☎ : - (0755) – 2586428

M.P. POWER TRANSMISSION CO. LTD.

SECTION-II
TECHNICAL SPECIFICATION FOR
GENERAL INSTALLATION WORKS

TENDER SPECIFICATION NO.
TS-01/2026-27 Dt.06.05.2026

TENDER FOR

Name of Work: : Construction of Septik Tank and Sewer Line at 132 KV S/s MACT Bhopal under jurisdiction of EHT- CONSTRUCTION DIVISION, BHOPAL. "Tender submitted with conditions will summerly be rejected"

Tender issued to M/s/Shri. _____

_____

On payment of Rs. : 885/- only (590/-(Tender fee) +295/- (processing Fee) (I/C GST)

Due date of opening : 27.05.2026

Issuing Authority: - E.E. (EHT-C) DN
MPPTCL, Bhopal

Office of the
EXECUTIVE ENGINEER (EHT-Construction) DN.
MP Power Transmission Company Limited, Bhopal
Address: Transco Administrative Complex Building, Bijali Nagar Colony, Govindpura, Bhopal (MP) 462023
e-mail: eehtc.bpl@mptransco.nic , website : www.mptransco.nic.in

Note: - Tender Specification No., Name of work, Tender cost and amount of earnest money with other details shall be noted by the bidders himself.

TECHNICAL SPECIFICATIONS

1. General

The item wise detailed Specifications are intended for the general description of items covered in the bill of quantities. The specifications are not however, intended to cover the minute's details and the work shall be executed according to the spirit of the specifications and the best prevailing PWD practice. Except where otherwise specified or authorized by the Engineer-in-charge in writing all work shall conform to the relevant clause of the latest editions or specifications in force in Madhya Pradesh PWD namely Standard Specifications for Buildings and Communication department (with correction slip up to date). All materials shall conform to the relevant latest edition of Indian Standard Specifications issued by the Bureau of **Indian** Standards for building works, Code of Practice for plain and Reinforced concrete for General Building Construction (IS:456) are to be complied with. Where these specifications are at variance with the specifications laid down in the books stated above, the former will be applicable. As regards matters not covered by any of above specifications, the decision of the Engineer-in-charge shall be treated as final and shall be binding upon the contractor. The contractor is expected to get clarified any doubts about the specification etc., before tendering by discussions with the Executive Engineer (EHT-C) DN. MPPTCL, Bhopal.

2. Clearing site and layout

Before the work is commenced, the area described and shown on plan shall be cleared by the contractor at his own cost of all obstructions, loose stones, materials, vegetation such as grass, shrubs, bushes and stumps of tress, roots etc., as directed. Bushes above 0.9m in height shall be considered as trees and shall not be cut down or be removed without instructions from the Engineer-in-charge. The product of the clearing shall be stacked in such places and in such manner as may be ordered by the Engineer-in-charge and the ground left in a perfectly clean condition. The useless materials obtained by the clearing should be removed from the area and disposed of as directed by the Engineer-in-charge. All holes or hollows whether originally existing or produced by digging up roots shall be carefully filled up with earth well rammed and leveled off as directed.

On completion of the works, the site around the building structures shall be cleared by the contractor at his own expense to the satisfaction of the Engineer-in-charge.

The layout of the buildings or structures shall then be done by the contractor at his own cost. The contractor shall be responsible for accuracy of the layout.

Rates quoted will be inclusive of all work made in this clause.

3. Protection of bench marks

It shall be the responsibility of the contractor to maintain and protect at his own cost the bench marks and plinth of all the buildings and structures given by the Engineer-in-charge, from the commencement of work till its completion and in case of damage caused to bench marks and other reference points, the contractor will have to make good all such damages to the satisfaction of Engineer-in-charge at no extra cost to the Company.

4. Final finish

The contractor will be responsible for soundness of construction as well as for a good final finish and every effort must therefore be made by the contractor to have entire work completed to a high standard of workmanship.

5. Earth work in excavation

(a) The excavations for several parts of the work shall be carried out to widths, lengths and depths as indicated in the drawings or as may be finalized during execution of the work or to such other dimensions as may be directed in writing by the Engineer-in-charge. The excavations shall be carried out

to the levels required and bottom and sides dressed. Wherever directed by the Engineer-in-charge, a bottom layer of 150mm thickness shall be left undisturbed and subsequently removed only when concrete for permanent work is about to be put in.

(b) In respect of excavations wrongly carried out by the contractor to greater depths than ordered in writing, it is specified that the contractor shall have to make good these additional depths by depositing cement concrete 1:5:8 at his own cost.

(c) The contractor will be responsible to remove any slipped earth etc., and to provide all shoring that may be required and no extra amount will be payable to him on his account.

(d) The excavated materials shall be back filled wherever required, watered and thoroughly consolidated. The contractor shall have to make good all settlements of filling that may occur at the end of the maintenance period.

(e) All unused excavated soil shall be removed from the spots as directed and stacked in good size regular stacks up to 2m in height or spread in low area so as to bring the same to the required levels as per directions of the Engineer-in-charge. Black cotton soil, moorum, soft rock and soil shall be stacked separately and not mixed with each other.

(f) If different rates are payable for excavation in soft soil, hard soil, ordinary rock, hard rock etc., no work shall be done until the Engineer-in-charge has classified the particular portion of the soil in categories mentioned as above.

The rate for excavation shall include for shoring, strutting, Carriage of soils to leads and lifts as decided, banking and filling in layers, dressing both excavated and filled up areas.

5.1 Classification of soil

As regards the classification of soil, the Indian Standard Code of practice for methods of measurement of building works 1.5.1200 (latest edition) shall be followed. An extract from the above is reproduced below.

Excavation shall be classified under the following heads and measured separately for each class: -

(a) Ordinary soil comprising any of the following: -

(i) Vegetation, organic soil, turf, sand, gravel, loam, clay, peat, soft shale or loose moorum.

(ii) Any of soil in (a) (i) Mixture.

(iii) Mud concrete below ground level and

(iv) Generally, any material which yields to an ordinary application of pick and shovel or phawra, rake or other ordinary digging implement and not affording resistance to digging greater than the hardest of any soil mentioned in (a) (i) to (a) (iii)

(b) Hard soil comprising any of the following: -

(i) Black cotton soil, stiff heavy clay, hard shale or compact moorum requiring tools and/or pick and grafting shovel, closely applied.

(ii) Shingle and river or nallah bed boulders.

(iii) Soling or roads, paths etc. and hard core.

(iv) Macadam surface of any description (Water bound, grouted tar makes etc.)

(v) Lime concrete, stone masonry in lime mortar and rock work in lime or cement mortar below ground level.

(vi) Soft conglomerate, where the stones can be detached from the matrix with picks and shovels.

(vii) Generally, any material which requires close application of picks or scarifiers to loosen and not offering resistance to digging greater than the hardest of any soil mentioned in (b)(i) to b(vi) above.

(c) Ordinary rock comprising any of the following: -

(i) Lime stone, sand, laterite, hard conglomerate or the soft or disintegrated rock which can be quarried or split with crowbars or wedges,

(ii) Unreinforced Portland cement concrete which can be broken up with the crowbars or picks and stone masonry in cement mortar below ground level.

(d) Hard rock (requiring blasting) comprising any of the following:-

(i) Any rock or Portland cement concrete for the excavation of which the use of mechanical plant or blasting is required.

(ii) Reinforced cement concrete (reinforcement through but not separated from the concrete) below ground level. Hard rock requiring blasting but prohibited for any reason and excavation has to be carried out by chiseling or any other agreed method.

6. Filling in foundations and basement

Materials used for filling in or around the foundations shall, be to the approval of the Engineer-in charge, from the excavated soil to the extent possible and any material other than excavated soil for refilling shall be from a source approved by the Engineer-in-charge. Where the excavation consists of black cotton soil, the trench shall be refilled with sand or moorum as decided and ordered by the Engineer in-charge. The space around the foundation in trenches shall be cleared off all debris, brick or stone pieces etc. and filled with earth in layers not exceeding 15 Cm. in thickness, each layer being watered and thoroughly rammed. No filling shall be executed until the concrete footings, foundations etc. have been inspected and approved by the Engineer-in-charge. While refilling with excavated soil no payment for lead will be made to the contractor in case the lead is already included in the item of excavation.

The plinth shall 40 Similarly filled with earth in 15 Cm. layer being watered and consolidated. When the filling reaches the finished level, the whole shall be flooded with water in order to avoid any settlement in a later stage.

The depth of filling shall be taken as the consolidated depth (and not the depth of loose earth). The contractor shall be responsible for making good all settlements of filling that may occur up to the end of the period of maintenance and make good all the damages done to the flooring etc. No extra payment will be made on this account.

7. Cement concrete (Plain and Reinforced)

8 . 7.1 General

(i) Types of cement concrete required for work in various situations, unless otherwise shown in drawing or unless otherwise specified in particular specifications or on bill of quantities shall be as follows-

(a)	Filling concrete below column footings, raft, plinth beam, P.C.C.	1:4:8.
(b)	Foundation Sub- base floors.	1:4:8.
(c)	Bed block sills, copings, lintels, roof, floors and all structural reinforced floors and all Structural reinforced concrete including pre cast work.	M-20
(d)	Concrete in machine foundations and special situations.	

(ii) Generally, cement concrete (plain or reinforced) shall conform to the requirements of Indi Code of practice for plain and reinforced concrete for general building construction as issued by the Indian Standards Bureau in all respects specially strength, quality and proportion materials, workmanship, mixing, testing, form work, placing, fixing reinforcement etc. except in case of variance from this specification where the later shall prevail.

(iii) The proportion of cement and aggregates for the various concrete mixes will generally as laid down in the special instruction or as per strength of concrete desired. The Engineer-in-charge reserves the right to direct the relative proportions of fine and coarse aggregate varied in order to obtain the densest mix possible with the aggregate for in the work. However, the consumption of cement shall not be less than the quantity given in the Appendix A.

7.2 Cement

Only cement as is supplied by the Board/Company from Boards/Company's stores shall be USE unless otherwise specifically mentioned in Schedule-B for the work. Before accepting the issue of cement the contractor shall satisfy himself about the quality and point out any unsuitable quality to the Engineer in-charge after whose approval, the unsuitable cement may not be issued to him. On receipt of cement the contractor shall arrange for proper storage. If at the time of mixing the cement, it is found that the cement is unsuitable for the work in hand, the contractor shall remove the same within 24 hours from site on written orders of Engineer-in-charge failing which, it shall be removed departmentally at the contractors to expense.

7.3 Aggregate

The coarse aggregate shall be of approved stone and shall be of maximum size as specified the items of the bill of quantities. The size of sieves being selected such that the next size is double the preceding one. The sieves generally used are No.150-300-600 Microns 1.18-2.36-4.75-10mm — 12.50-16, 20-40mm.

20mm grade aggregate and for 40mm grade aggregate the actual grading should be as per instructions of the Engineer-in-charge. The aggregate (fine or coarse) from sources approved by the Engineer-in-charge in writing shall only be used IS: 383 (latest edition) should be followed.

7.4 Mixing concrete

(i) The arrangement made for handling, gauging, transporting and mixing the concrete mat (also and adding the cement and water shall be to the approval of the Engineer-in-charge

(ii) The amount of coarse aggregate and sand in each batch shall be so arranged that one more full bags of cement are used per batch. Except in exceptional circumstances, a bag of

cement shall not be divided.

(iii) Concrete shall be mixed as near as possible to the place of deposit in mechanically operated mixers of a type and capacity to the satisfaction of the Engineer-in-charge with mechanical control of water, and deposited as soon as possible after mixing. No concrete that has b mixed for over 20 minutes shall be used in the work. Mixing shall be done for at lea minutes after all the three materials including water are passed into the drum and be any portion of the batch is discharged. The method or mixing used shall be such a produce a dense homogeneous concrete without excess of water. For small batches, I-mixing may be done if permitted by the Engineer-in-charge. The mixing drum shall be washed out and cleaned on completion of work each day or on every stoppage of work if the stoppage is more than 20 minutes.

(iv) Only sufficient water shall be used in the mix as required to obtain thorough compaction and a satisfactory surface with means of consolidation available. In floor and roof slabs, particular care must be taken to keep the water content to an absolute minimum and c account must a wet mix which will tend to bring fines of laitance to the surface be Water for each batch shall be measured in a self-measuring tank fitted to the concrete mixer.

The limits of proportions of water to cement should be determined during the preliminary tests and the mixing of concrete finally selected for the work shall be to the entire satisfaction of the Engineer - in-charge. In suitable cases, the slump test may be used to estimate the consistency but the criterion of consistency of the concrete shall be such that the slump when tested in accordance with standard method shall be maintained wherever possible at 64mm. But the Engineer-in-charge may where exceptional conditions demand it permit a greater slump up to a maximum limit of 114mm.

7.5 Placing and compaction of concrete

(i) Before placing concrete, the exposed faces of sub grade, form. work and reinforcements are to be thoroughly washed with water and wetted with thick cement slurry immediately before the concrete is placed. Placing of concrete shall not be commenced until the Engineer-in charge or his representative has inspected the shuttering, reinforcements, etc. against which the concrete is to be placed.

(ii) Concrete must be placed in its final position as quickly as possible after mixing, before initial set has taken place.

(iii) The concrete shall be placed in regular layers as approved by the Engineer-in-charge.

(iv) The concrete shall be well tamped and pinned so that it is thoroughly worked into all corners and around all reinforcements and thoroughly consolidated by hand compaction or mechanical vibration as specified until the concrete assumes a jelly like constituent with water just appearing on the surface, care being taken during the foregoing operation not to disturb any shuttering, reinforcements, foundation bolts, pipe sleeves or bolt hole, pocket positions or disturb any fixtures embedded.

(v) The method of handling concrete from mixer to the work shall be such that there is no risk of segregation of ingredients.

(vi) The operation of deposition of concrete shall be continue so far as practicable until the section authorized by the Engineer-in-charge has been completed to the height or dimension shown or required.

(vii) Concrete shall not be deposited for a height greater than 900 mm.

(viii) During the placement of concrete, the top surface shall not be allowed to go dry. Where the surface of any concrete has become dry or set and further concrete is to be deposited thereon, the surface should be picked, wire brushed, watered and thoroughly grouted with a rich mortar

before depositing new concrete.

(ix) All concrete (plain or reinforced) directed to be compacted by mechanical vibration shall be compacted thoroughly by approved mechanical internal type vibrators. The vibrators may be electrically of pneumatically driven, but must have a frequency not less than 300 cycles per minutes and be of the internal type. All vibration shall be carried out under the direction of specialists or to a plan approved by the Engineer-in-charge. Care must be taken to avoid segregation due to excessive vibration. Homogeneous concrete should result from vibrating and the concrete should be free from interstices or pockets or combs.

(x) Pointing and patching shall not be done unless the surface has been inspected by the Engineer-in-charge and the same have been specifically approved in writing as satisfactory and that the roughness or honey comb does not extend more than 1O mm inside the surface. In no case shall honey combed concrete be permitted, and if the Engineer-in-charge thinks that work has been badly or carelessly carried out affecting the design calculation or working stresses for the respective mixes, the same will be dismantled and reconstructed by the contractor at his own cost.

7.6 Construction joint:

All construction or expansion joints in concrete shall be formed only at positions agreed by the Engineer-in-charge and shall be formed against well strutted shuttering to give plane faces with ample rebates. All such joints shall have continuous, square bonds and grooves to produce a water tight key and the exposed faces of joints are to be monolithic with main mass of concrete. The Contractor shall take all necessary steps by means of providing timber edgings and make an exact horizontal straight finish to outside edges of any lift to concrete. There shall be no vertical construction joints. The responsibility for making all the construction joints water tight shall rest with the contractor.

7.7 Curing of concrete

Concrete shall be protected from rapid drying and during the first ten days of hardening, the shuttering and the exposed faces of the concrete shall be kept constantly wet by the spraying of water or other means, to the approval and satisfaction of the Engineer-in-charge. The contractor shall make all arrangements for curing the concrete to the entire satisfaction of the Engineer-in-charge.

All curing must be done by covering the surface with hessian cloth or empty cement bags to the concrete surface and keeping it wet by spray of water intermittently. For horizontal surfaces pooling by 7.5
Cm high earth or mortar bunds should be resorted to. Walls will be wrapped with hessian as soon as practicable
after concreting is completed and the hessian shall be kept saturated by means of a continuous pumped flow of water from perforated piping or other methods as approved. All must be done for at least 14 days.

7.8 Protection of work

No concrete shall be deposited in inclement weather particularly heavy rains or hot weather. Concrete shall be prevented from rapid drying or sludging.

The contractor shall deal with all water encountered during concrete operation so as to prevent it from damaging the surface or exerting pressures against the concrete, until at least 40 hours' have elapsed after deposition. All ground water shall be drained before any concrete is deposited and under no circumstances shall concrete be placed in or through water.

7.9 Water proofing

Water proofing compound shall be used wherever specified or directed by the Engineer-in-charge. The contractor shall suggest the make of the water proofing compound he intends to use and also submit the pamphlet giving the maker's specifications and directions for the water proofing compound.

The contractor's attentions is however drawn to the requirements that the works shall be water tight and as such all precautions shall be taken to ensure a thorough and a close punning of the concrete.

On completion of curing, the structure when necessary is to be filled with water. The water is to be maintained at this level for a period of 7 days after which it may be emptied. Any part which shows signs of leakage are to be marked during the test and are to be traced to the inside face of the structure after emptying and sealed with Bitumen or other suitable approved material to the satisfaction of the Engineer-in-charge. The structure is then to be refilled with water which is to be maintained at this level for another 7 days and retested and retreated as above, if necessary, in case of leakages and the process repeated till the water level is maintained without any signs of leakage. The cost of all the above operations shall be deemed to be included in the rate for concrete work.

7.10 Test for crushing strength

The contractor shall be held responsible for ensuring that the crushing strength of concrete as placed shall not be less than the minimum specified strength for a particular mixes as per the Indian Standard Code of Practice.

Samples of concrete, when deposited, shall be taken at random from the portion deposited before start of initial set and test cubes there from shall be made in standard 152mm cubes. Should the crushing strength prove to be below the figures specified, the contractor shall make such change in

preparation or in the method of mixing, laying concrete to the required strength without increase in price. In case the work is already executed such work shall be rejected and it shall then be redone by the contractor at his own expense.

7.11 Form work

Form work shall consist of pre-fabricated timber or steel and or shall be used for all faces of concrete which need support. Details of form work shall be submitted to the Engineer-in-charge for approval before work is commenced. The shuttering shall be erected true to shape. The shuttering should be reasonably water tight and sufficiently strong and well braced to retain its shape and shall not be liable to distortion when the wet concrete is deposited, it shall given true lines to the edges and faces of concrete when shuttering is removed. The form work should be so prepared that the required surface finish is obtained.

The sheeting boards used for form work for vibrated concrete shall be placed and laid perfectly true with tongued and grooved joints to prevent the percolation of liquid from the concrete.

All timber surfaces which will come into contact with cement concrete shall be truly planed and painted with oil of approved quality.

The shuttering is to be designed, fabricated and erected in such a way as to permit lifts of not more than 1.5m in height unless otherwise specified by the Engineer-in-charge. The contractor shall be entirely responsible for the strength, design and fabrication of the form work. The striking of the form work should be done after obtaining written approval of the

Engineer-in-charge in the manner suggested by him.

All shuttering or molds with supporting false work, struts and staging etc. shall be of suitable quality either metal or of timber and of such substantial strength with ample strutting etc. as will ensure that the shuttering molds remain rigid without any springing or distortion throughout the placing, ramming, compacting by vibration and setting of the concrete, and the design of the shuttering molds shall be such as will get struck and removed for reuse without injury to the concrete.

All to the Engineer-in-charge's approval, no shuttering or molds fixing or supports etc. will be allowed to be incorporated in the finished concrete. In case the Engineer-in-charge directs to use some steel supports which may get embedded in concrete, the same shall be provided without any extra cost.

All joints, shuttering or molds shall be in either horizontal or vertical planes and shall be free from shaving, dust dirt, mud or other debris all to the Engineer-in-charge's approval. Prior to concreting and after concreting, the exposed surfaces of the shuttering or molds shall be cleaned of all adhering concrete before depositing fresh concrete.

7.12 Rejection of concrete work

The contractor on written permission of the Engineer-in-charge shall remove and reconstruct at his own cost any portion of work, which in the opinion of Engineer-in-charge gives evidence before or after removal of forms that the concrete was of inferior quality at the time of deposition or was partially segregated or was not sufficiently or was excessively vibrated or some reinforcement bars had been omitted, incorrectly placed, displaced, or which gives evidence of any fault, or injury from any cause whatsoever which in the opinion of Engineer-in-charge may prejudicially affect the strength or durability of construction.

Samples of concrete When being deposited shall be taken from time to time and standard test cubes after curing for the required period will be got tested for crushing strength in a standard approved laboratory by the Engineer-in-charge but at the Contractor's expenses. If the crushing strength prove to be below the strength specified in the Indian Standard Code of Practice, the contractor shall replace or rebuild the structure concerned at his own cost.

7.13 Striking of form works

The contractor shall be responsible for any injury to the concrete work and for any damage caused by or arising from the removal or striking of forms and supports and any advice, permission or approval given by the Engineer-in-charge or any person whether their employee or not, related to the removal of form and supports shall not relieve the contractor of his responsibility defined below.

(i) No shuttering shall be removed before the concrete has sufficiently set to withstand safely the stress to which the structure may then be subjected. The shuttering shall be removed carefully without causing any shock or vibration to the concrete.

(ii) 48 hours in the case of vertical shuttering to mass concrete and stand heads. 4 days in the case of vertical faces of reinforced concrete walls, piers and beams.

(iii) 10 days in the case of supports of reinforced concrete floor slabs, provided temporary props are fixed before decentering and maintained in position for a further period of 10 days. Where it is not desired to fix temporary props, the striking time must be at least 14 days.

(iv) In no case, however, the striking of shuttering should be done without the approval of the Engineer-in-charge.

(v) The timing given for striking of shuttering is provisional only. The contractor will be responsible for any injury to the concrete work whether reinforced or not and for any damage caused by or arising from, the removal and striking of shuttering and supports.

(vi) The contractor shall be held responsible for and make good at his own cost all injury and damages arising from premature removal of the shuttering. A small portion of the shuttering shall first be exposed to ensure that the concrete has set sufficiently hard before the whole area of shuttering is removed.

No load shall be put or any weight suspended from slabs for one months after casting .Temporary props, if considered necessary, shall be left in for the support of the underside of slabs, beams, etc. as long as is reasonably practicable after striking the shuttering. No shuttering or temporary props shall be removed without obtaining permission from the Engineer-in-charge.

9 . Reinforcement

The bars for reinforcement shall be bent cold, correctly and accurately to the size and shape shown on detailed drawing or as directed by Engineer-in-charge.

As far as possible, bars of proper lengths shall be used but where this cannot be done and overlapping has to be resorted to, a lap of 40 times diameters of bars shall be given with proper hooks at the ends and the two bars shall be bound with annealed steel or GI wire 16 to 18 SWG and twisted tight along with overlap as per standard practice. The overlap jointing shall be staggered.

All reinforcement shall be free from loose mill scale, rust, oil, grease, dirt, paint and other deleterious matter before placing the concrete. The bars crossing one another shall be bound at every intersection with annealed steel wire not thinner than 16 SWG and twisted tight to make the skeleton or the network rigid so that the reinforcement is not displaced during deposition of concrete, Precast spacer blocks of 1:2 cement mortar about 40mm wide and necessary thickness shall be used to keep reinforcement bars on the forms and in proper position.

The mesh work shall be temporarily supported so as to retain its correct position in molds during the process of depositing and consolidating concrete. The ends of all such wires shall be turned into body of concrete and not allowed to project towards the surface of concrete. The concrete distance blocks shall be used as directed between reinforcement and at bottom and sides of forms so as to ensure correct cover to the bars. Greatest care shall be taken to prevent displacement or bending of members before concrete pouring is started. In case where bars project they should be adequately protected against displacement or bending of members before concrete pouring is started. During concreting a competent steel placer shall be used to adjust to correct position of reinforcements that may get displaced.

No concreting shall be started unless the Engineer-in-charge or his representative has checked the reinforcements and has recorded the Measurements in the measurement book.

Reinforcement shall be measured according to the weight of steel actually used, no allowances being made wastage. The rate shall be frit' Steel fixed in place and shall include all necessary binding and also all necessary Wiring to keep the Steel in position.

1 0 . Rubble Masonry

The stone used in Masonry shall be of approved quality and obtained from quarries approved in Writing by the Engineer-in-charge.

All the joints should be of even thickness so as to permit and even pointing (Struck, sunk or raised as the Case may be) required to be done. Hammer dressing or chisel dressing to the edge to make the joints uniform and even, shall be included in the rates and no extra rates will be paid for this. All the corners of walls shall be truly vertical The Face Work shall be washed and cleaned on completion. Exposed faces of walls not intended to be plastered or

pointed with: different type of mix of mortar or otherwise covered shall be unfinished with any of the type. of pointing specified below as the work proceeds;

(a) External faces unless otherwise specified with a neat struck joint or keyed joints.
(b) Internal faces with a neat flush joint.

Faces intended to be Plastered or pointed with different mix of mortar raised or struck type pointing etc. shall have joint raked out to at least 10 mm depth and properly cleaned and wetted to receive the finish specified.

Pointing shall be done with cement mortar 1:4, or as directed by the Engineer-in-charge.

1 1 . Damp Proof course

The damp proof course shall be laid in cement concrete 1:2:4 with 20mm metal for 40 mm thick

proof course. The damp proof course shall be laid to the full width of the plinth masonry. The edges shall be straight, even and truly vertical. The superstructure masonry work shall not be commenced on the freshly laid damp proof course, unless the later has been flooded with water for at least 48 hours. A cost of bitumen mixed with sand or as specified in the bill of quantities should be given over the D.P.C. Using 10(ten) Kg. of bitumen for 10 sqm. of D.P.C.

1 2 . Brickwork

(a) The whole of the brick work is to be built in English bond unless otherwise directed. No four brick course Shall rise more than 25mm above the thickness of four brick course when laid dry. No bricks bats shall be used except where required as closures.
(b) erwise directed. No four brick course Shall rise more than 25mm above the thickness of four brick course when laid dry. No bricks bats shall be used except where required as closures.
(b) The bricks shall be thoroughly soaked in water before inclusion in work to reduce initial suction rate of water. The brick work must be kept continuously wet during the setting of mortar, after initial setting of mortar.
(c) The bricks shall be thoroughly bedded on cement mortar in the first instance and vertical joint to be filled properly with cement mortar during each layer. The work will be done in the proper manner in the first instance only and no grouting shall be resorted to.
(d) The brickwork must be laid true to line and level with horizontal courses and vertical courses etc.

Unless otherwise specified in the bill of quantities, brick work shall be built in cement mortar (1:6). The matrix immediately over the lintels in exterior wall only shall be in cement mortar 1:3. All half brickwork shall be built in cement Mortar 1:4. Where specified or directed by the Engineer-in-charge, 2 Nos. 6rnm die steel reinforcement bars may be provided to half brick walls.

Signature of Tenderer

(c) String courses, cornices and molding shall not generally be provided unless as shown on the drawings or as directed by the Engineer-in-charge. The architectural features and treatment if required as per the drawings as may be finalized before actual execution of work shall have to be incorporated during construction and such items whether in large or small quantities and any shape and size, shall have to be provided by the contractor at the rates in relevant items of the bill of quantities. The contractor shall not be eligible to claim any extra on this account.
(d) of quantities. The contractor shall not be eligible to claim any extra on this account.
(e) shall not be eligible to claim any extra on this account.
(f) Brickwork will be measured as the net quantity as shown on the drawings or as specified and no allowance shall be made for cutting and wastage or increase of width due to highest thickness of joints. The thickness shall therefore, be measured as under irrespective of actual thickness of the brick;

(g)	1/2	(h)	brick thick	(i)	10 Cms
(j)	1	(k)	-do-	(l)	20 Cms
(m)	1 ½	(n)	-do-	(o)	30 Cms
(p)	2	(q)	-do-	(r)	40 Cms and so on.

(s)
(t) NOTE: - If the British size bricks are used, measurements will be restricted to Metric size bricks for payment.
(u) Plastering
(v) The work shall be carried out as per the following specification: -
(w) Joints of brick work and masonry shall be raked out 1O mm deep to form key for the cement plaster and concrete surfaces shall be thoroughly picked and roughened for the same purpose. The rates for plastering shall be inclusive of preparing the surface as above.
(x) The surface shall be thoroughly wetted as directed before the plastering coat is laid.
(y) The patches of plaster 15x15 Cm should be put 3m apart to correct plane and to the specified thickness.
(z) Sand screened through 5mm sieve and is liable to retention of 25% (maximum of 3mm mesh sieve) shall only be used. The sand shall be thoroughly graded and free from silt, loam, vegetable and calcareous matter. The sand from sources approved by Engineer-in charge in writing shall only be used.

(a) Cement and sand be mixed in proportion as specified then water shall be added to form an easily workable paste. In no case shall mortar which has been allowed to stand for more than half an hour after mixing be used.

(b) The plaster shall then be laid in single coat to the line connecting 15 x 15Cm patch laid beforehand and the surface shall be finished smooth with wooden floats.

(c) In the case of internal wall, the piaster shall be left off in a straight line 23 Cm above the level. This portion together with portion of the floor near the wall should be plastered, the junction being curved to a radius of 40mm.

For measurement, all openings shall be deducted for each plaster face and return and soffits shall be added. Measurements for lintel bottom jambs and sills shall be added.

(d) All plaster shall be to the specified thickness only. For any increases in plaster thickness due to irregularities in work face, contractor will not be entitled for any extra payment.

(e) Proper precaution shall be taken to see that the work is cured for at least 14 days.

(f) The contractor shall take every precaution right from the commencement of plaster work to prevent any brazing as that may appear on the surface of the plaster and shall be responsible to make good

any portion of the work which in the opinion of the Engineer-in-charge requires removal and redoing. All internal surface which are specified or directed to be plastered in two coats, shall be plastered as under.

(i) The base coat shall be of cement mortar of proportion and thickness as specified in the bill of quantities and shall be applied to masonry and concrete surfaces in which all bricks. joints have been thoroughly rough ended to form a key for the rendering. The surface of the masonry work and concrete shall be thoroughly wetted before the application of the rendering.

(ii) The surface of the first coat rendering shall be roughly scratched to a minimum depth of 3mm thus forming a key for the lime punning. Lime punning shall not be carried out until after the base coat has thoroughly set.

13. Lime Punning or Lime Neeru Finish

The lime punning shall consist of:-
(a) 3 Part of Lime (ground pure)
(b) 1 Part of approved shell lime.

The materials are to be properly tempered with water and screened through linen cloth. The materials shall then be allowed to be settled in a pit so that extra water is absorbed. Care being taken to cover the pit with gunny bags or other suitable materials when the material is of sufficient consistency so as to be able to be applied with trowels. The punning shall be laid in not more than 3 mm thick and rubbed to obtain a uniform finish. The surface shall then be cured excessively by continuous watering to avoid cracks being developed during setting.

Very fine sand may be added in punning in suitable proportions if so approved at site by the Engineer-in-charge.

14. Precast Concrete work

The work shall be carried out as per relevant item for cement concrete. All precast work be done on level platforms and cured by immersing in the tanks for 21 days. The pre cast articles shall be carefully handled so as not to develop cracks or get damaged. All the exposed faces of precast slab etc. shall be rendered with a finishing coat of neat cement floated smooth and cured. The casting shall be of shape as ordered by the Engineer-in-charge without any extra charge.

Precast RCC sills, coping and lintels 1.5m span and under may be cast in situ or precast to sizes and shapes with necessary weathering, chamfered, angles and covering etc. as shown in the drawings. Jellies shall be of approved pattern and cast in pieces of exact dimensions as required.

Unless otherwise specified, all precast articles shall be set in cement mortar 1:3 and the joint finished neatly to match with the precast work.

The rate for precast work shall be inclusive of fixing it in position.

15. Wood work Wrought and put up in Roof Door/Windows Frames

The timber used for wood work shall be first class Madhya Pradesh teak or sal or bija as specified. The timber shall be of good quality, well-seasoned, free from decay and dead knots etc. The seasoning of timber shall be judged from the moisture content for various purposes. All the timber is to be approved by the Engineer-in-charge, and any timber rejected by him shall be removed at once from site of work. The

rates for wrought timber include cartage to and delivery at the site of the work, the fair rendering off all surfaces, chamfering of angle etc.

The rate for timber wrought framed and fixed includes all sawing, planning jointing, framing, labour and materials for raising and fixing and also the nail, spikes, screws etc. necessary for the framing and fixing.

All work shall be paid for net measurements, no allowance being made for wastage, but the length of each piece shall be taken overall so as to include projections for tongues or scrafts. In case of planned surface, an allowance shall be made for planning up to 2mm on each face.

In case of roof trusses, a full sized truss shall first be lined out on the ground on a level platform. From this full size diagram, templates of tenons, mortices and scrafts etc. shall be made for use in the manufacture of trusses. All timber coming into contact or embedded in masonry or concrete shall be well painted with two coats of boiled coal tar or solignum as specified, the cost of which is deemed to be included in the rates quoted. This shall not be paid for separately.

16. Joinery

All the joinery work involved in doors and windows frames shall be wrought and finished according to the detailed drawings made available during execution of the work and direction given at that time and strictly as per the corresponding items in the bill of quantities or in accordance with the instructions of the Engineer-in-charge in the absence of minor details in the drawings or descriptions. The allowance of 1.5mm only shall be allowed in wrought thickness for planning on both faces except in the case of panels for panelled joinery which shall be of the thickness shown in the drawings. Salwood shall not be permissible in joinery work. Work is to be framed as soon as possible after receipt of the detailed information and should then be stored so that air can circulate freely around it. No work shall be glued or wedged up to unit required for use. All external work is to be put together in lead paint and finished. Framings are to be properly measured as described. All doors and framing up to 5 Cm thick in hardwood to doors are to be single tenoned and tongued and all lock rails to doors are to be double tenoned, Any joinery work which may split, fracture, shrink, part in joints or show flaw or other defects or unsoundness or bad workmanship shall be removed and replaced with new materials.

The use of nails in joinery is prohibited.

For panel, joinery up to 225mm width shall be of one piece, panels exceeding 225mm width may be in two pieces with a central tongued and grooved joint.

17. Doors and Windows

17.1 General

(i) Work shall be carried out in accordance with standard drawings or such modification there of as are issued from time to time. The directions of the Engineer-in-charge shall be final in this matter. Doors and windows will be provided with single or double flap shutters as specified.

(ii) Sills may be omitted, if so ordered in writing by the Engineer-in-charge.

The lower ends of the vertical frames shall be buried in the floor to the extent of 40mm when the sills are omitted. In other cases, the sill itself shall be buried in the floor to the same extent.

The height in case of doors without sills shall be measured from the top of the floor to the top of the frame. When however wooden sills are provided, the height shall be measured from the bottom of sill to the top of the frame.

The sizes of doors and windows given in the drawings shall be overall size including the frames. The section of the frames shall be as shown on the drawings. Unless otherwise specified, heavy iron fittings shall be used samples should be got approved from the Engineer-in-charge. The rates for the doors or windows or ventilators shall include the cost of the frame fixing in wall, iron hold fasts, hinges, stoppers, all fixtures and fastenings and French polishing or painting as specified. Where fixtures fastening and shutters are supplied free of cost to the contractor, the rate shall be exclusive of the cost thereof, but inclusive of fixing.

17.2 Flush Doors

When flush doors are specified to be used as shutters for doors, they shall be of Sitapur or other equivalent quality as per the samples approved by the Engineer-in-charge. The flush door shall be of minimum thickness of 40mm or as specified and have the required finish such as varnishing, beading etc. All fittings like hinges, handles, locks etc. should be of heavy type and of approved quality. The flush doors

should be well sand papered and then neatly painted with 3 coats of approved paint including the finishing coat. Flush doors with teak faced veneered, should be finished with a coat of transparent Luxol or Duro glazed paint so as not to cover the veneer.

17.3 Fly proof doors

Where fly proof gauge shutters have to be provided in the same frames in addition to the usual shutters, the thickness of the frames shall be increased by the specified thickness of the fly proof Shutters.

The wire gauge shall be bent at right angles in the rebate of styles and sills turned back and fixed with beading. The wire gauge shall be of 12 meshes per linear inch made of 24 imperial S.W,G.wire. The Helical spring hinges of approved make shall be provided for fly proof shutters.

17.4 Factory made panelled door shutters

The construction of factory made panelled door shutter shall conform to 16,1003 (Part-I) (latest revision).

(i) Stiles and Rails:

Shutters shall be made of kiln seasoned and chemically press-Lire treated second class hardwood stiles and rails. Width of stiles and top rails shall be 100mm whereas the width of lock and bottom rails shall be 200mm. Thickness of stiles and rails shall be as-follows:

(a) For Interior doors - 30mm
(b) For exterior doors - 40mm.

(ii) Panel Inserts:

Panels shall be boiling water proof(BWP)grade phenol formaldehyde synthetic resin bonded Plywood both Side, commercial veneered, conforming to IS 3097 (latest revision). Thickness of panels Shaft be as follows:-

(a) For interior (i.e. for 30 mm stiles/rails) - 9mm
(b) For exterior doors (i.e. for 40mm stiles/rails) - 12mm

17.5 Windows with iron bar

All windows specified with iron bars shall be provided with 113111M diameter round iron

bars or as detailed in the drawing. The bars shall be passed through a central rail Of flat iron 5 x 19 mm Or through transom bar as detailed in the drawing and fixed vertically or horizontally as directed into the frame with their ends properly riveted. Iron bars shall be paid for separately as per the weight of steel actually used, no allowance being made for wastage and shall be inclusive of fitting in position, punching or drilling holes in flat iron or central rails and riveting the ends.

17.6 Steel sashes

The steel sashes shall be fixed in position in brick work with necessary lugs and fittings provided. The fixing shall be done in accordance with the supplier's instruction. The rate shall be inclusive of glazing with cement mastic and putty of approved quality etc. The sashes only will be supplied to the contractor free of cost at the Company's site stores, if so provided for in the bill of quantities.

18. Lintels

All lintels shall be of reinforced cement concrete 1:2:4 constructed in situ or precast and fitted and placed in position. The bearing at each end of the supporting walls shall not be less than 15 Cm.

Lintels when precast shall be marked clearly to indicate the position of the reinforcement.

19. Window Sill

Windows shall be provided with precast cement concrete or cast in situ cement concrete slabs as directed to approved thickness or as shown in the drawing. The front face of the sill will project 30 to 50 mm beyond the face of the wall and shall be throated. The sill will be chamfered on the exposed edge.

20. Flooring

Unless otherwise specified, the flooring shall consist of 40mm thick cement concrete 1:2:4(with 20mm graded metal) as wearing surface, laid over a layer of thick cement concrete 1:4:8 or lime concrete.

The bed on which the floor paving is to be laid should be properly prepared. The sub-grade shall be cleaned of all dirt and other foreign matter. The slope desired in the floors shall be provided in the Sub-grade. The ground should be well consolidated before and after laying the Sub-grade so that no settlement whatsoever takes place at a later stage.

The bed of concrete should be thoroughly rammed. The sub grade shall be thoroughly wetted with water before laying the floor. Paving shall be laid on panels of uniform size in squares or rectangles not exceeding 2.5 Sqm. in area but no side shall be longer than 2m. The work shall be carried out in alternate panels in the first instance so that the two panels have one corner point common. At least 4 days shall elapse before commencing the concreting of intermediate bays. The top surface should be finished to a smooth and hard surface using extra cement.

While being placed, the concrete shall be vigorously sliced and spaded with suitable tools to prevent formation of voids or honey comb pockets. The concrete shall be brought to specified levels by means of a heavy straight edge, resting on the side from and drawn with a swing motion, in combination with a series of lifts and drops alternating with small lateral shifts. While concreting the remaining alternate bays, care shall be taken to ensure that the edge of previously laid bays are not broken by careless or hard temping. Immediately after laying the

concrete, surface shall be inspected for high or low spots and any needed correction made up by adding or removing concrete.

The surface shall then be finished as ordered and cured.

The junctions of floors and walls, floor and dado or skirting shall be rounded off as directed without any extra payment.

Any inequalities in the bed of the floor shall have to be made good by the Contractor at his own cost by providing the concrete required, to provide a truly plane surface. Payment will be made only for thickness specified.

21. Polished Coloured Concrete Floors

The surface of ordinary cement concrete floor when ordered to be coloured shall be finished with a thin topping consisting of one part of Portland cement to two parts of sand coloured with the addition of approved mineral pigment of required colour thoroughly mixed with cement when dry. The quantity of pigment shall be such so as to produce the required shade but in no case it will exceed one third part of cement. The coloured top layer shall be laid immediately after laying the concrete.

Cutting and polishing may be done by hand or machine. In hand cutting and polishing, the first cut shall be made with coarse carborundum stone (60 grade) or approved hard stone, coarse sand and plenty of water after the coloured surfacing layer has been drowned for not less than 36 hours. After the first cut the surface shall be thoroughly washed to remove all grinding mud and covered with a grout of cement and colouring matter, in original proportions, in order to fill the pin holes that appear after cuttings.

The final cut or polish shall be carried out after an interval of 10 days with polishing stones or carborundum stone of FF (fines) grade.

After the final cut, oxalic acid shall be dusted over the surface (3.2 Kg. per 100 Sqm) sprinkled with water and rubbed hard with numdah blocks. The following day, the floor shall be wiped with a moist rag and dried with a soft cloth. A hot mixture of turpentine and bees wax (4:1 weight) shall then be applied to the surface and rubbed with clean cotton waste. The rubbing must be continued until the floor ceases to be sticky.

In cutting and polishing by machine, the procedure is the same except that special rapid butting grit blocks fixed in the machine replace the hard polishing stones in the hand process.

Signature of Tenderer

22. Mosaic Tile Flooring

The pattern and tint of the tiles shall be approved by the Engineer-in-charge. The tiles

shall be true in shape and free from cracks. The tiles shall be carefully set perfectly true in Surkhi Lime Mortar (3:1) with a mixture of cement at the rate of 1.2 bags per 10 Sqm. The joints shall be uniform and as thin as possible. They shall run in straight lines. The tiles floor shall be well polished by hand or machine.

23. Stone Slab Flooring

Stone slabs for flooring, paving trends and risers or steps etc. shall be of selected quality hard, sound, dense and homogeneous in texture, free from cracks, decay, weathering and flaws. They shall be of the finish and colour as approved by the Engineer-in-charge. The intent is to use local stone, Kotah Stone, Jaisalmer Marble and Dhoulpur stone individually and or in combination.

For polished stone flooring, the slabs shall have top (exposed) face machine polished before being brought to site. Edges of stone shall be fine chisel dressed on all sides to a minimum depth of 15mm and table rubbed to a smooth finish so that straight edge laid along the side of the stone shall be fully in contact with it. The edges of stone slab for stair treads, risers and steps shall be machine cut of full depth. The slabs shall confirm to the sizes called for in the drawings. All angles and edges of the slabs be true square and free from chippings and the surface shall be true and plane. The thickness of the stone slab shall be 20mm to 25mm for flooring work. For stair treads, the thickness of stone slab shall be 25 mm thick uniformly. The stone slab for steps shall be 40mm thick uniformly. Before starting the work, Contractor shall get samples of slabs approved by the Engineer-in-charge.

24. Ceramic Tile Flooring

Flooring to toilets and other areas where called for shall be of nonslip ceramic tiles of Kajaria,Orient, Nitco, Johnson, Somani or other equivalent make as approved by the Engineer-in-charge. The tiles shall be of approved colour, size and shape and shall be laid to the pattern approved by the Engineer-in-charge.

The tiles shall be of uniform colour, true to size and shape and free from cracks, twists, uneven edges, crazing and other defects. The tiles shall be laid over a bed of 20mm thick cement mortar 1:4(1Cement:4 coarse sand) and levelled to a true surface. The surface of the bedding mortar shall be left rough to provide bond for the tiles. A floating coat of thick cement slurry shall be laid over the screed to proper levels and the non-slip ceramic tiles set over the same firmly to correct line and levels. The joints shall be filled and finished neat with cement paste pigmented to the shade of the tile. The joints shall be finished neat as directed and shall be straight, regular and uniform. On completion the surface shall be washed with water, rubbed with fine saw dust and left clean. The finished floor surface shall be true to required levels.

25. Weathering and Water Proofing Course

Weathering course over all RCC roof slabs shall be as follows: -

Lime concrete terracing to roofs shall consist of lime concrete of average thickness 75mm laid all over the RCC roof slabs and shall be composed of:

1 Part approved lime.

1 Part approved Surkhi.

1/2 Part brick Koba.

and appropriate quantities of methi and molasses as solution and lime water added. The terracing is to be placed, rammed and trimmed and beaten for a minimum period of seven (7) full working days during which it shall be kept wet and thereafter kept wet for a period of not less than 28 days. During beating, the surface shall be periodically and liberally sprinkled with a mixture of 3Kg.of bail fruit and 100 liters of water. The mortar which has been brought to the Surface by beating shall be smoothened and Worked, to et fine finish with steel trowels. No plastering shall be done. The whole work shall be completed in the approved manner for first class work to the satisfaction of the Engineer-in-charge.

A curve of 10 Cm. radiuses shall be formed at the junctions of the lime concrete terracing with the walls at a minimum height of 5 Cm above the surface of the terracing.

The top edge of the lime concrete shall be protected by brick concrete over sailing course. The over sailing course shall be weathered with cement filled and properly throated below so that water dropping there from shall drop clear of the cover to the area of the roof terracing.

A layer of water proof paper or asphalt shall be laid over the lime concrete terracing over which shall be laid the finishing layer of 40mm thick cement concrete of 1:2:4 mix with 12rnm graded aggregate divided in panels of 1 xl m and joint filled with asphalt. The rates shall include laying and supplying of necessary Materials.

2 6 . Painting

All wood, iron work, steel work described as to be painted shall be given one coat of approved primer and two coats of the best quality ready mixed oil paint of approved make. The brand of paint and manufacturer shall be approved by the Engineer-in-charge, if the paint is not Supplied by the Department. Mixing of paints by Contractor at site is not permitted.

Generally, iron and steel work eta. would have received its primary shop coat before being delivered to the site.

Generally, all surfaces must be thoroughly cleaned before application of the paint and care must be taken to ensure this. No paint work shall be carried out in condition of dust.

When more than one coat is specified, each coat may vary slightly in shade and shall be passed by the Engineer-in-charge before the outer most coat is applied.

Each coat must be thoroughly dry before application of the next additional coat. All surfaces shall be adequately prepared before application of each coat, the surface shall be rubbed down with an abrasive material appropriate to the Surface under treatment.

Brushes of best quality, suitable size and approved manufacturer shall be used for the work.

Brushes shall be thoroughly cleaned before being used for a different type or class of materials. The use of cloth dipped in paints in lieu of the brushes is prohibited.

Particular care shall be taken to get at places such as difficult joints, tops and bottoms of door and window § leaves etc. are not left out in painting.

Primer with a Mixture of 3 parts of raw linseed oil and one part of boiled linseed oil per 10 Sqm.of superficial surface.

Alternatively, if ordered, apply a coat of approved primer as per maker's instructions.

Apply one more coat of under coating followed by a finishing coat, high gloss or matt finish as ordered.

First class workmanship is required in all paint work, which must be carried out to the approval and satisfaction of the Engineer-in-charge.

No painting on exterior or other exposed part of the work shall be carried out during inclement weather and surface shall be thoroughly dry before painting is proceeded with at all stages or processes of the work.

(a) Wood Work: - All wood work must be dry and free from any foreign materials incidental to building operations. All loose knots shall be removed from and holes filled with well fitted new sound timber set in red or white lead paint and securely pinned. All projecting knots shall be gauged well below the surface.

The surface shall be sand papered smooth along the line of the grains and dusted clean. All knots shall receive two thin coats of knotting well brushed in. Teak to be painted in a light shade shall be given one coat of knotting to prevent the teak holes from bleeding and staining the paint.

The surface shall then be given a coat of priming and allowed to dry. Unless otherwise directed, the priming coat shall be applied before the wood work is fixed in position. All holes, cracks, crevices etc. shall be stopped carefully to a true level surface with putty.

NOTE: Stopping with putty will be done after the application of the priming coat.

The surface thus prepared and primed shall be treated with one or more coats of under coating followed by one coat of finishing paint as specified.

(b) Plaster, Concrete, Brick, Stone and Asbestos Cement sheets.

The surface to be painted should be allowed to dry for at least three months, preferably longer if possible, Dryness of surface is essential to guard against trapped moisture brushing out through the paint and running it.

Preparation of new unpainted surface shall be carried out as under:

Clean the surface of all loose of foreign materials incidental to building operations, scrap off lime wash coating if any, sand paper lightly and dust with a cloth. Stop nail holes, etc. and repair defect, if any, with new material similar in composition to that of the main surface.

Neutralize any free alkali in the surface by treating with a dilute solution of Hydrochloric or sulphuric acid 1 part of acid to 50 parts of water and wash down with clean water. Allow the surface to dry.

27. Varnishing

Clean the surface of all foreign matter, rub down with fine sand paper, dust off, stop holes, cornices, etc. with putty and thin clean glue applied hot. When dry, rub down smooth with sand paper.

Stain to the required tint, if ordered.

Apply one coat of undercoating of finishing varnish, allow it to harden and flat down lightly with fine sand paper.

Apply second coat of under coating, if ordered and flat down.

The finishing varnish shall be applied just as it comes from the cane taking care to brush it out evenly and avoiding laying it not too thickly, lay off in long clean weeps of the brush without going over the work too often, trim edges to prevent runs and blobs, use clean and well-worn brushes. The work should be free from loose hair and brush marks.

28. Interior Finishing

The interior of the rooms shall be finished off with white or colour wash of approved shade or

with oil bound washable distemper or plastic emulsion paint of approved shade and manufacturer as specified. The surface, required to be treated with plastic emulsion paint or oil bound washable distemper, shall be thoroughly dried and cleaned and given one coat of size, thereafter, two coats of plastic emulsion paint or oil bound washable distemper of brand and shade approved by the Engineer-in-charge. Such emulsion paint or distemper shall be mixed and work carried out in accordance with the manufacturer's specifications and as per instructions of the Engineer-in-charge. The work shall be finished to first class workmanship and to the entire satisfaction of Engineer-in-charge. Surface to be finished with plastic emulsion paint or oil bound distemper or cement based paint like snowcem, must not be white washed.

29. White Washing

The surfaces described to be white washed shall be thoroughly dried and cleaned and given one coat of size thereafter two coats of lime wash.

The white wash shall be prepared in accordance with the b'est practice and shall consist of ground lime shell whiting and gum mixed with water in proportions. The coat shall be applied in alternate directions and the work completed shall be uniform and free from brush marks and other blemishes etc.

30. Colour Washing

Generally, the specification for colour washing is the same as for white washing, but pigment of approved tint should be added to the mixture.

31. French Polishing

French polish shall be composed of shellac dissolved in methylated spirit of required consistency.

Wood surfaces which are described or specified to be French polished shall first be cleaned, rubbed down smooth with sand paper, dusted off and stopped and treated with linseed oil which shall be thoroughly wiped off.

The polish shall then be applied to the surface with beading covered by a clean linen rag well wetted with, polish rubbed hard on the wood, uniformly and completely covering the surface with the polish. The surface, after drying, is then to be rubbed smooth with fine glass paper and the above process repeated alternately.

The surface shall be finished to high gloss and to be approved by the Engineer-in-charge.

Signature of Tenderer

32. Glazing

All glass shall be of good quality, free from spots, bubbles, smoke wanes, air holes and other defects. In cutting glass, proper allowance shall be Made for expansion, unless ordered

otherwise (e.g. to be fixed with wood beads), the glass shall be well beaded in oil putty, springed firmly back puttied, and finished to neat chamfer, rebate whether in new or old work shall be painted one coat before glazing or moistened with raw linseed oil, if the joinery is not to be boiled.

Each pane of glass shall be square, jointing is not allowed. Broken or damaged glass shall be replaced. No glazing be considered complete until all satins have been removed from the surface of glass.

Sheet glass shall be plain, clear and weigh not less than the weights per sq mt. specified. For door and windows shutters, 20 to 24 oz. size sheet glass shall be used.

Plain glass be transparent, translucent or wired as ordered. The transparent type shall have polished surface, the vision obtained being clear and undistorted.

A tolerance of 0.55 to 0.80 mm shall be admissible on the nominal thickness of polished plate.

For glazing in metal sashes, putty be Gold size putty (1 1/2) pints of Gold size per 100 lbs. or linseed oil putty or patent mastic as ordered.

The rate for putty glazing to wood sashes etc. shall include painting rebates, springing beading with back and front puttying etc. with oil putty or as specified, fixing beads and include panel pins.

The rates for glazing in metal sashes shall include painting rebates, Gold size putty or pattern glazing mastic and for fixing the glazing pins (supplied with the sashes)or in the case of metal sashes with loose beads (wood or metal) for taking of beads, beading glass and refixing beads with set screws provided.

33. Rain Water Pipe

All rain water pipes, gutters, offsets, shoes, bends, tees and rain water bends etc. shall be of either cast iron (in accordance with relevant I.S. Specifications) or Asbestos Cement (Everest Brand or its equivalent conforming to relevant IS Specifications) as specified by the Engineer-in-charge.

All the brackets for rain water pipes are to be soft metal strictly corresponding with the shape of the gutter. The screw on the faces should be used wherever possible.

Suitable clips shall be used for pipes without ears and these shall be either plain or ornamental as the moulding of the pipes may require.

Rain water pipe shall be of sufficient capacity for their duty. and shall be of heavy type. The contractor shall be required to submit samples and get the approval of the Engineer-in-charge.

The rate shall include for providing and fixing. T.W. gutkas, fixing flat iron clamps bent to suitable shape etc. filling the joints with cement mortar 1:3 curving etc. complete including all works incidental thereto.

34. Roofing with Mangalore Tiles

The tiles shall be 1st class well burnt, and of standard size, hard and uniform in texture, sound throughout and free from blisters etc. and shall weigh not less than 2.5Kg. when dry. The tiles shall not absorb More than 15% of its own weight when immersed in water for 24 hours. The tiles shall be commercial or equivalent Make. The gauge of tiles shall be 310mm center to center of battens.

Roof ridge and hip tiles shall be Mangalore pattern (first quality) as per sample approved by the Engineer-in-charge. The last two rows of tiles at eaves shall be tied by GI Wire to the wooden battens. Ridge and hip tiles shall be bedded in lime Mortar (1:3) & pointed with the

same mortar colored to match the tiles.

35. A.C. Sheet Roofing

Asbestos sheets shall be Trafford or Big-six size. Everest quality manufactured by M/s.Asbestos Cement Limited Bombay or other equivalent approved manufacturer and conforming to relevant I.S. Specifications.

A.C. ridge shall be 2 piece suitably separated adjustable ridges manufactured by M/asbestos Cement Limited, Bombay or equivalent approved manufacturer and conforming to relevant I.S. Specifications.

The roofing work with asbestos sheets shall be done in accordance with the manufactures instructions with 8mm diameter galvanized hook or crack bolts to purlins and with coach screw to wall paints. The selection and the cutting of the sheets shall be done as per the instruction of the Engineer-In-charge to reduce wastage to a minimum. The bitumen washer and cup washers used shall be obtained from the manufactures of the A.C. sheets and shall not be of ordinary commercial quality.

Cement mortar (1:4) fillets or benching 75mm x 75mm shall be provided where the lower roof abates against the wall and where vent pipes emerge through the roof wall as shown on the drawings.

When required 30mm x 6mm flat iron wind ties shall be fixed at the end laps and eaves end of the sheets. The fixing shall be done with the same hooks which secure the sheets and the purlins. The measurement shall be taken for the finished work, the laps between sheets shall not be measured. The lap of the sheet under the ridge pieces shall also not be measured for the purpose of payment.

36. Asbestos Sheet Ceiling

The asbestos sheets shall be of approved manufacture. The A.C. sheets shall not be less than 3/16" (5mm) thick.

The sheeting shall be laid truly parallel or perpendicular to the wall and shall be fixed to the battens with 44mm iron screw. All ceiling shall be neat and clean. The sheets shall not be forced up against one another.

The joints in the ceiling shall be covered by teak wood beading 25mm x 12mm thick fixed to the ceiling joints with 55mm screws on the underside of the sheeting’s.

The overlap of the beading be equal on each of the two adjoining sheets. The beading shall be mitred at junctions. The spacing of screws shall not exceed 150mm.

37. Valley Gutters

Valley gutters of 13 to 22-gauge plain galvanized iron sheet bent to shape as shown on the drawings shall be provided. They should have 225mm long welded overlaps, welding shall be bronze4ivelding with silicon bronze rods silvered copper flux.

38. Hand Railing

Hand railing shall be of teak wood or GI pipe or as specified in the drawing and shall be manufactured strictly as per specifications and drawings issued.

39. Fencing with R.C.C. Post

All posts and struts shall be of standard design. The posts shall be RCC 1:2:4 (with 6mm

metal) reinforced with 6mm diameter MS bars, as per standard drawings and neatly finished, the spacing of posts shall be 2.0m center to center or near about to suit the dimension of the area to be fenced. Even 10th and corner posts shall be strutted on both sides. GI barbed wire or woven wire as specified of approved quality shall be fixed to posts by 16 SWG wire.

4 0 . Fire place And Chimneys

The fire places and chimneys in kitchen shall be as per dimensions shown on standard drawings. They shall be built in brick work in cement mortar 1:6 and inside being plastered smooth with work in cement mortar 1:3 and sharp corners inside rounded off as they are built. The chimney shaft finally by capped with 65 mm thick RCC slab projecting on all sides beyond the outside faces of chimney shaft by 225mm. The sides of the shaft shall be provided with suitable number of opening just under the capping slab for proper escape of smoke.

Where so specified, A.C.flue pipes with cowls shall be provided instead of chimney shaft as directed by the Engineer-in-charge.

4 1 . Pointing to masonry

Where indicated on drawings, exposed faces shall be pointed in cement mortar 1:4 to the type specified. Surfaces to be pointed shall be prepared and wetted thoroughly before pointing is done.

Pointed faces shall be kept wet for at least 5 days for lime pointing and 10 days for cemen1 pointing. Some of common types of pointing are given below.

41.1 Flush pointing

(a) Shall be flush with the face of the wall and to the width of the joint neatly cut on both edges.

(b) Struck pointing or weather struck pointing the tip, the top of horizontal joints shall be mostly pressed back about 3mm with the pointing tool so that the joint is sloping from top t(bottom and shall be pressed back to form a semi-circular or V groove of the same width a the horizontal join.

(c) Keyed pointing shall be carried out by first finishing the joints as for flush pointing and the ruling off the horizontal and vertical joints with a round edged tool to form narrow semicircular grooves in proper alignment.

External pointing shall be taken to at least 150mm below the ground level.

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4 2 . Heavy Duty Floors

Heavy duty floors for workshops, power station etc. shall consist of cement concrete (1:2:4) laid to thickness as specified over a sub-grade of 1:4:8 cement concrete of specified thickness as directed by the Engineer-in-charge. The floor shall have a screeded finish to

prevent skidding. The surfaces of the floor should be hardened by the addition of concrete floor hardeners like I ronite, Hardon ate, etc. Where floor hardening is specified it shall be done using floor hardener or an approved manufacturer, laid in accordance with manufacturer's instructions/specifications. The tenderer shall specify in the tender documents some of the floor hardeners proposed to be used.

4 3 . Rolling Shutters

(a) For openings not exceeding 12 Square meters: -

The shutter shall be made out of 20 gauge cold rolled mild steel or galvanized iron laths, having 75mm width and deeper convex corrugations to stand heavy pressures. The two edges of the laths shall be accurately fixed 'to form a very strong hinge throughout their lengths. The bottom of the shutter shall be attached with heavy Section flanged type pressed steel rail by spot welding on either end of the rail locking bolts made from heavy section. Flat shall be provided in such a way that operated from inside and outside. Handles shall be 6hromium plated. The shaft the shutter shall be of heavier gauge steel tube on which the counter balancing spring (good strong quality) shall be fitted. Each spring shall be secured to mild steel pulleys. The side top brackets taking the whole assembly shall be of pressed steel, and unbreakable having holes on the flanges for fixing at site. The side guides in which shutters slide shall be made of strong steel section having deep grooves and pressed from thick M.S.Plates. Top covers shall be of 18/20 gauge sheets shaped to, suit top brackets. The shutters shall be so secured to the pulleys as the shaft that when erected at side; the, convex laths are seen from outside.

(b) For openings exceeding 12 Square Meters: -

The rolling shutters shall have the same specifications as detailed above excepting that the shutters shall be made out of 18 gauge laths. The operation of the shutter shall be by means of mechanical gearing with gat iron wheels and worms of gunmetal. The end of the shutter shall be fitted with a chain puffin f6r4hairts operation.

The rolling Shutters shall be painted with two coats of anticorrosive red-oxide before dispatch from the manufacturer's workshop. The make of the rolling shutters shall be specified by the tenderer and shall be subject to the approval of the Engineer-in-charge.

The rolling shutters shall be erected and fixed in position as per instruction of the manufacturers and the rates quoted shall be inclusive of fixing with all fixing accessories, anchor bolts, grouting etc. complete in all respect.

4 4 . Labour only for fixing bolts including nuts, and washers complete

The scope of work under this item covers taking delivery of the bolts including nuts, washers etc. complete from the site office/department's representative, arranging suitable weighing arrangements of the nuts and bolts including washers if required, by the Engineer-in-charge, their transportation up to the site of respective structure foundations, fixing of the same in proper alignment and level as per drawing/ requirements, suitably including keeping it in proper position as per requirement during concreting etc. complete as per direction of Engineer-in-charge. Scope of work under this item also covers taking delivery of template from the site office, its transportation up to respective foundation, its fixing/alignment in proper position by making suitable arrangement, its removal after concreting and return it to site store/ shifting to other foundation after cleaning and straightening etc. in good condition. The payment of this

item restricted to weight of nut bolts and washer only and no extra payment whatsoever under this item shall be paid.

45. In case of any ambiguity in regard to specifications or method of execution of any item of work, the procedure laid down in USR relevant I.S. specifications or specifications indicated in a particular item shall hold good.

46. The field and material tests as pre4scribed in relevant PWD SOR be performed mandatorily.

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APPENDIX-A

CEMENT CONSTANTS

S. NO.	ITEM	UNIT	MATERIALS	QUANTITY OF MATERIALS
1	2	3	4	5
1	Cement Lime Mortar 1:1:6	Cum	Cement Lime Sand	0.16 Cum 0.16 Cum 1.00 Cum
2	Cement Lime Mortar 1:2:9	Cum	Cement Lime Sand	0.11 Cum 0.22 Cum 1.00 Cum
3	Cement Lime Mortar 1:3:12	Cum	Cement Lime Sand	0.08 Cum 0.25 Cum 1.00 Cum
4	Cement Mortar 1:2	Cum	Cement Sand	0.50 Cum 1.00 Cum
5	Cement Mortar 1:3	Cum	Cement Sand	0.33 Cum 1.00 Cum
6	Cement Mortar 1:4	Cum	Cement Sand	0.25 Cum 1.00 Cum
7	Cement Mortar 1:5	Cum	Cement Sand	0.20 Cum 1.00 Cum
8	Cement Mortar 1:6	Cum	Cement Sand	0.16 Cum 1.00 Cum
9	Cement Mortar 1:8	Cum	Cement Sand	0.12 Cum 1.00 Cum
10	a) Plum Cement Concrete 1:2:4 with 25% Plums	Cum	Plum Metal Cement Sand	0.21 Cum 0.64 Cum 0.16 Cum 0.32 um
	b) Plum Cement Concrete 1:2:4 with 25% Plums	Cum	Plum Metal Cement Sand	0.22 Cum 0.68 Cum 0.11 Cum 46.1 um
	c) Plum Cement Concrete 1:2:4 with 25% plums	Cum	Plum Metal Cement Sand	0.23 Cum 0.69 Cum 0.09 Cum 0.35 Cum
11	Cement Concrete 1:1:2	Cum	Metal Cement Sand	0.77 Cum 0.40 Cum 0.38 Cum
12	Cement Concrete 1:1:5:3	Cum	Metal Cement Sand	0.82 Cum 0.283 Cum 0.41 Cum
13	Cement Concrete 1:2:4	Cum	Metal Cement Sand	0.85 Cum 0.22 Cum 0.43 Cum

14	Cement Concrete 1:3:6	Cum	Metal Cement Sand	0.90 Cum 0.154 Cum 0.45 Cum
15	Cement Concrete 1:4:8	Cum	Metal Cement Sand	0.92 Cum 0.12 Cum 0.46 Cum
16	Cement Concrete 1:5:8	Cum	Metal Cement Sand	0.85 Cum 0.11 Cum 0.53 Cum
17	Cement Concrete 1:5:10	Cum	Metal Cement Sand	0.94 Cum 0.09 Cum 0.47 Cum
18	Cement Concrete 1:6:12	Cum	Metal Cement Sand	0.94 Cum 0.08 Cum 0.47 Cum
19	Brick Bat Filling	Cum	Brick Bat	1.00 Cum
20	Metal Filling	Cum	Metal	1.00 Cum
21	Plain Ashlar Masonry / Ashlar rough tooled masonry/Ashlar rock. (Quarried) faced masonry.	Cum	Masonry Stone Mortar	Cum 0.12 Cum
22	Squared rubble masonry (first sort) / squared rubble masonry (Second sort) /Hammer dressed coursed rubble masonry / Face Stone masonry.	Cum	Rubble Masonry Stone (Bond Stone) Mortar	0.84 Cum 0.16 Cum 0.35 Cum
23	Uncoursed or Random Rubble masonry	Cum	Rubble Masonry Stone Mortar	0.84 Cum 0.16 Cum 0.42 Cum
24	Fixing fine dressed cut stone lintels in mortar	Cum	Cut Stone Mortar	Cum 0.12 Cum
25	Fixing fine dressed cut stone Copings, Cornices , string courses and plinth coursed in mortar	Cum	Cut Stone Mortar	Cum 0.12 Cum
26	Stone brick masonry with solid stone masonry block precast in CC 1:4:8	Cum	Precast Blocks Mortar	0.90 Cum 0.12 Cum
27	Sun-dried brick masonry	Cum	Bricks Mortar	Cum 0.25 Cum
28	Burnt brick masonry	Cum	Bricks Mortar	1.0 Cum 0.21 Cum

29	Honey comb brick masonry	Cum	Bricks Mortar	0.72 Cum 0.05 Cum

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.NO.	ITEM	UNIT	MATERIALS	QUANTITY OF MATERIALS
1	2	3	4	5
30	Flag stone flooring over 20mm thick bedding of CM 1:6 including pointing in	Sqm	Flag Stone CM 1: 6 CM 1: 3	1.10 Sqm 0.0224 Cum 0.0026 Cum
31	Grouted stone pitching	Cum	Pitching tone Mortar	1.0Cum 0.20 Cum
32	Dry stone pitching	Cum	Pitching Stone	1.00 Cum
33	Dry boulder pitching.	Cum	Boulder	1.0 Cum
34	75 mm thick improved terrace flooring in cement concrete with neat cement floating coat.	Sqm	C.C.Cement (for finishing and slurry)	0.075 Cum 0.003 Cum
35.	40mm thick improved terrace flooring in cement concrete with neat cement	Sqm	C.C. Cement (for finishing and slurry)	0.04 Cum 0.003 Cum
36.	15mm thick lime plaster on brick masonry with neeru finish.	Sqm	Lime Mortar White wash lime	0.025 Cum 0.003 Cum
37.	20mm thick lime plaster on brick masonry with Neeru finish.	Sqm	L.M. White wash Lime	0.025 Cum 0.003 Cum
38.	Cement plaster on stone work :- a. 20 mm thick b. 25mm thick.	Sqm Sqm	C.M. C.M.	0.025 Cum 0.028 Cum
39.	6 mm thick cement plaster to ceiling.	Sqm	C.M.	0.0072 Cum
40.	Cement Plaster on brick work:- a. 10 mm thick b. 15 mm thick. c. 20 mm thick.	Sqm Sqm Sqm	C.M. C.M. C.M.	0.012 Cum 0.018 Cum. 0.022 Cum
41.	Rough cast cement plaster:- a. 15 mm thick b. 20 mm thick	Sqm - do-	C.M. C.M.	0.02 Cum 0.022 Cum
42.	Cement for floating coat of neat cement over plaster.	Sqm	Cement	2.2 Kg.

43.	Pointing on brick work:- a. Flush pointing. b. Ruled pointing. c. Raised and cut	Sqm - do- -do-	Mortar Mortar Mortar	0.003 Cum 0.003 Cum 0.0046 Cum
44.	Cement pointing to flag stone flooring.	Sqm	C.M.	0.0026 Cum
45.	Cement wash with portland cement slurry.	Sqm	Cement	0.107 Kg.
46.	Ordinary Portland Cement	Cum	Portland Cement	28.80 Bags.