Engineer reserves the right by mutual agreement to fix or alter any of the basic rates or prices inserted in this schedule by the Tenderer if, in his opinion, they do not comply with the above or are considered by him to be unreasonable or unrealistic. The size and quantity of all materials shall confirm to the specifications contained in this Document.

3.01 Labour Rate per hr. Rs.

(a) Unskilled labour
(b) Skilled or semi-skilled

1) Mason
2) Carpenter
3) Brick layer
4) Concretor
5) Plasterer
6) Steel bender and fixer
7) Scaffolder
8) Joiner
9) Glazier
10) Pavor
11) Plumber
12) Painter
13) Electrician
3.02 Plant and Machinery

<table>
<thead>
<tr>
<th>Description</th>
<th>Capacity</th>
<th>Per hr. of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Tractor with trailer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Smooth wheel roller</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Small hand propelled</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vibrating roller</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4) Vibrating plate Compactor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Concrete mixer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) Concrete needle vibrator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7) Compressor with jack hammer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8) Vibrating screed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9) Bulldozer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10) JCB type excavator</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11) Mobile crane</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12) Tipper Truck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13) Welding Set</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.03 Materials

<table>
<thead>
<tr>
<th>Description</th>
<th>Unit</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Ordinary Portland cement</td>
<td>Bag of 50 kg</td>
<td></td>
</tr>
<tr>
<td>2) Building sand</td>
<td>M3</td>
<td></td>
</tr>
<tr>
<td>3) Aggregate -60mm</td>
<td>M3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-50mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-40 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-20 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-12 mm</td>
<td></td>
</tr>
<tr>
<td>4) Quarry dust</td>
<td>M3</td>
<td></td>
</tr>
<tr>
<td>5) Rubble 150 mm (maximum)</td>
<td>M3</td>
<td></td>
</tr>
<tr>
<td>6) Reinforcing steel bars</td>
<td>Tone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8 mm to 32 mm dia. TMT bars fe-415</td>
<td></td>
</tr>
<tr>
<td>7) Structural Steel</td>
<td>Tone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M.S. angles</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M.S. Channels</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M.S. 'I' beams</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M.S. flats &amp; plates</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M.S. black sheets</td>
<td></td>
</tr>
<tr>
<td></td>
<td>G.I. plain sheets</td>
<td></td>
</tr>
<tr>
<td>8) 0.6 mm thick pre colour coated industrial trough type sheets</td>
<td>M2</td>
<td></td>
</tr>
<tr>
<td>9) 1.6mm thick translucent sheet</td>
<td>M2</td>
<td></td>
</tr>
<tr>
<td>No.</td>
<td>Item Description</td>
<td>Quantity</td>
</tr>
<tr>
<td>-----</td>
<td>-------------------------------------------------------</td>
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</tr>
<tr>
<td>10)</td>
<td>Red burnt clay bricks</td>
<td>1000 Nos.</td>
</tr>
<tr>
<td>11)</td>
<td>150x150x6mm thick white Glazed tiles</td>
<td>12 Nos.</td>
</tr>
<tr>
<td>12)</td>
<td>PKS stone</td>
<td></td>
</tr>
<tr>
<td></td>
<td>600 x 450 mm 20 mm thick M2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>600 X 600 mm 20 mm thick M2</td>
<td></td>
</tr>
<tr>
<td>13)</td>
<td>Fully vitrified tiles – 600mm x 600mm M2</td>
<td></td>
</tr>
<tr>
<td>14)</td>
<td>Ceramic tiles 200 mm x 300 mm M2</td>
<td></td>
</tr>
<tr>
<td>15)</td>
<td>Flat enamel paint</td>
<td></td>
</tr>
<tr>
<td>16)</td>
<td>Paint – Luxor silk of Berger of Asian paint</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Acrylic base Exterior paint (Apex)</td>
<td></td>
</tr>
<tr>
<td>17)</td>
<td>Apex</td>
<td></td>
</tr>
<tr>
<td>18)</td>
<td>Zinc Chromate primer</td>
<td></td>
</tr>
<tr>
<td>19)</td>
<td>G.I. Pipes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>12mm dia. M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20mm dia. M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>25mm dia. M</td>
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<tr>
<td></td>
<td>32mm dia. M</td>
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<tr>
<td></td>
<td>40mm dia. M</td>
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</tr>
<tr>
<td></td>
<td>50mm dia. M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>65mm dia. M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>75mm dia. M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100mm dia. M</td>
<td></td>
</tr>
<tr>
<td>20)</td>
<td>RCC NP3 pipes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>300mm dia. M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>450mm dia. M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>600mm dia. M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>750mm dia. M</td>
<td></td>
</tr>
<tr>
<td>21)</td>
<td>Stone ware pipes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100mm dia. M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>150mm dia. M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>230mm dia. M</td>
<td></td>
</tr>
<tr>
<td>22)</td>
<td>PVC pipe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>100mm dia. 6kg/cm2 M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>150mm dia. 6 kg/cm2 M</td>
<td></td>
</tr>
<tr>
<td></td>
<td>200mm dia. 6kg/cm2 M</td>
<td></td>
</tr>
<tr>
<td>23)</td>
<td>ISI mark welding rods</td>
<td></td>
</tr>
</tbody>
</table>

Consultant: VMS Engineering & Design Services (P) Ltd,
24) Plain Glass
   a) 4.0mm thick M2
   b) 5.0mm thick M2
   c) 5.5mm thick M2
   d) 6.0mm thick M2
   e) 12.0mm thick M2

25) Gypsum board false ceiling
   a) 12mm thick M2

26) Aluminum section – 3mm thick Kg
    of Jindal / Indal

27) 80/100 Bitumen Kg
### SECTION - M LIST OF DRAWING:

<table>
<thead>
<tr>
<th>SR. NO</th>
<th>DRAWING NO</th>
<th>TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>T.A.41.101_R0</td>
<td>Ground floor &amp; Roof plan</td>
</tr>
<tr>
<td>2</td>
<td>T.A.41.201_R0</td>
<td>Section &amp; Elevation</td>
</tr>
<tr>
<td>3</td>
<td>T.S.101_R0</td>
<td>Foundation Layout &amp; Details for Compound Wall</td>
</tr>
</tbody>
</table>
**List of Sanitary Fittings & Fixtures**

**MSME Toilet**

<table>
<thead>
<tr>
<th>Sanitaryware : Hindware</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wash Basin</td>
<td>Windsor Wall Hung Basin - New Cat No: 10036</td>
</tr>
<tr>
<td>WC_Anglo Indian</td>
<td>Universal - New Cat No: 20012</td>
</tr>
<tr>
<td>Seat Cover</td>
<td>Inbuilt</td>
</tr>
<tr>
<td>Cistern</td>
<td>Sleek Plus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Faucets : Jaquar</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Pillar Cock</td>
<td>CON-011KN</td>
</tr>
<tr>
<td>Angular Stop Cock</td>
<td>CON-059 KN : Angular Stop Cock With Wall Flange</td>
</tr>
<tr>
<td>Bib Cock</td>
<td>CON-047 KN : Bib Cock With Wall Flange</td>
</tr>
<tr>
<td>Health Faucet</td>
<td>ALD-577 : Health Faucet With 1.2 M Long Flexible Tube &amp; Wall Hook</td>
</tr>
<tr>
<td>Flush Cock</td>
<td>Con-1081KN : Flush Cock With Wall Flange</td>
</tr>
</tbody>
</table>