

**RAJKOT MUNICIPAL CORPORATION**  
**e - Tender No.RMC/PWD/CZ/21-22/**



**Bid Documents For**

Demolition of existing Health Centre and Construction of  
new RCH Centre at Vijay Plot Street No.12 in Ward No.7  
(Re – Tender) TECHNICAL SPECIFICATIONS



Milestone Dates for e-tendering is as under	
1. Downloading of e-Tender documents	17-06-2021 To 02-07-2021 upto 18.00 Hrs.
2. Pre-bid meeting in the office of the Addl. City Engineer at Central Zone Office	22-06-2021 at 1700 Hours
3. Online submission of e - Tender	02-07-2020 upto 18.00 Hrs.
4. Submission of EMD, Tender fee and other required documents as per Financial, Experience etc. by Regd.A.D./ Speed Post only.	03-07-2021 and 07-07-2021 up to 18.00 Hrs.
5. Opening of online Primary Bid	07-07-2021 at 18.00 Hours onwards
6. Verification of submitted documents	08-07-2021 at 10.30 Hours onwards
7. Agency to remain present in person along with original documents for verification	09-07-2021 between 16.00 to 17.00 Hours
8. Opening of online Price Bid	12-07-2020 at 17.00 Hours onwards (If Possible)
9. Bid Validity	120 Days

JUNE-2021

ADDL. CITY ENGINEER  
RAJKOT MUNICIPAL CORPORATION  
DR.AMBEDKAR BHAVAN,  
CENTRA; ZONE, DHEBARBHAI ROAD,  
RAJKOT- 360 001 (GUJARAT)

## Rajkot Municipal Corporation

### :: TECHNICAL SPECIFICATIONS ::

#### Item No.1

Dismantling of Super Structure and disposing it in designated place as instructed

#### Item \_\_\_\_\_ No.2

Dismantling of RCC

1. The work shall consist of removing, as herein after set forth; existing culverts, bridges, pavement, kerbs and other structures like guards-rails, fences, utility poles, manholes, catch basins, inlets, etc. Which are in place but interfere with the new construction or are not suitable to remain in place and of salvaging and disposing of the resulting materials and back-filling the resulting trenches and pits.
2. Existing culverts, bridges, pavements and other structures which are within the highway and which are designated to be removed, shall be removed up to the limits and extent specified in the drawings or as indicated by the Engineer-in-charge.
3. Dismantling and removal operations shall be carried out with such equipment and in such a manner as to leave undisturbed, adjacent pavement, structures and other work to be left intact.
4. All operations necessary for the removal of any existing structure which might endanger new construction shall be completed prior to the start of new work.
5. The structures shall be dismantled carefully and the resulting materials so removed as not to cause any damage to the serviceable materials to be salvaged, the part of structure to be retained and any other properties or structures nearby.
6. Unless otherwise specified, the superstructure portion of culverts / bridges shall be entirely removed and other parts removed to below the ground level or as necessary depending upon the interference they cause to the new construction. Removal of overlying of adjacent material if required in connection with the dismantling of the structures shall be incidental to this item.
7. Where existing culverts / bridges are to be extended or otherwise incorporated in the new work only such part or parts of the existing structure shall be removed as are necessary to provide a proper connection to the new work. The connecting edges, shall be cut, chipped and trimmed to the required lines and grades without weakening or damaging any part of the structure to be retained. Reinforcing bars which are to be left in place so as to project into new work as dowels or ties shall not be injured during removal of concrete.
8. Pipe culverts shall be carefully removed in such a manner as to avoid damage to the pipes.
9. Steel structures shall unless otherwise provided be carefully dismantled in such a manner as to avoid damage to members thereof. If specified in the drawing or directed by the Engineer-in-charge that structure is to be removed in a

condition suitable for re-erection, all members shall be match marked by the contractor with white lead paint before dismantling. End pins, nuts, loose, plates, etc. shall be similarly marked to indicate their proper location. All pins, pin holes and machined surfaces shall be painted with a mixture of white lead and tallow and loose parts shall be securely wired to adjacent members or packed in boxes.

10. Timber structures shall be removed in such a manner as to avoid damages to such timber or lumber as is designated by the Engineer-in-charge to be salvaged.
11. In removing pavements, kerbs, gutters, and other structures, like guard rails, fences, manholes, catch, basins, inlets etc. where portions of the existing construction are to be left in the finished work, the same shall be removed to an exiting joint or cut and chipped to a true line with a face perpendicular to the surface of the existing structure. Sufficient removal shall be made to provide for proper grades and corrections with the new work as directed by the Engineer-in-charge.
12. All concrete pavements base course in carriageway and shoulders etc. designated for removal shall be broken to pieces whose volumes shall not exceed 0.02 cubic meter and, stockpiled at designated locations if the material is to be used later or otherwise arranged for disposal as directed.
13. Where directed by the engineer-in-charge holes and depressions caused by dismantling operations shall be backfilled with excavated or other approved material and thoroughly compacted in line with surrounding area.
14. All materials obtained by dismantling shall be the property of Government. Unless otherwise specified, materials having any salvage value shall be placed in neat stack of like material within the right-of-way as directed by the Engineer-in-charge, for which contractor will remain responsible for its safe custody and preservation for 60 days after recording measurements of the salvaged material.
15. Pipe culverts that are removed shall be cleared and neatly piled on the right-of-way at points designated by the Engineer-in-charge.
16. Structural steel removed from old structure shall, unless otherwise specified or directed be stored in a neat and presentable manner on blocking in locations suitable for loading. Structures or portions thereof which are specified in the contract for re-erections shall be stored in separate piles.
17. Timber of lumber from old structures which is designated by the Engineer-in-charge as materials to be salvaged shall have all nuts and bolts removed from and shall be stored in neat piles in locations suitable for loading.
18. All the products of dismantling operations which in the opinion of the Engineer-in-charge cannot be used or auctioned shall be disposed as directed, within 100 meters.

19. The work of dismantling structure shall be paid for in units indicated below by taking measurement before and after, as applicable;

- |     |   |             |
|-----|---|-------------|
| i)  | Dismantling of super structure<br>and disposing off | Cubic Meter |
| ii) | Dismantling of RCC                                  | Cubic Meter |

20. The contract unit rates for the various items of dismantling shall be for payment in full for carrying out the required operations including full compensation for all labor, materials, tools equipment, safeguard and incidentals necessary to complete the work. These will also include excavation and backfilling where necessary and for handling, salvaging, piling and disposing of the dismantled material within all lifts and up to a lead of 90 meters.

Item No.3 :

Excavation of Foundation in Soft Murrum, Soil or Sand from 0.0 mtr. to 1.50 mtr depth including lifting and laying in designated place as instructed

Item No.4 :

Excavation of Foundation in Hard Murrum, Soil or Sand from 0.0 mtr. To 1.50 mtr depth including lifting and laying in in designated place as instructed

Item No.5 :

Excavation of Foundation in Soft rock from 0.0 mtr. To 1.50 mtr depth including lifting and laying in designated place as instructed

1.0 General:

1.1 Any soil which generally yields to the application of the pickaxes and shovels, phawaras rakes or any such ordinary excavation implement or organic soil, gravel, slit, sand turf lawn, clay, peat etc. fall under this category.

2.0 Cleaning the site:

2.1 The site on which the structure is to be built shall be cleared, and all obstructions, loose stone, materials and rubbish of all kind, bush, wood and trees shall be removed as directed. The materials so obtain shall be property of the government and shall be conveyed and stacked as directed within RMC limit. The roots of the tree coming in the sides shall be cut and coated with a asphalt.

2.2 The rate of site clearance is deemed to be included in the rate of earth work for which no extra will be paid.

3.0 Setting out:

After clearing the site, the center lines will be given by the engineer-in-charge. The contractor shall assume full responsibility for alignment, elevation and dimension and of each and all parts of the work. Contractor shall supply labors, materials, etc required for setting out the reference marks and bench marks and shall maintain them as long as required and directed.

4.0 Excavation:

The excavation in foundation shall be carried out in true line and level and shall have the width and depth as shown in the drawings or as directed. The contractor shall do the necessary shoring and strutting or providing necessary slopes to a safe angle, at his own cost. The bottom of the excavated area shall be leveled both longitudinally and transversely as directed by removing and watering as required. No earth filling will be allowed for bringing it to level, if by mistake or any other reason excavation is made

deeper or wider than that shown on the plan or directed. The extra depth or width shall be made up with concrete of same proportion as specified for the foundation concrete at the cost of the contractor. The excavation upto 1.5 mt depth shall be measured under this item.

#### 5.0 Disposal of the excavated stuff:

The excavated stuff of the selected type shall be used in filling the trenches and plinth or leveling the ground in layers including ramming and watering etc.

The balance of the excavated quantity shall be removed by the contractor from the site of work to a place as directed in designated place and all lift.

#### Mode of Measurement and Payment:

The measurement of excavation in trenches for foundation shall be made according to the sections of trenches shown on the drawing or as per sections given by the engineer-in-charge. No payment shall be made for surplus excavation made in excess of above requirement or due to stopping and sloping back as found necessary on account of conditions of soil and requirements of safety.

The rate shall be for a unit of one cubic Meter.

#### Item No.6:

Foundation filling with CC work in proportion of 1:2:4 using 1.5 cm to 2.0 cm aggregate including Raming, Curing etc.

#### 1.0. Materials

1.1 Water shall conform to M-1. Cement shall conform shall conform to M-2. Sand shall conform to M-4. Stones aggregate 20 mm. nominal size shall conform to M-12.

#### 2.0 Workmanship

##### 2.1 General

2.1.1 Before starting concrete the bed of foundation trenches shall be cleared of all loose materials, leveled, watered and rammed as directed.

##### 2.2 Proportion of Mix

2.2.1 The proportion of cement, sand and coarse aggregate shall be one part of cement, 2 parts of sand and 4 parts of stone aggregate; and shall be measured by volume.

##### 2.3 Mixing

2.3.1 The concrete shall he mixed in a mechanical mixer at the site of work. Hand mixing may however be allowed for smaller quantity of work if approved by the Engineer-in-charge. When hand mixing is permitted by the Engineer-in-charge in case of break-down of machineries and in the interest of the work, it shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. However in such cases 10% more cement than otherwise required shall have to be used without any extra cost. The mixing in mechanical mixer shall be done for a period 1. 1/2 to 2 minutes. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the purpose.

##### 2.4 Transporting & placing the concrete.

2.4.1 The concrete shall, be handed from the place of mixing to the final position in not more than 15 minute by the method as directed and shall be placed into its final position, compacted and finished within 30 minutes of mixing with water i.e. before the setting commences. .

2.4.2 The concrete shall be laid in layers of 15 cms to 20 cms.

2.5 Compacting:

2.5.1 The concrete shall be rammed with heavy iron rammers and rapidly to get the required compaction and to allow all the interstices to be filled with mortar.

2.6 Curing

2.6.1 After the final set, the concrete shall be kept continuously wet if required by ponding for a period of not less than 7 days from the date of placement.

2.7 Mode of measurements and payment:

2.7.1 The concrete shall be measured for its length, breadth, and depth, limiting dimensions to those specified on plan or as directed.

2.7.2 The rate shall be for a unit of one cubic metre.

Item No.7

CC work 1:1.5:3 for RCC footing using aggregate of size 10-20 mm, centring, curing, finishing etc. complete (without reinforcement)

Item No.8

CC work 1:1.5:3 for Beam using aggregate of size 10-20 mm, centring, curing, finishing etc. complete (without reinforcement)

Item No.13

CC work 1:1.5:3 for Column using aggregate of size 10-20 mm, centring, curing, finishing etc. complete (without reinforcement)

Item No.14

CC work 1:1.5:3 for RCC slab using aggregate of size 10-20 mm, centring, curing, finishing etc. complete (without reinforcement)

Item No.15

CC work 1:1.5:3 for Lintel using aggregate of size 10-20 mm, centring, curing, finishing etc. complete (without reinforcement)

Item No.16

CC work 1:1.5:3 for Chhaja using aggregate of size 10-20 mm, centring, curing, finishing etc. complete (without reinforcement)

Item No.17

CC work 1:1.5:3 for Stair Case using aggregate of size 10-20 mm, centring, curing, finishing etc. complete (without reinforcement)

Item No.50

Cement Concrete Work for Copping in proportion of 1:2:4 including Foam Work, finishing, curing etc. complete

1.0 Materials:

Water shall confirm to M-1, cement shall confirm to M-1.5, Sand shall confirm to M-3, Grit shall confirm to M-8. Graded stone aggregate 20 mm, nominal size shall confirm to M-12.

2.0 General:

2.1 The concrete mix is not required to be designed by preliminary tests. The proportion of concrete mix shall be 1:1.5:3 (1 Cement: 1.5 coarse sand: 3 graded stone aggregate 20 mm nominal size) and 1:2:4 (1 Cement: 2 coarse sand: 4

graded stone aggregate 20 mm nominal size) by volume.

Concrete work shall have exposed concrete surface or as specified in the item.

- 2.2 The designation ordinary M-100, M-150, M-200, M-250 specified as per IS correspond approximately to 1:3:6, 1:2:4, 1:1<sup>1</sup>/<sub>2</sub>:3 and 1:1:2 nominal mix of ordinary concrete by volume respectively.
- 2.3 The ingredients required for ordinary concrete containing one bag of cement of 50 Kg by weight (0.0342 Cu.M) for different proportions of mix shall be as under:

Grade of concrete	Total quantity of dry aggregate by volume per 50 kgs of cement to be taken as the sum of individual volume of fine and coarse aggregates, max.	Proportion of fine aggregate to coarse aggregate	Quantity of water per 50 Kgs of cement maximum
M-100 (1:3:6)	300 Litres	Generally 1.2 for fine aggregate to coarse aggregate by volume but subject to an upper limit of 1:1.1/2 and lower limit 1:3	34 Litres
M-150 (1:2:4)	220 Litres		32 Litres
M-200 (1:1 <sup>1</sup> / <sub>2</sub> :3)	160 Litres		30 Litres
M-250 (1:1:2)	100 Litres		27 Litres

- 2.4 The water cement ratio shall not be more than specified in the above table. The cement concrete of the mix specified in the Table shall be increased if the quantity of water in mix has to be increased to overcome the difficulties of placements and compaction so that water cement ratio specified on the table is not exceeded.
- 2.5 Workability of the concrete shall be controlled by maintaining a water cement ratio that is found to give a concrete mix which is just sufficient wet to be placed and compacted without difficulty with the means available.
- 2.6 The maximum size of coarse aggregate shall be as large as possible within the limits specified but in no case greater than one fourth of minimum thickness of the member, provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and to fill the corners of the form.
- 2.7 For reinforced concrete work, coarse aggregates having a nominal size of 20 mm, are generally considered satisfactory.
- 2.8 For heavily reinforced concrete members as in the case of ribs main beams, the nominal maximum size of coarse aggregate should usually be restricted to 5 mm, less than the minimum the distance between the main bars, or 5 mm less than the minimum cover to the reinform or whichever is smaller.
- 2.9 Where the reinforcement is widely spaced as in solid slabs, limitations of size of the aggregate may not be so important, and the nominal maximum size may some times be as greater as or greater than the minimum cover.
- 2.10 Admixture may be used in concrete only with approval of engineer-in-charge based upon the evidence that with the passage of time, neither the compressive strength of concrete is reduced nor are other requisite qualities of concrete and steel impaired by the use of such admixtures.

### 3.0 Workmanship:

### 3.1 Proportioning:

Proportioning shall be done by volume, except cement which shall be measured in terms of bags of 50 kg. weight the volume of one such bag being taken as 0.0342 cu.metre. Boxes of suitable size shall be used for measuring sand aggregate. the size of boxes (internal) shall be 30 x 30 cms, and 38 cms deep while measuring the aggregate and sand the boxes shall be filled without shaking ramming or hammering. The proportioning of sand shall be on the basis of its dry volume and in case of damp sand, allowances for bulkage shall be made.

### 3.2 Mixing:

3.2.1 For all work, concrete shall be mixed in a mechanical mixer which along with other accessories shall be kept in first class working condition and so maintained throughout the construction. Measured quantity of aggregate, sand and cement required for each batch shall be poured into the drum of the mechanical mixer while it is continuously running. After about half a minute of dry mixing measured quantity of water required for each batch of concrete mix shall be added gradually and mixing continued for another one and a half minute. Mixing shall be continued till materials are uniformly distributed and uniform color of the entire mass is obtained and each individual particle of the coarse aggregate shows complete coating of mortar containing its proportionate amount of cement. In no case shall the mixing be done for less than 2 minutes after all ingredients have been put into the mixer.

3.2.2 When hand mixing is permitted by the engineer-in-charge for small jobs or for certain other reasons, it shall be done on the smooth water tight platform large enough to allow efficient turning over the ingredients of concrete before and after adding water. Mixing platform shall be so arranged that no foreign material gets mixed with concrete nor does the mixing water flow out. Cement in required number of bags shall be placed in a uniform layer on top of the measured quantity of fine and coarse aggregate, which shall also be spread in a layer of uniform thickness on the mixing platform. Dry coarse and fine aggregate and cement shall then be mixed thoroughly by turning over to get a mixture to uniform color. Specified quantity of water shall then be added gradually through a rose can and the mass turned over till a mix of required consistency is obtained. In hand mixing quantity of cement shall be increased by 10 percent above that specified.

3.2.3 Mixers which have been out of use for more than 30 minutes shall be thorough cleaned before putting in a new batch. Unless otherwise agreed to by the engineer-in-charge the first batch of concrete from the mixture shall contain only two thirds of normal quantity of coarse aggregate. Mixing plant shall be thoroughly cleaned before changing from one type of cement to another.

### 3.3 Consistency:

3.3.1 The degree of consistency which shall depend upon the nature of the work and the methods of vibration of concrete, shall be determined by regular slump tests in accordance with IS 1199 - Latest edition. The slump of 10 mm to 25 mm shall be adopted when vibrators are used and 80 mm when vibrators are not used.

### 3.4 Inspection:

3.4.1 Contractor shall give the engineer-in-charge due notice before placing any concrete in the forms to permit him to inspect and accept the false work and forms as to their strength, alignment, and general fineness but such inspection shall not relieve the contractor of his responsibility for the safety of men, machinery, materials and for results obtained. Immediately before concreting, all forms shall be thoroughly cleaned.



3.4.2 Centering design and its erection shall be got approved from the engineer-in-charge. One carpenter with helper shall invariably kept present throughout the period of concreting. Movement of labor and other persons shall be totally prohibited for reinforcement laid in position. For access to different parts suitable mobile platforms shall be provided so that steel reinforcement in position is not disturbed. For ensuring proper cover, mortar blocks of suitable size shall be cast and tied to the reinforcement. Timber, kapachi or metal pieces shall not be used for this purpose.

### 3.5 Transporting and Laying:

3.5.1 The method of transporting and placing concrete shall be as approved. Concrete shall be so transported and placed that no contamination, segregation or loss of its constituent material takes place. All form work shall be cleaned and made free from standing water dust, snow or ice immediately before placing of concrete. No concrete shall be placed in any part of the structure until the approval of the engineer-in-charge has been obtained.

3.5.2 Concreting shall proceed continuously over the area between construction joints. Fresh concrete shall not be placed against concrete which has been in position for more than 30 minutes unless a proper contraction joint is formed. Concrete shall be compacted in its final position within 30 minutes of its discharge from the mixer. Except where otherwise agreed to by the engineer-in-charge concrete shall be deposited in horizontal layers to a compacted depth of not more than 0.45 meter when internal vibrators are used and not exceeding 0.30 meter in all other cases.

3.5.3 Unless otherwise agreed to by the engineer-in-charge, concrete shall not be dropped in to place from a height exceeding 2 meters. When trunking or chutes are used they shall be kept close and used in such a way as to avoid segregation. When concreting has to be resumed on a surface which has hardened it shall be roughened swept clean, thoroughly wetted and covered with a 13 mm thick layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself. This 13 mm layer of mortar shall be freshly mixed and placed immediately before placing of new concrete. Where concrete has not fully hardened all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes care being taken to avoid dislodgement of any particles of coarse aggregate. The surface shall then be thoroughly wetted all free water removed and then coated with neat cement grout the first layer of concrete to be placed on this surface shall not exceed 150 mm in thickness and shall be well rammed against old work particular attention being given to corners and close spots.

3.5.4 All concrete shall be compacted to produce a dense homogenous mass with the assistance of vibrators unless otherwise permitted by the engineer-in-charge for exceptional cases such as concreting under water where vibrators cannot be used. Sufficient vibrators in serviceable condition shall be kept at site so that spare equipment is always available in the event of breakdowns. Concrete shall be judged to be compacted when the mortar fills the spaces between the coarse aggregate and begins to cream up to form an even surface mixture. During compaction, it shall be observed that needle vibrators are not applied on reinforcement which is likely to destroy the bond between concrete and reinforcement.

### 3.6 Curing:

Immediately after compaction, concrete shall be protected from weather including rain running water shocks vibration traffic rapid temperature changes frost and drying out process. It shall be covered with wet sacking hessian or other similar absorbent material approved soon after the initial set and shall be kept

continuously wet for a period of not less than 14 days from the date of placement. Masonry work over foundation concrete may be started after 48 hours of its laying but curing of concrete shall be continued for a minimum period of 14 days.

### 3.7 Sampling and testing of concrete:

3.7.1 Samples from fresh concrete shall be taken as per IS 1199 - Latest edition, and cubes shall be made cured and tested at 7 days or 28 days as per requirements in accordance with IS 516 - Latest edition. A random sampling procedure shall be adopted to ensure that each concrete batch shall have a reasonable chance of being tested i.e. the sampling should be spread over the entire period of concreting and cover all mixing units. The minimum frequency of sampling of concrete of each grade shall be in accordance with following:

Quantity of concrete in the work	No. of samples	Quantity of concrete in the work.	No. of samples
1-5 cmt	1	16-30 cmt	3
6-15 cmt	2	31-50 cmt	4
51 and above	4 ± one additional for each additional 50 m or part thereof		

NOTE: - At least one sample shall be taken from each shift. Ten test specimens shall be made from each sample five for testing at 7 days and the remaining five at 28 days. The samples of concrete shall be taken on each days of the concreting as per above frequency. The number of specimens may be suitably increased as deemed necessary by the engineer-in-charge when procedure of tests given above reveals a poor quality of concrete and in other special cases.

3.7.2 The average strength of the group of cubes cast for each day shall not be less than the specified cube strength of 150 Kg/Cm<sup>2</sup> for concrete 1:2:4 and 200 Kg/cm<sup>2</sup> for concrete 1:1<sup>1</sup>/<sub>2</sub>:3 at 28 days. 20% of the cubes cast for each day may have value less than the specified strength. Such concrete shall be classified as belonging to the appropriate lower grade. Concrete made in accordance with the proportion given for a particular grade shall not, however, be placed in a higher grade on the ground that the test strength are higher than the minimum specified.

### 3.8 Stripping:

3.8.1. The engineer-in-charge shall be informed in advance by the contractor of his intention to strike the form work. While fixing the time for removal of form, due consideration shall be given to local conditions, character of the structure, the weather and other conditions that influence the setting of concrete and of the materials used in the mix. In normal circumstances (generally where temperatures are above 20°C) and where ordinary concrete is used, forms may be struck after expiry of periods specified below for respective item of work.

#### Stripping Time:

In normal circumstances and where ordinary cement is used forms may be struck after expiry of following periods:

- a) Side of walls, columns and vertical faces of beams - 24 to 48 hours.
- b) Beam soffits (props left under) - 7 days
- c) Removal of props slabs:
  - i) Slabs spanning upto 4.5 m - 10 days
  - ii) Spanning over 4.5 m - 14 days
- d) Removal of props for beams and arches
  - i) Spanning upto 6 m - 14 days
  - ii) Spanning over 6 m - 21 days

3.8.2 All form work shall be removed without causing any shock or vibration as would damage the concrete. Before the soffit and struts and struts are removed, the concrete surface shall be gradually exposed, where necessary in order to ascertain that concrete has sufficiently hardened. Centering shall be gradually and uniformly lowered in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually. Where internal metal ties are permitted, they or their removable parts shall be extracted without causing any damage to the concrete and remaining holes filled with mortar. No permanently embedded metal part shall have less 25 mm cover to the finished concrete surface. Where it is intended to re-use the form work, it shall be cleaned and made good to the satisfaction of the engineer-in-charge. After removal of work and shuttering, the City Engineer shall inspect the work and satisfy by random checks that concrete produced is of good quality.

3.8.3 Immediately after the removal of forms, all exposed bolts etc. passing through the cement concrete member and used for shuttering or any other purpose shall be cut inside the cement concrete member to a depth of at least 25 mm below the surface of the concrete and the resulting holes be filled by cement mortar. All fins caused by form joints, all cavities produced by the removal of form ties and all other holes and depressions, honeycomb spots, broken edges or corners and other defects, shall be thoroughly cleaned, saturated with water and carefully pointed and rendered true with mortar of cement and fine aggregate mixed in proportions used in the grade of concrete that is being finished and of as dry consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure thorough filling in all voids. Surfaces which are pointed shall be kept moist for a period of 24 hours. If pockets / honeycombs in the opinion of the engineer-in-charge are of such an extent or character as to affect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare the concrete defective and require the removal and replacement of the portions of structure affected.

(a) the bars shall be kept in position by the following methods :

- (i) In case of beam and slab construction, sufficient number of precast cover blocks in cement mortar 1 :2 (1 cement : 2 coarse sand) about 4 x 4 cms. section and of thickness equal to the specified cover shall be place between the bars and shuttering as to secure and maintain the requisite cover of concrete over the reinforcement. In case of cantilevered or doubly reinforce beams or slabs, the main reinforcing bars shall be held in position by introducing chain spacers or supports bars at 1.0. to 1.2 metres centers.
- (ii) In case of columns and walls, the vertical bars shall be kept in position by means of timber templates slots accurately cut in them, the templates shall be removed after concreting has been done below it. The bars shall also suitably tied by means of annealed steel wires to the shuttering to maintain position during concreting.

1.2. All bars, projecting from pillars, Columns beams, slabs etc, to which other bars and concrete are to be attached or bounded to later on, shall be protected with a coat of thin neat cement grout, if the bars are not likely to be incorporated with succeeding mass of concrete within the following 10 days, This coat of thin neat cement shall be removed before concreting.

4.0 Mode of measurements & payment.

- 4.1 The consolidated cubical contents of concrete, work as specified in item shall be measured. The concrete laid in excess of sections shown on drawing or as directed shall not be measured. No deduction shall be made for
  - (a) Ends of dissimilar materials such as joints, beams, posts, girders, rafters, purline trusses, corbels and steps etc. upto 500 sq.cm. in section,
  - (b) Opening upto 0.1 Sq. M.

- 4.2 The rate includes cost of all materials labour, tools and plant required for mixing, placing in position, vibrating and compacting, finishing, as directed. curing and all other incidental expenses for producing concrete of specified strength. The rate excludes the cost of form work.
- 4.3 The rate shall be for a unit of one cubic meter.

**Item No.9**

Masonry work using Aerated light weight concrete block having crushing strength not less than 35 kg/sqcm for superstructure above plinth level upto floor two level in cement mortar 1:5(1 cement :5 fine sand) complete as per technical specification

The work of this item shall have to be carried out as per requirement and complete the whole work as per the instructions of engineer in charge to his complete satisfaction. Engineer in charge. Over and above, the work shall also be required to be carried out with the specification for this item is provided separately by the engineer in charge. The rate for this item will be paid on cubic meter basis.

**Item No.10**

**Brick Masonry work with cement mortar 1:6 complete:**

**Materials:**

Water shall confirm to M-1.

**Cement:**

Cement shall confirm to M-3.

**Brick:**

The bricks shall be hard or machine moulded and made from suitable soils and burnt. They shall be free from cracks and flaws and nodules of free lime. They shall have smooth rectangular faces with sharp corners and shall be of uniform colors.

The bricks shall be moulded with a frog of 100 mm x 40 mm and 10 mm to 20 mm deep on one of its flat sides. The bricks should not be broken when thrown on the ground from a height of 600 mm.

The size of modular bricks shall be 190 mm x 90 mm x 90mm.

The size of the conventional bricks shall be as under:

(9" x 4.3/8" x 2,3/4") 225 x 110 x 75 mm

Only bricks of one standard size shall be used in one work. The following tolerances shall be permitted in the conventional size adopted in a particular work.

Length  $\pm 1/8"$  (3mm) width :  $\pm 1/16"$  (1.5mm)

Height:  $\pm 1/16"$  (1.5 mm)

The crushing strength of the bricks shall not be less than 35 kg/sq.cm. The average water absorption shall not be more than 20 percent by weight. Necessary tests for crushing strength and water absorption etc., shall be carried out as per IS: 3495 (Part I to IV) - latest edition.

**Workmanship:**

**i) Proportion:**

The proportion of the cement mortar shall be 1:6 (1-Cement, 6-Fine sand) by volume.

**Wetting of bricks:**

The bricks required for masonry shall be thoroughly wetted with clean water for about two hours before use or as directed. The cessation of bubbles, when the bricks are wetted with water is an indication of thorough wetting of bricks.

**Laying:**

Bricks shall be laid in English bond unless directed otherwise. Half or cut bricks shall not be used except when necessary to complete the bond; closer in such case shall be cut to required size and used near the ends of walls.

A layer of mortar shall be spread on full width for suitable length of the lower course. Each brick shall first be properly bedded and set frame by gently tapping with handle of trowel or wooden mallet. Its inside face shall be flushed with mortar before the next brick is laid and pressed against it. On completion of coarse the vertical joints shall be fully filled from the top with mortar.

The work shall be taken up truly in plumb. All courses shall be laid truly horizontal and all vertical joint shall be truly vertical. Vertical joints in alternate coarse shall generally be directly one over the other. the thickness of brick coarse shall be kept uniform.

The brick shall be laid with frog upwards. A set of tools comprising of wooden straight edges, mason's spirit level, square half meter rub, and pins, string and plumb shall be kept on site of work for frequent checking during the progress of work.

Both the faces of walls of thickness greater than 23 cms shall be kept in proper place. All the connected brick work shall be kept not more than one meter over the rest of the work. Where this is not possible, the work shall be raked back according to bond (and not left toothed) at an angle not steeper than 45 degrees.

All fixtures, pipes, outlets of water, hold fasts of doors and windows etc. which are required to be built in wall shall be embedded in cement mortar.

**Joints:**

Bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not expose 12 mm. The face joints shall be raked out as directed by raking tools daily during the progress of work when the mortar is still green so as to provide key for plaster or pointing to done.

The face of brick shall be cleaned the very day on which the work is laid and all mortar dropping removed.

**Curing:**

Green work shall be protected from rain suitably. Masonry work shall be kept moist on all the faces for a period of seven days. The top of masonry work shall be kept well wetted at the close of the day.

**Mode of measurement & Payment:**

The measurement of this item shall be taken for the brick masonry fully completed in foundation upto plinth. The limiting dimensions not exceeding those shown on the plans or as directed shall be final. Battered tapered and curved position shall be measured net.

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

The testing of material is to be carried out at the cost of the contractor.

Item No.11

20 mm thick Sand Face Cement Plaster Work in which 1 plaster in proportion of 1:3 and 2nd plaster in the proportion of 1:2 using Cement: Mortar with sponge finishing etc. complete (Note: Before carrying out Plaster work on RCC, required tipping work should be carried out as instructed)

## Materials

Water shall confirm to M-1. Cement mortar shall confirm to M-11.

## 2.0 Workmanship

2.1. The work shall be carded out in the coats. The backing coat (base coat) shall be 12 mm. thick in C.M. 1:3. Before the first coat hardens its surface shall be beaten up by edges of wooden tappers and close dents shall be made on the surface. The subsequent coat shall be applied after this coat has, been allowed to set for 3 to 5 day, depending upon the weather conditions. The surface shall not be allowed to dry during this period.

2.2 The second coat shall be completed to 8 mm. thickness in C.M. 1:2 as described above, including raising sand facing by bushing. The sample of sand face shall be got approved before the work is started. The whole work shall be carried out uniformly as per sample approved. This item includes scaffolding cost.

## 2.3. Curing:

The curing shall be started overnight after finishing of plaster. The plaster shall be kept wet for a period of 7 days. During this period, it shall be protected from all damages.

## 3.0 Mode of measurements &amp; payment

3.1 The relevant specifications of the item shall be followed that the sand face plaster on outside up to 10 m. above ground level shall be measured under this item.

3.2 The rate shall be for a unit of One sq. metre.

Item No.12

Cement Plaster 12 mm thick using Cement:Mortar in proportion 1:3 with Niru Finishing curing, etc. complete

## Material:

Water shall confirm to M-1.

Cement Mortar shall confirm to M-11

## Workmanship:

12 mm thick cement plaster in single coat in CM 1:3 (1-cement : 3-sand) with a floating coat of neat cement slurry.

## Scaffolding:

Wooden bullies, bamboos, planks, treatles and other scaffolding shall be sound. These shall be proper examined before erection and use. Stage scaffolding shall be provided for ceiling plaster which shall be independent of the walls.

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

**Mode of Measurement & Payment:**

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

All plaster shall be measured in square meter unless otherwise specified length, breadth or height shall be measured correct to a centimeter.

Thickness of the plaster shall be exclusive of the thickness of the key i.e. grooves or open joints in brick work, stone work etc. or space between laths. Thickness of plaster shall be average thickness with minimum 10 mm at any point on this surface.

This item includes plastering up to floor two level.

The measurement of wall plastering shall be taken between the walls or partition (dimensions before plastering being taken) for length and from the top of floor or skirting to ceiling for height, depth of cover of cornices, if any, shall be deducted.

Soffits of stairs shall be measured as plastering on ceilings. Elowigns soffits shall be measured separately.

For jambs, soffits, sides, etc. for openings not exceeding 0.5 sq.mt. each in area for ends of joints, beams, posts girders, steps etc. not exceeding 0.5 sq.mt. each in area and for openings exceeding 0.5 sq.mt. and not exceeding 3.00 sq.mt. in each area deductions and additions shall be made in the following manner:

- a) No deductions shall be made for ends of joints, beams, posts etc. and openings not exceeding 0.5 sq.mt. each and no addition shall be made for reverse, jambs, soffits, side etc. of these openings, for finish to plaster around ends of joints, beams, posts etc.
- b) Deductions for openings exceeding 0.5 sq.mt. but not exceeding 3.00 sq.mt. each shall be made as following and no addition shall be made for reverse, joints, soffits, sides, etc. of these openings.
  - i) When both faces of all walls are plastered with same plaster. Deductions shall be made for one face only.
  - ii)
    - For openings having door squares equal to or projecting beyond the thickness of wall. Full deduction for opening shall be made from each plastered face of the wall.
    - In case of openings of area above 3 dq.mt. each deduction shall be made for opening but Jambs, soffits and slits shall be measured.
    - The rate shall be for a unit of square meter.

Item No.18

Filling in foundation and plinth with hard murrum or selected soil in layers of 0.23 cm. thickness including watering, ramming and consolidating etc. complete.

## 1.0 Materials :

- 1.1 Murrum shall be clean of good binding quality, and of approved quality obtained from approved pots/quarries of disintegrated rocks which contain silicons materials and natural mixture of clay of calcarions origin. The size of murrum shall not be more than 20 mm.

## 2.0 Workmanship :

- 2.1 The murrum or selected soil shall be filled in foundation and plinth in 20 cms. layers including consolidating, ramming, watering, dressing etc. complete.

## 3.0 Mode of measurement and payment:

- 3.1 The relevant specifications of the item shall be followed.  
3.2 The rate includes cost of collecting and carting murrum/or selected earth of approved quality with all lead and labour required for filling in trenches and plinth.

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

Item No.19:

Foundation filling with CC work in proportion of 1:3:6 using 1.5 cm to 2.0 cm aggregate including Ramming, Curing etc.

## 1.0. Materials

- 1.1 Water shall conform to M-1. Cement shall conform shall conform to M-3. Sand shall conform to M-6. Stones aggregate 20 mm. nominal size shall conform to M-12.

## 2.0 Workmanship

## 2.1 General

- 2.1.1 Before starting concrete the bed of foundation trenches shall be cleared of all loose materials, leveled, watered and rammed as directed.

## 2.2 Proportion of Mix

- 2.2.1 The proportion of cement, sand and coarse aggregate shall be one part of cement, 2 parts of sand and 4 parts of stone aggregate; and shall be measured by volume.

## 2.3 Mixing

- 2.3.1 The concrete shall he mixed in a mechanical mixer at the site of work. Hand mixing may however be allowed for smaller quantity of work if approved by the Engineer-in-charge. When hand mixing is permitted by the Engineer-in-charge in case of break-down of machineries and in the interest of the work, it shall be carried out on a water tight platform and care shall be taken to ensure that mixing is continued until the mass is uniform in colour and consistency. However in such cases 10% more cement than otherwise required shall have to be used without any extra cost. The mixing in mechanical mixer shall be done for a period  
1. 1/2 to 2 minutes. The quantity of water shall be just sufficient to produce a dense concrete of required workability for the purpose.

## 2.4 Transporting &amp; placing the concrete.

- 2.4.1 The concrete shall, be handed from the place of mixing to the final position in not more than 15 minute by the method as directed and shall be placed into its final



position, compacted and finished within 30 minutes of mixing with water i.e. before the setting commences.

2.4.2 The concrete shall be laid in layers of 15 cms to 20 cms.

2.5 Compacting:

2.5.1 The concrete shall be rammed with heavy iron rammers and rapidly to get the required compaction and to allow all the interstices to be filled with mortar.

2.6 Curing

2.6.1 After the final set, the concrete shall be kept continuously wet if required by ponding for a period of not less than 7 days from the date of placement.

2.7 Mode of measurements and payment:

2.7.1 The concrete shall be measured for its length, breadth, and depth, limiting dimensions to those specified on plan or as directed.

2.7.2 The rate shall be for a unit of one cubic metre.

Item No.20

Apex Color work on Outer side of Wall (Two coats) (with Base Coat)

### FINISHES

#### EXTENT AND INTENT

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

#### STORAGE

Storage of materials to be used on the job shall be, only in a single place approved by the Engineer-in-charge of RMC for this work. Such storage place shall not be located within any of the buildings included in the contract.

#### MATERIALS

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

#### SHADES

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

#### COMMENCEMENT OF WORK

Painting / finishing shall not be started until the surfaces to be painted / finished are in a condition fit to receive painting / finishing and so certified by the Engineer-in-charge of RMC for this work.

Painting / finishing work shall be taken in hand only after all other civil work is completed.

Buildings where painting / finishing work is to commenced shall be thoroughly swept and cleaned up before commencement of painting / finishing.

#### SCAFFOLDING

Only double scaffolding having two sets of vertical supports shall be provided for all, painting / finishing work. The supports shall be tied together with horizontal pieces over which the scaffolding planks shall be fixed.

All the vertical and horizontal members of the scaffolding shall be placed sufficiently away from the surfaces to be painted to ensure proper and unit erupted application.

#### WORKMANSHIP

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

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

#### CONCEALED SURFACES

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

#### PROTECT AND CLEAN

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

#### 10. PREPARATION OF SURFACES

PLASTER WORK: Fill all holes, cracks and abrasions with plaster of parish / cement slurry as directed, properly prepared and applied and smoothed off to match adjoining surfaces. Do not use sand paper on plaster surfaces. Plaster shall

be allowed to dry for at least 12 (twelve) weeks before the application of paint / finishes.

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

#### 11. APPLICATION

The paint shall be continuously stirred in the container so that its consistency is kept uniform throughout.

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

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

In order to achieve a superior finished surface, putty paste fillers shall be used on, all surfaces to be painted. To fill pores, dents, etc. The putty / paste fillers shall be approved quality and manufacture and shall be applied to the surface with a knife or other sharp edged tools after the priming coat as well as after each undercoat. The surface, after filling with putty / paste tiller, shall be rubbed down with fine sand paper and dusted off before the application of the subsequent coat.

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

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

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

Item No.21

Plastic Emulsion paint (two coats) (Asian Paint, ICI, Dulux, Nerolac, Berger, etc. of approved type (with prime coat):

Materials:

The enamel paint shall satisfy in general requirements in specifications of oil paints. Enamel paint shall conform to I S Latest edition.

Workmanship:

The materials required for work of painting work shall be obtained directly from approved manufacturer or approved dealer and brought to the site in maker's drum, bags etc. with seal unbroken.

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

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

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

Application of paint:

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

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

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

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

Mode of measurement and payment:

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

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

- a) Dimensions shall be measured to the nearest 0.01 meter.
- b) Areas shall be worked out to the nearest 0.01 meter.

No deductions shall be made for openings not exceeding 0.5 sq.m. each and no addition shall be made for painting to beddings, moulding, edges, jambs, soffits, sills etc of such opening.

In case of fabricated structural steel and iron work, priming coat of paint shall be included with fabrication. In case of trusses, if measured is sq.m compound griders, stanchions, lattices, girder and similar work, actual are shall be measured and no extra shall be paid for painting on bolts heads, nuts, washers etc. No addition shall be made to the weight calculated for the purpose of measurements of steel and iron works for paint applied on shop or at site.

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

The rate is including priming coat.

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

#### Item No.22

#### Providing & laying Vitrified Tiles for flooring work in 1st Quality

##### 1.0. Materials

Approved quality vitrified tiles as approved by engineer-in-charge / architect.

#### BEDDING

The sub-grade shall be cleaned, wetted and mopped. The bedding shall then be laid evenly over the surface tamped and corrected to desired level and allowed to harden enough to offer a rigid cushion to tiles and to enable the mason to place wooden planks across and equal on it.

The Color vitrified tiles shall be laid on cement mortar bedding of 10 mm thick in C.M. 1:3. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of bedding. The base shall be cleared and well wetted. The mortar shall then be spread in thickness not less than 10mm at any place and average 12mm thickness. The proportion of the cement mortar shall be as specified in the item.

#### FIXING TILES

The tiles before laying shall be soaked in water for at least two hours. Neat grey cement grout at 3.3 Kg. Cement / Sq. Mt. of honey like consistency shall be spread over the mortar bedding as directed. The edges of the tiles are smeared with neat cement slurry. The tiles shall be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straight line or as per pattern.

The tiles shall not have staggered joints. The joints shall be true to centre line both ways. The Nahni trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed, they shall be cut (Swan) to the required size and the edges rubbed smooth to ensure straight and true joints. The joints shall be filled with grey cement grout with wire brush of trowel to a depth of 5mm and loose material removed. White cement shall be used for pointing the joints. After fixing the tile finally in an even plane the flooring shall be kept wet and allowed to nature undisturbed for 7 days.

## CLEANING

The surplus cement grout that may have come out of the joints shall be cleared off before it sets. Once the floor has set, it shall be carefully washed, cleared by dilute acid and dried. Proper precaution and measures shall be taken to ensure that the tiles are not damaged many ways till the completion of the construction.

Mode of Measurement:

The rate for flooring work shall be paid on square meter basis.

### Item No.23

Supply & Fixing of Glazed tiles (1st Quality) of required size in Cement Roga and joints to be filled with white cement after 12mm rough plaster in proportion of 1:3

## MATERIALS

### Glazed Tiles

The tiles shall be of best quality as approved by the Engineer- in-charge. They shall be float and true to shape. They shall be free from cracks, crazing spots, chipped edges and corners. The glazing shall be of uniform shade.

Variation from the stated sizes, other than the thickness of tile shall be plus or minus 1.5 mm. The thickness of tile shall be 6 mm. Except as above the tiles shall conform to I.S. Latest edition.

## BEDDING

The sub-grade shall be cleaned, wetted and mopped. The bedding shall then be laid evenly over the surface tamped and corrected to desired level and allowed to harden enough to offer a rigid cushion to tiles and to enable the mason to place wooden planks across and equal on it.

The Color glazed tiles shall be laid on cement mortar bedding of 12 mm thick in C.M. 1:3. The mortar shall have sufficient plasticity for laying and there shall be no hard lumps that would interfere with the evenness of bedding. The base shall be cleared and well wetted. The mortar shall then be spread in thickness not less than 10mm at any place and average 12mm thickness. The proportion of the cement mortar shall be as specified in the item.

## FIXING TILES

The tiles before laying shall be soaked in water for at least two hours. Neat grey cement grout at 3.3 Kg. / Cement / Sq. Mt. of honey like consistency shall be spread over the mortar bedding as directed. The edges of the tiles are smeared with neat cement slurry. The tiles shall be well pressed and gently tapped with a wooden mallet till they are properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints between the tiles shall be as thin as possible in straight line or as per pattern.

The tiles shall not have staggered joints. The joints shall be true to centre line both ways. The Nahni trap coming in the flooring shall be so positioned that its grating shall replace only one tile as far as possible. Where full size tiles cannot be fixed, they shall be cut (Swan) to the required size and the edges rubbed smooth to ensure straight and true joints. The joints shall be filled with grey cement grout with wire brush of trowel to a depth of 5mm and loose material removed. White cement shall be used for pointing the joints. After fixing the tile finally in an even plane the flooring shall be kept wet and allowed to nature undisturbed for 7 days.

## CLEANING

The surplus cement grout that may have come out of the joints shall be cleared off before it sets. Once the floor has set, it shall be carefully washed, cleared by dilute acid and dried. Proper precaution and measures shall be taken to ensure that the tiles are not damaged many ways till the completion of the construction.

The rate for this item will be paid on one square meter basis.

### Item No.24:

Supply & Fixing of Polished of Kota Stone of required size & thickness as instructed to fixed in Platform / Cup Board etc

### Item No.28:

Supply & Fixing of Granite Stone (Telephone Black Color) on wall after rough cast Cement Plaster in proportion of 1:3 and fixing grainage in Cement Paste

#### 1.0 Materials

- 1.1. Water shall confirm to M-1. Lime mortar shall confirm to M-10, Cement mortar shall confirm to M-11, Polished kota stone shall confirm to M-49.

#### 2.0 Workmanship

- 2.1. Each slab shall be cut to the required size and shape and fine chisel dressed at all the edges. The sides t h u s dressed shall have a full contact if a straight edge is laid along. The sides shall be table rubbed with coarse sand before paving. All angles and edges of the slabs shall be true square and free from chippings and giving a plane surface. The thickness shall be 25 mm. (Average) as specified in this item but not less than 20 mm at any place.
- 2.2 Bedding for the Kota stone slabs shall be of cement mortar 1:6 (1 cement : 6 coarse sand) of average thickness 20 mm. Sub grade shall be cleaned, wetted and mopped. Mortar of the specified mix and thickness shall be spread on an area sufficient to receive one kota stone slab. The slab shall then be washed clean before laying. It shall be laid on top pressed, tapped gently to bring it in level with the other slabs. It shall then be lifted and laid aside. Top surface of the mortar shall then be corrected by adding fresh mortar at hollows or depressions. The mortar shall then be allowed to harden bit. Over this Surface, cement slurry of honey like consistency shall be applied. The slab shall then be gently placed in position and tapped with wooden l mallet till it is properly bedded in level. with and close to the adjoining slab. The joint shall be as fine as possible. The slabs fixed in the floor adjoining the walls shall enter not less than 10 mm. under the plaster, skirting or dedo. The junction between wall and floor shall be finished neatly. The finished surface shall be true to levels and slopes as directed.
- 2.3 The floor shall be kept wet for a minimum period of 7 days so that bedding and joints set properly.
- 2.4 Polishing shall be normally commenced after 14 days of laying the stone slab. First polishing shall be done with carborundum stones of 120 grade grit fitted in the heavy machine and then second polishing shall be done with carborundum stone of 220 to 350 grade grit fitted in heavy machine. Water shall be properly used during polishing. The stone shall then be washed clean with water. When directed by the Engineer-in-charge; wax polish of approved quality shall be applied on the surface with the help of soft cloth over a clean and dry surface. Then the polishing machine fitted with bobs shall be run over it.

- 2.5 The holes required for Nahni traps, pipes and other fittings shall be made without any extra cost.
- 2.6 The kota stone for platform and c.b. shall be supplied and fixed with two side polished and the work shall have to be completed as per requirement and instructions of engineer in-charge.
- 3.0. Mode of measurements & payment
- 3.1. The rate shall include the cost of all materials and labour involved in all the operations described above. The kota stone flooring shall be measured in square meters correct to two places of decimal, length and breadth shall be measured correct to a: centimeter and between the finished face of skirting dedo or wall plaster and no deduction shall be made nor extra paid for any opening in floor of areas up to 0.1 sq.mt.
- 3.2. The rate shall be paid for a unit of one sq. meter

Item No.25

Supply, Fixing & Polishing for Granite Flooring work 18 mm thick & 200 mm Base of Lime:Mortar in proportion of 1:2

The work of supply, fixing and polishing for granite flooring work 18 mm thick shall have carried out as required by engineer in charge, with 20 mm base of lime mortar in proportion of 1:2. The workmanship, under layer, mixing of materials, laying, grinding and curing etc shall also be carried out and complete the whole work as per the instructions of engineer in charge.

The payment will be made on square meter basis.

Item No.26

Supply and Fixing of Marbel riser length 0.90-1.45 and 15-20 cm width border etc. as per design with fixing complete

Item No.27

Marbel step 25-30 cm width / border / molding as per design with complete fixing

The contractor shall have to supply Polished Kota Stone steps and risers of length 0.90 to 1.45 mtr and thickness 20-25 mm to be fixed in Lime:Mortar 1:2 and Cement slury and as instructed. The fixing of polished kota stone for steps and risers shall have to be carried out and complete as per requirement and as per the instructions of engineer-in-charge.

The payment will be made for a unit of one running meter.

Item No.29:

Flush door 25mm thick with Iron frame for door & window with polishing / oil painting using company viz. kitply / century /dura / everest

**Wooden flush door shutters (solid core) :**

The solid core type flush door shutters shall be of decorative or non-decorative type as specified in the drawing. The size and thickness of the shutter shall be as specified in drawings or as directed. The timber species for core shall be used as per I.S. Latest edition. The timber shall be free from decay and insect attack. Knots and knot holes less than half the width of cross-section of the members in which they occur may be permitted. Pitch pockets, pitch streaks and harmless pin holes shall be permissible except in the exposed edges of the care members. The commercial plywood, cross-bands shall conform to I.S: latest edition.



The face panel of the shutters shall be formed by gluing by the hot press process on both faces of the core with either, plywood or cross-bands and face veneers. The lipping, rebating, opening of glazing; venetian etc. shall be provided if specified in the drawing.

All edges of the door shutters shall be square. The shutters shall be free from twist or warp in its plane. Both faces of the shutters shall be sand papered to smooth even texture.

The shutters shall be tested for

- (1) **End immersion test** : The test shall be carried out as per I.S. latest edition. There shall be no delamination at the end of the test.
- (2) **Knife test** : The face panel when tested in accordance with I.S. latest edition shall pass the test.
- (3) **Glue adhesion test** : The flush door shall be tested for glue adhesive test in accordance with I.S.: latest edition. The shutters shall be considered to have passed the test if no delamination occurs in the glue lines in the plywood and if no single delamination more than 80 mm in length and more than 3 mm in depth has occurred in the assembly glue lines between the plywood face and the stile and rail. Delamination at the corner shall be measured continuously around the corner. Delamination at the knots, knot holes and other permissible wood defects shall not be considered in assessing the sample.

The tolerance in size of solid core type flush door shall be as under:

In Nominal thickness  $\pm 1.2$  mm in Nominal height  $\pm 3$  mm.

The thickness of the shutter shall be uniform throughout with a permissible variation of not more than 0.8 mm: when measured at any two points.

This wooden shutter must be framed with steel section.

## 2.0. Workmanship

The relevant specifications shall be followed except that the shutters be non decorative type and block board core with face veneer or plywood, with 25 mm thickness.

Readymade shutters shall be of correct size and shall fit into the door or other openings without excessive scrapping of edges. Adding of battens etc., to make up to the size shall not be allowed.

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

### Item No.30:

Providing & fixing 32mm thick teakwood paneled door with 125x63 mm teakwood frame, partly glazed (6mm thick) and partly paneled with all necessary fixing and oil paint.

#### 1.0. Materials

Wood in frames shall conform to M-29

#### 2.0. Workmanship

- 2.1. The item covers the requirement of frames for doors, windows, clerestory windows, their supply and fixing.

## 2.2. Frames:

- 2.2.1. All members of frames shall be exactly at right angles. The right angle shall be checked from inside surfaces of the frames of the respective members. Size of frame 100 mm x 63 mm.
  - 2.2.2. All members of frames shall be straight without any warp or bow and shall have smooth surfaces well planed on the three sides exposed at right angles to each other. The surfaces touching the wall may not be planed unless it is required in order to straighten up the member or to obtain the overall sizes within the tolerances as specified.
  - 2.2.3. Frame shall have dovetail joints. When clerestory is included, it shall be provided by having full length one piece post for door or windows and clerestory window extending the frame on top at the head to the required extent. Horns shall not be provided in the head of the frame. When no sills are provided, the vertical posts of the frame in the ground floor shall be embedded in the sill masonry for 10 cm. on upper floors, the vertical posts shall be fixed in the floor or masonry by forming notches 10 mm. deep. Slight adjustment of spacing as necessary shall be done to have the hold fasts in the joints of masonry course. The frame shall be erected in position and held plumb with strong support from north sides and built in masonry as it is being built. The transom shall be through tenoned into the mortices of the jamb post of the full width of the jamb post and the thickness of the tenon shall be not less than 15 mm.
- ## 2.3. Tolerance:
- Unless specially mentioned otherwise tolerance of  $\pm 1.5$  mm. shall be allowed for each wrought face.
- 2.4. The tenons shall be closely fitting into the mortices and suitably pinned with wood dowels not less than 10 mm. dia. metre. The depth of rebates for housing the shutter shall be as shown in the detailed drawing or as directed.
  - 2.5. The contact surface of tenon and mortise shall be treated before putting together with an adhesive of approved make.
  - 2.6. Minimum number of three hold-fasts shall be fixed on each side of door and windows frames, one at the center point and the other two at 30 cm. from the top and the bottom of the frames. In case of windows and ventilators frames whose height is less than 1 M. two hold-fasts, in each side shall be fixed at quarter points of the trams. The size of each hold-fast shall be 300 x 25 x 6 mm. and of mild-steel with split end. The hold fasts shall be fixed with screws to frames.
  - 2.7. Mild steel hold fasts shall be protected with a coating of coal asphalt tar. The surface of frame abutting the masonry or concrete faces shall be properly treated by applying a coat of approved coating:

Item No.31:Supply and fixing of Laminates 1 mm of approved quality

The laminates of 1 mm of approved quality as per the instructions of engineer in charge shall have to be supplied and fixing work with required material is to be carried out fully.

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

Item No.32:Enamel painting on door/window, iron door, iron grill or woodwork two coat with Primer

## 1.0. Materials :

1.1.The ready mixed paint, brushing, wood primer pink shall confirm to I. S. 3536-1966 (Latest edition).

## 2.0. Workmanship : 2.1. Preparation of Surfaces :

2.2.1. All wood work shall be dry and free from any foreign matter incidental to building operations. Nails shall be punched well below the surface to provide a firm key for stopping. Mouldings shall be carefully smoothed with abrasive paper and projecting fibres shall be removed. Flat portion shall be smoothed off with abrasive paper used across the grain prior to staining and with the grain prior to staining or if the wood is to be left in its natural colour, wood work which is to be stained may be smoothed to scraping instead of by glass papering if so required.

2.2.2.Any knots, resinous or stricaks or blueish sap wood that are not large enough to justify cutting out shall be treated with two coats of pure shellac knotting applied thinly and extended about 25 mm. beyond the actual area requiring treatment.

## 2.2. Application of primer :

2.2.1. The relevant specifications shall be followed for application of primer.

1.0. Materials : The enamel paint shall confirm to M-44 B.

## 2.0Workmanship :

## 2.1. General:

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

2 1.2. All materials not in actual use, shall be kept properly protected, lids of containers shall be kept closed and surface of paint in open or partially open containers covered with a thin layer of turpentine to prevent formation of skin. The materials which have become stale or flat due to improper and long storage shall not be used. The paint shall be stirred thoroughly in its container before pouring into small containers. While applying also the paint shall be continuously stirred in smaller container. No left over paint shall be put back into stock tins. When not in use, the containers shall be kept properly closed.

2.1.3. If for any seasons, thinning is necessary, the brand of thinner recommended by the manufacturer shall be used.

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

## 2.2. Application:

- 2.2.1. Brushing operations are to be adjusted to the spreading capacity advised by the manufacture of particular paint. The paint shall be applied evenly and smoothly by means of crossing and laying off. The crossing and laying off consists of covering the area over with paint, brushing the surface hard for the first time over and then brushing alternately in opposite directions two or three times and then finally brushing lightly in direction at right angles to the same. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying off will constitute one coat.
- 2.2.2. Each coat shall be allowed to dry completely and lightly rubbed with very fine grade of sand paper and loose particles brushed off before next coat is applied. Each coat shall vary slightly in shade and shall be got approved from Engineer-in-charge before next coat is started.
- 2.2.3. Each coat except the last coat shall be lightly rubbed down with sand paper of fine pumice stone and cleaned of dust before the next coat is applied. No hair marks from the brush or clogging of paint puddles in the corners of panels angles of mouldings etc. shall be left on the work.
- 2.2.4. Special care shall be taken while painting over bolts, nuts, rivets, overlaps etc. Approved best quality brushes shall be used.

## 3.0. Mode of measurements & payment:

- 3.1. The relevant specifications of item shall be followed for mode of measurements and payment. The rate is excluding priming coat.
- 3.2. The rate shall be for a unit of one sq. metre.

### Item No.33:

#### Iron Work as per drawing and Instructions all complete:

All structural steel shall conform to IS 266 - Latest edition. The steel shall be free from the defects mentioned in IS 226 (Latest edition) and shall have a smooth finish. The material shall be free from loose mill scale, rust, pits or other defects affecting the strength and durability. River bars shall conform to IS 1148 Latest edition.

When the steel is supplied by the contractor, test certificate of the manufacturer shall be obtained according to IS 226 Latest edition and other relevant Indian Standards.

The design should be made as per the instructions of engineer-in-charge. The rate includes supplying and welding (along with labours), transportation and fixing in position of the steel work.

The rate shall be for a unit of one Kilogram.

### Item No.34

Providing T.M.T. reinforcement for R.C.C. work including cutting, bending binding and placing in position etc. up to floor two level, tor steel.

#### 1:0. Materials

- 1.11. TMT bars of Fe-415 should be used which shall conform to M-19. Mild steel binding wires shall conform to M-21.

## 2.0. Workmanship

- 2.1. The work shall consist of furnishing and placing reinforcement to the shape and dimensions shown as on the drawings or as directed.
- 2.2. Steel shall be clean and free from rust and loose mill scale at the time of fixing in position and subsequent concreting.
- 2.3. Reinforcing steel shall conform accurate to the dimensions given in the bar bending schedules shown on relevant drawings. Bars shall be bent cold to specified shape and dimensions or as directed, using a proper bar bender, operated by hand or power to attain proper radius of bends. Bars shall not be bent or straightened in a manner that will waste the material. Bars bent during transport or, handling shall be straightened before being used on the work. They shall not be heated to facilitate bending. Unless otherwise specified, a 'U' type hook at the end of each bar shall invariably be provided to main reinforcement. The radius of the bend shall not be less than twice the diameter of circle having an equivalent effective area. The hooks shall be suitably encased to prevent any splitting of the concrete.
- 2.4. All the reinforcement bars shall be accurately placed in exact position shown on the drawings, and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm in size and by using stay blocks or metal chair spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals, Bars shall not be allowed to sag between supports nor displaced during concreting or any other operations of the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal supports shall not extend to the surface of concrete, except where shown on drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed. Pieces of broken stone or brick and wooden blocks shall not be used. Layers of bars shall be separated by spacer bars, precast mortar bricks or their approved devices. Reinforcement after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed: To prevent reinforcement from corrosion, concrete cover shall be provided as indicated on drawings. All the bars projecting from concrete and to which other bars are to be spliced and which are, likely to be exposed for a period exceeding 10 days shall be protected by a thick coat of neat cement grout.
- 2.5. Bars crossing each other where required shall be secured by binding wire (annealed) of size not less than 1 mm in such a manner that they do not slip; over each other at the time of fixing and concreting:
- 2.6. As far as possible, bars of full length shall be used. In case this is not possible. Overlapping of bars shall be done as directed, When practicable, overlapping bars shall not touch each other, but be kept apart by 25 mm. or 1.25 times the maximum size of the coarse aggregate whichever is greater by concrete between them. Where not feasible, overlapping bars shall be bound with annealed wires not less than 1 mm. thick twisted tight. The overlaps shall be staggered for different bars and located at points, along the span where neither shear nor bending moment is maximum.
- 2.7. Whenever indicated on the drawings or desired by the Engineer-in-charge, bars shall be joined by couplings which shall have a cross-section sufficient to transmit the full stresses of bars so the ends of the bars that are joined by coupling shall be

upset for sufficient length so that the effective cross section at the base of threads is not less than the normal cross-section of the bar. Threads shall be standard threads: Steel for coupling shall confirm to I:S.226 (Latest edition)

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

### 3.0. Mode of measurements & payment

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

### Item No.35

#### Writing Alphabets & Numbers on Building/Quarter

The writing of Alphabets & Numbers on Building / Quarter shall be written as and where asked to write with approved quality oil paint and colors as required as per the instructions of engineer in charge. The Alphabets & Numbers of required size shall be written as required.

The payment will be made per Alphabet/Number basis.

### Item No.36 :

18 gauge collapsible gate with primer & double coat oil paint.

For this work, new steel channel of size 3.4" of 1.9 to 2.0 cm as well as strip of 3/4" x 3/16" shall be used. The gap between the two channel while the door is closed shall be maximum 10 cm as well as the joint of strip shall be riveted. In the work of door, at the top and bottom on the track of size 1-1/2" x 3/8" the steel track of size 1.5 cm to 1/8" shall be fixed in the wall and the girder shall be fixed on it so as to get the door

open/closed easily. The said gate shall be fixed in line level and plumb in the wall as per the instructions of the engineer-in-charge.

In the door, necessary handle, locking arrangement shall be done as per the instructions of the engineer-in-charge.

On completion of the work, first two coats of red lead shall be done and two coats of silver or as per the selection of shade of oil paint shall be done on it.

The rate for this work will be paid per square meter basis.

Item No.37:

FRP Door supply all fitting and fixture complete

Providing and fixing 28 mm thick single shutter door with flush depressed panel design with core material PU foam done in situ & sandwich panel of 4 mm thick plywood & moulded in wooden blocks for fixtures. FRP thickness to be 1.50 mm to 2.00 mm including providing and fixing FRP moulded section frame of section size 100 mm x 50 mm chamfered type with FRP thickness of 2.00 mm and core of rigid polyurethane foam having density 32 Kg/ cmt to 36 Kg/cmt., compressive strength 3.5 Kg./sqcm to 4.5 Kg./sqcm. and fire retardant grade, PU foam shall be done situ with Canadian Ponderosa wooden blocks for fixtures. In built holdfast arrangement to use fasteners for fixing with masonry or R.C.C. The whole section of frame and shutter shall be waterproof, acid / alkali resistant & well coat colour. the frame and shutter shall be fixed with all necessary stainless steel fixtures and fastenings etc. complete as per direction of engineer in charge.

Materials: -

Frame materials shall be of fire extinguishing grade FRP skin having section 100 mm x 50 mm chamfered type with thickness of 1.50 mm to 2.00 mm and core material shall be fire extinguishing grade rigid polyurethane foam having density 32 Kg/ cu.cm to 36 Kg/ cu.cm, flexural strength 1.8 Kg / Sqcm to 2.00 Kg / Sqcm and compressive strength 3.5 Kg / Sqcm to 4.5 Kg / Sqcm. Whole frame shall be water proof, weather proof, termite proof and mild acid / alkali resistance. P.U foam shall be done in situ with plantation wooden pieces embedded inside for holding fixtures and stiffening. Frame shall be straight in line, level and having three joint-less pieces. Frame shall be fixed in masonry / R.C.C with Mild Steel hold fast or with 115 mm long screws as hold fast with sleeve in position and finished in colour cement. 28 mm thick shutter in depressed panel design shall be having 1.5 mm to 2.0 mm thickness fire extinguishing grade FRP skin, sand-witch panel of 4 mm thick plywood and embedded wooden pieces for stiffening as well as holding hinges and fixture, all molded into a one piece shutter. Core material shall be injected fire extinguishing grade rigid polyurethane foam done in situ having density 32 Kg / Cucm to 36 Kg / Cucm compressive strength 1.8 Kg / Sqcm to 2.00 Kg / Sqcm, flexural strength 3.5 Kg / Sqcm to 4.5 Kg / Sqcm. Whole shutter shall be water proof, weather proof, termite proof and mild acid/alkali resistance. 28 mm thick depressed panel FRP shutter shall be joint-less. It shall be straight and smooth and of standard shape finished in gel coat. All necessary fixture and fastening shall be fixed where wooden pieces are provided.

Workmanship:

Frame shall be fixed in masonry/R.C.C member. Shutter shall be fixed in true line; level and proper manner having 2.0 to 3.0 ply i.e. air space for smooth and easy working. Pull handles, Door stopper, Door stopper, bearing hinges & S.S self tapping Phillips cross head special screws conforming to anti corrosive high grade AISI 304 stainless steel of standard make or as equivalent approved by Engineer-in-charge conforming to anti corrosive high grade AISI 304 stainless steel only, & Tower bolt of the make Orbit or as equivalent approved by Engineer-in-charge conforming to standards of ORBIT & anti corrosive high grade AISI 304 stainless steel only.

All fixtures and fastenings of standard make shall conform to AISI 304 Grade Stainless Steel.

The following table presents main elements (forming the Chemical composition) of AISI 316 Grade Stainless Steel.

- It can withstand the corrosion caused by atmospheric / environmental or major chemical reactions.
- It can resist high temperatures without going under any deformity which makes it highly recommended for fire safety doors in any building.
- It shall have remarkable creep strength and Rupture strength.
- It shall be repelled the Bacteria & shall be made higher degree of hygiene.
- It shall be of natural finish, it shall not required regular cleaning or maintenance making it most suitable for public places.
- It shall tolerate forceful and intense use.
- Specially developed fixing stud and grubs shall be used to ensure accurate fitting of elements and eliminates shaking of elements.

Fixtures & Fastenings:

Following fixtures and fastening shall be used for single shutter. All fixtures and fastening of the make shall be of anti corrosive high grade AISI 304 stainless steel in Glossy & satin combination finish only. Fixtures and fastening of standard make shall be fixed by skill person only.

The rate shall include anti corrosive high grade AISI 304 stainless pull handle, hinges, door stopper in Glossy & satin combination finish of the standard make including fixing with S.S self tapping Philips cross head special screws and Stainless steel tower bolt of the make Orbit. The size and number of hinges shall be as per table given above  $\pm 1.50$  mm tolerance will be allowed in thickness of shutter and  $\pm 1.20$  to  $2.00$  mm for size of frame.

Mode of measurements & payment:

The rate for shutter includes cost of anti corrosive high grade AISI 304 stainless pull handle, Door stopper, hinges, S.S self tapping Philips cross head special screws in Glossy & satin combination finish of standard make, tower bolt of the make orbit. The dimensions of the door shall be measured clear size of the opening made for fixing of door with frame.

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

Item No.38:

Supply and fixing of vitrified for Skirting work (1st Quality) width upto 10 cm:

The tiles shall be of best quality as approved by the engineer-in-charge. They shall be flat and true to shape. They shall be free from cracks, crazing spots, chipped edges and corners. the glazing shall be of uniform shade. Variation from the stated sizes, other than the thickness of tile shall be plus or minus 1.5 mm. Except as above the tiles shall conform to I S (latest edition).

Skirting should be 10 cm in height from flooring

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



Item No.39 :

Supply & Fixing of Broken Glazed (China Mosaic) tiles size 5-6 mm thick of different size and shade (approved crazy pattern) in Cement: Mortar 1:2 and joint filling with White Cement / Coloured Cement including Ramping, Watering, Curing etc. complete

The work is to be carried out with supply and fixing of Broken Glazed (China Mosaic) tiles of size 5-6 mm thick of different size and shade (approved crazy pattern) in C M 1:2 and joint filling with white cement / coloured cement including ramping, watering, curing etc complete with 25 mm bedding of cement mortar 1:6 with required slope. The whole work of this item is to be carried out and completed as per the instructions of engineer in charge.

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

## Item No.40-A

Providing & Fixing Orissa Pan W.C. & European type of appropriate make incl. "P" or "S" trap as required along with drain connection and all the necessary fixtures and half turn flush cock etc. of size 580mm x 440mm completed as directed.

## MATERIALS

Orissa type water closet:

The specification of Orissa type white glazed water closet of first quality shall conform to IS: latest edition and relevant specification of Indian type water closet except that pan will be with the integral squatting pan of size 580 x 440 mm with raised footrest.

## WORKMANSHIP

The pan shall be sunk into the floor and embedded in a cushion of average 15 cm cement 1:5:10 (1 Cement: 5 Fine Sand: 10 Graded stone aggregate 40 mm. nominal size) or as specified. This concrete shall be left 115 mm below the top level of the pan so as to allow for flooring and its bed concrete. The floor should be suitably stopped so that the waste water is drained into the pan. The pan shall be provided with 100 mm. 'P' or 'S' traps as specified in the item no. with approximately 50 mm. seal. The joints between the pan and the trap shall be made leak-proof with cement mortar 1:1 (1 Cement: 1 Fine Sand).

The rate shall be paid for a unit of number basis.

## Item No.40-B

Providing & fixing cast iron Nahni trap of 7.6 cm with Cast Iron Grating etc complete.

## 1. 0 MATERIAL

## 1.0 Nahni trap

1.1. Nahni Trap shall be of cast iron and shall be sound and free from porosity or any defects which affect serviceability . The thickness of the base matel shall not be less then 6.5 mm. The surface shall be smooth and free from sraze. chips and other flaws or any other kind of defect which affect serviceability. The size of Nahni trap shall be specified and shall be of self cleaning design.

- 1.2. The Nahni trap shall be of quality approved by Engineer in charge and shall generally confirm to the relevant Indian standard
- 1.3. The Nahni trap provided shall be with deep seal. minimum 50 mm expect at places where trap with deep seal can not be accommodated. The cover shall be cast iron perforated cover shall be provided on the trap of appropriate size as approved by Engineer in charge.
- 1.4. The Nahni trap supplied on site shall be in good condition without any damages in it and the surface shall be bright and smooth without any scratch etc.

## 2.0 WORKMANSHIP FITTING & FIXING

- 2.1 When the Nahni trap are to be Fitted, the ends shall be carefully filed out so that no obstruction to bore in offered. The Nahni trap shall be fitted with pipes carefully in such a manner as will not result in slackness of joints when the two pieces are screwed together
- 2.2 In jointing the Nahni trap the inside of the socket. The end shall then be tightly fixed in the socket, when Nahni trap is feted with a pipe wrench Care shall be taken that all items are free from dust, dirt and rust during fixing Burr from the joints shall be removed after fixing. After fixing, the open ends of the Nahni trap shall be temporarily plugged to prevent excess of water soil or any other foreign matter.

### TESTING OF JOINTS

After fitting, the Nahni traps shall be inspected under working conditions of pressure and flow. Any joints found liken shall be redone, and all leaking Nahni traps shall be removed and replaced without extra cost.

The Nahni traps shall be tested in sections as the work laying proceeds, veeping the joints exposed for inspection during the testing.

## 3.0 MODE OF MEASUREMENT & PAYMENT :

- 3.1. The unit rate of Nahni trap shall include the cost of all materials, tools and plant required for fitting, the same to specified position as per drawings, and as directed by Engineer in charge finishing structure, etc, and all other incidental expenses for producing item of Nahni trap work to complete the structure or its components as shown on the drawings, and as directed by Engineer in charge and according to these specifications. They shall also include the cost of making, fixing and removing of all scaffolding and forms required for the work.  
The rate of Nahni traps shall include the cost of all labour, materials, G I fittings as required, tools and plant scaffolding and all incidental expenses as described herein above.
- 3.2. The Nahni trap shall be measured for its Number, limiting dimensions to those specified on plan or as directed. The rate shall be for a unit of one Number.
- 3.3. The payment will be made on number basis of the finished work.

Item No.40-C:

White porselin wash bassin 510/410mm indian make C.I. bracket with fitting cromium plated topes 25cm plastic waste pipe and 12mm pillar cock with comp.

## 1.0: Materials :

1.1. The white glazed earthenware wash basin shall be 510 mm. x 410 mm. of 1<sup>st</sup> quality and make as approved by the Engineer-in-charge. The wash basin shall conform to M-59.

## 2.0 Workmanship :

2.1 The wash basin shall be fixed on the wall as and where directed. The wash basin shall be supported on a pair of R.S. or C.I. brackets fixed in C.M.1:3. (1 cement : 3 sand). The bracket shall conform to I.S. : latest edition. The wall plaster on the rear shall be cut to rest the top edge of the wash basin. After fixing the basin, plaster shall be made good and surface finished to match with the existing one. :

2.2 The bracket shall be painted white with ready-mixed paint.

2.3. The C.I. brass trap and union shall be connected to 32 mm. dia. waste pipewhich shall be suitably bent towards the wall and which shall discharge into an open drain leading to a gully trap. or direct in to the gully-trap on the ground floor and shall be connected to a waste pipe through a floor trap on the upper floors. C.P. brass trap and union may not be provided where the surface drain or a floor trap is placed directly under the basin and the waste is discharged intovertically.

2.4. The height of the front edgeof the wash basin from the floor level shall be 80 cms.

2.5. The necessary inlet, outlet connections and fittings such as pillar cocks; CP Grass waste trap waste pipe, stop cock, chain wish rubber plug etc. shall be fixed.

2.6. The payment of fittings shall be made separately under separate items.

## 3.0: Mode of measurements &amp; payment

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

3.2. The rate shall be for aunit of One number.

Item No.40-D:

White porselin Laboratory Sink size 60/450/200 mm with supply and fitting.

## 1.0: Materials :

1.1. The white glazed earthenware wash basin shall be 60/450/200 mm. of 1<sup>st</sup> quality and make as approved by the Engineer-in-charge. The wash basin shall conform to M-59.

## 2.0 Workmanship :

2.1. The sink shall be fixed on the wall as and where directed. The wash basin shall be supported on a pair of R.S. or C.I. brackets fixed in C.M.1:3. (1 cement : 3 sand). The bracket shall conform to I.S. : latest edition. The wall plaster on the rear shall be cut to rest the top edge of the wash basin. After fixing the basin,

- plaster shall be made good and surface finished to match with the existing one. :
- 2.2. The bracket shall be painted white with ready-mixed paint.
  - 2.3. The C.I. brass trap and union shall be connected to 32 mm. dia. waste pipe which shall be suitably bent towards the wall and which shall discharge into an open drain leading to a gully trap. or direct in to the gully-trap on the ground floor and shall be connected to a waste pipe through a floor trap on the upper floors. C.P. brass trap and union may not be provided where the surface drain or a floor trap is placed directly under the basin and the waste is discharged into vertically.
  - 2.4. The height of the front edge of the wash basin from the floor level shall be 80 cms.
  - 2.5. The necessary inlet, outlet connections and fittings such as pillar cocks; CP Grass waste trap waste pipe, stop cock, chain wish rubber plug etc. shall be fixed.
  - 2.6. The payment of fittings shall be made separately under separate items.
- 3.0: Mode of measurements & payment
- 3.1. The rate includes cost of all labour, materials, tools and plant etc. required for satisfactory completion of this item as specified in workmanship.
  - 3.2. The rate shall be for a unit of One number.

Item No.40-E :

Flushing Valve cast iron chromium plated push cock or handle type with flushing supply and fixing

Providing, supplying and fixing of flush valve of 25 mm dia, brass chrome plated push cock or handle type with flushing of approved quality and make including necessary fittings, fixing as directed by the engineer-in-charge etc complete.

The rate for this work will be paid per Number basis.

Item No.40-F

Providing and fixing Brass Wheel valve of 15 mm dia and fixing etc complete of mark etc complete.

**MATERIALS**

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

The ISI Marked Brass full way wheel valve of 25 mm dia shall have to fitted as per instructions of engineer-in-charge.

The rate for this work will paid per Number basis.

Item No.40-G :

Brass Cock screw down bolt type 15 mm dia fitting with fixing

The Brass Cock Screw down bolt type of 15 mm dia is to be provided and all the necessary fitting and fixing with required material as per the instructions of engineer in charge is to be carried out and complete accordingly.

The rate shall be for a unit of one number.

Item No.40-H

Providing and fixing Overhead Water Tanks "Sintex" or equivalent of 2000 Litres capacity with all necessary plumbing fittings etc. comp. as directed by Engineer-in-charge.

**(A) MATERIALS AND WORKMANSHIP :**

Overhead water tanks "Sintex" or equivalent of cylindrical vertical tanks with closed top with of self-supported type having approved grade of polyethylene, molded to seamless and suitable for potable water tank of capacity as mentioned in Schedule-B as per company's dimensions provided with G.I. fittings of size 25mm Dia for inlet, outlet, overflow and scour connections and float valves etc. complete placed with all fittings fixing as directed by engineer in charge.

The rate for this work will be paid per number basis.

Item No.40-I :

White Porcelain Urinal with required plastic waste pipe fitting and fixing  
Providing and fixing urinal of approved quality including connecting the urinal with waste pipe, trap etc. complete : white earthen ware flat back or corner type size 430 mm. x 260 mm. x 350 mm.

## 1.0 Materials :

1.1 The white earthenware flat pack or corner type urinal of size 430 mm. 260 mm. x 350 mm. shall conform to M-64.

## 2.0 Workmanship:

2.1 The urinals shall be fixed in position by using wooden plugs and screws and shall be at a height 65 cms. from the floor level to the top of the lip or urinal, unless otherwise directed. The wooden plugs shall be 50 mm. x 50 mm. at base lapping to 38 mm. x 38 mm. at top and 50 mm. in length shall be fixed in wall in cement mortar 1 : 3 (1 cement : 3 coarse sand).

The urinal shall be connected to 32 mm. dia. galvanized mild steel waste pipe which shall discharge in the channel or floor trap. The connection between the urinal and flush or waste pipe shall be made by means of putty or white lead mixed with chopped hemp.

## 3.0 Mode of measurements &amp; payment :

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

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

Item No.41 :

Providing water proofing treatment to be done by Dr.Fixit Touch shield-P3160, 3.00 mm thick or as per I S Specifications and as approved engineer in charge.

## Material:

As per the instructions and as approved by engineer in charge.

## Workmanship:

## Method of Application

## Horizontal Joints

Clean the construction joint of loose mortar and dust.

Apply primer as directed (refer section on application of primer), wait for about half and hour until the primer dries a little and becomes "sticky".

Clean hands of dust, oil or grease and dry it.

Unroll the water bar coil slowly and carefully on the joint without pulling and stretching it. Press it to ensure that it sticks to the concrete surface and hugs the profile of the concrete surface.

Remove the protective wrap and pour the concrete.

Apply primer as directed (refer section on application of primer). Wait for about half an hours until the primer dries a little and becomes "sticky".

Clean hands of dust, oil or grease and dry it.

Unroll the water bar coil slowly and carefully on the joint without pulling and stretching it. Press it to ensure that it sticks to the concrete surface and hugs the profile of the concrete surface.

If primer cannot be applied for some reason, hang the waterbar strip from the top by bending over about 150 mm of the waterbar horizontally on the top of the retaining wall. If this is not possible, tie the end of the water bar with binding wire or string to any available projecting rebar and hang the water vertically in position.

The rate for the work will be paid on one square meter basis.

#### Item No.42

##### Aluminium Sliding window

The sliding window shall have to be provided and laying aluminium (Jindal Brand) sliding window by using fram size of 65 mm x 40 mm three track frame, shutter 20 mm x 80 mm aluminium shutter with 5 mm transparent glass with locking system handle fixing including powder coating etc. Complete is to be carried out by the contractory as per requirement and instructions of engineer in charge to his satisfaction as may be required for this item work.

The rate for the work will be paid on one square meter basis.

#### Item No.43

##### Removal of Excavated Stuff and Laying within the sites specified in Notification as directed by Engineer-in-Charge

After Refilling the pipe / chamber trenches by the excavated stuff is 15 cm thick layer, including ramming, watering and consolidating up to possible extent as specified in excavation & refilling item, the surplus stuff shall be disposed off at the following sites as directed within the prescribed limits of Notification as directed by the engineering in charge.

1. Beside Kotharia Police Station near Stone Quarry
2. All Quarry areas of Raiya Smart City

The excavated material of black cotton soil should be stacked at the location specified by the engineer in charge at no extra cost.

If the contractor fails to dispose the excavated stuff as specified, penalty will be imposed by Rajkot Municipal Corporation as per the Notification for C&D waste,

After refilling surplus earth shall have to carted by the contractor within specified limit including loading transporting unloading spreading.

MODE OF MEASUREMENT AND PAYMENT:

The rate shall be per Cubic Meter of truck-body basis.

#### Item No.44

Fixing teakwood frame & 18 mm plywood shutters on existing selves, 0.8 mm lamination inner side, Alluminium fittings, stopper, lock, paint.

##### 1.0. Materials.

- 1.1. Wood for shutter shall conform to M-29. 2. Glass shall conform to M-38. 3. Anodised aluminium butt hinges shall conform to M-43.

##### 2.0. Workmanship

- 2.1. The item covers the requirement of preparation of shutters for doors, windows, clerestory windows, their supply and fixing.

##### 2.2. Shutters:

- 2.2.1. Panelled shutters shall be constructed in the form of timber frame work of styles and rails with panel inserted of type as specified in the detailed drawings. Panel shall be fixed by providing grooves in the style and rails. The style and rails shall be joined to each other by mortise and tenon joints at right angles.
- 2.2.2. All members of the shutters shall be straight without any warp or bow and shall smooth, well planed faces at right angles to each other.
- 2.2.3. The size of styles and rails shall be as per drawing or as directed. Styles and rails of shutters shall be made of one piece only.

##### 2.3. Timber paneling :

- 2.3.1. Thickness of the panel shall be as specified in the item as shown in the drawing or as directed. If the panel is made from more than one piece the piece shall be finished as shown in the detailed drawings and shall be joined with continuous groove with specified size. The end pieces of the panel and the top and bottom of the panel shall be provided with continuous tongue to frame into groove of the frame shutter. An air space of 1.5 mm. shall be left in the groove of frame of shutter while framing the panels in it.
- 2.3.2. The faces of the panel as well as various pieces of the panel shall be closely fitted to the sized of the grooves.
- 2.3.3. Finishing of the corners of raised panel edges shall be done as shown in drawings or as directed.
- 2.3.4. The thickness specified shall be finished thickness and no tolerance will be permitted.

##### 2.5. Fixtures and Fastenings :

- 2.5.1. The rate shall include anodized aluminum butt hinges including fixing with iron screws. The size and number of hinges shall be as per table given in annexure-1.

##### 3.0 Mode of measurements any payment

- 3.1. The liner dimensions shall be measured correct upto 1 cm. The quantity shall be worked out correct to 2 places of decimals of cu. m.
- 3.2. The rate for shutter includes cost of providing block and clear for keeping the shutter in open position directed.

- 3.3. The dimension of the shutter shall be measured clear size of the shutter in close position between the grooves of the frame.  
The rate shall be for a unit of one square meter.

Item No.45 :

Making cupboard with 18 mm plywood which 6 mm ply back side, 0.8 mm white lamination inner side, fixing approved quality sunmica, hinges, stopper etc. 18 mm thick ply with both side lamination for selves. plywood brands - Kitply, Century, Dura, Everest.

The cupboard with 18 mm plywood with 6 mm ply on back side is to be provided and fixed with approved quality material as instructed. 0.8 mm white lamination inner side is to be fixed of approved quality sunmica with hinges, stopper, etc. Both side lamination for selves for 18 mm thick ply is to be done. The Plywood brand shall be Kitply, Century, Dura, Everest. The work as may be instructed by the Site Engineer shall have to be completed. The rate shall be for a unit of one square meter basis.

Item No.46 :

Making Table of wooden with sunmica sheet on both side with including all fittings & labour

The wooden table shall have to be prepared by providing all the required material of approved quality as per the requirement and instructions of engineer in charge. The size of the table shall be 1.37 X 0.75 X 0.75. The plywood requirement and other details for making the table is as under:

Plywood of 18 mm of approved quality and water proof ISI Mark : 56.00 Sq.Mt.

Plywood of 12 mm of approved quality and water proof ISI Mark : 24.00 Sq.Mt.

Plywood of 6 mm of approved quality and water proof ISI Mark : 32.00 Sq.Mt.

Sunmica 1 mm of approved quality 8'X4' size sheet 2 Nos.:

Wooden Dhoka for foot rest and front portion of box for placing the Key-Board

Wooden Bidding patti as per requirement of 1" x 0.25" of 2" x 0.25"

Steel Sliding channel of approved quality and make for drawers : 3 Nos.

Necessary Locks of approved quality : 3 Nos.

S S Handle as per instructions : 3 Nos.

Hinges of approved quality and size : 2 Nos.

Fevicol : 2 Kg

Nails, Screw, Magnet, Agrotape etc. as per requirement

Rickshaw Trip for bringing of materials - 1 Trip

Applying Oil Paint, Polishing, Astar, etc. for 1 Table including material and labour.

The whole work for preparation of table is to be carried out by providing all above and other necessary materials as may be required to complete the item as per requirement and instructions of engineer in charge to his satisfaction.

The rate will be paid for a unit of one square meter basis.



Item No.47:

Providing and laying in foundation and plinth/ floors lime concrete with hard broken aggregate 4-9 cm nominal size and 40% mortar comprising of 1 Lime putty : 2 fine sand and curing complete including cost of form work.

## 1.0 Materials:

1.1. Water shall conform to M-1. Sand shall conform to M-6. Lime shall conform to M-2. Graded aggregated 40 mm, nominal size shall conform to M-12.

## 2.0. Workmanship:

## 2.1. General

2.2.1. Before starting the concrete the bed of the foundations trenches shall be cleared of all loose materials and watered and rammed as directed.

## 2.2. Proportion of Mix :

2.2.1. The proportion of lime, sand and aggregate shall be specified in the item of the work and shall be measured by volume.

2.2.2. The lime mortar shall consist of proportion of 1 Lime putty : 2 sand volume. The lime mortar shall be prepared by wet process Power driven mill shall be used for preparation of lime mortar. The slaked lime shall be placed in the Mill in even layers and ground for 180 revolutions with sufficient water. The water shall be added as required during grinding (and care shall be taken not to add more water) so that it will bring the mixed materials to a consistency of stiff paste, thoroughly wetted sand shall then be added evenly and the mixture ground for another 180 revolutions.

2.2.3. Lime mortar shall be kept damp, protected from sun and rain till used-up, covering it by tarpauline or open sheds.

2.2.4. All the lime mortar shall be used as soon as possible after grinding. It should be used on the day of which it is prepared but in no case mortar made earlier than 36 hours shall be permitted for use.

## 2.3. Mixing :

2.3.1. The concrete shall be mixed in mechanical mixer. Mixing shall be continued until there is uniform distribution of the material and the mass is uniform in colour and consistency but in no case mixing shall be done for less than 2 to 3 minutes. Providing and laying in foundation and plinth/under floors lime concrete with graded bricks aggregate 40 mm. nominal size and 40% mortar comprising of 1 Lime Putty : 2 fine sand and curing complete excluding cost of form work.

## Mode of measurement and payment:

The lime work shall be measured in length, breadth and depth as specified in drawing or as directed, correct upto largest centimetre and cubical content shall be worked out upto two places of decimals.

3 2. The rate shall be for a unit of one cubic metre.

Item No.48

Foundation filling with Rubble Cement Mortar in proportion of 1:6 Cement:Mortar

Item No.49

Rubble Plinth masonry work in Cement:Mortar in proportion of 1:6 with Brick Masonry Or Rubble Corner and in proportion of 1:3 without C.Pointing

## Materials

Stones for the works shall be of the specified varieties which are hard, durable, fine grained and uniform in colour (for superstructure work) free from veins, flaws and other defects. Quality and work shall conform to the requirements specified in IS: 1597 (Part-I) (Latest Edition). The percentage of water absorption shall not exceed 5 percent as per test conducted in accordance with IS: 1124 (Latest Edition). The Contractor shall supply sample stones to the RMC for approval. Stones shall be laid with its grains horizontal so that the load transmitted is always perpendicular to the natural bed.

Cement-sand mortar for stone masonry works shall be in the proportion of 1:6. Materials and preparation of mortar shall be as specified below:

## Workmanship

For All Works below ground level the masonry shall be random rubble uncoursed with ordinary quarry dressed stones for the hearting and selected quarry dressed stones for the facing.

For all works above ground level and in superstructure the masonry shall be random rubble uncoursed, well bonded, faced with hammer dressed stones with squared quoins at corners. The bushings on the face shall not be more than 40 mm on an exposed face and on the face to be plastered it shall not project by more than 12 mm nor shall it have depressions more than 10 mm from the average wall surface.

Face stones shall extend back sufficiently and bond well with the masonry. The depth of stone from the face of the wall inwards shall not be less than the height or breadth at the face. The length of the stone shall not exceed three times the height and the breadth on base shall not be greater than three-fourths the thickness of wall nor less than 150 mm. The height of stone may be upto a maximum of 300 mm. Face stones or hearting stones shall not be less than 150 mm in any direction.

Chips and spalls shall be used wherever necessary to avoid thick mortar joints and to ensure that no hollow spaces are left in the masonry. The use of chips and spalls in the hearting shall not exceed 20 percent of the quantity of stone masonry. Spalls and chips shall not be used on the face of the wall and below hearting stones to bring them to the level of face stones.

The maximum thickness of joints shall not exceed 20 mm. All joints shall be completely filled with mortar. When plastering or pointing is not required to be done, the joints shall be struck flush and finished as the work proceeds. Otherwise, the joints shall be raked to a minimum depth of 20 mm by a raking tool during the progress of the work while the mortar is still green.

Through or bond stones shall be provided in walls upto 600 mm thick and in case of walls above 600 mm thickness, a set of two or more bond stones overlapping each other by at least 150 mm shall be provided in a line from face to back. In case of highly absorbent types of stones (porous lime stone and sand stone, etc.) the bond stone shall extend about two-thirds into the wall and a set of two or more bond stones overlapping each other by at least 150 mm shall be provided. Each bond stone or a set of bond stones shall be provided for every 0.5 sq.m of wall surface.

All stones shall be sufficiently wetted before laying to prevent absorption of water from the mortar. All connected walls in a structure shall be normally raised uniformly and regularly. However if any part of the masonry is required to be left behind, the wall shall be raked back (and not saw toothed) at an angle not exceeding 45 deg. Masonry work shall not be raised by more than one meter per day.

Green work shall be protected from rain by suitable covering. Masonry work shall be kept constantly moist on all the faces for a minimum period of seven days for proper curing of the joints.

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

Item No.51:

Supply & Fixing of 80 mm M-30 Grade cement concrete rubber mold paving inter locking paving block (Grey colour) after bedding of Bhogavo sand in line and CC on the edge in proportion of 1:2:4 with curing tc. complete

Scope work:

The scope of work includes supplying and lying of precast paver blocks at site, as mentioned in the Item. Laying of **ISI Mark** paver blocks at site as per requirement in technical specification, within shortest possible time. The site is public place hence care should be taken to ensure that the routine activities shall not be disturbed. The job of laying may required to be carried out during night also. The work shall be executed in perfect line and level as per instructions of Engineer in charge. Colored concrete paver blocks shall be manufactured as per specifications using approved color pigment. The color shade shall be as selected by employer before commencement of the work. The contractor shall guarantee that all material and components designed, fabricated, supplied and laid by him shall be free from any type of defect due to faulty material and/Workmanship/erection For a period of One year from the date of completion of work.

1.0 MATERIALS

1.1. Cement and Cement Admixtures

1.2. Aggregates

1.2.1. Coarse Aggregates

1.2.1.1. Coarse aggregates shall comply with the requirements. As far as possible crushed semi-crushed aggregates shall be used. For ensuring adequate durability, the aggregate used for production of blocks shall be sound and free of soft or honeycombed particles.

1.2.1.2. Other types of aggregates such as slag and crushed, over-burnt brick or tile which maybe found suitable with regard to strength, durability of concrete and freedom from harmful effects may be used in preparation of concrete for production of paver blocks. However such aggregates shall not contain more than 0.5 percent of sulphates as SO<sub>3</sub> and shall not absorb more than 2 percent of their own mass of water.

1.2.1.3. Heavy weight aggregates or light weight aggregates such as bloated clay aggregates and sintered fly ash aggregates may also be used provided the purchaser is satisfied with the data on the properties of concrete made with them.

1.2.1.4. The nominal maximum size of coarse aggregates used in production of paver blocks shall be 12 mm.

### 1.2.2. Fine Aggregates

Fine aggregates shall conform to the requirements. Both river/quarry sand and stone dust meeting the requirements can be used.

### 1.3. Admixtures

Admixtures: Previous experience with and data on such materials should be considered in relation to the specified standards of mechanization, supervision and workmanship in production of blocks. They may be added for specific requirements without affecting other quality parameters.

### 1.4. Pigments

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

Pigments	Relevant Indian Standard
Black or Red or Brown pigment	IS 44
Green pigment	IS 54
Blue pigment	IS 55
or	IS 56
White pigment	IS 411
Yellow pigment	IS 50

Pigment quantity to be restricted to a maximum of 9 percent by weight of cement content. The pigment should be finer than the cement (Fineness value between 2-15 m<sup>2</sup>/kg).

1.4.2. The pigments shall not contain zinc compounds or organic dyes.

1.4.3. Lead pigments shall not be used unless otherwise specified by the purchaser.

### 1.5. Water

The water used in production of paving blocks shall conform to the requirements specified.

## 2 PHYSICAL REQUIREMENTS

### 2.1. General

2.1.1. The physical requirements of paver blocks are categorized into two groups, namely:

- a) Obligatory requirements shall be for ensuring durability of pavements constructed with paver blocks as well as obtaining better levels of service in block paving work, and
- b) Optional requirements shall be as per the specific demands of the purchaser. These are described in 6.2 and 6.3.

2.1.2. All paver blocks shall be sound and free of cracks or other visual defects which will interfere with the proper paving of the unit or impair the strength or performance of the pavement constructed with the paver blocks.

2.1.3. When two layer paver blocks are manufactured there shall be proper bonding between the layers. Delamination between the layers shall not be permitted. The

compressive strength of the two layer blocks shall meet the specified requirements.

- 2.1.4. When paver blocks with false joints, surface reliefs or projections are supplied, the same shall be specified. Also, the surface features shall be well formed and be devoid of any defects.

## 2.2. Obligatory Requirements

### 2.2.1. Visual Inspection

Visual inspection of quality of paver blocks shall be carried out in natural daylight, prior to the tests for other properties. The inspection shall be conducted by the purchaser and the manufacturer jointly at a location agreed to between them, normally at the site or factory. Visual inspection shall be conducted as per 7.1.

NOTE— When efflorescence occurs and it is not deleterious to the performance of the blocks in use and is not considered significant.

### 2.2.2. Dimensions and Tolerances

- 2.2.2.1. The recommended dimensions and tolerances for paver blocks, measured as per the method in Annex B, are given in Table 2. Minimum block thickness shall be 50 mm and maximum 120 mm. The thicknesses 60 mm, 80 mm, 100 mm and 120 mm will be considered as standard thicknesses under this specification.

- 2.2.2.2. All blocks manufactured to meet this specification shall have arris/chamfer as per the dimensions and tolerances given in Table 2.

### 2.2.3. Thickness of Wearing Layer

When paver blocks are manufactured in two layers, the wearing layer shall have minimum thickness as specified in Table 2. The thickness of the wearing layer shall be measured at several points along the periphery of the paver blocks. The arithmetic mean of the lowest two values shall be the minimum thickness of the wearing layer.

### 2.2.4. Water Absorption

The water absorption, being the average of three units, when determined in the manner described in Annex C, shall not be more than 6 percent by mass and in individual samples, the water absorption should be restricted to 7-percent.

### 2.2.5. Compressive Strength

- 2.2.5.1. Compressive strength of paver blocks shall be determined as per the method given in Annex D. Paver block strength shall be specified in terms of 28 days compressive strength. In case the compressive strength of paver blocks is determined for ages other than 28 days, the actual age at testing shall be reported. The average 28 days compressive strength of paver blocks shall meet the specified requirement. Individual paver block strength shall not be less than 85 percent of the specified strength. In case blocks of age less than 28 days are permitted to be supplied, correlation between 28 days strength and the strength at specified age for identified batch/mix of blocks shall be established.

- 2.2.5.2. The specified average 28 days compressive strengths of different grades of paver blocks are given in Table 3 and the minimum specified strengths of individual paver blocks are given in 6.2.5.1.

Table 2 Recommended Dimensions and Tolerance for paver Blocks  
(Clauses 6.2.2.1, 6.2.2.2, 6.2.3 and 9.1.2)

Sr No	Dimensions	Measurement method, Ref. to	Recommended Values	Tolerance limit for paver block	
				Thickness < 100 mm	Thickness 100 mm
1	2	3	4	5	6
i)	Width, W	Annex-B	To be specified by manufacturer	± 2 mm	± 3 mm
ii)	Length, L	Annex-B	To be specified by manufacturer	± 2 mm	± 3 mm
iii)	Thickness, T	Annex-B	50 to 120 mm	± 3 mm	± 4 mm
iv)	Aspect ratio (L/T)	Annex-B	Maximum : 4.0	+ 0.2	+ 0.2
v)	Arris/chamfer	Annex-B	Maximum : 5.0 Maximum : 7.0	± 1 mm	± 1 mm
vi)	Thickness of wearing layer	6.2.3	Maximum : 6.0	± 2 mm	± 2 mm
vii)	Plan area, A <sub>SP</sub>	Annex-B	Maximum: 0.03 m <sup>2</sup>	+ 0.001 m <sup>2</sup>	+ 0.001 m <sup>2</sup>
viii)	Wearing face area, A <sub>SW</sub>	Annex-B	Minimum 75 percent of Plan Area	-1 percent	-1 percent
ix)	Squareness	Annex-B	Nil	± 2 mm	± 3 mm

Table 3 Compressive Strength Requirements of Concrete Paver Blocks  
(Clauses 6.2.5.2 and 9.1.4)

Sr.No.	Grade of paver blocks	Minimum average 28 days compressive strength N/mm <sup>2</sup>
1	2	3
i)	M-30	f <sub>ck</sub> + 0.825 x established standard deviation (rounded off to nearest 0.5 N/mm <sup>2</sup> )
ii)	M-35	
iii)	M-40	
iv)	M-50	
v)	M-55	

#### 2.2.6. Abrasion Resistance

The abrasion resistance of paver blocks should be determined as per the method given in Annex E. It may be specified the limits to the test results, which should be complied with by the manufacturer.

### 2.3. Optional Requirements

#### 2.3.1. Tensile Splitting Strength

The tensile splitting strength of paver blocks should be determined as per the method given in Annex F. When required by the purchaser, the test values for tensile splitting strength of paver blocks may be specified by the manufacturer.

#### 2.3.2. Flexural Strength/Breaking Load

The flexural strength/breaking load of paver blocks should be determined as per the method given in Annex G. When required by the purchaser, the test values

for flexural strength breaking load of paver blocks may be specified by the manufacturer.

#### 2.3.4 Colour and Texture

When required, the colour and texture of paver blocks should be mutually agreed to between the purchaser and the manufacturer.

### 3. TEST METHODS

- 3.1. Visual inspection shall be conducted by first examining each paver block from a sample lot for any elimination. The blocks shall then be laid out on a level floor in any desired paving pattern, approximately covering a square area of 1m<sup>2</sup>. Any visual defects of paver blocks, including cracks and flaking, shall be recorded by observing the paved blocks from a distance of approximately 2 m from each edge of the paved area. The texture and colour of the paver blocks shall be compared with the manufacturer's tie samples supplies earlier to the purchaser.
- 3.2. Tests other than for visual aspects shall be carried out in a laboratory agreed to between the purchaser and the manufacturer. Wherever applicable, calibrated equipment shall be used for tests.
- 3.3. Compliance with the obligatory physical requirements laid down in 6.2 shall be ensured by conducting tests as described in Annexes B to E. Compliance with optional physical requirements laid down in 6.3 shall be ensured by conducting tests as described in Annexes F to H.
- 3.4. Unless otherwise specified in the enquiry or order, the cost of the tests shall be borne as follows:

### 4. SAMPLING

- 4.1. The paver blocks selected for testing shall be representative of the consignment, the points of selection being evenly distributed through the consignment.
- 4.2. The number of blocks to be sampled from each batch for each test shall be as given in Table 4.

Table 4 Sampling Requirements  
(Clause 8.5)

Sr No	Property	Requirement Ref to C1 No.	Test method Ref to	Number of paver blocks for test	
				Quality assurance by Third Party	Quality assurance by Manufacturer / Purchaser
1	2	3	4	5	6
i)	Visual Inspection	6.2.1	7.1	8 <sup>2)</sup>	4(16) <sup>2)</sup>
ii)	Dimensions	6.2.2	Annex B	8 <sup>2)</sup>	4(16) <sup>2)</sup>
iii)	Thickness of wearing layer <sup>3)</sup>	6.2.3	6.2.3.	8 <sup>2)</sup>	4(16) <sup>2)</sup>
iv)	Water absorption	6.2.4	Annex C	3	3
v)	Compressive strength	6.2.5	Annex D	8	4(16)
vi)	Tensile splitting strength	6.3.1	Annex E	8	4(16)
vii)	Flexural strength /	6.3.2	Annex F	8	4(16)

	breaking load				
viii)	Abrasion resistance	6.2.6	Annex G	8	4(16)

- 1) The number within brackets is the number to be sampled to avoid secondary sampling from the batch if on -the basis of the conformity criteria, additional blocks are required to be tested to assess conformity.
- 2) These blocks may be used for subsequent test.%

4.6 The sample paver blocks shall be marked for future identification of the consignment it represents. The block shall be kept under cover and protected from extreme conditions of temperature, relative humidity and wind till they are required for test. The test shall be undertaken as soon as practicable after the sample has been taken.

## 5. ACCEPTANCE CRITERIA

### 5.1. Obligatory Requirements

- 5.1.1. The lot shall be considered as conforming to the requirements of this specification if the conditions mentioned in 9.1.2 to 9.1.4 are satisfied.
- 5.1.2. The sampled blocks tested for dimensions, aspect ratio, chamfer, plan area, wearing face area, deviation from squareness, and, in the case of two layer blocks, thickness of wearing layer shall meet the tolerance limit specified in Table 2.  
2. Blocks with visual defects with sample lot shall not be more than three.
- 5.1.3. For water absorption, the mean value of 3 samples determined shall be not more than the maximum limit specified in 6.2.4.
- 5.1.4. The 28 days compressive strengths and tolerance of 8 numbers of paver blocks manufactured as per the grades of paver blocks recommended in Table 1 shall be as given in Table 3.

### 5.2. Optional Requirements

Acceptance criteria for optional requirements shall be as per mutual agreement by the purchaser and manufacturer.

Care should be taken to see that single sized sands with excessive amount of fines or plastic fines should not be used. The shape of sand particles should preferably be sharp rather than rounded. Since the sharp possess higher strength and resist the migration of sand from under the block to less frequently trafficked areas. Even though sharp sands are relatively more difficult to compact than rounded sands, the use of sharp sands should be preferred for the more heavily trafficked pavements. The beddings and should be free of deleterious materials.

If necessary to restrict fines (silt and/or clay) to 10 percent, since excessive fines make joint filling very difficult. Similarly, it is not advisable to use cement in the joint filling sand which will not only make it difficult to completely fill the joints but would also adversely affect the desired flexibility characteristics of the paving block layer. The joint filling sand should be as dry as possible; otherwise complete filling of joints will be difficult. To overcome the problem of efflorescence on the surface of paving block layer, the joint filling sand should be washed to remove soluble salts.

Preparation of Subgrade: This is the foundation layer on which the block pavement is constructed. The prepared subgrade should be graded and trimmed to a tolerance of  $\pm 20$  mm of the design levels, and its surface evenness should have a tolerance of within 15 mm under a 3 m straight edge.

Placing and screeding of bedding sand:



The thickness of the sand bed after compaction should be in the range of 20-40 mm, whereas, in the loose form it can be 25 to 50 mm. It is preferable to restrict the compacted thickness to 20-25 mm to reduce the risk of any localized precompaction, which would affect the final block surface level. Bedding sand should not be used to fill up local depressions on the surface of a base or sub base. The depressions should be repaired in advance before placing sand.

Sand to be used should be uniformly in loose condition and should have a uniform moisture content. Best moisture content is that when sand is neither too wet nor too dry and have a value of 6 to 8 percent. Requirement of sand for a day's works should be prepared and stored in advance and covered with tarpaulin or polythene sheets.

The processed sand is spread with the help of screed boards to the required thickness. The screed boards are provided with nails at 2-3 m apart which when dragged gives the desired thickness. The length of nail should take into account the surcharge to be provided in the uncompacted thickness. Alternatively, the screed can be dragged on edge strips kept on both sides as guide. The sand is subsequently compacted with plate vibrators weighing 0.6 tonnes or more. Level checks shall be carried out on a grid pattern to establish that the desired level is achieved. Local correction can be done either by removing or adding extra sand followed by levelling and compacting the layer. There will be some settlement of sand after the blocks are placed and compacted, which must be allowed for, while fixing the level of sand bed.

The blocks will settle after trafficking in such a manner that the surface profile becomes parallel to base / sub base profile. Sand bed assumes uniform thickness under moving loads.

#### Laying of Blocks:

Blocks can be laid generally by manual labour but mechanical aids like hand-pushed trolleys can expedite the work.

Normally, laying should commence from the edge strip and proceed towards the inner side. When dentated blocks are used, the laying done at two fronts will create problem for matching joints in the middle. Hence, as far as possible, laying should proceed in one direction only, along the entire width of the area to be paved.

While locating the starting line, the following should be considered:

- On a sloping site, start from the lowest point and proceed uphill on a continuous basis to avoid downhill creep in complete areas.
- In case of irregular shaped edge restraints or strip, it is better to start from straight string line.
- Influence of alignment of edge restraints on achieving and maintaining laying bond

#### Compaction:

For compaction of the bedding sand and the blocks laid over it, vibratory plate compactors are used over the laid paving units; at least two passes of the vibratory plate compactor are needed. Such vibratory compaction should be continued till the top of each paving block is level with its adjacent blocks. It is not good practice to leave compaction till end of the day, as some blocks may move under construction traffic, resulting in the widening of joints and corners contact of blocks, which may cause spalling or cracking of blocks. There should be minimal delay in compaction after laying of the paving blocks to achieve

uniformity of compaction and retention of the pattern of layer; however, compaction should not proceed closer than 1 m from the laying face exception after completion of the pavement.

During the vibratory compaction of the laid blocks, some amount of bedding sand will work its way into the joints between them; the extent sand getting worked up in to the joints will depend on the degree of pre-compaction of sand and the force applied by the block compactor. Standard compactors may have a weight of about 90 kg, plate area of about 0.3 m<sup>2</sup> and apply a centrifugal force of about 15 kN, while heavy duty compactors may weigh 300-600 kg, have a plate area of about 0.5-0.6 m<sup>2</sup> and apply a centrifugal force of 30-65 kN. Where the bedding sand has been pre-compacted and for heavily trafficked block pavements, heavy duty compactors should be used. After compaction by vibratory plate compactors, some 2 to 6 passes of a vibratory roller (with rubber coated drums or those of static weight less than 4 tonnes and nominal amplitude of not more than 0.6 mm) will further help in compaction of bedding sand and joint filling.

#### Joint Filling:

The importance of complete joint filling cannot be over-emphasised. Unfilled or partially filled joints allow blocks to deflect, leading to loose blocks possibly spalling the edges and a locally disturbing bedding sand layer.

After the compaction of the bedding sand has been completed (and some bedding sand has been forced up in the joints between blocks) the joints should be completely filled with sand meeting the desired specifications. The joint filling sand should be stockpiled at suitable locations for convenience. There should be minimum delay in joint filling the process should in any case, be completed by the end of the day's work.

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

Dry sand and dry blocks are best for the filling of joint, as damp sand tends to stick at the very top of the joints; also, if the blocks are wet and the sand dry, the sand will again stick at the joint top. Hence, if either the blocks or sand are wet, one may get a false impression of the joints being full, but the next rain will reveal that they are actually hollow. If the weather does not allow sand and blocks to be dry, the joint filling sand should be washed in by light sprinkling of water. In this case, several cycles of application of sand, water sprinkling and plate compaction will be necessary to completely fill the joints.

#### Opening of Traffic:

Until all the joints are completely filled, no traffic should be permitted over the block pavement. In case of lime or cement treated layers in the pavement, it must be ensured that these are given at least 14 to 7 days respectively to cure, before traffic is permitted. The block pavement should be inspected frequently, to ensure that any incompletely filled joints, exposed by traffic and / or weather are promptly filled. Such frequent inspection should be continued till dust and detritus from the roadway tightens the surface of the joints.

#### Laying and Surface Tolerance:

While the laying, the surface tolerance, given below may be observed:

Layer / Item	Tolerance
Subgrade	+0, -25 mm of nominated level
Select Subgrade / Sub-base	+0, -20 mm of nominated level
Base course	+0, -10 mm of nominated level 10 mm deviation from a 3 m straight edge
Plan deviation: from any 3 m line from any 10 m line	10 mm (Maximum) 20 mm (Maximum)
Vertical deviation from 3 m line at kerbs intrusions, channels, edge restraints elsewhere	+ 3 mm, -0 mm
Maximum difference in surface level between adjacent paving units.	+ 10 mm, -15 mm
Deviation of finished surface level from designated level	+ 10 mm, -15 mm
Joint width range	2 mm to 4 mm
Percentage of joints outside range	10% max. along 10 m line
Nominal joint width	3 mm

Laying of concrete paving blocks:

Laying of the blocks shall be done, precisely at the indicated level and profile and in a way that a good surface draining to the gulley chambers is assured.

Around gulley chambers and inspection pits the pavement shall have a level of 5 mm higher than the above mentioned elements.

The blocks shall be laid to the pattern directed by the Engineer or the pattern recommended by the designer. The blocks shall be laid as tight as possible to each other. The maximum joint width shall be limited to 4 mm

Laying of broken blocks is not allowed except along connections or edges. The maximum length of a purpose broken block is 100 mm. Breaking of the blocks shall be done with a "block splitter" or a mechanical saw.

Fine angular sand as per specification shall be brushed into the joints, and thereafter compaction shall be done with a vibrating plate compactor on a clean surface. After compaction, again fine angular sand shall be brushed in to the joints.

Field Laboratory Tests:

Necessary field / laboratory tests shall be carried out by the contractor while executing the work at his own cost.

The field / laboratory tests may be conducted in an Engineering College / approved technical institution as directed by the engineer in charge.

The agency shall have to carry out the testing for paving block at Government approved laboratory at his own cost and submit the test report to this office or other relevant provisions of IS: 15658-2006 shall apply. The agency shall have to carry out the testing of paving blocks as per the instructions and in the presence of the engineer-in-charge.

Item No.52Steel Railing work:

The steel railing work at site is to be carried out of required size and design by providing required material supply, fitting and fixing, cutting, welding, primer and paint work of approved quality (two coats) complete as per instructions of engineer in charge. The pattern of steel railing shall be as approved by the engineer in charge.

The galvanized pipe to be used in the work should be 40 mm dia of Class-B. The Channel should be 100 X 50 X 5 mm and the interval gaps should be 1.82 to 2.40 mt. The fitting of pipe should be done in three rows.

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

Item No.53Raising of Manhole from road level.

The work of raising of drainage manhole is to be carried out from the road level as per the instructions of engineer in charge. During the work, dismantling of asphalt, Excavation, masonry, plaster, Coping of frame cover, road level finishing, removing of rubbish from manhole and lifting of additional rubbish etc. is to be carried out and complete the whole work to the satisfaction of engineer in charge.

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

Item No.54:

Inspection chamber with inside dimension 300 mm x 300 mm x 450 mm depth

Providing and constructing inspection chamber as per the type design in brick masonry in C:M 1:3 and outside plastering in C:M 1:3 necessary coping in RCC M200 fixing C I steps and fixing manhole frame and covers over manholes etc.complete, providing and fixing safety chain wherever necessary as per the stipulations in the type design complete.

The rate for this work will be paid per chamber.

Item No.55Providing & Fixing strip curtain for window including Vertical bands, channel, string, chain, ricklink, curtain cloth (Fabric), end-cap, underloop, bracket, window bar etc. Complete

The curtain work of standard Handloom as per requirement, for the doors and windows of required length and width of door and window shall have to be done backing with stain and unfolded primer with fitting and fixing of curtain rods, brackets of approved quality including fixing. The whole material as may be required to complete the item shall have to be provided and work shall have to be carried out as per requirement and instructions of engineer in charge to his satisfaction.

The payment will be made for a unit of one square meter basis.

## **ELECTRIFICATION**

### **GENERAL**

01. The work shall be carried out as per C.P.W.D. specifications of electrical works 1972 for internal E.I. the Indian electricity rule 1956 as amended up to date for such work, unless otherwise specified in writing by the O.O.W.
02. All materials should be of ISI mark/standard and of approved quality.
03. The run of the cables position of junction boxes, fittings etc. should be approved by the O.O.W. The layout of the above should be marked on the site and approved by the O.O.W. before actual execution.
04. Persons executing electrical work should have electrical license as required according to IE Ac.
05. The earthing should be done in presence of the O.O.W. or his authorized representative.
06. Contractor shall quote rates of item no.37 including cost of all materials and labour charges of following item in point included
  - (a) Point wiring with 1.0 mm<sup>2</sup> copper PVC insulated-wire with 1.0 mm<sup>2</sup> copper PVC insulated wire for earth continuity in PVC casing capping having double locking arrangement with grooves, trunking of as per ISI for light & fan. Complete with 5A tissiono type shockproof accessories erected on polished wooden block covered with 3mm thick laminated sheet.
  - (b) Point wiring with 1.0 mm<sup>2</sup> copper PVC insulated-wire with 1.0 mm<sup>2</sup> copper PVC insulated wire for earth continuity in PVC casing capping having double locking arrangement with grooves, trunking of as per ISI for plug with tissiono type shock proof 3 pin socket & switch 5 Amp. Erected & polish wooden block covered with 3mm thick laminated sheet.
  - (c) Mains with ISI marked copper conductor PVC insulated wire in PVC casing capping erected with copper conductor PVC insulated wire for earth continuing of following size 2wire 1.5mm<sup>2</sup>, 2 wire 2.5mm<sup>2</sup>.
  - (d) All internal wiring are concealed PVC pipe wiring.
  - (e) 240V MCB Double pole switch. 6 to 32 Amp. With enclosure –
  - (f) Steel meter box with shutter and locking arrangement
07. Completion certificate and test report must be submitted after the end of the works or during the execution as per requirement of the O.O.W.
08. The electrical fitting / fixtures of all required items should be carried out as per the instructions of engineer incharge.

**The electrification items for this tender includes ceiling fan, wall fan, exhaust fan, FTL, CFL, LED battern, various LED lighting, door bells including wiring, controlling switch board, MCB and all other related required apparatus instructed by Engineer-In-charge. The electrification work carried out should be provided with necessary Test Report, the cost of testing is to be borne by the agency.**

All items should be got approved from the Engineer-In-Charge

## **MEDIUM VOLTAGE DISTRIBUTION SYSTEM** **(INTERNAL LIGHTING & POWER WIRING)**

### **01. GENERAL**

Medium voltage distribution system shall be applicable for wiring 3 phase, 4 wire 440 Volts, 50 HZ. A.C. supply & single phase, 2 wire 240 Volts, 50 HZ. A. C. supply.

## 02. REGULATIONS & STANDARDS

The system shall be governed by the requirements of IS:732: I.E. rules, & IEE regulations. I.S. standard & codes applicable for medium voltage distribution is also listed in standard specification.

## 03. PVC CASING CAPPING & ACCESSORIES

The thickness of PVC conduits shall be as follows as per IS-14927 Part-I 2001

40 mm dia.	1.5 mm
32 mm dia.	1.5 mm
25 mm dia.	1.5 mm
20 mm dia.	1.5 mm
15 mm dia.	1.5 mm

## 04. WIRING CONDUCTORS

All wiring conductors shall be PVC insulated, standard copper conductors of 650 V/1100V grade. Wiring conductors shall be confirmed in all respects to IS: 694.

- 4.1 The current rating for wiring conductors shall be based on the following parameters
- Ambient temperature 40° C.
  - Conductor temperature 70° C.

Wiring conductors shall be supplied in red, black, yellow, blue colors for easy identification of wires. The wiring conductors shall be supplied in sealed coils of 100 m. length. The wiring conductor shall bear manufacturer's trade mark name, ISI mark, voltage grade etc.

- 4.3 Wiring for power, lighting circuit's, television systems shall be carried out in separate and distinct wiring system.
- 4.4 The wiring system envisaged will be generally shown on the layout drawings and line diagrams, however, a brief account of the general wiring system is given below :-
- SUBMAINS WIRING  
Wiring from switch board to the individual distribution board.
  - CIRCUIT WIRING  
Wiring from DBs to the points control boxes for lighting, fans, SA socket etc. and from DBs to the power sockets in the case of power wiring.
- 4.5 The sub-main wiring shall be single phase 2 wire system. Each sub-main wiring circuit shall also have its own copper earth continuity wire. The number & size of copper earth continuity wire shall be as per the detailed drawings and Standard specification.
- 4.6 Circuit wiring shall generally be of single phase system. However a maximum of 3 to 4 single phase circuits belonging to the same phase/pole could be installed in the same conduit or race-way. Each circuit wiring shall be provided with suitable copper earth continuity conductor as per standard specification No. ADF-150-85. Not more than eight light points/fan points shall be grouped on one lighting circuits. The load per circuit shall not exceed 800 watts. The minimum size of conductor for wiring of lighting circuits shall not be less than 1.5 mm in case of copper conductor. Power wiring shall not have than one sockets connected to one circuit. All the wiring shall be carried out in looping in-loop system. .

The maximum number of various size conductors that could be drawn into various sizes of conduits shall be as per table II of IS: 732. The wiring shall be color coded for easy identification of phases and neutral. The following color code shall be adopted.

Phase	R	Red
	Y	Yellow / White

	B	Blue
Neutral		Black
Earth		Green

- 4.7 The circuit wiring may be separately measured or included in point wiring as per the nomenclature specified in BOQ.

## **05. SWITCHES, SOCKETS & ACCESSORIES**

### **5.1 GENERAL REQUIREMENTS**

Light control switches shall be 5A rating for controlling up to four light points and 15A rating for more than four light points. Light control switches shall be of piano key type design suitable for flush mounting for general lighting. Wherever specifically called for tumbles type switches shall be used for surface mounting. Light control shall have either integral mounting plates or white PVC/Perspex plates as specified / approved.

- 5.2 All sockets 6A & 16A ratings shall be flush mounting type with control switches of piano key type design of the same rating as that of the sockets. All sockets outlets shall be of 5 pin type. The base of the socket shall be of high quality porcelain with pins made of brass. Sockets shall be provided with PVC surface plates with round corners and beveled edges. All the sockets shall be provided with plug tops of approved quality and design.

### **5.3 LAMP HOLDERS, CEILING ROSES ETC.**

Accessories for, light outlets such as lamp holders, ceiling roses etc. shall be in conformity with requirements of specifications. Only approved make of accessories shall be supplied.

### **5.4 INSTALLATION OF SWITCHES, SOCKET & ACCESSORIES**

All the switches shall be wired on phase. Connections shall be made only after testing the wires for continuity, cross phase etc. with the help of meter. Switches, sockets, fan regulator etc. shall be housed in proper approved. Teakwood / PVC / metal box with PVC / Perspex sheet plates. Regulators shall be fixed on adjustable MS flat straps inside the enclosure. The arrangement of switches and sockets shall be neat and systematic. Covers for enclosures accommodating switches, sockets, etc. (Point control boxes) shall be of 3 mm thick, fine finished PVC / Perspex materials and fixed to the enclosure in plumb with counter-sunk head, chromium plated brass screws. Outlets shall be terminated into a ceiling rose for fan points and into auto way porcelain or bakelite connector for ceiling light points. For wall plug sockets, the conductors may be terminated directly into the switches and sockets. The outlets, points control boxes etc. shall be set out as shown on the drg. Before fixing these, the contractor shall obtain clearance from the O.O.W. with regard to their proper location. The enclosures of sockets and 3rd pin of the sockets shall be connected to the ground through a proper size earth continuity wires as laid out in standard specification.

## **06. LUMINAIRES**

### **6.1 GENERAL**

The MCBs shall be rated for 9 KA fault level. The MCBs shall be checked & coordinated with the down-stream MCBs for proper operation.

## **07. POINT WIRING**

Point wiring shall commence from the first point control box / local control box for the points connected to the same circuit. Point wiring for, lights, fans, 5A -15A sockets etc. shall be carried out with copper conductor PVC insulated wires of 1.0 & 1.5 Sq.m. cross section as per BOQ. The points wiring shall be inclusive of 40m / 32mm / 25mm / 20mm PVC casing capping of standard and approved make (As specified hereinbefore) along with approved quality accessories such as bends, reducers, junction boxes, etc. together with wiring accessories such as ceiling roses, lamp holder, connector, points control boxes (enclosure for electrical accessories) etc. Points wiring shall be provided with 1.0mm copper conduit PVC insulated earth continuity wire for earthing 3rd pin of sockets, luminaires and fan fixtures. Light Control shall be either single, twin or multiple points controlled by a switch as specified.

**08. TESTING & ELECTRICAL INSTALLATION**

Testing and installation shall be as per IS: 7362-1963.

- (a) The insulation resistance shall be measured by applying between earth and the whole system of conductors or any section thereof with all fuses in places and all switches closed and except in earthen concentric wiring all lamps in position or both poles of the installation otherwise electrically connected together, where a direct current pressure of not less than twice the working pressure, provided that it need not exceed 500 Volts for medium voltage circuits. Where the supply is derived from the three wires (A.C. or D.C.) or a poly phase system, the neutral pole of which is connected to earth direct or through added resistance, the working pressure shall be deemed to be that which is maintained between the outer or phase conductor and the neutral.
- (b) The insulation resistance measured as above shall not be less than 50 divided by the number of points on the circuits provided, that the whole installation shall be required to have an insulation resistance greater than one megahm.
- (c) Control rheostats, heating and power appliances and electric signs may, if required, be disconnected from the circuit during the test, but in event the insulation resistance between the case of frame work and all live parts of each rheostat appliance and sign shall not be less than that specified in the relevant Indian standard specification or where there is no such specification shall not be less than half a mega ohm.
- (d) The insulation resistance shall also be measured between all conductors connected to one pole or phase conductor of the supply and the entire conductor connected to the middle wire or the neutral or to the other pole or phase conductor of the supply and its value shall not be less than specified in sub clause (b).
- (e) On completion of an electric installation (or an extension to an installation) a certificate shall be furnished by the Contractor countersigned by the qualified supervisor under whose direct supervision the installation was carried out. The certificate shall be in the prescribed form as required by the local electric supply authorities. One such recommended form is given in Appendix.

**8.1 TESTING OF EARTH CONTINUITY PATH**

The earth continuity conductor including metal conduits and metallic envelopes of all cases shall be tested for electric continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or leakage circuit - breaker measured from the connection with the earth electrodes to any point in the earth continuity conductor in the completed installation shall not exceed one mega ohm.

**8.2 TESTING OF POLARITY OF NON-LINKED SINGLE POLE SWITCHES.**

- (a) In two wires installation a test shall be made to verify that all non linked single pole switches have been fitted in the same conductor throughout and such conductor shall be labeled or marked for connection to an outer one phase conductor or to be the non earthed conductor of the supply.
- (b) In a three wire or four wire installation a test shall be made to verify that every non linked signal switch is fitted in a conductor which is labeled and marked for connection to one of the outer phase conductor of the supply.

**09. CERTIFICATE OF INSPECTION**

The contractor shall be responsible for getting the installation inspected and approved by the Electrical Inspector and other local electric supply authorities concerned, for getting the electric supply at the earliest.

The contractor shall obtain and deliver to the owners the certificate of final inspection and approved by the local electrical authorities concerned. The inspection fees etc. shall be paid by the, Contractor. In case any defects are pointed out by the Electrical Inspector the contractor shall remove these defects at his own cost, and arrange for re inspection by the Electrical Inspector till such time the installation is finally approved and the required certificate



is issued. The contractor shall bear all expenses and deposit the necessary fees for the second and subsequent inspections by the Electrical Inspector.

**10. ADDITIONAL SPECIFICATION AND CONDITIONS**

The contractor shall keep himself in touch with the building work and shall adjust his work accordingly so as to minimize breaking of masonry / concrete. No claim whatsoever on account of delay due to building work shall be entertained.

Any damage done to the building during the reaction of the work shall be made good by the contractor, free of charge to the satisfaction of the Engineer-In-charge. On his failure to do so the same will be made good at his risk and cost through another agency.

**11. EARTHING :**

Supplying & erecting funnel type earthing having earth plate of following size burrid in specifically prepared earth pit 3 mtr. Below ground with 40 kg. charcol and salt with alternate layers of charcol & salt, 20mm dia. G.I. pipe with Funnel with a wire mesh for watering & bricks masonry block, C.I. cover complete as per para 7.3 of IS 3043 with necessary length of double G.I. / copper earth wire No. 6 SWG bolted with lug to the plate and covered in 12mm dia. G.I. pipe 2.5 mtr. long complete connected to the nearest switch gear with end socket as per direction & duly tested by earth tester confirming to ISS (As per drawing) with following specification.

**Note:** The quantity of items mentioned or as may be required for Electrification work shall have to be provided by the contractor as per the instructions of engineer-in-charge and should complete the whole work accordingly.

**Vendor List for Electric Items**

Sr. No.	Item	Vendor List
1	Wire / Cable	Havells / Finolex / Polycab / RR Cable / Alwyn / KEI
2	PVC Pipe	PCC / Amit / Mihir / Polycab / Supreme / Vraj
3	Accessories (Modular)	MK / North West / Snider / Havells / Anchor Roma / Soldier / ABP / Gold Metal
4	MCB / DB Box	Hager / HPL / Snider / ABP / Havells / MDS / Stainley / Super / Standard / Indo Asia
5	Luminiare fittings / LED Lights	Phillips / Crompton / Havells / C&S / GE / Bajaj
6	Fan / Exhaust Fan	Crompton / Orient / Havells / Khaitan / Bajaj / Armodald / Usha
7	Meter	MICO / L&T / IMP / RISHABH / ABB
8	Selector Switch	Soldier / L&T / TL / LS
9	Indicator	L&T / C&S / GE / Seimens / Technique / Salzor

The plumbing work shall have to be carried out as per requirement and material to be supplied of brand as required and duly got approved from the engineer in charge before using in the work.

Addl.A.E.  
R.M.C.

Dy.Ex. Engineer  
R.M.C.

Addl. City Engineer  
R.M.C.

Signature of Contractor: