CONTRACT – TECHNICAL SPECIFICATIONS

Common for Package-A and Package-B

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CHAPTER 1.0

General Instructions to the Contractor

1. The scope of work shall be generally as per Bill of Quantities, drawings etc. for the subject work which are self-explanatory but not limited to the quantities and specifications indicated therein.

2. However, it is understood that the scope of work shall include inter alia, the carrying out of any and all works and providing any and all facilities, as required for completing the works as per terms and conditions of Contract Document.

3. Technical specifications shall include quality standards, supply of all materials, tools tackle etc. required for completion of job, but not limited to the following works:

   i. Surveying Work
   ii. Earthwork & Excavation
   iii. PCC & RCC
   iv. Reinforcement & Steel structural works
   v. Form Work
   vi. Brick/Bela Stone Masonry
   vii. Plastering/Pointing
   viii. Flooring
   ix. Water Supply, Drainage and Sanitary Works
   x. Electrical works
   xi. Painting
   xii. Handrail
   xiii. Water Proofing
   xiv. Plain Cement concrete Road – {**Applicable only for Package-B (Sarkhadi)**}
   xv. Miscellaneous Works
   xvi. Site Cleaning and Handing over.

4. The work shall be carried out and inspected as per following specifications, drawings, IS Codes and Standard Engineering practices as fully described in the technical documents.

5. All the persons of the contractor shall obey all the safety rules & regulations. All the PPE for Contractor's persons shall be arranged by the contractor.

6. All material required in the work shall need prior approval of Engineer In-Charge (EIC)/PMC failing which material will not be accepted and no payment will be made towards that. The contractor shall submit the sample of the each and every material to be brought before at site for approval. Rejected material shall not be used and taken out from the Site premises with due permission of EIC.

7. The contractor should ensure the safety of his material, equipment, tools and tackles. HPLNG will not be responsible for any damage or loss to any of contractor's material.

8. If required, the contractor shall have to construct Site Office, Store for keeping spares/ materials of required size at his own cost. Contractor should arrange the site premises to facilitate smooth functioning of the contractor at its owndiscretion. Contractor shall not have any claim in this regard.

9. The contractor shall have to clear all the sites off any balance materials, construction debris, garbage, temporary structures etc.; deposit scrap materials toHPLNG and hand over the site in neat and clean condition to HPLNG.

10. Contractor shall get the measurement sheets, in duplicate, signed by the engineer in charge daily on completion of the job.

11. The Contractor has to comply the followings.

    i. Before excavation Surveying must be done with proper peg markings combined check with PMC/Engineer In Charge.
    ii. All survey equipment's must have calibration certificates.
    iii. All Survey point co-ordinates must be verified by engineer In-Charge/PMC.
    iv. Without surveying excavation/PCC will not be allowed.
    v. All existing datum levels must be recorded before commencement of any site
    vi. activities by the contractor.
    vii. Excavation and PCC will be commenced only after the proper documentation of survey co-ordinates with PMC/EIC signatures.

CHAPTER 2.0

Quality of Materials

i. Materials shall be of the approved quality best obtainable. A list of materials ofapproved brand(s) and manufacturers(s) or equivalent manufacturer as indicated in the Tender. Testing of materials of approved brand(s) may have to be done at the discretion of Owner/client. The cost to be borne by the contractor. In case, for some reason or other materials are required to be obtained from any manufacturer other than those listed, then prior approval from Owner/client will benecessary supported by a relevant test certificate qualifying the required standard. Further tests as directed by the Owners/client shall also be carried out by the contractor at their own cost, if required

ii. Samples of all materials including the sources shall be approved before placingorder and the approved sample shall be carefully preserved in an appropriate manner at the site office for verification from time to time.

iii. For standard bought out items, the sizes manufactured by the firms listed, shall prevail when there is discrepancy in the sizes mentioned in the schedule withoutany financial adjustment.

iv. Materials shall be tested in any approved Testing Laboratory conforming to the requirements and frequency indicated in the list of Mandatory tests. The test certificate in original shall be submitted to the Owners/PMC and entire chargesconnected with testing including charges for repeated tests if ordered, shall be borne by the contractor.

v. It shall be obligatory for the contractor to furnish certificates(s), if demanded by the Owners, from the manufacturer or the material supplier that the work has beencarried out by using their material and as per their recommendations.

vi. All materials supplied by the Contractor shall be properly stored and the contractorshall be responsible for its safe custody until they are required on the works and tillthe completion of work.

vii. The contractors without any extra cost shall provide all equipment and facilities for carrying out field tests on materials.

Unless otherwise shown on the drawings or mentioned in the Schedule of quantities or special specifications, the quality of materials, workmanship, dimensions etc. shall be followed hereunder.

1.0 EARTH FILLING

Shall be selected earth suitable for filling as approved by the Owner/PMC and free from building rubbish or organic decomposed materials. It shall be obtained eitherexcavation as or brought from the outside such that it is complete responsibility of the contractor. Black cotton soil shall not be used for filling.

2.0 CEMENT (OPC 53 GRADE)

Cement grade shall be used as specified by the Consultants/EIC for all construction. Cement shall comply in every respect with the requirements of the latest publication of IS 269/IS: 455. The use of cement other than ordinary Portland cement / Blast furnace slag cement may be allowed with prior approval of OwnerRepresentative.

The weight of cement shall be taken as 1440 kg. per cum (90 lbs. per cft), Cement shall be measured by weight and in whole bags, and each undisturbed and sealed 50 kg. bag being considered equivalent to 1.25 cft in volume. Care should be taken to see that each bag contains full quantity of cement. When part bag is required,cement shall be taken by weight or measured in measuring boxes.

No other make of cement but than approved by the Owner/PMC once will be allowed on works and the source of supply shall not be changed without approval of the owner/PMC in writing. Necessary Test should be conducted in laboratory and certificates to show that the cement is fully complying the specifications shall be submitted by the contractors to the Owners.Test shall be conducted as follows

i. Fitness of cement as per IS 12269 & IS 4031 Part 2
ii. Consistency of cement as per IS 4031 Part 4
iii. Initial & Final Setting time as per IS 4031
iv. Soundness & Compressive strength as per IS 4031/IS 42269
v. Chemical composition as per IS 4032/IS 42269

Not withstanding this, cement brought on site shall be re-tested in an approved testing laboratory every 50.00 M.T. or part thereof. Cement ordered for re-testingshall not be used for any work pending results of retest.

Cement shall be stored to prevent deterioration by dampness or intrusion of foreign matter. It shall be stored in such a way as to allow the removal and use of cement in chronological order of receipt i.e., first received being first used. Cement deteriorated and or colored shall not be used on work but shall be removed at oncefrom the site. However, allowing use of warehouse set cement shall be determinedby the Owner whose decision in this regard shall be final and binding. Weekly record of cement received and consumed shall be maintained by the Contractor in the prescribed format at site and submitted to Owner Representative, if called for. Theoretical consumption vis-a-vis materials brought at site by the Contractor shallalso be submitted with proper documents with every bill for verification.

3.0 FINE AGGREGATE

Sand shall be from natural source or crushed stone screenings, if allowed, chemically inert, clean, sharp, hard, durable and well graded and free from excessive deleterious materials. The silt content shall be within 8%. If it is excess,washing shall be done in an approved manner to bring it within allowable limit.

The fine aggregate for concrete shall be graded and the fineness modulus mayrange between 2.60 to 3.20.

The fineness modulus of fine aggregate may range between 1.80 to 2.60 forplasterwork and all other works.

Fine aggregate shall be approved based on the source and test conducted with sample.
Test shall be conducted as per IS 383 & IS 2386

4.0 COARSE AGGREGATE

Shall consist of crushed or broken stone 95% of which shall be retained on 4.75 mm IS test sieve. It shall be obtained from crushing Granite, Quartzite, Trap, basaltor similar approved stones. Coarse aggregate shall be chemically inert when mixedwith cement and shall be roughly cubical in shape and free from soft friable, thin laminated or flaky pieces.

Coarse aggregate shall be approved based on the source and test conducted with sample.
Test shall be conducted as per IS 383 & IS 2386

5.0 STEEL REINFORCEMENT MILD STEEL BARS

Mild steel reinforcement bars shall conform to IS 226- 1962 "Standard quality" orIS 432-1966 - Grade-II. Other qualities of steel shall not be acceptable.

6.0 HIGH YIELD STRENGTH DEFORMED BARS(HYSD FE 500/500D CRS)

Where deformed high yield strength reinforcement bars are specified, the contractorsshall use the following:

"Tor-steel" as manufactured by SAIL/TATA/JINDAL/JSW or other manufacturersconfirming to IS 1786 - 1979.

7.0 BRICKS/BELLA STONE

The bricks shall be first class (F.B.S) kiln burnt bricks of regular and uniform size,shape and colour, uniformly well burnt throughout but not over burnt. They shall be free from cracks or other flaws.

They shall show a fine grained uniform homogeneous and dense texture on fractureand be free from lumps of lime lamination, cracks, air holes, soluble salts causingefflorescence or other defects which may in any way impair the purpose intended. They shall not break even when thrown on the ground on their flat face in a saturated condition from a height of 60.00 cm (About 2').

After immersion in water, absorption by weight shall not exceed 20 percent of thedry weight of the brick when tested according to I.S.S. No. 1077-1970. The brickshall have a minimum average compressive strength of 35 to 50kg/ per cm2 as specified on the nomenclature of the item.

The bricks/ Locally available Bella Stone to be used for the work shall be approvedby the Engineer In-Charge.

Bella stone shall be approved based on the source of sample and test to be conducted for the approval.

Test shall be as per IS 2386:1963 & IS 9143:1979

Note: - (a) Approve the samples of locally available Bela stone from the Engineer-In- Charge before procurement on large scale and shall maintain the same for the entire work (b) Necessary Openings/niches/cut-outs, wherever required as per drawings and asked for by the Engineer-In-Charge, shall be provided by the contractor without any extra cost. (c) The rate shall include cost of locally available bela stone, labour and making to all geometrical shapes and sizes, testing, transporting, wastages, handling, scaffolding, curing etc without any extra cost

8.0 CONSTRUCTION WATER

Water for mixing Cement mortar or concrete shall not be salty or brackish and shall be reasonably clean and free from objectionable quantities of silt and traces of oil, acid and injurious alkali, salts organic matter and other deleterious materials which will either weaken the mortar or concrete or cause efflorescence or attack the steel in reinforced cement concrete. Water shall be obtained from sources approvedby the Owner. Potable water is generally considered satisfactory for mixing and curing concrete, mortar, masonry etc. Where water other than municipal source is used this shall be tested in an approved testing laboratory to establish its suitability.All charges connected therewith shall be borne by the contractor.

Construction water shall be approved based on the source and test conducted with sample.
Test shall be conducted as per IS 456 & IS 3025

9.0 CEMENT MORTAR

Cement mortar shall be of proportions specified for each type of work in theschedule. It shall be composed of Portland cement and sand.

The ingredients shall be accurately gauged by measure and shall be well & evenlymixed together preferably in a mechanical pan mixture. Care beige taken not to add more water than is required. No mortar that has begun to set shall be used.

If hand mixing is done, then it shall be done on pucca waterproof platform. The gauged materials shall be put on the platform and mixed dry. Water will then be added and the whole mixed again until it is homogeneous and of uniform colour.

Cement mortar shall meet the requirements of IS:2250 and shall be prepared by mixing cement and sand by volume(1 part of cement and 6 parts of sand - 1:6)for the Main wall while 1:4 cement mortar (1 part of cement and 4 part of sand) for the partition walls.The sand being used for the mortar shall be sieved.

10.0 TIMBER

The timber shall be type specified in item and of excellent quality and well- seasoned. It shall have uniform colour, straight grains and shall be free from dead Knots, Cracks and sapwoods. The moisture content shall be within 12% for 50mmand above thickness and 10% for thickness below 50mm.

11.0 ADMIXTURE

Contractor to use any other admixture in the concrete like FOSROC, SIKA etc., as per direction of Engineer in Charge before starting of any concrete job.

Admixture shall be approved based on the source and test conducted with sample.
Test shall be conducted as per IS 9103

12.0 HANDRAIL:

Stainless steel railing shall be (SS 304 grade) 1000 mm high sat finish tubular railing of approved design in staircases, ramps, around floor cut outs etc. It consists of:

i. 50mm da SS pipe top
ii. 38mm da SS balusters (at ovary third step for staircase, @ maximum 1200mm c/c for ramp, floor cut-outs) 3 no's minimum
iii. 18mm din SS pip intermediate handmils Including: Fixing balusters to floor with 4 no's "Hilt* bolts and 8mmthick,
iv. 100mr dia SS base plate & SS cap/collar Fixing top handrail to the balusters with 12mm dia SS bar connector & 6mm thick SS saddle plate Fixing intermediate handrails to the balusters with 12mm dia S bar connector
v. All end caps, decorative caps over balustrades, necessary bending. welding, polishing of all welded joints.
vi. The material used to be of Glossy finish and shall be installed as per the approved drawings mentioned location such as Ramp, Staircase etc.

13.0 APPLICABLE CODES, STANDARDS AND GUIDELINES

This section summarizes the laws, regulations, codes and standards which shall be used when applicable for the construction CER associated facilities at Chhara Village Schools. The laws, regulations, codes and standards are:

- Indian National Standards
- Other International Standard

The applicable codes, specifications or documents shall be the latest edition including all amendments.

In case of conflict between several codes, the contractor may propose the codeapplied, and/or the deviations required.

14.0 LIST OF APPLICABLE CODES, STANDARDS AND GUIDELINES:

i. IS 1893-2005 Criteria for Earthquake Resistant Design of Structure
ii. IS 875 (Part 3) (1987) Code of Practice for Design Wind Loads
iii. IS 456 (2000) Code of Practice for Plan and Reinforced Concrete.
iv. IS-800 (1984) Code of Practice for general Construction in Steel

v. IS-6403 (1981) Code of Practice for determination of Bearing Capacity of Shallow Foundation
vi. IS-875 Code of practice for design loads
vii. IS-1893(Part-I and IV) Criteria for earthquake resistant design of structures
viii. IS: 1904 Code of practice for design & construction of Foundations in soils
ix. IS:2911 Code of practice for Design and construction of Pile foundations
x. IS-8009 (Part 1) (1978) Code of Practice for calculation of settlement of shallow foundations subject to symmetrical static vertical loads.
xi. IS 1200 Method of measurement of building and engineering works

CHAPTER 3.0

TECHNICAL SPECIFICATIONS FOR THE WORKS

SCHEDULE I : EARTHWORK

i. Site Clearance: The site shall be cleared of rubbish of all kinds, rocks, trees, dirt and superfluous earth, all muds, brush wood, stumps of trees and saplings, grass and other rank vegetation etc. the serviceable materials to be stacked at site and in a manner as directed by the Owner Representative. All cavities or holes formed shall be filled with good earth well rammed and leveled neatly. Site clearance shall be done 7 meters around the proposed construction. The contractor shall provide all labour and materials for site clearance at his own cost.

ii. Profiles: Shall be with pegs, bamboos or strings to show the correct formation before the start of work and maintained till the completion of the work.

iii. Excavation: The foundation trenches shall be excavated to the exact width of the lowest step of the foundation or footing as shown on drawing. The sides of the trenches shall be kept in steps and bottom horizontal both transversely and longitudinally as shown on the drawings. Steps shall be squarely benched out as shown on the drawings or as directed by the owner. The excavated earth shall be deposited at least three meters or 1/3rd of depth away from the edge of excavation whichever is more. Working space on the outer periphery, if required, shall be provided by the Contractor as per IS code and shall be paid as per actual or as per IS. Code whichever is less.

iv. The bed of the trenches shall be made level and compact by watering and ramming, any soft and defective spots detected shall be filed with concrete of the mix as specified for foundations or as directed by the Owner Representative. Cost of such concrete shall be paid to the contractor. In case excavation is taken deeper than required, the extra depth shall be made good with concrete as specified for foundation or as directed by the owner at no cost to the Employer.

v. The contractor shall at his own expense without extra charges shall make provision for all shoring, strutting, close or open timbering, pumping, dredging or bailing out water and the trenches shall be kept free from water until the work in foundations is completed and trenches refilled. The trenches shall be inspected and passed before concrete is placed.

vi. The measurements shall be the exact length and width of the allowed step of the trench or footings as shown on the drawing (without working space), and depth shall be measured vertically. The extra earthwork done by the contractor, providing steps etc. and earth work done in making ramps/steps as approach to work place shall not be measured and paid for.

vii. Earth Filling: Filling can be general in the sides of foundation trenches, under floors and for site formation. The earth to be used for filling shall be free from saltpeter organic or other foreign matter. The space around the foundations in trenches and under floors shall be cleared of all debris, brick piece, or any other surplus mortar falls etc. Filling

shall be done in layers not exceeding 150 mm thickness. Each layer shall be well watered and rammed to the satisfaction of the Owner Representative. Final surface shall be neatly dressed.

The earth filling shall be computed from levels recorded before start of filling andafter completion of filling, the quantity so computed shall be paid with deductionof 1/13 as mentioned in para 1.4 above for open site formation and without any deduction of 1/13 for filling under floors i.e., in confined situations.

Sand-Filling: The sand shall be clean and free from any foreign matter. Sand fillingshall be done, measured and paid in the same manner as earth filling as described in the foregoing para

viii. Hard Core: Shall either be of stone ballast, gravel or stone rubble of size mentioned in the schedule of quantities and shall be free from dust and otherimpurities.

Hard core of stone ballasts not exceeding 40 mm, and shall be laid in required thickness, dry, rolled and consolidated with a power roller to the satisfaction of the Owner Representative unless otherwise specified in the schedule of quantities.

Hard core of rubble stone shall be laid with stones of required height vertically, closely and hand packed with smaller pieces and/or stone ballast 40 mm, as directed by the Owner Representative and consolidated dry with a ten-tonne power roller unless otherwise specified in the schedule of quantities to the satisfaction of the Owner Representative.

ix. No separate payment shall be made for re-excavation or loosening of excavated soilfor disposal and transportation due to its having become hard or consolidated due to passage of time, rains or any other cause whatsoever.

x. The lead shall be measured by the shortest route possible.

xi. Any termite treatment used shall be as per IS-6313 (part II) 1971 with a guaranteeperiod of 10 years and shall be carried out by an approved specialist agency.

SCHEDULE II- PLAIN AND REINFORCED CONCRETE WORK

i. Cement Concrete: For foundations shall be mixed in proportion and with ingredients as specified in the Bill of quantities. The concrete shall be mixed in a mechanical mixer. No more concrete shall be mixed than can be consumed within half an hour. It shall be deposited gently in the trenches in horizontal layers not more than 30 cm. thick and rammed and consolidated with steel rammers of 5 to 6kg. Weight.

ii. After laying and consolidation is completed watering twice a day for aweek from the next day shall be done.
   - Plain cement concrete shall be M10 1:3:6
   - Reinforced Cement Concrete Work (OPC 53 Grade):

iii. Grade of concrete shall be M20, M25 & M30 based on the building and road work drawings.

a) M30 FOUNDATIONS
b) M30 CONCRETE SUPER STRUCTURE
c) M20 RCC LINTEL, RCC BELOW MASONRY (1:1.5:3)
d) M25 CEMENT CONCRETE ROAD WORKS
e) M30 GRADE SLAB

iv. General: It is intent of these specifications to ensure that all concrete placed at various locations in the job should be durable, strong enough to carry the designloads, it should wear well and be practically impervious to water. It should be freefrom such defect as shrinkage, cracking, and honey combing and soiling of the surface. Unless otherwise called for in these specifications as plain and reinforced concrete shall confirm in all respect to IS 456:1978.

v. Proportions: The proportion by volume of the concrete in the various parts of the work will be specified on the drawings and shall be accurately measured. The quantity of water used shall be the minimum consistent with practical workabilityand shall be varied as required to suit the moisture content of the aggregate and toproduce concrete having the specified slumps.

vi. Mixing: The aggregate and sand shall be free from all list and earthy matterwashed if required by the Owners before using. The materials shall be accuratelymeasured in boxes and mixed in a machine. Water being added in required quantity only. The mixture shall be semi-liquid mass with cement uniformly distributed.

vii. Strength: Concrete mixed in the proportions desired should have compressivestrength at 7 and 28 days after placing.

viii. The contractor shall as and when directed by the owner cast 6 cubes of the concrete being used in the work and after maturing shall get them tested. The cost of all testing shall be borne by the Contractor.

ix. Mixing: All concrete whether plain or reinforced, ordinary or controlled shallbe mixed in a full bag mechanical mixer, having a minimum drum speed of 60 revolution per minute. The cement and aggregate shall be first mixed dry until all particles of aggregate are coated with cement.

x. Water shall be added and mixing continued for one and a half to two-minute time resulting a concrete of a uniform colour and consistency.

xi. If there is a segregation after unloading from the mixture the concrete should be remixed.

xii. Water Cement Ratio: The water cement ratio shall be carefully controlled throughout the work; this calls for regular check on the equipment used measuringwater. Only graded liter cans shall be used for this purpose.

xiii. Concrete should not be dropped from height greater than 1.5 M. properly constructed chutes shall be used in such cases where it is necessary to exceed this height. Concrete must be thoroughly worked in to the forms so that they are entirely filled; reinforcing bars adequately and tightly surrounded and entrapped airreleased from the mass of concrete.

xiv. Placing shall be carried out by hand punning as well as vibrators. Concrete shouldnot be moved any considerable distance in the moulds, being consolidated as nearly as possible in the place where it is dumped. In casting beams or other deep sections concrete shall not be placed in layers.

xv. Transportation: Concrete should be placed in its final position within 30 minutes of mixing. The contractor shall arrange the mixer position and adopt a method of transportation to ensure that this period is not exceeded under any circumstances. Transportation shall be smooth and free from jolting.

xvi. **CONSOLIDATION:** All plain and reinforced concrete shall be consolidatedby means of mechanical vibration. Adequate number of vibrators shall be used toensure full compaction of concrete in about 10 minutes of placing. If needle vibrators are used, these shall be inserted at place not exceeding 0.5 M. apart until it is immersed to the full depth of concrete. Where ever possible shutter vibrators should be used, and the contractor shall design the shuttering so that this can withstand vibration. Care shall be taken to ensure that concrete is not over vibratedto avoid segregation. In addition to mechanical vibration, sufficient hand tools must be used to ensure full consolidation against reinforcement and at edges and corners.

xvii. **Construction Joints:** Construction joints shall be made only were shown on the drawing or approved by the Owners. Such joints shall be kept to the minimum and shall not be in valleys.

xviii. The joints shall be at right angles to the direction of main reinforcement. In case of columns and walls the joint shall be horizontal and 2 to 5 cms. below the bottom of the beam or slab running into the column or wall head or below the anchor reinforcement of beam and slab coming into the column and wall and the portion of the column into wall between the stopping of level andthe top on the slab shall be concreted with the beam or slab

xix. Testing:

a) Consistency: Only sufficient water shall be added to the cement and aggregate during mixing to produce a consistency so that the concrete shall be sufficiently workable to enable it to be well consolidated to be worked into the corners of the shuttering and around the reinforcement and to give the specified strength. Slump tests shall be carried out from time to time as directed by the Owners on concrete being placed in the works at the commencement of each period of concrete placing in accordance with the procedure laid down in the latest Indian Standards specifications.

b) The slump shall not exceed in limits specified for different items of works as given below or as directed.

- Precast work - 1" (25mm) slump
- Footing & roads - 3" (75mm) slump
- Columns - 3" (75mm) slump
- Walls - 3" (75mm) slump
- Slabs - 3’’(75mm) slump

c) Preliminary Test: The Contractor will be called upon to submit representativesamples of materials to be used for concrete so that preliminary tests in accordancewith I.S. 456-1978 may be carried out in a recognized laboratory to establish the suitability of the materials and proportion of mix by weight proposed by the Contractor. The contractor shall have to bear all costs in connection with this test.

d) **Curing of Concrete**: All exposed faces of concrete shall be covered with Hessian, sand or similar material which shall be kept continuously wet for a period of at least 7 days after casting. After removal of Hussein or sand all concretesurfaces shall be well wetted at intervals for a period of at least three weeks.

e) **Protections of completed Works:** The contractor shall take suitable precautionary measures to prevent breaking and chipping of corners and edges ofcompleted work.

f) **Surface Finish of Concrete:** All framework, centering and shuttering used for concreting shall be rigid and straight so as to produce all concrete members true to line and level with a tolerance of 1/8" (3mm). This shall be cast against an approved pattern made up of new material such as timber/steel/ply to give neat andexposed finish. No old shuttering material is allowed to site work.

SCHEDULE III

FORM WORK

Form work shall be erected true to line and to the shapes required in the workand shall carry without deformation the full weight of wet concrete, and other live loads. It should also withstand the effect of vibration without deflection, bulging distortion or loosening of its component parts. The contractor shall be responsible for the sufficiency of the form work, centering and moulds. Form work shall be oiled thoroughly before concreting.

Wire or similar ties shall not be left in concrete having face exposed to weather. Bolts shall be permitted if they are greased to allow for easy withdrawal and theholes subsequently made good.

The form work shall be designed so that the sufficient slabs and the side of beamsmay be removed first bearing form work to the soffit of beams and their supportsinspection. Wedges shall be provided to allow accurate adjustment of form workand its easy removal.

All joints shall be tongued and grooved and sufficiently tight to prevent leakage ofgrout. Chamfer fillets shall be provided at all corners wherever called for on the drawings. The boards shall be planned and straightened in order that the surface against the corner shall not be coated with approved oil before it is fixed inposition.

Clean out holes shall be provided at the bottom of all columns and pier form work and care shall be taken to remove any rubbish, wood shaving or any other foreign material before concreting temporary supports shall be provided as required and/orordered by Owners. The contractor shall provide steel/plywood form work in placeof timber boarding wherever called for by the Owners.

TIMBER SHUTTERING:

Form work for exposed concrete work shall be of seasoned wrought hard wood timber planks, free from loose knots. The planks shall be 50 mm. thick, 100 to 125mm. wide with tongued and grooved joints assembled to pattern approved by the Owners. The form work shall be so constructed, bracketed and stayed as to remain rigid and true during and after pouring. The boards shall be planned to thickness, so that the surface against the concrete shall not be broken at joint between boards.Chamfers, groove, mounding, beveled edges etc. shall be made in the form itself tothe size, profiles and details called for on the drawings.

The Contractor shall provide 12 mm thick shuttering quality plywood of approvedmake or equivalent approved by the Owner in place of 40 mm thick timber plate shuttering mentioned above for such location as called for by the Owners. The joints in the plywood shuttering shall be located as directed by the Owners.

Shuttering, centering and form work for all exposed concrete work like exposed column, beams, ribs, coffer, slabs, chajja, facias, walls etc. shall be of such finishand rigidity as to produce all faces fair smooth true to line, level and plumb. No rendering or touching up shall be permitted on these faces.

STEEL SHUTTERING:

Steel shuttering for exposed concrete work shall be made of shuttering plates of standard sizes and to suit the pattern of exposed concrete indicated in Owner's drawings. The shuttering plates used will be made of steel sheets strengthened at the edges and in middle to prevent sagging or any deflection when concrete is laid.These plates will be free from any deformity or dents and should fit with each properly without any space or grooves being left between adjacent plates to avoid any leakage of concrete slurry. If any concrete projects out between plates this willbe neatly cut away.

The contractor shall be required to produce working drawings showing the generalconstruction of form work and panels with details such as nail positions and holesfor supports that may be required. Nail head shall be positioned as instructed by the Owners. Grooves and Chambers shall be formed as shown on the drawings without any extra cost.

Any holes for the supports, which the Contractor may need shall be approved by the Owners. All such holes shall be subsequently filled in carefully so as to match with the other surfaces. Walls, columns etc. Shall generally be cast to the full height in more operation and the form work shall put in accordingly.

If permitted by the Owners, these may be completed in two or more heights when the form work shall be carefully and correctly raised for further height so as to ensure a neatjoint without disturbing the pattern. Any groove required by the Owners at the jointshall be provided by the contractor at no extra cost.

Coating for Shuttering: Burma shell shuttering oil, colorless and emulsify in water shall be used for oiling the wood work, when only thin film shall be neatly appliedavoiding collection at one place. Any mark left by the shuttering oil shall be washed clean.

- Removal of Form work: All form work shall be kept in position until theexpiry of a minimum period after concreting as specified below: -
- Forms supporting sides of beams, walls and columns. 2 days
- Bottoms of slabs up to 15ft. (4.50 M) span. 7 days
- Bottoms of slabs above 15 ft. (4.50 M) span to 20 ft. (6 M) span 10 days
- Bottoms of beams up to 20 ft. (6.00 M) 14 days
- Bottoms of beams over 30 ft. (6.00 M) span 21 days
- After removal of form adequate props shall be provided to support beams/slabsuntil 28 days after concreting.

SCHEDULE IV

REINFORCEMENT:

i. Steel reinforcement shall be either mild steel of tested quality to IS 432-1960 or square or round twisted steel confirm IS 1786-61 or confirming to IS 1139-1966 ascalled for on the drawings. Fabric reinforcement in topping slab or precast concreteunits shall be of hard drawn mild steel wire mesh, IRC weld mesh or another equivalent as approved. Bars shall be free from mill scale, excessive rust, oil or paint.

ii. The contractor shall submit bar bending schedules for the approval of the Owners prior to commencement of fabrication. These will indicate the accurate dimensions and bending of bar as required on the structural drawings. Fabrication shall be accurately done to the dimensions, spacing and minimum cover as shown on structural drawings.

iii. All joints in Mild steel reinforcement up to and including 16 mm dia shall be over-lapped. The lengths of overlap for tension and compression joints shall be in accordance with the typical detail. Joints in mild steel reinforcement above 16 mm diameter may be welded if permitted by the Owners in writing. All joints in to steelreinforcement shall be over-lapped strictly in accordance with typical drawing. Thelaps shall be as agreed in such a way that at one particular section not more than 25% of the bars are lapped.

iv. Measurements: The length of bars shall be measured correct to cm. of reinforcement placed in position as per drawings. only such laps, dowels, chairs, spacer pins, as approved by the Owners or as shown on drawings shall be measured. All wastage such as cut piece etc., shall be included in rates and no extraamount shall be paid. In case of contractor's own supply, the weight of **various diameter bars shall be as per standard ISI weight. No allowance shall** be made for rolling margins.

v. Cover to Reinforcement: Cover shall be taken to maintain the correct cover to reinforcement. Unless otherwise specified on the drawing the following minimum covers (exclusive of rendering or other decorative finish) shall be provided in all reinforced concrete work.

vi. Under water concreting: For under water concreting, the methods, equipment, materials and proportions of the mix to be used shall be submitted to and approvedby the Owner Representative before the work is started. The concreting operation shall be done as per provisions of 1S 4560: 1978 (clause 13.2) under otherwise directed by the Owner Representative.

vii. All the reinforced cement concrete works shall be design mix concrete of M15 & M20 grade and or as specified. The contractor prior to commencement ofconcreting work and get the same approved in writing from the Owner Representative.

viii. All steel shall be rigidly held in place with 18gauge annealed steel wire. Cement mortar (1:2) cubes, M.S. chairs and spacer bars shall be used to ensure accurate positioning of reinforcement.

SCHEDULE V

MASONRY WORK

1. BRICK WORK/BELLA STONE WORKS

GENERAL

- All brick work should be carried out as shown on the drawings with setbacks, projections, curvatures, cuttings, footings etc. No additional cost for use of cut bricks shall be allowed. Wherever the proportion of cement mortar has not been specifically mentioned, cement mortar in the proportion of 1:6 shall be used. Flat brick shall be provided wherever required without any extra cost Brick work shall be kept wet while in progress, till mortar has properly set. On holidays or when work is stopped, top of all unfinished masonry shall be kept covered. Should the mortar become dry or powdery, for want of curing, work shall be pulled down and rebuilt at the contractor's expenses.

- All masonry work shall be done by skilled craftsmen in a workmanlike manner throughout. Exterior walls shall be completely waterproof. Masonry shall be loaded, unloaded, stored, and handled in such manner as to prevent chipping, scratching, or other damage. Slightly damaged masonry units may be used in areasnot exposed to view; no chipped, marred and fully damaged masonry units will notbe permitted.

- Forms and Shoring: Forms and shoring for beams and other members supporting masonry and for reinforced masonry members shall conform to the shape, lines and dimensions of members indicated and shall be sufficiently rigid to prevent deflections which may result in cracking or other damage to supported masonry.
- Approved curing conditions shall be maintained, and forms shall remain on girders and beams not less than 10 days, and on slabs not less than 7 days, after completion of the members. No less than 16 hours shall elapse before uniform construction loads are applied to completed masonry members. Not less than 64 hours shall elapse before concentrated loads are applied.
- **SOAKING**

All bricks/Bella Stone shall be immersed in water for twenty-four hours before being put into work so that they will be saturated and will not absorb water fromthe mortar.

BRICK/BELLA STONE BATS

No bats or cut bricks shall be used in the work unless absolutely necessary around irregular openings or for adjusting the dimensions of different course and for closures, in which case, full bricks shall be laid at corners, the bats being placed onthe middle of the courses.

Works of Brick Masonry/Bella stone Masonry

i) LAYING

- The brick/ Bella stone shall be laid in mortar to line, level & shapes shown on the plan, slightly pressed and thoroughly bedded in mortar and all joints shall be properly flushed and packed with mortar and not hollows left anywhere. Brick shall be handled carefully so as not to damage their edges. They should not also bethrown from any height to the ground but should be put down gently. All courses shall be laid truly horizontal and all vertical joints made truly vertical. Vertical joints on one course and the next below should not come over one another & shall not normally be nearer than quarter of a brick length. For battered faces beading shall be at right angles to the face. Fixtures, frames etc. if any, shall be built in at place shown in the plans while laying the courses only and not later by removal ofbricks already laid. Care shall be taken during construction to see those edges of bricks at sills, heads etc. are not damaged.

- The verticality of the walls and horizontally of the courses shall be checked very often with plumb bob and spirit level respectively.

- Joints shall not exceed 10 mm (about 3/8") in thickness & this thickness shall be uniform throughout. The joints shall be raked out not less than 10 mm (about 3/8")deep when the mortar is green where pointing is to be done. When the brick /BellaStone surface is to be plastered, the joints shall be raked to a depth of 5mm when the mortar is green so as to provide good key to plaster.

ii) UNIFORM RAISING

Brick/Bella Stone work shall be carried up regularly in all cases where the nature of work will admit, not leaving any part 60 cm. lower than another but where building at different levels is necessary, the bricks shall be stepped so as to give later a uniform level & effective bond. Horizontal courses should be to line and level, and face plumb as shown on the plan.

iii) SCAFFOLDING

- The scaffolding must be strong and rigid stiffened with necessary cross bearers and always decked and bared on the sills with closed board ceilings and swings to prevent injury to persons or materials. The Contractor shall have to allow other trades to make reasonable use of his scaffolding as directed by the Owner Representative /Owners. If for the interest of work the contractor have to erect scaffolding in the other properties including local bodies or Corporation. The arrangement for the same including the cost of licensing fees etc. shall to be borne by the Contractor and the Owner should be kept free from any liability on this account.

- Put-log holes shall be made good by bricks to match the face work when put logs are removed after ensuring that the holes behind are solidly filled in the 1:4:6 cement concrete.

All brick works shall be kept well-watered for 14 days after laying. If white pozzolana cement is used for mortar, the curing shall be extended by one week atcontractor's expenses.

iv) HALF BRICK /BELLA STONE WORK

The mortar mix for half brick and 75 mm thick brick work shall be as specified.Half brick and brick on edges work, shall be provided with MS 6mm dia steel reinforcements.

Joints shall not exceed 10 mm (about 3/8") in thickness & this thickness shall be uniform throughout. The joints shall be raked out not less than 10 mm (about 3/8")deep when the mortar is green where pointing is to be done. When the brick surface has to be plastered, the joints shall be raked to a depth of 5mm when the mortar is green so as to provide good key to plaster.

v) **Cement Mortar for Brick Masonry**

Cement mortar shall meet the requirements of IS:2250 and shall be prepared by mixing cement and sand by volume (1 part of cement and 6 parts of sand), or as directed by the Engineer-in-Charge.

As shown on the drawing, for brick masonry of one brick thickness or more, while 1:4 cement mortar (1 part of cement and 4 parts of sand) shall be used for brick masonry of half brick thickness. The sand being used for mortar shall be sieved. The mortar shall be used as soon as possible after mixing and before it has begun to set and in any case within initial setting time of cement after water is added to the dry mixture.

Mortar unused for more than initial setting time of cement, shall be rejected and removed from the site of work Cement mortar shall be prepared in accordance with IS-2250 by mixing cement, sand and water in specified proportions. The mortar shall be consumed as soon as it is prepared. Unused mortar kept for more than 30 minutes shall be rejected, and removed from the work site.

vi) Mortar Proportioning

The unit of measurement for cement shall be a bag of cement i.e. 50kg or 0.035m^3 in volume. Sand shall be measured volumetrically in measuring box of suitable size considering dry volume. In case of damp sand suitable bulkage to be considered and quantity of sand to be adjusted accordingly

a. Mixing

Mixing will be done in mixing machine. Sand and cement shall be mixed in required proportion. The mixing shall be done thoroughly till the uniform color is formed. The water is to be added and mixed to obtain the mortar of required workability / consistency.

The mixing of mortar shall be done in a mechanical mixer operated manually or by power. The Engineer-in-Charge may, however, permit hand-mixing as a special case, taking into account the magnitude, nature and location of work. The Contractor shall

take the prior permission of Engineer-in-Charge, in writing, for using hand-mixing before the commencement of work.

i) Mixing in Mechanical Mixer

Cement and sand in specified proportions, by volume, shall be thoroughly mixed dry in a mixer. Water shall then be added gradually and wet mixing continued for at least one minute. Care shall be taken not to add more water than that which shall bring the mortar to the consistency of stiff paste. Wet mix from the mixer shall be unloaded on water-tight masonry platform, made adjacent to the mixer. Platform shall be at least 150 mm above the levelled ground to avoid contact of surrounding earth with the mix. Size of the platform shall be such that it shall extend at least 300 mm all-round the loaded wet mix area. Wet mix, so prepared, shall be utilized within initial setting time of cement after addition of water. Mixer shall be cleaned with water each time before suspending the work.

ii) Hand Mixing (Approval required PMC/Owner)

The measured quantity of sand shall be levelled on a clean water-tight masonry platform and cement bags emptied on top. The cement and sand shall be thoroughly mixed dry by being turned over and over, backward and forward, several times till the mixture is of uniform colour. The quantity of dry mix which can be consumed within initial setting time of cement shall then be mixed with just sufficient quantity of water to bring the mortar to the consistency of stiff paste.

vii) Construction Procedure:

a) Soaking of Bricks

Bricks shall be soaked in water before use for a period that is sufficient for the water to just penetrate the whole depth of bricks as well as to remove dirt, dust and sand. Proper soaking of bricks shall prevent the suction of water from the wet mortar as otherwise mortar will dry out soon and crumble before attaining any strength. The bricks shall not be too wet at the time of use as they are likely to slip on mortar bed and there will be difficulty in achieving the plumpness of wall as well as proper adhesion of bricks to mortar. The period of soaking shall be determined at site by a field test by immersing the bricks in water for different periods and then breaking the bricks to find the extent of water penetration. The least period that corresponds to complete soaking, will be the one, to be allowed for in the construction work.

The soaked bricks shall be stacked over a clean place, wooden planks or masonry platforms to avoid earth, dirt being smeared on them. It shall be ensured that at the time of laying of soaked bricks, they are skin dry.

b) Laying

Brick work (one or more brick thickness) shall be laid in English Bond unless otherwise specified. Half or cut bricks shall not be used except when needed to complete the bond. In case, the defective bricks shall be used. A layer of average thickness of 10mm of Cement Mortar for Brick Masonry

Cement mortar shall meet the requirements of IS:2250 and shall be prepared by mixing cement and sand by volume (1 part of cement and 6 parts of sand), or as directed by the Engineer-in-Charge.
As shown on the drawing, for brick masonry of one brick thickness or more, while 1:4 cement mortar (1 part of cement and 4 parts of sand) shall be used for brick masonry of half brick thickness. The sand being used for mortar shall be sieved.
The mortar shall be used as soon as possible after mixing and before it has begun to set and in any case within initial setting time of cement after water is added to the dry mixture.

Mortar unused for more than initial setting time of cement, shall be rejected and removed from the site of work Cement mortar shall be prepared in accordance with IS-2250 by mixing cement, sand and water in specified proportions.
The mortar shall be consumed as soon as it is prepared. Unused mortar kept for more than 30 minutes shall be rejected, and removed from the work site.

c) Jointing:

Joints shall be restricted to a width of 10mm with Brick work of any classification. All bed joints shall be normal to the pressure upon them i.e. horizontal in vertical walls, radial in circular brick masonry and at right angles to the face in the battered retaining walls. The vertical joints in alternate courses shall come directly one over the other and shall be truly vertical. Care shall be taken that all the joints are full of mortar, well flushed up. In case no pointing is to be done, cement mortar shall be neatly struck as the work proceeds. The joints in faces which are to be plastered or pointed shall be squarely raked out to a depth of 12mm while the mortar is still green. The rake joints shall be brushed to remove loose particles.
After the day's work, the faces of the Brickwork shall be cleaned on the same day with wire brush and all mortar droppings removed.

d) Curing:

Green work to be well protected from rain and curing shall be carried out as per Specifications.

Masonry work, as it progresses, shall be kept thoroughly wet by sprinkling water at regular intervals, on all the faces. Curing shall be done after 24 hours of completion of day's work as per IS 2212.

2. STONE MASONRY

i) Stone

Stone to be used in masonry shall be trap, granite, quartzite, gneiss,laterite or any other type of good stone as specified in the BOQ or as approved by the Engineer. For all practical purposes good trap, granite, quartzite or gneiss shall be used unless specified otherwise in the BOQ.

All stones shall be free from defects like cavities, cracks, sand holes, flaws, injurious veins, patches of loose or soft materials, etc. The percentage of water absorption shall generally not exceed 5% (IS 1124).

The strength of building stones should be adequate to carry the loads imposed. Table 1 of IS 1597 gives the minimum crushing strength of approved stones. Minimum strength shall be 20 kg/mm2 unless higher minimum strength is specified in any case.

Stones used shall be small enough to be lifted and placed by hand. Length of the stones shall not exceed 3 times of the height, and the breadth of the base shall not be greater than three-fourths or the thickness of wall or less than 150 mm. The height of stones for stone masonry shall not be more than 300 mm.

Stones with round faces shall not be used.

ii) MORTAR

The cement, sand and water used shall meet the Indian standardSpecifications (IS 2250).

Mortar shall be prepared by mixing fine graded aggregate with cement in theproportion specified for respective items of work as detailed in BOW. Mixing of mortar shall be done by mechanical mixers only.

Mortars shall be specified by proportion. Volumetric mixing shall be based on dry volumes of each ingredient. For convenience, measurement shall correspond to volume of one cement bag i.e.,0.035 cu m. Boxes shall be of size (40 X 35 X 25) cm. These shall be marked as mortar mixing boxes by red paint and shall be used throughout the contract. Hand mixing or mechanical mixing proportion shall be done with the use of these boxes.

Cement mortar shall be prepared by mixing cement, sand and non shrinkage compound in specified proportions. Proportioning shall be carriedout as detailed above. Sand shall be added suitably to allow for bulkage if required. Bulkage shall be determined as specified in IS 2386 Part III. Cement and sand added to mixer shall be thoroughly mixed and water shall be added to it gradually. After addition of water the mixer shall run for a minimum of 3 minutes. The mortar mixed shall be consumed within 30 minutes of its mixing.

Stone Masonry- 1:6

Minimum compressive strength of masonry mortar shall be for 1:6 ratio is 3 N/mm2

iii) WORKMANSHIP

Dressing and shaping of stone shall be done before being used in masonry.
Quality of dressing and shaping shall be as approved by the Engineer In charge.All necessary chases for joggles, dowels and cramps should beformed in stone before hand.

Sufficiently wetted, cleaned stone shall be laid to lines, levels, curves and shapes as shown in the plans. Stones shall be laid on their broadest face in mortarand settled carefully in place with a wooden mallet. Clean chips and spells, carefully selected to fit in the spaces shall be wedged to avoid thick beds or jointsof mortar.

All connecting walls shall be raised together. In case one part is required tobe left behind, raking back at an angle of 45 degrees or less shall be done.

It is imperative to adjust levels right at the start to achieve correct levels of window sill, roof, etc. But as this is quite difficult to achieve, it shall be part of thestone masonry work to provide cement concrete sill of mix in a ratio of 1:4:8 (1 cement, 4 parts of sand and 8 parts of 20 mm graded aggregate) of 100 to 150 m thickness in consultation with the Engineer In charge.

Maximum thickness of joint shall be 20 mm for random rubble and 10 mm forcourse. Stones shall be set and laid by wooden hammer (mallet) and voids, if any, packed and consolidated by stone chips used shall not be more than 15% by volume of masonry.
Stones of full width of wall thickness shall be provided at every 600 mm center to center in each layer and staggered. For walls thicker than 600 m two through stones overlapping each other at a minimum of 150 mm shall be placed.

The work shall be in perfect plumb or battered as specified.
Corners stones shall be well-dressed and chiseled. These shall be laid header and stretcher alternate. They shall not be smaller than 0.025 cum and 300mm in length. Further it must be noted that 25% of the above shall be made fromdressed corner stones. Jambs shall be made from dressed corners.
Work of the day shall be raked to a depth of 20 mm while the mortar is green and cleaned with a string brush or wire brush. Stone surface shall be free ofmortar or cement coats.

Vertical joints shall be staggered.

At angular junctions, stones at each alternate course shall be well bondedinto the respective courses of the adjacent wall.

Masonry construction with very thin faces, tied up with occasional throughstones or filled up with dry packing or small size aggregates shall be strictly prohibited.
Storey rods showing the heights of all doors and windows and other necessary information has been used at the time of construction of masonry.

Door and window frames shall be fixed with hold fast of adequate size andstrength. Iron hold fast shall be treated with anti-corrosive coating and timber to prevent attack from insects and termites. In addition, hold fast shall be securely embedded in chases with cement concrete in a ratio of 1:2:4. Frames shall preferably be fixed simultaneously as work proceeds.

iv) Mixing

The mixing of mortar shall be done in mechanical mixtures operated by power or manually as decided by the Engineer. The engineer may however, permitand hand

mixing at his discretion considering in nature, magnitude and location ofwork and practicability of the use of mechanical mixtures.

In case, where mechanical mixers are not to be used, the contractor shall take permission of the engineer in writing before the commencement of the work.

a) Hand Mixing

The measured quantity of sand shall be leveled on a clean water tight platform and cement bags emptied on top. The cement and sand heap shall be thoroughly mixed dry by being turned over and over, backward and forwards, several times till the mixture is of a uniform colour. The quantity of dry mix whichcan be used within 30 minutes, shall then be mixed in a masonry through with sufficient amount of water to a stiff paste of necessary working consistency.

v) Protection and Curing

Green work shall be protected from rains by suitable covering. Masonry in cement or composite mortar shall be kept constantly moist on all the faces for a minimum period of seven days. The top of masonry shall be left flooded with water at close of the day. Care shall be taken not to disturb or wash out green mortar. In case of stone work in lime mortar, curing shall commence two days afterlaying of masonry and shall continue for the next seven days.

Proper necessary curing for the Masonry Brick work construction day to day prior to the plaster work.

SCHEDULE VI

FINISHING WORKS

1.SCAFFOLDING:

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

2.PREPARATION OF SURFACE:

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

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

3.ORDINARY CEMENT PLASTER:

The preparation of surface shall be as stated above. The thickness and preparationof plaster shall be as specified in the schedule of items.

The mortar shall be applied evenly with force on the surface to be plastered. The mortar surface shall be finished at once by rubbed over with a trowel till the cement appears on the surface. All corners, angles and junctions shall be truly vertical & horizontal as the case may be neatly finished. Rounding of corners andjunctions where required shall be done without extra charge. The mortar shall adhere to the surface intimately when set and there should not be hollow sound when struck.

4.PAINTING WORKS:

Preparation of surface

All damaged portions of the surface plaster shall be removed to full depth of plaster in rectangular patches and plastered again, all holes and cracks, patches etc. not exceeding 0.1 sq. mm area shall be made good with materials similar to that of the surface. Surface affected by efflorescence, moss, fungi, algae, etc. shall be cleaned before painting. The surface shall, be thoroughly cleaned of all dirt, dust, mortar droppings and other foreign matters before whitewash is to be applied.

Preparation of White Wash:

The fat lime conforming to IS: 712 shall be slaked at site and shall be mixed andstirred with about S liters of water for 1 kg of unslaked lime to make thin cream. This shall be allowed to stand for a period of 24 hours and then shall be screened through a clean coarse cloth. 4 kg of gum dissolved in hot water shall be added to each cubic meter of lime cream. Approved quality ultramarine blue conforming toIS 55 @ 3 gram per kg of lime shall also be added to the solution. The whole solution shall be stirred thoroughly before use.

Application:

White wash shall be applied with "MOONJ" brush to the specified number of coats.The operation for each coat shall consist of stroke of the brush from the top to down wards, another from the down to upwards over the first stroke, similarly one stroke horizontally from right and another stroke from the left. Each coat shall be allowed to dry before the next coat is applied. The white washing on ceiling shouldbe done prior to that on walls

Protective measures

Surfaces of doors, windows, floors etc. which are not to be white washed shall be protected from being splashed upon. Such surfaces shall be cleaned of white washsplashed if any.
Colour washing:Scaffolding
Wherever scaffolding is necessary, it shall be erected in such d way that as far aspossible no pan of scaffolding shall rest against the surface to be white/ colour washed. For white washing of ceiling, proper stage scaffolding shall be erected.

Preparation of surface:

All damaged portions of the RCC Surface shall be removed to full depth of rectangular patches and repaired again, all holes and cracks, patches etc. not exceeding 0.1 sq. mm area shall be made good with materials similar to that of thesurface. Surface affected by efflorescence moss, fungi, algae, etc. shall be cleanedbefore painting. The surface shall, be of all dirt, dust, mortar droppings and other foreign matters shall be removed or cleared from the RCC surface.

Sufficient quantity of colour wash enough for the complete job shall be preparedin one operation to avoid any difference in colour. The basic white wash solutionshall be prepared in accordance with clause 2.1.3. Mineral colors of approved shade and quality not affected by lime shall be added to the white wash solution inproportions as directed by Engg.in-charge. Solid lumps etc. in the colour powder shall be ground to fine powder, sieved and mixed evenly and thoroughly to the white wash solution.

Application of Colour Wash:

Colour wash shall be applied with "MOONJ" brush to the specified number of coats. The operation for each coat shall consist of stroke of the brush from the top to down wards, another from the down to upwards over the first stroke, similarly one stroke horizontally from right and another stroke from the left. Each coat shallbe allowed to dry before the next coat is applied. The white washing on ceiling should be done prior to that on walls.

Protective Measure:
Surfaces of doors, windows, floors, walls etc. which are not to be white washed/colour washed shall be protected from being splashed upon. Such surfacesshall be cleaned of white wash splashed if any.

5. Interior Premium Plastic Emulsion
Paint:Surface preparation

The surface shall be thoroughly brushed free from dust, dirt, grease, mortar droppings and other foreign materials and shall be made smooth by sand papering. Preparation of surface consists of application of plaster of Paris punning over entire surface, filling all holes and depressions with plaster of Paris, applying a coat of cement primer, two or more coats of water-based cement putty over entire surface, (as per manufacturer's recommendations to give paste like putty) sand papering etc.The surface shall be allowed to dry before the regular coat of paint is allowed.

Application of Premium Emulsion Paint:

The paint mix shall be continuously stirred while applying for maintaining uniform consistency. Number of coats shall be as specified. The painting shall be laid evenlyand smoothly by means of crossing and laying off. The crossing and laying off consists of covering the area with paint, Boniface hard at first, then brushingalternately in opposite direction 2 to 3 times lightly in a direction at right angles to the same. In this process, no hair marks no clogging of paint puddles shall be permitted. The full process of "Laying off will constitute one coat. The paint shallbe applied by means of brush or roller. The Surface on finishing shall present a flat, velvet. The surface on finishing shall present a flat, velvety smooth finish, even and uniform shade without patches, marks, paint drops etc.

Precautions:

Brushes shall be quickly washed in water immediately after use and kept immersedin water during break periods to prevent the paint from hardening on the brush. Oldbrushes, if used shall be completely dried of turpentine/oil paints by washing in warm soap water. No oil base putties shall be used in filling cracks/holes. Washing of painted surface shall not be done within 3 to 4 weeks of application.

Protective Measures:
Surfaces of doors, windows, floors etc. which are not to be white washed shall be protected from being splashed upon. Such surfaces shall be cleaned of white washsplashed if any.

6. OIL Bound Distemper:

Scaffolding

Wherever scaffolding is necessary, it shall be erected in such a way that as far aspossible no part of scaffolding shall rest against the surface to be white/ colour washed. For OBD of ceiling, proper stage scaffolding shall be erected.

Surface preparation

The surface shall be thoroughly brushed free from dust, dirt, please, mortar droppings and other foreign materials and shall be made smooth by sand papering. All surfaces shall be made pod of uneven plaster, with 2 coats of putty mixed with water. The surface shall then be rubbed down again within plaster with a fine gradesand paper and made smooth. A coat of distemper shall be applied over the patches.The surface shall be allowed to dry before the regular coat of distemper is allowed.

Primer Coat

The primer coat shall be alkali resistant primer or distemper primer and shall be of the same manufacture as oil bound distemper. If the wall surface plaster has not dried completely, alkali resistant primer otherwise distemper primer shall be applied.The mixture of alkali resistant primer shall be prepared as per approved manufacturer's instructions. The white wash imp on ceiling should be done prior to that on walls.

Application of OIL BOUND DISTEMPER:

The distemper shall conform to IS: 428 and shall be diluted with water or any otherprescribed thinned recommended by the manufacturer. Preparation of surface in general shall be as described. After the primer coat has dried for at least 48 hours, minimum two costs ofapplied with double bristle brush or roller in horizontal strokes follow ed by together form one coat, the subsequent coats to be applied after at least end consecutive coats to permit proper drying of the preceding coat. Two coats over the primer coat by brush or roller.

Protective Measures

Surfaces of doors, windows, floors etc. which are not to be white washed shall be protected from being splashed upon. Such surfaces shall be cleaned of white wash splashed if any.

7..Acrylic based exterior emulsion paint:

Material

It shall be an acrylic based wall coating for exterior surfaces consisting of pure acrylic resin and additives to form a crack free, flexible, touch, alkali resistant, UVresistant waterproof coating.

Preparation of Surface

The surface to be coated shall be cleaned and all dirt, dust, grease and loose particles shall be removed. Any old paint shall be removed with removing agent as per manufacturer's instructions. The surface affected by moss, fungus, algae, efflorescence shall be treated in accordance with IS: 2395.

Application

A primer coat of similar shade shall be applied as per manufacturer’s specifications. The paint shall be stirred to a uniform consistency. Two coats shall be applied over the primer coat by brush or roller. Each coat shall be applied after the previous coat has dried completely. The coverage of paint and application shallbe strictly as per manufacturer's specifications.

8. Textured wall coating:

Preparation of surface

The surface to be coated shall be free from dirt, dust, grease and loose particlesshall be removed

Application
Bonding agent and water shall be mixed first, then, the flakes / granules shall be added and mixed thoroughly and kneaded till no lumps are found. The dough shallbe left for 20-30 minutes before starting application. The bonding agent flakes / granules and water shall be mixed in different ratios for different finishes as per manufacturer's specifications. The first application shall be by steel trowel. It shallbe smoothed, if the specified finish requires, by a plastic trowel. However, the granules / flakes etc., bonding material, mixing, method of application, surface preparation etc., shall be as per manufacturer's re-commendations and specifications.

9. CEMENT PAINT:

PREPARATION OF SURFACE

For new work, the surface shall be thoroughly cleaned of all mortar dropping, dirt,dust, algae, grease and the foreign matter by brushing & washing.

The surface shall be thoroughly wetted with clean water before the cement paint is applied. In the case of old work, all loose pieces and scales shall be cleaned of all dirt, dust, algae, oil etc. by brushing & washing. Pitting in plaster shall be made good and a coat of water proof cement paint shall be applied over patches after wetting them thoroughly.

PREPARATION OF MIX

Cement paint shall be mixed in such quantities as can be used up within an hour ofits mixing as otherwise the mixture will set & thicken, affecting flow & finish.

Cement paint shall be mixed with water in two stages. The first stage comprises of 2 parts of cement paint and one part of water stirred thoroughly & allowed to standfor five minutes. Care shall be taken to add the cement paint gradually to the waterand not vice-versa. The second stage shall comprise of adding further one part of water to the mix and stirring thoroughly to obtain a liquid of workable and uniformconsistency. In all cases the manufacturer's instructions shall be followed meticu- lously.

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

APPLICATION:

The solution shall be applied on the clean and wetted surface above 1 coat of grey cement wash with brushes or spraying machine. The solution shall be kept well stirred during the period of application. It shall be applied on the surface which is on the shady side of the building so that the direct heat of the sun on the surface is avoided. The method of application of cement paint shall be as per manufacturer's specification. The completed surface shall be watered after the day's work.

The second coat shall be applied after the first coat has been set for at least 24 hours before application of the second or subsequent coats, the surface of the previous coat shall not be wetted.

For new work, the surface shall be treated with three or more coats of water proof cement paint as found necessary to get a uniform shade.

PRECAUTION

Water proof cement paint shall not be applied on surfaces already treated with white wash, colour wash, distemper dry or oil bound, varnishes, paints etc. It shall not be applied on gypsum, wood and metal surfaces.

SCHEDULE VII

FLOORING:

1. PCC FLOORING:

Flooring shall be laid in average 100 mm thickness over sub base (as per structural drawings/ specifications) and shall generally conform to IS: 456. The flooring shall be laid in panels and shall consist of:

100 mm thick base course of M-15 (1:3:6) grade cement concrete (with 20 mm and downsize stone aggregate) laid on the sub-base in area as desired shape and pattern approved by Engineer-In Charge. The required levels, slopes, linearity etc to be maintained for drainage or water. Cement concreteshall be placed in position and beaten with trowel, including tamping and finishing smooth. Finishing of the surface shall follow immediately after completion of laying of base. The bed for flooring shall be prepared either level or sloped as per drawings and as instructed by Engineer-in-charge.

Neat cement @ 2.75Kg. per Sq. Mr. mixed with water to form a thick slurry applied over the base course (when the concrete is green), spread over the surface, pressed twice by means of iron floats; once when the slurry is applied and second time when the cement starts setting.

The junction of floor with wall plaster, cladding, skirting shall be rounded off uniformly up to a radius of 25mm unless otherwise mentioned. Each finished portion of floor, on completion shall be kept wet with ponding for a minimum period of 7 days.

2. KOTA STONE FLOORING:

Stone flooring shall be laid in minimum 40 mm overall thickness or subbase (as per Indian standard code specification), The kota stone slab shall be of selected quality and shade, hard, sound, dense are to be in homogeneous texture with free from cracks, decay, weathering and flex. This shall be machine cut to the requisitesize and thickness and chisel and dressed. For flooring and skirting/dado/riser the thickness of the stone slabs shall be 25 mm and 18 mm respectively. Skirting shallnormally be 125 mm high unless specified otherwise.

KOTA STONE PREPARATION:

Preparation of base shall include making it rough, cleaning thoroughly and applying neat cement slurry @ 2.75 kg of cement per Sq.M. of area to receive the mortar. Cement mortar shall be 15mm thick:6 (1 cement: 6 Coarse sand by volume) for flooring and 12mm thick 1:3 (1 cement: 6 Coarse sands by volume) for skirting. The mortar shall be laid for fixing one slab at a time. The slab shall bewashed clean before laying. It shall be laid over cement mortar bedding on top, pressed, tapped gently to bring it in level. It shall be then lifted and laid aside. Topsurface of the mortar then shall be corrected by adding fresh mortar at hollows and depressions. The mortar then shall be allowed to harden and cement slurry of honey like consistency @ 4.4.kg of cement per Sq. M shall be spread over the mortar. The edges of the slabs shall be buttered with white cement (with necessarypigment) grout to match the shade of the slabs. The slabs shall then be gently placed in position and tapped with wooden mallets till

it is properly bedded in level. The joints shall be as fine as possible. Surplus cement on the surface of the slab shall be removed. The slabs in flooring shall continue for not less than 10 mmunder the plaster/skirting. The finished surface shall be true to levels and slopes asinstructed by the Engineer-in-Charge. Cut size may be used along periphery as required. Curing, as required shall be done.

3. Glazed / Unglazed / Vitrified tile Flooring, Dado / Skirting / FaciaMaterials Tiles:

The tiles shall be of approved make as specified and shall generally conform to relevant Standards. They shall be flat and true to shape free from cracks, crazing spits, chipped edges and corners. The glazing shall be of uniform shade. The tiles shall be as specified in the schedule of quantity or drawings. The length of all four sides shall be measured correct to 0.1mm and average length breadth shall not vary more than +0.8 mm from specified dimensions. The variation of individual dimensions from average value of length/ breadth shall not exceed +0.5 mm.

Tolerance in thickness shall be (+) 0.4mm. The thickness of the tile shall not be less than as specified in the items and shall conform to in all respects. Samples oftiles shall be got approved by the Engineer-in-charge before use on the work.

Preparation of Surface and laying of vitrified Tiles:

Sub grade concrete or RCC slab or side brick wall / or plastered surfaces on whichtiles are to be laid shall be thoroughly hacked, cleaned of all mortar scales, concrete lumps etc. brushed, washed with water to remove mud, dirt etc. from the surface, wetted and mopped. 12mm thick plaster of shall be applied allowed to harden minimum for 48 hours. The plaster shall be roughened with wire brushes or by scratching diagonal lines 1.5mm deep at 7.5 mm centre both ways. The back of tiles shall be buttered with a coat of grey cement slurry paste and edges with white cement slurry and set in the bedding mortar. The tiles shall be tapped and correctedto proper planes ad lines. The tile shall be butt jointed in pattern and joints shall beas fine as possible. The top of skirting /dado shall be truly horizontal ad joints trulyvertical. The joints shall be pointed with cementations grout of matching colour.

After a period of curing of 7 days minimum, the tiles shall be cleaned and shall notsound hollow when tapped. The surface during laying shall be checked with a straight edge 2m long. The surface of skirting shall be kept flush with plaster with chipping of brick work / concrete wherever required. After the tiles have been laid,surplus cement grout shall be cleaned off.

Mortar and Bedding:

Cement mortar for bedding shall be of proportion specified in items schedule ad shall conform to the specification for materials, preparation etc. as specified undercement mortar. The amount of water added while preparing mortar shall be the minimum necessary to give sufficient plasticity for laying. Care shall be taken in preparation of the mortar to ensure that there are no hard lumps that would interfere with even bedding of the tiles. Before spreading the mortar bed, the baseshall be cleaned of all dirt, scum or laitance and loose materials and well wetted without forming any pools of water on the surface. The mortar of specified proportion and thickness shall then be even add smoothly spread over the base by use of screed battens to proper level or slope. Cement mortar of thickness and proportion as per requirement for dado

shall be applied to the wall after preparingthe wall surface as specified under cement plaster 20mm thick and brought to correct line and plumb and the surface left rough to receive the tiles.

Cleaning:

After the tiles have been laid in a room or the day fixing work is completed, the surplus cement grout that may have come out of the joints shall be cleaned off before it sets. After the complete curing, the dado or skirting over shall be washed thoroughly clean, In the case of flooring, once the floor has set, the floor shall be carefully washed clean and dried. When dry, the floor shall be covered with oil free dry saw dust. It shall be removed only after completion of the construction work and just before the floor is used

SCHEDULE VIII

STEEL WORK – {For Package-A, MDM shed for Chhara School}

1.FABRICATION

All materials shall be straight and if necessary, before being worked shall bestraightened and/or flattened by pressure, unless required to be curvilinear form and shall be free from twists.

CLEARANCE

The erection clearance for cleaned ends of members connecting steel to steel should be preferable not greater than 2mm at each end, the erection clearance at ends of beams without web cleats should be not more than 3mm at each end and where for practical reasons, greater clearance is necessary suitable designed seating should be provided.

Where galvanized bolts are used, the holes may be made not more than 2mmgreater than the diameter of the bolts unless otherwise specified by the Owner / Owner Representative.

CUTTING

Cutting may be effect by shearing, crapping or sawing, gas-cutting by mechanically controlled torch may be permitted for mild steel only. Gas cutting of high tensile steel shall not be permitted unless special care is taken to leave sufficient metal to be removed by machining so that all metalthat has been hardened by flame is removed. Hand flame cutting may be permitted subject to approval of the Owner Representative. Except where the material is subsequently jointed by welding no load shall be transmittedinto metal through a gas cut surface.

Shearing, cropping and gas cutting shall be clean, square and free from anydistortion and should the Owner / Owner Representative find it necessary the edges shall be ground afterwards.

The edges of plates that have been cut, when the plate is subjected to dynamic or fatigue loading, shall be machined over the full thickness.

PROTECTIVE PAINTING AND ERECTION

The specified protective treatment shall be completed after erection. All bolt heads and the site welds after de-slagging shall be cleaned. Damaged paint surfaces shall first be made good with the same type of paint as the shop coat.All site welds and not heads after proper cleaning shall receive one coat of shop paint, before application of protective painting.

Site protective painting should not be done in frostily of foggy weather or when humidity is such as to cause condensation on the surfaces to be painted.

Second coat of protective paint shall be applied after the first coating iscompletely dry.

MARKING

Each piece of steel work shall be distinctly marked before delivery in accordance with a marking diagram and shall bear such other marks as will facilitate erection viz. the relevant drawing number, its orientation where erect-ed, its weight when this exceeds 5 tons etc.

SHOP ERECTION

The steel work shall be temporarily shop erected or as arranged with Owner / Owner Representative so that accuracy of fit may be checked before dispatch.The parts shall be shop assembled with a sufficient number of paralleled driftsto bring and keep the parts in place.

PACKING

All projection plates or bars and all ends of members at joints shall be bundled.All screwed ends and machine surface shall be suitably packed & all nuts, washers and small loose parts shall be packed separately in cases so as to prevent damage or distortion during transit.

The Owner / Owner Representative shall have free access at all reasonable times to those parts of the Contractor / Manufacturer’s works are concernedwith the fabrication of the steel work and shall be afforded all reasonable facilities for satisfying himself that the fabrication is being undertaken in accordance with the provisions of this standard.

Unless specified otherwise, inspection shall be made at the place of manufacture prior to dispatch and shall be conducted so as to not interfereunnecessarily with the operation of the work.

The Contractor / Manufacturer shall guarantee compliance with the provisionsof this standard if required to do so by the Owner / Owner representative.

Should any structure, or part of a structure be found not to comply with any ofthe provisions of this standard, it shall be liable to rejection. No structure or part of the structure, once rejected shall be resubmitted for test except in caseswhere the Owner / Owner Representative or his authorized Representatives considers the defect as rectifiable. Defects which may appear during fabrication shall be made good with the consent of the accordance to the procedure laid down by the Owner Representative.

All gauges and templates necessary to satisfy the Owner / Owner Representative shall be supplied by the Contractor / Manufacturer. The Owner / Owner Representative may, at his discretion, check the test results obtained atthe manufacturer's works by independent tests at the Government Test House or elsewhere and should the materials so tested be found to be unsatisfactory, the costs of such tests shall be borne by the Contractor / Manufacturer, and if satisfactory, the cost shall be borne by the Owner.

ERECTION:

STORING AND HANDLING

All structural steel should be so stored and handled at the site that the membersare not subject to excessive stresses and damage. The mode of storing and handling operation must satisfy the Owner / Owner Representative.

SETTING OUT:

The positioning and leveling of all steel work, the plumbing of stanchions andthe placing of every part of the structure with accuracy shall be in accordance with the approved drawing and to the satisfaction of the Owner / Owner Representative. If not stated otherwise in the drawing, the maximum toleranceetc. will be as follows:

The maximum tolerance for line and level of the steel work shall be plus or minus 3mm on any part of the structure. The structure shall be not out of plumb by more than 3mm on any part of the structure. The structure shall benot out of plumb by more than 3mm on each 15mm section of height and notmore than 5mm for the entire height. The final positioning of the structure including level should require the approval of the Owner / Owner Representative.

DURING ERECTION:

During erection, the steel work shall be bolted or otherwise fastened and shown necessary temporarily braced to provide for all loads to be carried by the structure during erection including those due to the erection equipment andits operation.

No permanent bolting or welding should be done until paper alignment hasbeen obtained.

FIELD CONNECTIONS

All field assembly and welding shall be executed in accordance with the requirements for shop fabrication excepting such as manifestly apply to shop conditions only. Where the steel has been delivered, painted, the paint shall beremoved before field welding for a distance of at least 50mm on either of the joints.

SCHEDULE IX

PAINTING FOR STEEL WORKS {For Package-A, Chhara School}

EXTENT AND INTENT

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

STORAGE

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

MATERIALS

Materials used in the work shall be of manufacture approved by the Owner. 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, colour of paint and instructions for reducing. Thinning shall be done only in accordance with directions. Remove rejected materials immediately from the premises.

COLOUR

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

COMMENCEMENT OF WORK

Painting shall not be started until the surfaces to be painted are in a condition fit to receive painting and so certified by the Owner. Painting work shall be taken in hand only after all other builder's work is completed. Buildings wherepainting work is to be commenced shall be thoroughly swept and cleaned up before commencement of painting.

SCAFFOLDING

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

All the vertical and horizontal members of the scaffolding shall be placedsufficiently away from the surfaces to be painted to ensure proper and uninterrupted application.

WORKMANSHIP

The workmanship shall be of the very best, all materials evenly spread and smoothly flowed as without runner sags, using good quality tools, brushes, etc., as required. Only skilled painters shall be employed. A properly qualifiedforeman shall be constantly on the job whilst the work is proceeding. All surfaces to be painted shall be cleaned free of all loose dirt and dust before painting is started.

All work where a coat of material has been applied must beinspected and approved before application of the succeeding specified coat.
Each undercoat shall be distinct shade of the approved colour.

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

CONCEALED SURFACES

All interior and exterior trim, door frames, doors, shelving, cabinet work shallbe thoroughly and carefully back painted as all surfaces and edges which willbe 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

Contractor shall protect not only his own work all times, 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 should be cleaned and theoriginal finish restored. He shall remove from the premises all rubbish and accumulated material and shall leave the work in clean, orderly and acceptable conditions.

PREPARATION OF SURFACES

WOOD: Sandpaper to a smooth even surface and then dust-off and wipe clean. Touch up all knots and pit pockets with shellac on interior wood and without de-sealer on exterior work. After priming coat has been applied thoroughly fill all nail holes, irregularities and cracks. Use plaster wood filler for stained or naturalfinish and putty for painted work.

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 andsand papered clean. All cleaned surfaces shall be given one coat of approved phosphate before prime coat in accordance with the manufacturer's instructions. Shop coats of paint that have become marred shall be cleaned off, wire brushed, and spot primed over the affected areas.

APPLICATION

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

The painting 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 forthe first time and then brushing alternatively in opposite directions, two or threetimes 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 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 shallbe brought to the requisite consistency by adding a suitable thinner. Spraying shall be carried out only in dry conditions. No exterior painting 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 too thoroughly dry. Second coat shall be of suitable shade to match final colour and shall be approved by the Owner 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 Owner more time is required it shall be allowed. Finishedsurfaces shall be protected from dampness and dust until completely dry.
Finished work shall be uniform, of approved colour, smooth and free from runs,sags, defective brushing and clogging. Make edges of paints adjoining other materials of colour 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 shallbe approved quality and manufacture and shall be applied to the surface with a knife or other sharp edge tools after the priming coat as well as after each undercoat. The surface, after filling with putty/paste filler, shall be rubbed down with fine sandpaper 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 thenwith the grain to secure a clean surface. Surface to be stained shall be covered with a uniform coat of stain wiped off if required. The painted surfaces shall be finished to required texture. Glossy finish shall be achieved by use of sponge rollers or stippling brushes as called for.

TYPES OF PAINT FINISHES

ENAMEL PAINT:

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

Galvanized Steel Surfaces: Priming coat of galvanized metal primer after washing with galvanized metal cleaner, followed by three or more coats of synthetic enamel paint. Paste filler to be applied after every coat excepting finalfinishing coat and sanded.

SECTION-X

ELECTRICAL WORKS

Work under this section shall include all Supply,Providing, installation, testing,delivery and commissioning in perfect running conditions of the electrical installations for subject project.Complete electrical installations for all lighting,sockets, power outlets, Lighting fixtures,Main Distribution Boards (MDB),Panels, Conduits, Wiring,Light/Fan fittings, Earthing,Switches, sockets,fixing of Fuse-units/Meters/Panels/DBs/MCCBs/MCBs. The supply shall include all the equipment, accessories and other materials not enumerated in these specifications but found necessary for the completion and perfect functioning of the installations

Generally, all the works is to be in accordance with the requirements of the Specification and directed by Engineer-In charge Client/Pmc.

1.Contractor to prepare shop drawings (with layout and detailed dimensions) at his own cost and take written approvals from Client/PMC on his shop drawings, before start of his scope of works. If contractor executes any work without getting his shop drawings approved from CLIENT/PMC and later if any changes are being asked to contractor in his executed works, contractor to rectify the executed works as per CLIENT/PMC instructions without any extra cost to client.

2.Contactor must do required Excavation/PCC/Chamber-making-masonry-work/Smooth-Plastering/Back-filling-of-trenches for laying his underground/ground-level cabling, at his own cost. Contractor must do required Wall-chiseling/Leaving-sleeves for his scope of electrical works, at his own cost. Properly levelled plastering over the laid wall-conduiting is in scope of contractor and also full length of chiseled-walls & around switch boxes for fixing of his wall-conduits/switch-boxes at his own cost.

3.Conduits being laid inside slabs/beams (concealed conduits) must be tied to adjacent reinforcement-bars using 14-gauge GI wire (@ 350mm c/c). If any choke-up is observed in any concealed conduit, contractor is allowed to try opening it using the water-jet method only if POP/Gypsum is not done in ceiling/wall. Contractor may use any other safe & dry method to open-up such choked points, else he must lay fresh conduit for the points thru the flooring, at his own cost.Contractor must keep one of his persons during the casting of slab/beam/column so that he can ensure quality work for concealed conduit work.

After installing wall-conduits and after connecting the wall-conduits with concealed-slab-conduits (wherever it is required) contractor must pass 6mm thick Nylon-Rope-Wire thru each conduit and get it checked from Client/Pmc engineer-in-charge. All such Nylon-Rope-5.Wires

must be left inside the concealed conduits and must be taken out only after laying wires in the conduits. Wall-conduit laying bill will not be paid unless contractor get such verification done from Client/PMC Engineers. MS/GI Fish-wire must not be used anywhere. Nylon-Rope-Wire to be brought by contractor at his own cost. This will not be paid as extra item.

6.Supply,delivery,installation,termination,connection, testing, commisioning cable supply,cable laying,Distribution of power from Main panel to all buildings including new facilities and connection with existing Grid or Electrical system shall be done the contractor.

Main Power distribution boards shall conform to the stipulations of IS 732 or as approved by the Engineer Incharge at site. These shall be weatherproof and dust-proof and IP protection mentioned in item specification or technical specification.The panel shall be provided with all necessary arrangements and accessaries for the complete coonection in all respect.

7. Supply,Providing Electrical Connection ,and Commisioning of LED flood light with Supply of wire cable arrangements,Pipe supports/Pole stands for the light and necessary circuit breacker in outer area with complete set up power connection from existing..etc.,.

8. Supplying,Providing of Electrical connection and commisioning of 5 stage single reverse osomosis water purification system with necessary cable arrangements,switches,sockets,DBs for the complete operation ROplant and connection to Existing Power system.

9.Supply, Provding Electrical Connection and commisioning for water pump Set manufacturing As per IS standard including non return valve sluice valve flexible cable as per required volt meter capacitior stater switch pressure gauge with accessories of approved manufacture tools of 1.0 HP capacity with Supply,providng of necessary cable laying,switch,socket arrangments and complete earthing including earthing pits and connection to Existing Power system

10.Earthing with 40mm dia G.I Pipe of 3mtr long perforated on all sides.The Earthpit should be filled with alternate layers of charcoal, salt,&soil.The masonry chamber is to be covered with CI Cover of minimum 300x300mm size with all accessories & as per direction of Engineer in charge/PMC.Earthing strip 50x6mm to be provided with all necessary arrangements and requirements

ELECTRICAL EXECUTION:

POINT WIRING (LIGHT, FAN & PLUG)

The point wiring shall be confirmed IS: 5908 - 1970. A point shall consist of the branch wiring from the branch distribution board (switch board) together with a switch as required, as far as and including the ceiling rose or socket-outlet or suitable termination. A three-pin socket-outlet point shall include, in addition, theconnecting wire or cable from the earth pin to the earth stud of the branch distribution board. The installation shall generally be carried out in conformity with the requirements of the Indian Electricity Act, 1910, as amended up to date and the Indian Electricity Rules, 1956. The point wiring shall be carried out in theunder mentioned manner:

Supply, installation, fixing of conduits with necessary accessories, junction/inspection/switch/outlet boxes.

Supplying and drawing of wires of required size including insulated earthcontinuity wire.

Supply, installation and connection of flush type switches, sockets, coverplates, switch plates fan regulators etc. as specified.

The point shall be complete with branch wiring from the first switch board tothe outlet point through another loop. Switch boards, if necessary, in a circuit, conduit with accessories, junction, inspection boxes, control switch, socket outletboxes, ceiling roses, connector etc.

For Concealed type electric point wiring the Groove should be done by usingStone Cutter Machine.

Unless otherwise mentioned, the system of wiring shall consist of single core 650/1100-volt grade PVC insulated wire with Aluminium/copper conductor laid through exposed surface mounted/concealed in wall and ceiling rigid PVC pipe/rigid steel conduits/PVC oval conduit/PVC casing-N Capping/trunking/FIA approved PVC pipe etc. as specified. The rigid PVC pipe/rigid steel conduits/PVC oval conduit/PVC casing-N-Capping/trunking/FIA approved PVC pipe shall confirm to IS:9537/I.S.S. with minimum wall thickness of 1.5mm.

The corresponding accessories shall confirm to IS:3419. The minimum diameter of pipe shall be 20mm. The steel conduit and accessories shall confirm to IS:1653- 1964 and IS:3837-1966 as amended up-to-date respectively. The PVC trunking (PVC casing-N-Capping) shall be with double locking arrangement with grooves of size not below 1.5mm. in height confirm BS:4678 Part-4 of 1982 and with accessories of PVC/Resin polypropylene not below 1.8mm. thick duly sealed at joints. The wiring shall be as per colour code viz. Red for R phase, Yellow for Y phase, Blue for B phase, Black for neutral, Green for earth, Grey for control, white for bell point and all off wires shall be same as phase wire. The wiring shallbe done in a looping manner. All looping shall be made only in switch boards. The switches and socket outlets shall be shockproof flush type/Modular type/molded plate type with silver-coated contacts with ISI Marked IS:3854. The Conduit run on surfaces shall be supported on metallic 1.2mm. thick saddles/heavy duty PVC saddles which in turn shall securely screwed to wall or ceiling. Saddles shall be at intervals of not more than 500mm. Fixing screws shallbe with round or cheese head and of rust-proof materials. No cross-over of conduits shall be allowed. Unless it is

unavoidable. The entire conduit installationshall be clean and neat in appearance. The Conduits embedded into the walls shall be fixed by means of staples at intervals of not more than 500mm. Chases inthe walls shall be neatly made with electrically operated masonry wall cutter and shall be refilled after laying the conduit with suitable mortar and brought to the finish of the wall. Conduit buried in concrete structure shall be put in position and securely fastened to the reinforcement.

Proper care shall be taken to ensure that the conduits are neither dislocated nor choked out at the time of pouring concrete necessary fish wire shall be drawnin all conduit run. The all materials and accessories used shall confirm to Indian Standard Specification. All types of wiring shall be capable of easy inspection. The open (unconcealed) wiring shall run along with walls should run as near the ceiling as possible. All runs of wiring and the exact positions of all points and switch boards shall be first marked on the building and got approved from the in charge electrical engineer before actual commencement of work. The conduit forpoint wiring shall have a nominal cross-sectional area not less than either 1.00 mm2 copper or 1.5mm2 aluminium as specified.

For open type switch boards shall not be erected within 2.5 meter of any washing unit or in bathrooms lavatories on toilets or kitchens. The switch block shall be PWD type with best seasoned teak wood or other durable wood with solid back thoroughly protected both inside and outside with good insulating varnish shall be provided. There shall be a clear distance of not less than 25mm between the teak wood board and cover. All the joints of board shall be dovetailed. The wooden block shall be covered with 3 mm thick laminated sheetfirmly screwed on four corners with the help of chrome plated counter shunt round headed steel screws. For large size switch boards laminated sheet shall bescrewed at six plates.

Where so specified, the switchboards shall be recessed in the wall for concealed type wiring. The front shall be fitted with 3 mm thick laminated sheet. Ample room shall be provided at the back for connection and at the front betweenthe accessories mountings. The concealed base shall be of either 16-gauge M.S. or teak wood as specified or instructed.

The Maximum load of each circuit shall not exceed 800 watts and maximumpoints of each circuit shall not exceed 10 points. Where wiring passes through wall, care shall be taken to see that wire pass very freely through protective pipe[rigid steel conduit / rigid PVC pipe / porcelain tube] and that the wires pass through without any twist or cross in wires, or either ends of holes. The general and technical specification given in the tender booklet shall also beconsidered as a part of agreement. All the wiring materials shall be of approvedmake as specified in the tender booklet or as approved by in-charge Electrical Engineer.

The Rigid PVC/FIA Approved PVC pipe shall confirm IS:2509 or ISI markeda specified Rigid PVC pipe shall be 1.5 mm to 1.6 mm. thick manufactured from high grade PVC. The diameter of PVC pipe/FIA Approved shall be as per specified. Fittings for rigid PVC/FIA Approved pipe such as bends, elbows, nipples, couplings, reducers, plugs etc. shall be specifically designed and manufactured for their application. All fittings shall confirm to IS:3415. The rigid PVC/FIA Approved pipe shall be erected on wall/ceiling with properly screwed heavy duty rigid PVC saddles at the intervals not more than 500mm. and pipes topipes and pipes to fittings shall be fixed with adhesive solution. 16gauge G.I. fishwire shall be erected with erection of pipe as a drawer wire. The installation of pipes shall be as per IS:4648, IS:732 and IS:1646.

The PVC pipe/FIA Approved shall erected concealed in wall/ceiling or for open execution as specified and as per instruction of in-charge-electrical engineer.

The general specifications given in the tender booklet shall also be considered asa part of agreement. The PVC pipe/FIA Approved and fittings shall be of approved make as specified in tender booklet or as approved by in-charge- electrical engineer. For Concealed type electric point wiring the Groove should be done by using Stone Cutter Machine.

The computer board should be consisting of 1 No. 5A/15A Universal plug switch combined with fuse and indicator, 4 Nos. 5A switch & 4 Nos. 5A type 5pin Plug. In single board erected on MODULAR fitting Board sheet as directedby Engineer In-Charge.

Distribution boards shall be fabricated from 18-gauge M.S. sheet or shall be readymade as specified in the make of material list. It shall be of double door type with hinged (lockable if required) door suitable for recessed mounting in wall. Distribution boards shall be powder coated with 7-tank process application. The distribution boards shall be provided with phase barriers, wiring channels to accommodate wires and individual per phase neutral links. There shall be separate or individual earth link as per requirement. Proper arrangement shall be made for mounting of MCB's and other accessories. Distribution boards shall meet with the requirements of IS 2675 and marking arrangement of bus bars shallbe in accordance with I.S. standards. Bus bars shall be suitable for the incoming switch rating and sized for a temperature rise of 35° Cover the ambient. Each board shall have two separate earthing terminals. Circuit diagram indicating the load distribution shall be pasted on the inside of the DB as instructed. One earthing terminal for single phase and two terminals for 3 phase DB's shall be provided with an earth strip connecting the studs and the outgoing ECU earth bar.
The top and the bottom faces of the D.B. shall be provided for conduit entry of minimum 1" dia. The faces if asked shall be kept detachable. All outgoing feeders shall terminate on a terminal strip which in turn is interconnected to the MCB/Fuse base by means of insulated single conductor copper wires as follows

- 15 A 2.5 sq.mm
- 25 A 4.0 sq.mm.
- 32A 6.0 sq.mm

EARTHING

Earth pit of minimum bore dia.150mm size approved make Earthing Electrode consisting Pipe-in-Pipe Technology as per IS 3043-1987 made of corrosion free G.I.Pipes having Outer pipe dia of 50mm having 80-200 Micron galvanizing. Inner pipe dia of 25 mm having 200-250 Micron galvanizing, connection terminaldia of 12mm with constant ohmic value surrounded by highly conductive compound with high charge dissipation suitable for following type of applications.
(a) For Electrical Installation up to 440V in normal soil.
The bare copper wire of 8 to 16 SWG should be annealed & erected for earthingpurpose as directed and as required confirming to IS specification.

REFERENCED STANDARDS, CODES

IS:732 - 1989 Code of practice for electrical wiring installations.IS: 4648 - 1968 Guide for electrical layout in residential buildings.

SECTION-XI

PLUMBING WORKS:

The drawing proposal and approval to obtained by the contractor before commencement of the Plumbing activities and as directed by Engineer in Charge. Supply, installation, fixing & Commissioning are the complete as per approved drawing including labour, machinery, Power tool and Hand Tools.

The work shall include and to be carried out in accordance with all good buildingpractice and as per all regulations and by-laws;

Applicable codes:

IS:2065-1989 CODE OF PRACTICE FOR WATER SUPPLY IN BUILDINGS
IS: 12183 (Part 1) - 1987 Indian Standard CODE OF PRACTICE FOR PLUMBING IN MULTI- STOREYED BUILDINGS
SP 35 (1987): Handbook on Water Supply and Drainage (with Special Emphasison Plumbing)

The Scope of required work includes but not limited to the following supply andinstallation of item listed Below:

- Ball Valves
- Drain- /sewer- /waste drain line
- Flush handles
- Handwash basins
- Leak Detection
- Mixers
- Sewer pumps
- Taps
- Toilets
- Urinals
- Waste traps (S and P)
- Water flow pressure
- Water meters (incl smart meters)

SCHEDULE XII

RO PLANT FOR WATER ROOM

Supplying, installing, testing & commissioning 5 stage reverse osmosis water purification system with M. S powder coated frame, prefilter housing with 'O' ringpre-sedimentary filter GAC (granulated activated carbon) filter, carbon Filter withinline type post carbon filter auto low- and high-pressure switch with storage tank.plant capacity 1000 liter per hours. All parts

to be procured but not limited to i.e., Membrane, sedimentary filter, pump, pipes, storage tanks and other applicable units are to be valid ISI marked valid documentation
The final proposal to be submitted by the contractor to Engineer in-charge forvalidating and approval before procurement.

After installation of the entire RO plant system, the setup testing & commissioningto be done by the approved vendor itself at installed location. Contractor has to include the three years of maintenance in their price quote. The documentation between the vendor and the school authority has to be formalized by the contractor for three years. After three years school authority has to initiate by their own for the maintenance of the RO as per vendor recommendation.

SCHEDULE XIII

WATER PROOFING

Approved cement shall be used with prior approval of cement manufacturer is required from the engineer in charge. Unless otherwise specified cement shall bepreferably be ordinary Portland cement conforming to IS:269. Field testing/Laboratory testing to be done according to the requirements. Old cement shall be not be used for any works and it should be removed from site.

Aggregates:

Aggregate shall consist of natural sand and crushed stone and shall be chemically inert, strong, hard, clean, and durable against weathering and free from deleteriousmaterials and shall be as per IS:383-1970. Source shall be approved and in accordance with IS383 used for the concrete. Coarse aggregate shall be granular orcrystalline surface shall be free from elongated, flaky or laminated pieces. Total percentage of deleterious substances in the aggregate shall not exceed 5% for both crushes and uncrushed aggregates. Unless otherwise specifically stated on the drawings the maximum size of coarse aggregate shall be 20mm, but in no case greater than ¼ of the minimum thickness of the member.

Fine aggregate:

Source of Fine aggregate shall be approved by engineer in charge and shall be in accordance with IS 383. It shall be hard, dense and durable, free from impurities like dust, clay lumps and any other deleterious matter. Sampling and testing shall beas per IS 2386. The total percentage by weight of deleterious substances in sand shall not exceed 5% for uncrushed sand and 2% for crushed sand. The fineness modules shall be between 2.2 and 3.2. Aggregates delivered at site in wet condition or becoming wet due to rain or any other means shall be used by adjusting the moisture content to achieve the desired mix.
Water:
Potable water free from excess of acid, alkali, or salt shall be used.PH value of water shall not be less than 6. Source of water shall be approved by the engineer in charge and shall confirm to IS 456:2000. The water used for concrete work shall beclean and free from harmful chemicals and organic material. To ascertain the same,a sample of water will be tested in any

of the approved laboratories prior to the commencement of work and later on in case if any visible changes is found. It shallbe clean fresh, free from oils or other deleterious material whether in solution or in suspension.

APP Bituminous Membrane Waterproofing.

Material

The water proofing membrane shall have a non-woven polyester membrane coatedon both side with APP (Atactic polypropylene) modified bitumen. It shall have a Black finish with a very thin Polyethylene foil on both sides it shall be in rolls of 1x10m for continuous laying on large lengths. When installed, it shall form an impervious, flexible blanket, which accepts normal structural movement without breaking or cracking.

Preparation of surface

The roof surface (or screed) shall be thoroughly cleaned with a wire brush and all foreign matter etc. shall be removed. Well-defined cracks on the surfaces shall be cut to a V' section, cleaned and filled up flush with a paste of filling compound andcement in the ratio of 1:2. The finished surface shall be perfectly dry and any dampness should be allowed to evaporate.

Laying

One coat of bituminous solvent-based primer of approved quality and confirming toIS:3384 shall be cold applied @ 0.2-0.4 liter/Sq. Mr or as per manufacturer's recommendation, over the entire area to be water proofed including vertical surface.The primer shall be allowed to be dry for min 24hrs. The membrane shall be laid onthe perfectly dry prepared surface by torching-on method with a gas torch. All jointsshall have an overlap of 75mm which shall be torch sealed. The overlap shall be done in a manner, which does not hinder water flow along the roof slope. However, the necessary overlap (Middle & ends) of APP modified reinforced bituminous water proofing membrane shall be laid by torch welding as per recommendation of manufacturer. The membrane shall be finished with bituminous base aluminum paint. The waterproofing shall be continued up to the parapet/wall for minimum of 600mm over the finished roof surface or as per requirements. It shall be continued into rain water pipe by at least 100mm.

Cement Screed:

Plain cement concrete (1:2:4) of 25mm min. thickness with 24SWG chicken wire mesh shall be laid to slope in panels not exceeding 6sq.mtr area per panel over the Roof slab. The joints between the panels shall be raked out neatly (after stipulated curing period) to a min. 6mm x 6mm V-groove and filled up with an approved quality sealant compound recommend by manufacturer. Drain outlet shall be provided for all spouts/ rain water pipes by suitable rounding, filling and sloping ofPCC. At the junction of the roof and parapet or any other vertical surface, a fillet of75mm radius shall be formed in cement mortar (1cement:4 coarse sand).

The manufacturer against the performance of the finished waterproof coating shallprovide guarantee of 10 years.

Check for leak test

Water proofing leak test will be done by making a pond of water and it should be tested for 72 hours. During this water proofing leak test height of water should be atleast 25 mm at the ridge portion

Inspection and Testing:

All materials workmanship and finished construction shall be subjected to continuosinspection by QC Engineer and proper records of inspection shall be maintained.

Testing shall be done as per requirements and specification.

SCHEDULE - XIV

CEMENT CONCRETE ROAD WORKS - {For Package-B, Sarkhadi School}

i. SUBGRADE

Road works to be done in three layers. first layer to be placed on the prepared subgrade achieving 95% of dry density as per IS 2720. All subgrade material must be free from vegetable matter. · The subgrade must be shaped to the required profile. · The subgrade should be of an appropriate material and at a moisture content that it can be compacted to form a stable layer, for the full width of the embankment. The tests to check the compaction for should be completed before the first layer. If the results show the required density is not achieved further compaction is necessary. The compacted subgrade layer requires to be approved with any soft areas being rectified, before work can start on the pavement. The subgrade is the layer of embankment immediately below the pavement.

ii. WBM GRADE – I - 150MM LAYER THICK DRY MIX (40 TO 63MM SIZE):

Sub-Base - WBM dry mix ofgrade M10 (ratio 1:3:6) having thickness of 150 mm to be placed with Rolling compactor. Aggregate base is the main load spreading layer. It should consist of hard pieces of gravel crushed to the required size, and a filler of sand or other fine mineral matter. The material must be graded, with sufficient fines so that it can be compacted to produce a close and tight surface texture. The materials should not contain clay and the coarse aggregate should not appear particularly flaky or elongated.

iii. AGGREGATES

- Fine Aggregate: Colour being an important consideration, for exposed concrete,colour of sand used shall also be uniform throughout the entire construction. Preferably total quantity required for the work shall be collected and well mixedtogether to uniform shade.

- Coarse Aggregate: The colour of the aggregate shall be maintained the same throughout. Unless otherwise specified, exposed concrete in walls parapets and facias, which are non-load bearing and are less than 120 mm in thickness, the maximum size of the coarse aggregate shall be limited to 12mm. for which nothingextra shall be admissible. Flat or flaky pieces shall not be allowed.
- Reinforcement & Cover of Concrete: Correct placing of the reinforcement with proper cover is important in all exposed concrete work to avoid discoloration by rusting. The minimum cover specified under specification for C.C. work shall be maintained throughout. Concrete blocks or spacers shall be sparingly used at exposed surfaces. When used such blocks shall preferably be cast on vibrating table or in some other similar manner so that it may match the concrete surface intexture and colour.
- These shall be put at regular intervals. Cover blocks of materials other than castblocks shall not be allowed to be used.

iv. PLAIN CEMENT CONRETE:

SECOND layer of lean cement concrete of maximum thickness100 mm thick cement concrete of Grade M10 mix ratio (1:3:6) to be place and compaction to be done with plate compactor & vibrator needle

After that the FINAL layer 200 mm thick cement concrete of Grade M25 mix ratio (1:1:2) to be place and compaction to be done with plate compactor & vibrator needle. Concrete to be place on panel wise in between the panels joints to be kept for contraction and expansion of road to prevent from cracks.

v. Measurements and Proportioning of Concrete materials:

This shall be as laid down generally for CC work. In no case extra dust or sand oradditional quantity of water shall be allowed with the intention of getting better finish which shall only be obtained by erecting centering as specified above and proper vibrating of the mix after placing. In no case, the slump limit, specified under the specification for RCC work shall be exceeded.

Mechanical vibration: All concrete for exposed concrete work shall be vibrated, using needle vibrators 30/32 mm. Surface vibrators may be permitted to be used for thin slabs. External vibrators for walls may be allowed but this shall be done carefully to safeguard the displacement of the shuttering. Vibrators shall only be operated by skilled labour over or under vibration shall not be permitted. Any spillage or leakage, which is unavoidable, and which flows down the exposed concrete surfaces shall be immediately washed away with clean water and brushed before setting. All finishing to the top surface of exposed concrete member shall befinished to desired surface while the concrete is still green.

Finishing: Exposed concrete surface shall on no account be permitted to any sort ofrepairs or patching after striking the form work. In the event of any portion not coming up to standard, this shall be taken down by the Contractor at no extra cost. Decision of the Owners as to the rejection of such work shall be final and binding on the Contractor.

vi. COMPACTION:

After the concrete is placed in its position, it should be brought in its proper position by manual or tamper fitted with suitable handles.
Concrete is compacted by means of a power-driven finishing machine or by vibrating hand screed

vii. CURING PROCESS FOR CEMENT CONCRETE ROAD:

- Curing consists of checking the loss of water from the concrete slab, and keeping the fresh concrete slab moist during hardening period.
- Initial curing is done for 24 hrs.
- By this time, the concrete becomes hard enough to walk upon and then wet mats are removed and final curing done for 2 to 3 weeks.

- The final layer curing to be done byponding water system.

viii. FILLING OF JOINTS AND EDGE FILLING :

- After curing, the surface is cleaned and washed.
- The joints are then properly filled-in attains with a suitable sealing compound.

ix. OPEN TO TRAFFIC:

Concrete road is opened to traffic when it attains the required strength or after 28 days of curing

CHAPTER 4.0

MODE OF MEASUREMENT

The method of measurement for various items in the tender shall be as follows:

EXCAVATIONS

Footings: Area of excavation for footing shall be measured equal to the areaof the lowest concrete course as shown on the drawing. Depth shall be measured vertically from ground level to bottom of concrete course or dry rubble packing or brick flat soling as the case may be.

Where the excavation is made in trenches, measurements for cutting shallbe taken by means of tape and staff & after completion of work and total quality of excavation computed from these levels in manner approved by the Owner.

Where excavation is made for levelling the site, levels shall be taken beforestart & after completion of work and total quantity of excavation computedfrom these levels in manner approved by the Owner/Engineer.

Any additional excavation required for working space from work, shoring, planning, dewatering etc. shall not be measured for separately. Rates quoted for excavation shall include all these factors.

EARTH FILLING

Thick measurements will be considered as per Engineer In-Charge and thesame will be in Cubic meter.

CEMENT CONCRETE (PLAIN AND REINFORCED)

Cement concrete in P.C.C. & R.C.C items shall be measured exclusive of reinforcement and plaster thickness but shall include necessary costs ofhire charges of all equipment, curing, hacking and fair finish. Reinforcement and plaster, shuttering and centering shall be measured andpaid separately.

Items like R.C.C. precast Jalli, R.C.C. pipes and other such items which are normally manufactured in factories as well as those items which have been specifically mentioned in Schedule of Quantities shall be measured inclusive of reinforcement, shuttering etc.

No deduction will be made for openings up to 0.1 sqm. and no extralabour for forming such opening or voids shall be paid.

Columns shall be measured from the top of the footing & shall bemeasured through, including flare of the column in case of flat slab construction.

Beams shall be measured from face to face of columns/beams and shallinclude haunches, if any. The depth of the beam (other than raft foundationbeams) shall be measured from top of the slab to bottom of the beam.

Slabs (other than in raft foundation) shall be measured in bays (clear ofbeams) with deduction for column portion.

chajja: Only projection portion shall be measured in cubic meter.

Staircase: Measurements shall be in cum. Staircase comprising of step,soffit slab, landing slab etc. shall be measured and paid under this item. Side parapet walls, railings, finishing of risers & trades, T.S. Reinforcementand plastering etc. shall be paid separately under respective items.

REINFORCEMENT

Shall be measured in lengths of bars as actually placed in position. Weightcalculated as per standard tables with 3 places of decimal, no allowance being made in the weight for rolling margin. Wastage and binding wires shall not be measured.

BRICK/BELLA STONE WORKS

Except walls of half brick thickness or less, all brick/Bella stone work shallbe measured in cubic meters.

Walls of half brick/Bella Stone thickness or less shall each be measuredseparately and given in square meters stating the thickness such that partition wall etc.

THICKNESS OF WALL
Brick/Bella stone walls up to & including three bricks in thickness shall be measured in multiples of half brick which shall be deemed to be inclusive ofthe mortar joints. Where fractions of half brick occur to own rural or other reasons, the measurement shall be taken as full half brick.

For walling, which is more than three bricks in thickness, the actualthickness of wall shall be measured to the nearest centimeter.

Furniture items.
All furniture items proposal to be submitted as per the detailed BOQ items which includes the sizes for Table, chairs, steel storage cabinet, wood storage cabinet etc. to complete the job as per requirement and approved byEngineer in-charge which also includes furniture items make quality standards etc.

Structural Steel

Measurement for payment shall be made on basis of the weight of fabricationand erected steel work as computed from approved fabrication drawings. Theweights shall be calculated on basis of weight per meter as stipulated in the relevant Indian Standard Specification or in the Producer’s reference books. For calculating weights, gusset plates shall be measured based on the overall dimensions and no deduction shall be made for skew cuts, so long the area ofskew cuts does not excess 0.15 sqm cutting to waste, rolling margin, weights of weld metal deposited

and weights of shop and field bolts/rivets will not be included in the measured weights and shall be deemed to have been included in the rates quoted. However, no deduction will be made for rivet or bolt holes. Temporary works and all other materials not included in the permanent works shall be classified as plan for purpose of this clause and shall not be included in any measurement for payment. All measurement except as stipulated above will conform to Indian Standard Code of Practice IS-1200 latest.

(a) Hand Rail
After 100% completion of supply and fixing of hand rail includes all fixturesand accessories payment is to be done in terms of Rmt.

All electrical items for supply and installation payments are to be made under following steps as mentioned below,

After 100% job completion for supply and installation for Concealing ofConduit, Modular Board Fitting and wiring at all locations. 35 % can beClaimed against the Electrical Head Value.

After 100% job completion for supply and installation Earthing, Lighting, Fan etc.at all locations 35 % can be Claimed against theElectrical Head Value.
After 100% job completion for testing, Commissioning and successfulhandover, 30 % can be Clamed against the Electrical Head Value.

Sanitary & Plumbing Works
All Plumbing and sanitary fixture items for supply and installation, payments are to be made in terms of Rmt & numbers as mentioned below,

For supply and installation for Piping, fittings (includes all shape ofConnections) in Rmt as per actual job completed at site.

CHAPTER 5.0

LIST OF APPLICABLE DRAWINGS - CHHARA

LOCATION	DRAWING NO	DESCRIPTION
CHHARA		CHHARA SCHOOL KEY PLAN
		MDM SHED FOUNDATION LAYOUT MDM STRUCTURE DRAWING
	2006/01/R1- SHEET 1	ASSEMBLY HALL FOUNDATION LAYOUT
	2006-02 (SHEET 1/2)	LAYOUT & SCHEDULE OF PLINTH BEAM
	2006-02 (Sheet:-2/2)	STAIRCASE SECTIONAL DRAWING
	2006-03	LAYOUT & SCHEDULE OF RCC BEAM & SLAB AT FIRST FLOOR LEVEL
	2006-04	LAYOUT & SCHEDULE OF RCC BEAM & SLAB AT TERRACE LEVEL
	-2006-05	LAYOUT & SCHEDULE OF STAIR CABIN RCC BEAM & SLAB
		NAME PLATE DETAIL
		PLAY EQUIPMENT DETAILS
		DETAILS OF COMPOUND WALL
	-	DRINKING WATER ROOM DETAILS
	-	ASSEMBLY HALL BUILDING GROUND FLOOR AND SECOND FLOOR PLAN
	-	TERRACE PLAN
		AMPHITHEATRE
		PLAN AND SECTION OF BOYS TOILET
		PLAN AND SECTION OF GIRLS TOILET

LIST OF APPLICABLE DRAWINGS - SARKHADI

LOCATION	**DRAWING NO**	**DESCRIPTION**
SARAKHADI	-	SARKHADI SCHOOL KEY PLAN
		NEW SCHOOL BUILDING PLAN AND ELEVATION SECTION
	2021-02 SHEET-1	LAYOUT & SHEDULE OF RCC PLINTH BEAM AT GROUND LEVEL
	2021-02 SHEET-2	TYPICAL STAIR CASE SECTION
	2021-03	LAYOUT & SCHEDULE OF RCC BEAM & SLAB AT FIRST FLOOR LEVEL
	2021-04	LAYOUT & SCHEDULE OF RCC BEAM & SLAB AT TERRACE LEVEL
	2021-05	LAYOUT & SCHEDULE OF RCC BEAM & SLAB AT STAIR CABIN LEVEL
	2021-01-R1	LAYOUT OF RCC COLUMN & FOOTING AT GROUND LEVEL
		TERRACE PLAN
	-	TOILET BLOCK DETAILS
	-	DRINKING WATER ROOM DETAILS
	-	SARKHADI CEMENT CONCRETE ROAD TYPICAL SECTION

CHAPTER 6.0

INSPECTION & TEST PLAN

All materials required for the execution of the work should conform to the standard specification and approved by the Engineer-in-Charge before actually put to use. Commencement of work without prior approval shall be entirely at the risk and cost of the Contractor. No delay due to non- availability of the Materials, tools, equipment etc. will be entertained by the Owner. In the case of certain Machinery / Equipment, the Engineer-in-Charge may inspect the item for approval, before they are brought to site

The Owner shall be entitled at all times at the risk of the Contractor to inspect and / or test by themselves or through any independent person(s) or agency appointed by the owner and/or to direct the contractor to inspect and/or test all material(s), items and components whatsoever supplied or proposed for supply, for incorporation in the work inclusive, during the course of manufacture or fabrication by the Contractor and/or at the Contractors work or otherwise, such materials or items or components. The inspection and/or test shall be conducted at the expense of the Contractor and if conducted by the Contractor may be directed by the Owner to be conducted by agency (ies) nominated by Owner and/or in the presence of witness nominated by the Owner

The Contractor shall furnish to the Engineer-in-Charge for approval when requested or as required by the specification or other contract documents, adequate samples of material intended for incorporation in the works. Such samples to be submitted before the work are commenced permitting sufficient time for tests, examination(s) thereto by the Engineer-in-Charge. All materials furnished and incorporated in the work shall conform to the sample(s) in all respects. The Engineer-in-Charge shall be entitled to reject at any time any defective materials, item or components, (including special manufactured or fabricated items or components) supplied by the Contractor for incorporation in the works

The Contractor shall at all times ensure highest standard of workmanship, relating to the work to the satisfaction of the Engineer-in-Charge. The Engineer-in-Charge shall have the power to inspect the work as also to test or instruct the contractor to test the works or any structure, material or component thereto at the risk and cost of the Contractor, either by the Contractor or by any agency(ies) nominated by the Engineer-in-Charge or Site Engineer on his behalf. The Contractor shall provide all facilities, instruments material / labour required for testing the works (including checking the set time out of work) and shall provide Engineer-in-Charge all assistance necessary to conduct the test whenever and wherever required

[Type here]

The Engineer-in-Charge on inspection or test be not satisfied with the quality or workmanship of any work, structure, material, component (decision of the Engineer-in-Charge being final in this behalf), the Contractor shall re-perform, replace, re-install and / or re-erect as the case may be such work, structure material or component, as no such rejected work, structure, material, item or component shall be re-used without the prior permission of Engineer-in- Charge.

INCOMING MATERIAL INSPECTION REPORT(IMIR)

P.O No :		**Dispatch Note :**		**IMIR No :**	
Supplier Name :		**Mode of Transport :**		**Issue Date :**	
Supplier Invoice No :		**LR /RR /AR. No :**			
Date of Receipt :		**Package No :**			

Sr. No	**Description of the Item**	**HSN /SAC Code**	**Unit**	**Quantity**					**No. of Boxes /plates**	**Remarks**
				As per PO	**Cumulative Earlier received**	**Cumulative Earlier accepted**	**Receipt in current Lot**	**Accepted in current Lot**		

Documents Verified: (a) Test Certificates (b) Packing slips		**Comments: -**

	Requested By		**Approved By**	
Name Designation Signature with Date	**Contractor Store In Charge**	**Contractor Site-In charge**	**Owner Site Engineer**	**Owner Project Manager**

QUALITY ASSURANCE PLAN- SUPPLY MATERIAL

SR NO	COMPONENTS	MANUFCTURE NAME/ SOURCE	TYPE OF CHECK	FORMAT OF REPORT	APPROVING AUTHORITY	FREQUENCY OF THIRD-PARTY LAB TEST	FREQUENCY OF SITE LAB TESTING	ACCEPTANCE NORMS/ VALUE	REMARKS
1	CEMENT	ACC SURAKSHA / ULTRTECH/ AMBUJA PCC	PHYSCIAL & CHEMICAL ANALYSIS	MTC / TC OF EACH CONSIGNMENT	SITE IN-CHARGE	For every 50MT of cement purchase on same brand & Lot. Else as instructed by EIC	NA	IS 265 / IS 455	MTC- MILL TEST CERTIFICATE TC- TEST CERTIFICATE
2	AGGREGATES &WATER	CONTRACTOR TO OFFER ON BEST QUALITY	PHYSCIAL ANALYSIS	TR / TC OF EACH CONSIGNMENT	SITE IN-CHARGE	Once of any approved brand & Occasionally if Site-in-Charge desires	ON EACH CONSIGNMENT RECEIVED	IS 383 / IS 515	TR- TEST REPORT
3	REINFORCEMENT & MS ROUND BAR/STEEL	TATA / SAIL / VIZAG / JSW	PHYSCIAL & CHEMICAL ANALYSIS	MTC / TC OF EACH CONSIGNMENT	SITE IN-CHARGE	Once of any approved brand & Occasionally if Site-in-Charge desires	NA	IS 226 / IS 432 IS 1139 / IS 1786 IS 456-2000	
4	READY MIC CONCRETE (CUBE SIZE: 15 CM x 15 CM x 15 CM)		1.Compressive Strength & Slump 2.Mixed design 3. Flash ash content	TR FROM LAB	SITE IN-CHARGE	Occasionally if Site-in-Charge desires	One set per 1-25CuM RCC depending Upon nature of work	IS 456-2000	3 no's cubes to be crushed on 7th day & balance 3 no's to be crushed on 28th day. Note**

5	GALVANIZED STEEL	APPROVED VENDOR LIST	PHYSCIAL & CHEMICAL ANALYSIS	MTC / TC OF EACH CONSIGNMENT	SITE IN-CHARGE	Once of any approved brand & Occasionally if Site-in-Charge desires	NA	RBT Wire – IS:278-2009 "Y" angle Galvanization – IS 4759 / IS 2629 Concertina coil – IS 4454	RBT WIRE= Reinforced BarbedTape Wire
6	HOLLOW SECTION STEEL	APPROVED VENDOR LIST	PHYSCIAL & CHEMICAL ANALYSIS	MTC / TC OF EACH CONSIGNMENT	SITE IN-CHARGE	Once of any approved brand & Occasionally if Site-in-Charge desires	NA	IS 4923 -1997	
7	GRANULAR MATERIAL SAND, STONE	CONTRACTOR TO OFFER ON BEST QUALITY	GRADING, FITNESS MODULE, DRY DENSITY	TR FROM LAB	SITE IN-CHARGE	Occasionally if Site-in-Charge desires	NA	As per IS applicable standard	
8	PAINT	ASIAN PAINT, BERGER, NIPPON, NEROLAC, NOBEL	CHEMICAL ANALYSIS	MTC / TC OF EACH CONSIGNMENT	SITE IN-CHARGE	Occasionally if Site-in-Charge desires	NA	IS 101	

Note **: In addition to 3 + 3 Cube selection, 1 cube will be selected, preserved for 1 year and tested as per standards.

SR NO	ACTIVITY	COMPONENTS	TYPE OF CHECK	FORMAT OF REPORT	REFERANCE DOCUMENT	INSPECTION TYPE		ACCEPTANCE NORMS/ VALUE	REMARKS
						OWNER/ CONSULTANT	CONTRCTOR		
1	ELECTRODE	MAKE & MODEL	VISUAL	TR	MTC	RANDOM	100%	BIS STANDARD	
2	WELDER QUALIFICATION	WPS AND SAMPLE WELD	VISUAL	TR /TC	WPS	FIRST TIME	FIRST TIME	ASME SEC IX	
3	ASSEMBLY & PRE-WELD CLEANING	CUTTING AND FIXING	VISUAL	TR	GA DRAWING	10%	100%	GA DRAWING	
4	FIT-UP TEST	ASSEMBLY WITH TAKAWELD	VISUAL	TR	GA DRAWING	10%	100%	GA DRAWING	
5	WELD INSPECTION	TEST FOR HOLES, DENSITY, FINISHING	VISUAL	TR	AS PER BIS DOC	20%	100%	GENERAL PRACTICE	
6	DYE PENETRATION TEST	TEST ANY CRACKS, HOLESIN WELD	VISUAL	TR	AS PER BIS DOC	RANDOM	RANDOM	AS PER BIS STANDARD	
7	GRINDING AND CLEANING ON WELD AREA	CLEANING ON WELDED AREA BY COTTON, WIRE BRUSH	VISUAL	TR	GENERAL PRACTICE	20%	100%	GENERAL PRACTICE	
8	PRIMER PAINTING	AS PER APPROVED DOC	VISUAL	TR	GA DRAWING	50%	100%	AS PER BIS STANDARD	
9	ERECTION AT SITE	INSTALLATION AT SITE	VISUAL	TR	GA DRAWING	100%	100%	GA DRAWING	
10	FINAL PAINTING	FINAL FINISHING	VISUAL	TR	GA DRAWING	100%	100%	AS PER BIS STANDARD	

Contractor can perform the all the above test for sr. no 1 to 8 at fabrication yard, on clearance from Owner Engineer on individual check point, contractor can process for next execution point.

Note- During site execution if any further format is required related to electrical, plumbing etc. same to be formulated in consultation with the Engineerin-charge.

Sampling/Type	**Testing**	**Days/Criteria**
Minimum No of specimens taken from same shift work	7 days Compressive strength anoptional test if desired	3 no's
	28 days compressive strength test	3 no's
Minimum testing Frequency	Qty. of concrete in the Work M3	1-50, 51 & above
	1.1 plus one sample for each additional 50 M3 or part there of Note: I) At least one sample shall be taken from each shift or as directed byEngineer. II) For each sample 6 cubes shall be cast, 3 for testing at 7 days & 3 at 28days.	
Criteria for acceptance	As per clause 8.7.6 of IRS concrete Bridge Code, 1997, with all up to datecorrection slips	

The following formats will be formulated during site execution

1.0 QUALITY PLAN FOR RCC/PCC WORKS

2.0 QUALITY PLAN FOR RCC/PCC WORKS CUBE TEST

3.0 DETERMINATION OF SILT CONTENT IN FINE AGGRAGATE

4.0 PARTICLE SIZE DISTRIBUTION

5.0 CHECK LIST FOR REINFORCEMENT

6.0 CHECK LIST FOR FORM WORK

7.0 CHECK LIST FOR POURING OF CONCRETE

8.0 CHECK LIST FOR CONSTRUCTION JOINTS

9.0 CHECK LIST FOR FINISHED CONCRETE

10.0 CHECK LIST FOR STEEL FIT-UP & WELD VISUAL

11.0 CHECK LIST PAINTING WORK

12.0 CHECK LIST FOR INSTALLATION OF GALVANIZED STEEL & STRUCTURAL STEEL.

13.0 MEASUREMENT SHEET FOR JOINT INSPECTION

14.0 CHECK LIST FOR WATER PROOFING

15.0 CHECK LIST FOR ELECTRICAL WORK

16.0 CHECKLIST FOR ROAD WORKS

CHAPTER 7.0

THIS DRAWING IS AN INTEGRAL PART OF EACH CONCRETE DESIGN DRAWING AND APPLY TO ALL CONCRETEWORKS UNLESS NOTED OTHERWISE 0N THE DESIGN DRAWINGS.
ALL DIMENSIONS ARE IN MILLIMETERS, LEVELS AND CO—ORDINATES ARE IN METERS UNLESS NOTED OTHERWISE.
ALL DIMENSIONS GIVEN IN THE DRAWIN6S SHALL BE CO— RELATED WITH PLOT PLANS AND/OR ARCHITECTURAL DRAWINGS, DESIGN DRAWING WHEREVER APPLICABLE.
ONLY WRITTEN DIMENSION SHALL BE FOLLOWED AND NO DRAWING SHALL BE SCALED.
WHERE REQUIREMENT IN ENGINEERING DRAWING ARE IN CONTRADICTION TO REOUIREMENTS IN STANDARD DRAWINGS, THE ENGINEERING DRAWING SHALL.
LADDER PLINTHS SHALL BE LOCATED FOR CONCRETE GENERAL ARRANGEMENT DRAWINGS.

CONCRETE MATERIALS:

CONCRETE GRADE UNLESS NOTED 0THERWISEM15 PCC 1:3:6 AND 1:4:8

M30 FOUNDATIONS
M30 CONCRETE SUPER STRUCTURE
M20 RCC LINTEL, RCC BELOW MASONRY, PALYING ACTIVITY STRUCTURES, NAME PLATE,
M25 ROAD PAVING
M30 GRADE SLAB

REINFORCED CEMENT CONCRETE SHALL BE, USING GRADED STONE AGGREGATES 20MM A DOWN (UNO).
PLAIN CEMENT CONCRETE (PCC) SHALL BE USING GRADED STONE AGGREGATES 40MM A DOWN (UNO).
PCC FOR DAMP PROOF COURSE SHALL BE USING GRADED STONE AGGREGATES 10MM A DOWN (UNO).

MINIMUM CEMENT CONTENT SHALL BE AS DESCRIBED BELOW WITH MAXIMUM WATER CEMENT RATIO.
MINIMUM CEMENT CONTENT FOR M30 GRADE CONCRETE SHALL BE 320 KG/M3 WITH MAX WATER CEMENT RATIO OF 0.45 MINIMUM CEMENT CONTENT FOR M25 GRADE CONCRETE SHALL BE 300 KO/M3 WITH MAX WATER CEMENT RATIO OF 0.50 MINIMUM CEMENT CONTENT FOR M20 GRADE CONCRETE SHALL BE 250 K6/M3 WITH MAX WATER CEMENT RATIO OF 0.50 MAXIMUM CEMENT CONTENT SHALL NOT EXCEED 450 KG/M3.

FOR ALL CONCRETE WORKS CEMENT SHALL BE 53 GRADE ORDINARY PORTLAND CEMENT (OPC) 0R PORTLAND SLAB CEMENT (PSC) OR PORTLAND POZZOLANA CEMENT (PPC) AS PER RESPECTIVE IS CODES.
LEAN CONCRETE (P.C.C.) UNDER ALL R.C.C. FOUNDATIONS A BASE SLAB SHALL BE MINIMUM 75 THK. (UNO) AND 100 MM WHERE REQUIRED
LEAN CONCRETE (P.C.C.) UNDER ALL MASONRY WALL FOUNDATIONS SHALL BE 100 - 150 MM THK.

FORMWORK

TYPE OF FORMWORK FOR CONCRETE SHALL BE EITHER OF PLYWOOD 0R STEEL 0R FRP AS DIRECTED BY ENGINEER— IN—CHARGE.
ALL EDGES OF EXPOSED CONCRETE MEMBERS SHALL HAVE A CHAMFER OF 25mm x 25mm. CONCRETE IN CONTACT WITH SOIL SHALL BE POURED ON LEVELLING CONCRETE.
DESHUTTERING OF CANTILEVER STRUCTURE SHALL BE DONE ONLY AFTER GETTING SPECIFIC PERMISSION OF ENGINEER—IN—CHARGE.

REINFORCEMENT

DEFORMED BAR SIZE mm	WEIGHT (Kg/m)	CROSS SECTIONAL AREA (mm2)	PERIMETER (<+)
8	0.395	50.3	25.13
10	0.617	78.6	31.42
12	0.888	1131	37.70
16	1.580	2012	50.27
20	2.470	3143	62.83
25	3.850	4911	78.50
28	4.830	615.8	87.96
32	6.310	804.6	100.53
36	7.990	1018.30	115.10

HIGH YIELD STRENGTH DEFORMED TMT BARS OF GRADE Fe500D (CRS) CONFORMING TO IS:1786.2008(THE BAR SHOULD BE CORROSION RESISTANT) HAVING ELONGATION MORE THAN 14.51.

UNLESS NOTED OTHERWISE, MINIMUM LAP LENGTH FOR REINFORCEMENT SHALL BE 50 x DIA OFBAR FOR M30
WHERE BARS OF DIFFERENT DIAMETERS ARE TO BE SPLICED, THE LAP LEN6HT SHALL BECALCULATED ON THE BASIS OF DIAMETER OF SMALLER BAR.

LAPS FOR THE REINFORCEMENT BARS SHALL BE PROVIDED AS PER STANDARD DRAWING.

LAPS REQUIRED EITHER DUE TO SHORTER LENGTHS OR FOR FACILITATING INSTALL/\TI0NS SHALLBE APPROVED BY THE ENGINEER— IN —CHARGE.

LAPS SHALL BE STAGGERED WITH NOT MORE THAN 50% OF THE BARS LAPPED AT ANY SECTION.

LAPS REQUIRED EITHER DUE TO SHORTER LENGTHS OR FOR FACILITATING INSTALL/\TI0NS SHALL BE APPROVED BY THE ENGINEER— IN —CHARGE.

AT THE BEAM/COLUMN JUNCTION, BEAM BARS IF IN CONFLICT WITH COLUMN BARS, SHALL BECRANKED AFTER GETTING APPROVAL OF ENGINEER- IN -CHARGE.

REINFORCEMENT SHALL BE ADJUSTED TO CLEAR POCKETS, EMBEDDED PARTS ETC. IN N0 CASE, THE REINFORCEMENT SHALL BE CUT AND MODIFIED WITH APPROVAL OF ENGINEER-IN -CHARGE.

CHAIRS AND SPACER BARS SHALL BE PROVIDED AS DIRECTED BY ENGINEER-IN-CHARGE.

WELDING TO 0R OF REBAR IS NOT ALLOWED UNLESS NOTED OTHERWISE AND WITHOUT PRIOR APPROVAL OF ENGINEER IN-CHARGE

EMBEDDED ITEMS:

GRADE OF CAST IN PLATES SHALL BE E250A IN ACCORDANCE WITH IS: 2062.

EXPOSED PARTS OF ALL EMBEDDED ITEMS SHALL BE CLEAN & PAINTED AS PER SPECIFICATION.

BACKFILLING.

ENOUGH TIME SHOULD BE GIVEN FOR THE COCNRETE TO GAIN STRENGTH BEFORE ANY BACKFILLING IS DONE

THE EARTH FROM CUTTING SHALL BE DIRECTLY USED FOR FILLING.FILLING OF EARTH SHALL BE DONE IN REGULAR HORIZONTAL LAYERS, EACH NOT EXCEEDING 20CM.

EACH LAYER SHOULD BE COMPACTED BY VIBRO COMPACTOR. AVOID USING HUGE STONES /ROCKS FOR BACKFILLING.

COMPACTION:

THE CONCRETE SHOULD BE THOROUGHLY COMPACTED USING MECHANICAL VIBRATORS COMPLYING TOIS 2505:1992, IS 2506:1985, IS 2514:1963, AND IS 18652:2005.

SKILLED LABOUR SHALL OPERATETHE VIBRATORS.INADEQUATE VIBRATION WILL RESULT IN VOIDS WHILE EXCESSIVE VIBRATION WILL RESULT IN SEGREGATION THEREBY AFFECTING THE STRENGTH OF THE CONCRETE.

CONCRETE POURING:

CONCRETE MIXING, POURING & TESTING SHALL BE IN ACCORDANCE WITH STANDARD SPECIFICATION.

READY MIX CONCRETE MAY BE USED PROVIDED IT IS PRODUCED A SUPPLIED BY AN APPROVED PLANT AND IT COMPLIES WITH IS 4925 AND REQUIREMENTS OF STANDARD SPECIFICATION.

BEFORE POURING CONCRETE ALL EMBEDDED ITEMS, SUCH AS ANCHOR BOLTS, ELECTRICAL SLEEVES, CONDUITS, STUDS ETC SHALL BE INSTALLED AND SECURELY FIXED AGAINST DISPLACEMENT. LOCATION OF CONSTRUCTION AND EXPANSION JOINTS SHOWN IN THE DRAWING, AND ALSO AS PER REQUIREMENT OF ENGINEER—IN—CHARGE.

CONCRETE COVER:

CLEAR COVER TO STEEL AS BELOW

FOOTING 50MM
COLUMN 40MM
BEAM 35MM
RCC WALL 20MM
SLAB 20MM

GROUT:

GROUTING BELOW COLUMN BASE PLATE INCLUDINC SLEEVES AND POCKETS SHALL BE DONE WITH NON — SHRINK GROUT (PRE— MIX TYPE) HAVING 28 DAYS MINIMUM CUBE CRUSHING STRENGTH OF40N/mm2 WITH ORDINARY 1 :2 CEMENT/SAND MORTAR GROUT OF STRENCTH 40N/MM.

MINIMUM THICKNESS OF GROUT FOR STRUCTURE BASE PLATE & FOUNDATIONS SHALL BE 25mm AS PER DESIGN DRAWING.

6ROUT PREPARATION PLACEMENT, CURING, FINISHINC, ETC. SHALL BE AS PER STANDARD SPECIFICATION. **PREPARATION OF SURFACES FOR ALL GROUT TYPES SHALL BE AS FOLLOWS: -** ALL LAITANCE SHALL BE REMOVED BY SCABBLING DOWN TO SOUND CONCRETE PRIOR TO SETTING OF THE BASE PLATES. THE METHOD SHALL BE AGREED WITH THE ENGINEER AND SHALL NOT DAMAGE THE AGGREGATE SURFACE TO RECEIVE GROUT SHALL BE ROUGH, CLEAN AND LEVEL.

SURFACE OF CONCRETE AND BASE PLATES SHALL BE CLEAN OF OIL, GREASE, CHEMICALS, DIRT AND OTHER HARMFUL MATTER. WHERE BOLT BOXES ARE USED THE VOIDS SHALL BE FREE OF ALL FOREIGN MATTER.

CONCRETE INCLUDING BOLT HOLES SHALL BE SATURATED WITH CLEAN WATER PRIOR TO PLACING GROUT.AIR RELIEF HOLES SHALL BE PROVIDED IF REOUIRED.

CURING:

PROPER CURING OF FRESH CONCRETE REQUIRES THAT MOISTURE BE RETAINED TO PROMOTE ADDITIONAL HYDRATION OF CEMENT DURING THE CURIN G PERIOD AND TO PREVENT FORMATION OF SURFACE CRACKS DUE TO RAPID LOSS OF WATER WHILE THE CONCRETE IS PLACED.

WHEN SURFACE ARE CURED WITH MEMBRANE CURING COMPOUND, ALL FINISHING OPERATIONS, EXCEPT GRINDING, CHIPPING, HAMMERING SHOULD B E COMPLETED PRIOR TO APPLICATION OF THE MEMBRANE.

CURING SHOULD COMMENCE IMMEDIATELY FOLLOWING INITIAL SET OF COMPLETIONS OF SURFACE TO BE CURED WITH A UNIFORM FILM THAT WILL REMAIN IN PLACE WITHOUT GAPS 0R OMISSIONS FOR THE FULL DURATION OF THE CURINO PERIOD.
CURING COMPOUNDS USED IN CONSTRUCTION MUST BE NONTOXIC AND FREE OF TASTE & ODOR.

CHAPTER 8.0

LIST OF MATERIALS OF APPROVED BRAND / MANUFACTURER (ONLY FIRST QUALITY TO BE USED (WATER SUPPLY & SANITARY WORKS)

Sr No	Fixtures	Manufacturer/Brand
1	Cast Iron Pipes and Fittings (LA Class)	TISCO / ISCO/ KESHO SPUN Co. – Calcutta E.L.C. Standard approved manufacturers of any other brand of fittings having ISI marking.) or equivalent and approved by Engineer in charge.
2	R.C.C. Pipes (Socket & Spigot joint)	Indian Hume Pipe Co., Alcock cement Products, Patel Spun (Surat) or equivalent and approved by Engineer in charge.
3	G.I. Pipes	Jindal, Prakash, Surya, Gujarat Steel Tube, Tata, Bharat Steel Tube, Asian, Swastik, Bombay, Zenith, G.S.T. Unik.
4	G.I. Fittings	"RV" & "R" Mark, Unik. or equivalent and approved by Engineer in charge
5	Gun Metal Valves	Leader Engineering Works, Jallandhar, Crown / Prince – Surat Bombay Metal Co Annapurna Metal Work, Calcutta 'Sant' brand, Jallandhar, L&K, Bombay metal & Alloy man. co. Bombay, Premier, Aatco, Atlas, BR, BS, NN, Somani, DRP or equivalent and approved by Engineer in charge
6	Brass fittings	Leader Engineering Works, Calcutta L & K Mathura, Crown / Prince -Surat Annapurna Metal Works, Calcutta, Perko, Kingstone Ark, EnclssWillians, Chilly, AquvaPlus, Nova, Kingstone, Driple, RanutrolHansa. Or equivalent and approved by Engineer in charge
7	C.P. Fittings	Ego Metal Works, Ballabhgarh, GEM, New Delhi; Soma Calcutta; Bilmet, Bombay 'ESSCO', Delhi. Rajka Metal Works, Delhi Eng. Co. Metal Works, Calcutta Everite, NULiteNavbhart Shalimar Crown, Prince or equivalent and approved by Engineer in
8	W.C. Pan / Wash basin / Urinals /flushing cistern	CERA, Hind ware, Johnson, Hindustan, Parry ware, EID, Neycer.

9	Flushing Cistern -Cast iron	CERA, Hindware, Johnson, Hindustan, Parryaare, Nomos ELCO A-1 Automatic EID, Calcutta, Nelson flush valve, SRIF (Agara),
10	E.W.C. Seats (solid)	CVEIERGAA, Hindware, Johnson, Hindustan, Parryware, EID, Neycer.
11	Stainless Steel Sinks	Nirali, CERA, Cobra AMC
12	Mirrors	Modi Float glass, Asahi, Saint Gobin, Atul Glasswork, Haryana Sheet Glass, Vallabh Glass Works.
13	Plumbing / Sanitary Fixtures /Accessories	Jaquar, Continental, CERA, Hindustan Sanitaryware / Parryco India, Hindware, Lauvet, Kohlar, Rak, Jaquar, L&K, banellow, RV Brand, Somani
14	C.I. Sluice valve, Check valves	Kirloskar, IVC, Burn, William Jacks, Indian Valve (IVC), Advance, Leader. or equivalent
15	UPVC Borewell Column pipe	Astral, Supreme, Prince, Ashirvad Pipes, Duke, kisan, Precision.
16	Fibre reinforced R.C.C. Manhole cover	Pratibha, CIDCO, approved brand or equivalent and approved by Engineer in
17	Pratibha, CIDCO, approved brand or equivalent and approved by Engineer In charge	ISI approved make or equivalent and approved by Engineer in charge
18	P.V.C. Pipes & Fittings	Astral, Supreme, Prince, Finolex, Ashirvad Pipes, Jain, Kisan/KSR.
19	P.V.C. / H.D.P.E Water Tanks	Syntax, Reno, Ashirvad Pipes, Purves or equivalent and approved by Engineer in Charge
20	Ball Cock	GPA brand by Govardhan Das Jullunder, L & K Brand by L. K. Industries Mathura, Sant Brand by Sant Press Metal Works Jullundhar or equivalent and approved by Engineer in
21	UPVC Pipes (Solvent Welded Joints)	Astral, Supreme, Prince, Finolex, Ashirvad Pipes, Jain, Kisan, Precision

22	C.P.V.C. Pipes & Fittings	Astral, Supreme, Prince, Finolex, Ashirvad Pipes, Kisan, Precision
23	Water meter	Kapstan Bombay, Voltas Kent, Calcutta
24	SWR pipe	Astral, Supreme, Prince, Finolex, Ashirvad Pipes, Jain, Kisan/KSR.
25	Fire Hydrant Valve & Air Valve, Scour Valve	ISI approved make or equivalent and approved by Engineer in charge

LIST OF MATERIALS OF APPROVED BRAND / MANUFACTURER (ONLY FIRST QUALITY TO BE USED (ELECTRICAL WORKS)

Electrical Fixtures shall be as per following requirements
LED ceiling lights - 12watts
LED Tube lights - 18watts
LED Flood Lights - 400watts
Ceiling Fan -1200mm sweep
Exhaust Fan - 150mm dia
Lighting wire - 1.5 sq,mm
Main Primary - 2.5 sq.mm
Power Cable - 4 sq.mm
FRLS Wires should be recommended

Wires&Cables - HAVELLS/POLYCAB/KEI
Switches&Sockets - HAVELLS/ANCHOR
Fan & Exhaust Fan - HAVELLS/CROMPTON
Led Lights - BAJAJ/PHILIPS

All the electrical items should be from the approved manufacturer mentioned above or any equivalent manufacturer with proper approval from Engineer In charge/PMC

Notes:
The contractor shall produce samples of the materials for approval of the EIC/PMC/TPI. The materials of the makes out of the above as approved by the EIC/PMC/TPI shall be used on the work. Final authority shall be Engineer-in Charge.
In respect of materials for which approved makes are not specified above, for that material makes to be decided by the EIC/PMC/TPI.
For all the material of approved brands necessary testing as per IS standards shall be done by the agency and no extra payment shall be paid for that.

Note- Electrical, Furniture & RO with 1000 lit PER HOUR capacity tank related details to be prepared& furnished by the contractor along with the vendor details to Engineer in-charge for further reviewand approval in advance before the commencement of the relevant jobs at site during execution.