

PART B
SPECIAL CONDITIONS (CIVIL)

1.0 General

- 1.1 Except for the items, for which Particular Specifications are given or where it is specifically mentioned otherwise in the description of the items in the schedule of quantities, the work shall generally be carried out in accordance with the “**CPWD specifications 2019 Vol. I & II**” with upto date correction slips, additional / Particular Specifications, Architectural / structural drawings and as per instructions of Engineer-in-Charge.

The several documents forming the tender are to be taken as mutually complementary to one another. Detailed drawings shall be followed in preference to small scale drawings and figured dimensions in preference to scaled dimensions.

Should there be any difference or discrepancy between the description of items as given in the schedule of quantities, particular specifications for individual items of work (including special conditions) and I.S. Codes etc., the following order of preference shall be observed:

- (i) Description of Schedule of Quantities
- (ii) Particular Specifications and Special Conditions, if any.
- (iii) Drawings
- (iv) CPWD Specifications.
- (v) Indian Standard Specifications of B.I.S.
- (vi) Manufacturers' specifications & as decided by Engineer-in-charge.

“In the event of any variation/ discrepancy in the drawings, specifications and tender documents etc. the decision of the Engineer-in-charge shall be final, binding and conclusive on the contractor. In case, the contractor has any doubt, the same should be got clarified immediately from the Engineer-in-charge and no claim of the contractor shall be entertained thereafter. Moreover, the agency is not allowed to take benefit out of any clerical/ grammatical mistake in the standard clauses/Schedule of Quantities/Specifications etc. being used in the agreement”.

The works to be governed by this contract shall cover delivery and transportation upto destination, safe custody at site, insurance, erection, testing and commissioning of the entire works.

The works to be undertaken by the contractor shall inter-alia include the following:

- i. Preparation of detailed SHOP drawings and AS BUILT drawings wherever applicable.
- ii. Obtaining of Statutory permissions where ever applicable and required.
- iii. Pre-commissioning tests as per relevant standard specifications, code of practice, Acts and Rules wherever required.
- iv. Warranty obligation for the equipment and/or fittings/fixtures supplied by the contractor.

Contractor shall provide all the shop drawings or layout drawings for all the coordinated services before starting any work or placing any order for any of the services etc. These shop drawings/layout drawings shall be got approved from Engineer-in-charge before implementation and this shall be binding on the contractor. The contractor shall submit material submittals along with material sample for approval of Engineer-in-charge prior to delivery of material at site.

- 1.2 Any reference made to any Indian Standard Specifications, shall imply to the latest version of that standard, including such revisions / amendments as issued by the Bureau of Indian Standards up to last date of receipt of tenders. The Contractor shall keep at his own cost all such publications including relevant Indian Standard Codes applicable to the work at site.
- 1.3 The work shall be executed and measured as per metric dimensions given in the Schedule of Quantities, drawings etc. (FPS units wherever indicated are for guidelines only).
- 1.4 In the item of providing and fixing precast reinforced cement concrete in shelves, the cost of cutting chases and making good the same shall be inclusive in the item and nothing extra shall be paid on this account.

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- 1.5 In the item of finishing walls with water proofing cement/ exterior paint, only the plain/flat area shall be measured for payment and nothing extra shall be paid on account of pointed wall surface.
- 1.6 All the hidden items such as water supply lines, drainage pipes, conduits, sewers etc. are to be properly tested before covering.
- 1.7 Samples including brand / quality of materials and fittings to be used in the work shall be got approved from the Engineer-in-Charge, well in advance of actual execution and shall be preserved till the completion of the work.
- 1.8 Equipment like concrete pumps excavators/Transit mixers etc. shall be allowed to be moved away from the site when, in written opinion of Engineer-in-Charge, the same are no longer required at site of work.
- 1.9 The contractor, his authorized representative, workmen etc. shall strictly observe orders pertaining to fire precautions prevailing in the area.
- 1.10 The tenderer shall see the approaches to the site. In case any approach from main road is required at site or existing approach is to be improved and maintained for cartage of materials by the contractor, the same shall be provided, improved and maintained by the contractor at his own cost.
- 1.11 Contractor shall take all precautionary measures to avoid any damage to adjoining property. All necessary arrangement shall be made at his own cost.
- 1.12 The contractor shall take all precautions to avoid accidents by exhibiting necessary caution boards day and night, speed limit boards, red flags, red lights and providing barriers. He shall be responsible for all damages and accidents caused to work due to negligence on his part. No hindrances shall be caused to traffic, during the execution of the work.
- 1.13 The contractor shall take instructions from the Engineer-in-Charge regarding collection and stacking of materials at any place. No excavated earth or building rubbish shall be stacked on areas where other buildings, roads, compound wall, services etc. are to be constructed.
- 1.14 The contractor shall provide at his own cost suitable weighing, surveying, leveling and measuring arrangements as may be necessary at site for checking. All such equipment shall be got calibrated in advance from laboratory, approved by the Engineer-in-Charge. Nothing extra shall be payable on this account.
- 1.15 Contractor shall provide permanent bench marks, flag tops and other reference points for the proper execution of work and these shall be preserved till the end of work. All such reference points shall be in relation to the levels and locations, given in the Architectural and plumbing drawings.
- 1.16 Water tanks, taps, sanitary, water supply and drainage pipes, fittings and accessories should conform to approved manufacturers specifications where CPWD Specifications are not applicable. The contractor should get the materials (fixtures/fittings) tested from approved labs wherever required at his own cost.
- 1.17 The work shall be carried out in accordance with the Architectural drawings and Structural drawings, to be issued from time to time, by the Engineer-in-Charge. Before commencement of any item of work, the contractor shall correlate all the relevant architectural and structural drawings issued for the work, nomenclature of items, specifications etc. and satisfy himself that the information available there from is complete and unambiguous. The figures & the written dimensions of the drawing shall supersede the measurement by scale. The discrepancy, if any, shall be brought to the notice of the Engineer-in-Charge for immediate decision before execution of the work. The contractor alone shall be responsible for any loss or damage occurring by the commencement of work on the basis of any erroneous and/ or incomplete information and no claim, whatsoever shall be entertained on this account.
- 1.18 The contractor should submit the shop drawing of staging and shuttering for approval of Engineer-in-Charge before actually commencing the execution of work under the item. Nothing extra shall be payable on this account.

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- 1.19 Other agencies may also simultaneously execute and install the works and the contractor shall afford necessary facilities for the same. The contractor shall leave such recesses, holes, openings, trenches etc. as may be required for such related works (for which inserts, sleeves, brackets, conduits, base plates, clamps etc. shall be available as specified elsewhere in the contract) and the contractor shall fix the same at the time of casting of concrete, stone work and brick work, if required, and nothing extra shall be payable on this account.
- 1.20 All material shall only be brought at site as per program finalized with the Engineer-in-Charge. Any pre-delivery of the material not required for immediate consumption shall not be accepted and thus not paid for.
- 1.21 The contractor shall procure the required materials in advance so that there is sufficient time for testing of the materials and approval of the same before use in the work.
- 1.22 Existing drains, pipes, cables, over-head wires, sewer lines, water lines and similar services encountered in the course of the execution of work shall be protected against the damage by the contractor at his own expense. The contractor shall not store materials or otherwise occupy any part of the site in a manner likely to hinder the operation of such services. In case temporary supporting of such services is required to facilitate the work, the same shall be done by the contractor at no extra cost.
- In case the existing services are to be shifted permanently, then before dismantling the existing services, alternate/diversion of service lines has to be laid by the contractor so that there is no interruption in use of existing services. The contractor has to plan the alternate suitable route for diversion/shifting of service lines and get the same approved from the Engineer-in-Charge before starting shifting of services. Nothing extra shall be paid except the payment of dismantling and laying of new service lines as per conditions of contract.
- 1.23 The contractor shall be responsible for the watch and ward / guard of the buildings, safety of all fittings and fixtures including sanitary and water supply fittings and fixtures provided by him against pilferage and breakage during the period of installations and thereafter till the building is physically handed over to the client department. No extra payment shall be made on this account.
- 1.24 The contractor shall be fully responsible for the safe custody of materials brought by him/ issued to him even though the materials may be under double lock key system.
- 1.25 For construction works which are likely to generate malba / rubbish, contractor shall dispose of malba, rubbish & other unserviceable materials and wastes at his own cost to the notified specified dumping ground and under no circumstances these shall be stacked / dumped even temporarily, outside the construction premises.
- 1.26 The rates quoted by the Contractor are deemed to be inclusive of site clearance, setting out work, profile, establishment of reference bench mark(s), taking spot levels, construction of all safety and protection devices, barriers, preparatory works, working during monsoon, working at all depths, height, lead, lift and location etc until / unless specified otherwise and any other incidental works required to complete this work. Nothing extra shall be payable on this account.
- 1.27 For works below ground level the contractor shall keep that area free from water. If dewatering or bailing out of water is required, the contractor shall do it and nothing extra shall be paid except otherwise provided in the items of schedule of quantities.
- 1.28 Any legal or financial implications resulting out of disposal of earth shall be sole responsibility of the contractor. Nothing extra over the schedule shall be paid on this account.
- 1.29 The Contractor shall keep himself fully informed of all acts and laws of the Central & State Governments, all orders, decrees of statutory bodies, tribunals having any jurisdiction or authority, which in any manner may affect those engaged or employed and anything related to carrying out the work. All the rules & regulations and bye-laws laid down by Collector / MC etc. and any other statutory bodies shall be adhered to, by the contractor, during the execution of work. The Contractor shall also

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adhere to all traffic restrictions notified by the local authorities. The water charges (for municipal water connection as well as tanker water) shall be borne by the contractor. All statutory taxes, levies, charges (including water and sewerage charges, charges for temporary service connections and / or any other charges) payable to such authorities for carrying out the work, shall be borne by the Contractor. The Contractor shall arrange to give all notices as required by any statutory / regulatory authority and shall pay to such authority all the fees that is required to be paid for the execution of work. He shall protect and indemnify the Department and its officials & employees against any claim and /or liability arising out of violations of any such laws, ordinances, orders, decrees, by himself or by his employees or his authorized representatives. Nothing extra shall be payable on these accounts. The fee payable to statutory authorities for obtaining the various permanent service connections and Occupancy Certificate for the building shall be borne by the Department.

- 1.30 **Royalty** at the prevalent rates on all materials such as boulders, metals, sand and bajri etc. collected by the Contractor for the execution of the work, shall be paid by the Contractor directly to the revenue authority of the state government concerned. Nothing extra shall be payable on this account.
- 1.31 No foreign exchange shall be made available by the Department for importing (purchase) of equipment, plants, machinery, materials of any kind or any other items required to be carried out during execution of the work. No delay and no claim of any kind shall be entertained from the Contractor, on account of variation in the foreign exchange rate.
- 1.32 The Contractor shall conduct his work so as not to interfere with or hinder the progress of the work being performed by other Contractors or by the Engineer-in-Charge. As far as possible, he shall arrange his work and place, so as not to interfere with the operations of other Contractors or shall arrange his work with that of the others, in an acceptable and coordinated manner and shall perform it in proper sequence.
- 1.33 The Contractor shall assume all liability, financial or otherwise in connection with this contract and shall protect and indemnify the Department from any and all damages and claims that may arise on any account. The Contractor shall indemnify the Department against all claims in respect of patent rights, royalties, design, trademarks of name or other protected rights, damages to adjacent buildings, roads or members of public, in course of execution of work or any other reasons whatsoever, and shall himself defend all actions arising from such claims and shall indemnify the Department in all respect from such actions, costs and expenses. Nothing extra shall be payable on this account.
- 1.34 The Contractor shall make all necessary arrangements for protecting from rains, the work already executed and for carrying out the further work, during monsoon including providing and fixing temporary shelters, protections etc. Nothing extra shall be payable on this account. Also, no claims for hindrance shall be entertained on this account.
- 1.35 In case of flooding of site on account of rain or any other cause and any consequent damage, whatsoever, no claim financially or otherwise shall be entertained notwithstanding any other provisions elsewhere in the contract agreement. Also, the Contractor shall make good, at his own cost, the damages caused, if any.
- 1.36 The Contractor shall take all necessary precautions to prevent any nuisance or inconvenience to the owners, tenants or occupants of the adjacent properties and to the public in general. The Contractor shall take all care, as not to damage any other adjacent property or other services running adjacent to the plot. If any damage is done, the same shall be made good by the Contractor at his own cost and to the entire satisfaction of the Engineer-in-Charge. The Contractor shall use such methodology and equipment's for execution of the work, so as to cause minimum environmental pollution of any kind during construction, to have minimum construction time and minimum inconvenience to road users and to the occupants of the buildings on the adjacent plot and public in general, etc. He shall make good at his own cost and to the entire satisfaction of the Engineer-in-Charge any damage to roads, paths, cross drainage works or public or private property whatsoever caused, due to the execution of the work or by traffic brought thereon, by the Contractor. Further, the Contractor shall take all precautions to prevent any pollution of streams and waterways. All waste or superfluous materials shall be carted away by the Contractor, entirely to the satisfaction of the Engineer-in-Charge. Utmost care shall be taken to keep the noise level to the barest minimum so that no disturbance as far as possible is caused to the occupants / users of adjoining buildings. No claim whatsoever on account of

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site constraints mentioned above or any other site constraints not specifically stated here, shall be entertained from the Contractor. **Therefore, the Contractors are advised to visit the site and get firsthand information of site constraints. Accordingly, they should quote their tenders. Nothing extra shall be payable on this account.**

- 1.37 All ancillary and incidental facilities required for execution of work like labour camp, stores, fabrication yard, offices for Contractor, watch and ward, temporary ramp required to be made for working at the basement level, temporary structure for plants and machineries, water storage tanks, installation and consumption charges of temporary electricity, telephone, water etc. required for execution of the work, liaison and pursuing for obtaining various No Objection Certificates, completion certificates from local bodies etc., protection works, barricading, testing facilities / laboratory at site of work, facilities for all field tests and for taking samples etc. during execution or any other activity which is necessary (for execution of work and as directed by Engineer-in-Charge), shall be deemed to be included in rates quoted by the Contractor, for various items in the schedule of quantities. Nothing extra shall be payable on these accounts. Before start of the work, the Contractor shall submit to the Engineer-in-Charge, a site / construction yard layout, specifying areas for construction, site office, positioning of machinery, material yard, cement and other storage, steel fabrication yard, site laboratory, water tank, etc.
- 1.38 The Contractor shall display all permissions, licenses, registration certificates, bar charts, other statements etc. under various labour laws and other regulations applicable to the works, at his site office.
- 1.39 No tools and plants including any special T&P etc. shall be supplied by the Department and the Contractor shall have to make his own arrangements at his own cost. No claim of hindrance (or any other claim) shall be entertained on this account.
The Contractor shall be allowed to use the facilities if available at site & arranged by the associate-Contractors and other agencies working at site of the work. The Contractor shall be
- Allow to use of scaffolding already erected, toilets, sheds etc.
 - Properly co-ordinate their work with the work of other Contractors.
 - Provide control lines and benchmarks to his associate-Contractors and the other Contractors.
 - Provide electricity and water at mutually agreed rates.
 - Provide hoist and crane facilities for lifting material at mutually agreed rates.
 - Co-ordinate with other Contractors for leaving inserts, making chases, alignment of services etc. at site.
 - Adjust work schedule and site activities in consultation with the Engineer-in-Charge and other Contractors to suit the overall schedule completion.
 - Resolve the disputes with other Contractor amicably and the Engineer-in-Charge shall not be made intermediary or arbitrator. The contractor shall indemnify the Department against any claim(s) arising out of such disputes.
- 1.40 On completion of work, the contractor shall submit at his own cost four prints of "as built" drawings of the completed work to the Engineer-in-Charge. These drawings shall have the following information.
- Run off of all piping and their diameters including soil, waste pipes and vertical stacks.
 - Ground and invert level of all drainage pipes together with locations of all manholes and connections, upto outfall.
 - Run off of all water supply lines with diameters, location of control valves, access panels etc.
- In case the contractor fails to supply "as built drawing" aforesaid within 30 days of the date of completion, then the recovery @ Rs. 10,000/- for each such set of drawings shall be made from the contractor's final bill.
- 1.41 The contractor shall have to arrange water of desirable quality for the construction purpose for which he may have to install RO/ Water Softening plant at site or might have to bring/ purchase water from outside as per decision of Engineer-in-charge. Nothing extra shall be paid on this account.
- 2.0 Unless otherwise specified in the schedule of quantities or CPWD specifications, the rates for respective items shall be all inclusive and apply to the following: -
- All lifts & all heights, floors including terrace, leads and depths.
 - All labour, material, tools and plants and other inputs involved in the execution of the item.
 - Any of the conditions and specifications mentioned in the tender documents.

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- (iv) Providing sunk flooring in bath-rooms, kitchen, etc. as applicable and shown in the drawings.
- (v) Any legal or financial implications resulting out of disposal of earth, if any.
- (vi) Payment of Royalty at the prevailing rates, if any, on the boulders, metal, shingle, sand and bajri etc. or any other material collected by him for the work direct to revenue authorities.
- (vii) Performance test of the entire installation(s) before the work is finally accepted.
- (viii) Any cement slurry added over base surface (or) for continuation of concreting for better bond is deemed to have been built in the items.
- (ix) All incidental charges for cartage, storage and safe custody of materials brought to site.
- (x) Pumping/ bailing out surface water/rain water/ sub soil water, if necessary for any reason.

3.0 QUALITY ASSURANCE/ TESTING OF MATERIALS

3.1 GENERAL:-

- 3.1.1 All incidental expenditure on security, construction of cement godown, access roads, arrangement of water, electricity etc. to be incurred by the agency for arranging, installing and operation of Batch Mix Plant shall be deemed to have been included in his quoted rates and no claim whatsoever will be tenable on this account.
- 3.1.2 With each Running Bill, the details of test carried out shall be submitted by the contractor as per Performa **as per Part-B of NIT.**
- 3.1.3 Samples of materials required for testing shall be provided free of charge by the contractor. The tests are to be carried out in the approved laboratories for testing as approved by ADG/SDG. **All expenditure to be incurred for testing of samples e.g. taking samples, packaging, sealing, transportation, loading, unloading etc. including testing charges shall be borne by the contractor.**
- a) All the test in field lab setup at construction site shall be carried out by the Engineering Staff deployed by the contractor which shall be 100% witnessed by JE & 50% of tests shall be witnessed by AE-in-charge. At least 10% of the tests are to be witnessed by the Engineer-in-charge.
 - b) All the entries in the registers will be made by the designated Engineering staff of the contractor and same should be regularly reviewed by JE/AE/EE.
 - c) Contractor shall be responsible for safe custody of all the test registers.
 - d) Submission of copy of all Test Registers, Material at Site Register along with each alternate Running Account Bill and Final Bill shall be mandatory. These registers should be duly checked by AE(P)/EE in Division Office & receipts of registers should also be acknowledged by Accounts Officer by signing the copies and register to confirm receipt in division office
 - e) Extensive testing of the materials used for construction is a pre-requisite for attaining high quality of the work. This shall also require specialized tests, physical, chemical, ultrasonic, x-ray and various other types of tests which cannot possibly be carried out in a site laboratory. These tests also require specialized personnel who regularly deal in such testing. Therefore, the need arises for carrying out the tests in outside laboratories. These laboratories may be in the Govt. sector, Semi Govt. or Private sector. The outside private laboratories shall be short listed beforehand by EE and approval obtained from **ADG, CPWD, Bhopal**. In case of laboratories in the private sector, the past record and reputation of the laboratory must invariably be given due consideration. The infrastructure in these laboratories can also be inspected before they are short listed.
However, testing of material in any Govt., Lab / IIT or NIT Lab / Govt. Engineering College may be allowed by Executive Engineer or higher officers provided these labs have all necessary facility to carry out the required tests.
- 3.1.4 However, if any ultrasonic pulse velocity/load testing or special testing is to be done for concrete whose strength is doubtful, the cost of the same shall be borne by the contractor.
- 3.1.5 In case there is any discrepancy in frequency of testing as given in list of mandatory tests and that in individual sub-heads of work as per CPWD Specifications higher of the two frequencies of testing shall be followed and nothing extra shall be payable on this account.

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- 3.1.6 Special attention shall be paid towards line and level of internal and external plastering, exposed smooth surface of RCC members by providing fresh shuttering plates, sealing shuttering joints, accurate joinery work in wooden doors and windows, thinnest joints in stone/ tiling / cladding work, non-hollowness in floor and dado tiles work, protection of scratches over flooring by impounding layer of plaster of Paris, water tight pipe linings, absence of hollow vertical joints in brick masonry, proper compaction of filled up earth etc. and up keeping of quality assurance shall be of paramount importance, as such.

3.2 FIELD LABORATORY

The contractor has to establish field laboratory at site including all necessary equipment's and skilled manpower for the **Field Tests as per Part-B of NIT** at this own cost to have proper quality control. For performing the above tests, the **Field Testing Equipment's and Instruments as per Part-B of NIT** are to be arranged and maintained by the contractor.

- 3.2.1 The contractor shall ensure quality construction in a planned and time bound manner. Any sub-standard material / work beyond set-out tolerance limit shall be summarily rejected by the Engineer-in-Charge & contractor shall be bound to replace / remove such sub-standard / defective work immediately.
- 3.2.2 The list of Laboratory/ Field equipment referred above are to be arranged and maintained by the contractor at the site of work. In case the equipment required for any test is not available at site, the department shall get the test conducted from the third party. However, in that event, besides providing free materials of sample, the cost of taking of sample, packing, transportation, testing charges etc. shall be borne by the contractor irrespective of the results.
- 3.2.3 The contractor shall establish field laboratory including additional room (of minimum area of 20 sqm. each) for preserving samples of material till the completion of whole work. Nothing extra shall be paid for establishing field laboratory.

3.3 SAMPLE OF MATERIALS:-

- 3.3.1 All materials and fittings brought by the contractor to the site for use shall conform to the samples approved by the Engineer-in-Charge which shall be preserved till the completion of the work. If a particular brand of material is specified in the item of work in Schedule of Quantity, the same shall be used after getting the same approved from Engineer-in-Charge. Wherever brand / quality of material is not specified in the item of work, the contractor shall submit the samples as per **List of Preferred Makes as per Part-B of NIT** for approval of Engineer-in-Charge. For all other items, ISI Marked materials and fittings shall be used with the approval of Engineer-in-Charge. Wherever ISI Marked material / fittings are not available, the contractor shall submit samples of materials / fittings manufactured by firms of repute conforming to relevant Specifications or IS codes for the approval of Engineer-in-Charge.
- 3.3.2 To avoid delay, contractor should submit samples as stated above well in advance so as to give timely orders for procurement. If any material, even though approved by Engineer-in-Charge is found defective or not conforming to specifications shall be replaced / removed by the contractor at his own risk & cost.
- 3.3.3 BIS marked materials except otherwise specified shall also be subjected to quality test besides testing of other materials as per the specifications described for the item/material. Wherever BIS marked materials are brought to the site of work, the contractor shall, furnish manufacturer's test certificate or test certificate from approved testing laboratory to establish that the material procured by the contractor for incorporation in the work satisfies the provisions of specifications relevant to the material and / or the work done.

BIS marked items (except cement & steel for which separate provisions have been made in para 4.0) required on the work shall be got tested, for only important tests, which govern the quality of the product, as decided by the Engineer-in-Charge. The frequency of such tests (except the mandatory test) shall be 5% of the frequency as specified in BIS. For mandatory test, frequency shall be as specified in the CPWD Specifications.

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- 3.3.4 For certain items, if frequency of tests is neither mentioned in the CPWD Specifications & BIS, then tests shall be carried out as per decision of Engineer-in-Charge.

4.0 CEMENT & STEEL REINFORCEMENT (IF NOT STIPULATED TO BE SUPPLIED BY THE DEPT.).

- 4.1 Contractor has to produce manufacturers test certificate and challan for each lot of Cement & Steel Reinforcement procured at site.

4.2 CEMENT:-

- 4.2.1 The contractor shall procure Portland Pozzolona Cement conforming to IS: 1489 (Part-1) as required in the work, from reputed manufacturers of cement as per attached list of preferred make or from any other reputed cement Manufacturer having a production capacity not less than one million tonnes per annum as approved by **ADG, Bhopal**.

- 4.2.2 Samples of cement arranged by the contractor shall be taken by the Engineer-in-Charge and got tested in accordance with provisions of relevant BIS Codes. The cement shall be used on the work only after satisfactory test results have been received. The cement for such testing purpose shall be supplied by the contractor free of charge. In case test results indicate that the cement arranged by the contractor does not conform to the relevant BIS Codes, the same shall stand rejected and shall be removed from the site by the contractor at his own cost within a week's time of written order from the Engineer-in-Charge to do so. The cost of tests shall be borne by the contractor irrespective of the outcome of the test results; whether fail or pass.

- 4.2.3 Cement shall be brought at site in bulk supply of approximately 50 tonnes or as decided by the Engineer-in-Charge.

- 4.2.4 The cement godown of the capacity to store a minimum of 2000 bags of cement or as decided by NIT approving authority in case less than 100MT cement is required for the work, shall be constructed by the contractor at site of work for which no extra payment shall be made. The contractor shall be responsible for the watch and ward and safety of the cement go-downs. The contractor shall facilitate the inspection of the cement go-downs by the Engineer-in-Charge at any time.

- 4.2.5 The actual issue and consumption of cement on work shall be regulated and proper accounts maintained as provided in the contract. The theoretical consumption of cement shall be worked out as per procedure prescribed in **Clause-38** of the contract and shall be governed by the conditions laid therein.

- 4.2.6 The theoretical consumption of cement shall be worked out as per procedure prescribed in **clause-38** of the contract and shall be governed by conditions laid therein. In case the cement consumption is less than theoretical consumption including permissible variation, recovery at the rate so prescribed shall be made after ensuring structural soundness and stability on the basis of testing. In case of excess consumption, no adjustment shall be made.

For non-scheduled items, the decision of the **SE-Jabalpur, CPWD, Jabalpur** regarding theoretical quantity of the cement, which should have been actually used, shall be final and binding on the contractor.

- 4.2.7 Cement brought to site and cement remaining unused after completion of work shall not be removed from site without written permission of the Engineer-in-Charge.
- 4.2.8 In case the contractor brings surplus quantity of cement the same shall be removed from the site after completion of work by the contractor at his own cost after approval of the Engineer-in-Charge.
- 4.2.9 Cement, which is not used within 90 days from its date of manufacture, shall be retested at approved laboratory. Until the results of such tests are found satisfactory, it shall not be used on the work.
- 4.2.10 The contractor shall be responsible for the watch and ward and safety of the cement godown. The contractor shall facilitate the inspection of the cement godown by the Engineer-in-Charge at any time.

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- 4.2.11 The damaged cement shall be removed from the site immediately by the contractor on receipt of a notice in writing from the Engineer-In-Charge. If he does not do so within 3 days of receipt of such notice, the Engineer-In-Charge shall get it removed at the cost of the contractor.

4.3 STEEL REINFORCEMENT: -

- 4.3.1 The Contractor shall procure IS marked TMT reinforcement bars of various grades conforming to the criteria mentioned in the OM No. CSQ/SE(TAS)/Steel/2024/262-H dated 14/08/2024 issued by CPWD Directorate and as given on **page no. 77 to 85** of this tender document only from Reputed Steel manufacturers such as SAIL, Tata Steel Ltd, RINL, Jindal Steel & Power Ltd and JSW Steel Ltd.
- 4.3.2 For reinforced cement concrete or pre-stressed concrete works, the reinforcement bars shall consist of the following grade conforming to IS 1786: 2008 (with upto date amendments) (Indian Standard Specification for high strength deformed steel bars and wires for concrete reinforcement): Fe 500D/ Fe 550D.
- 4.3.3 The contractor shall obtain manufacturer's certificate stating the process of manufacture, chemical composition and test sheet giving result of each mechanical test applicable to the material purchased and submit it to the Engineer-in-Charge. Each test certificate shall indicate the number of the cast to which it applies, corresponding to the number or identification mark to be found on the material.
- 4.3.4 The Engineer-in-Charge shall get each consignment tested for both chemical composition and physical properties (including bend and re-bend test) as specified under para 4.3.1 above from labs approved by ADG, Bhopal or any Government laboratory as approved by Engineer-in-Charge through the contractor for which no payment shall be made to the contractor and all the charges for these tests shall be borne by the contractor.
- 4.3.5 Samples shall also be taken and got tested by the Engineer-in-Charge as per the provisions in this regard in relevant BIS codes. In case the test results indicate that the steel arranged by the contractor does not conform to the specifications the same shall stand rejected, and it shall be removed from the site of work by the contractor at his cost within a week time on written orders from the Engineer-in-Charge to do so.
- 4.3.6 The steel reinforcement bars shall be brought to the site in bulk supply of 10 tonnes or more, or as decided by the Engineer-in-charge.
- 4.3.7 The steel reinforcement bars shall be stored by the contractor at site of work in such a way as to prevent their distortion and corrosion, and nothing extra shall be paid on this account. Bars of different sizes and lengths shall be stored separately to facilitate easy counting and checking.
- 4.3.8 For checking nominal mass, tensile strength, bend test, re-bend test one sample for each, specimens of sufficient length shall be cut from each size of the bar at random, and at frequency not less than that specified below:

Size of bar	For consignment upto or below 100 tonnes	For consignment above 100 tonnes
Under 10 mm dia bars	One sample foreach 25 tonnes or part thereof	One sample for each 40 tonnes or part thereof
10 mm to 16 mm dia bars	One sample for each 35 tonnes or part there of	One sample for each 45 tonnes or part there of
Over 16 mm dia bars	One sample for each 45 tonnes or part there of	One sample for each 50 tonnes or part there of

- 4.3.9 The contractor shall supply free of charge the steel required for testing including its transportation to testing laboratories. The cost of tests shall be borne by the contractor.
- 4.3.10 The theoretical consumption of steel shall be worked out as per procedure prescribed in **clause-38** of the contract and shall be governed by conditions laid therein. In case the consumption is less than

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

theoretical consumption including permissible variations, recovery at the rate so prescribed shall be made. In case of excess consumption, no adjustment shall be made.

- 4.3.11 The steel brought to site and remaining unused shall not be removed from site without the written permission of the Engineer-in-charge.
- 4.3.12 The contractor shall submit original vouchers from the manufacturer for the total quantity of steel supplied under each consignment to be incorporated in the work. All consignment received at the work site shall be inspected by the site staff along with the relevant documents before acceptance. The contractor shall obtain Original Vouchers and Test Certificates and furnish the same to the Engineer-in-Charge in respect of all the lots of steel brought by him from approved supplier to the site of work. The original vouchers and test certificates shall be defaced by the Site staff and kept on record in the site office.
- 4.3.13 Reinforcement including authorized spacer bars and lapages shall be measured in length of different diameters as actually (not more than as specified in the drawings) used in the work nearest to a centimeter. Wastage and unauthorized overlaps shall not be measured.
- 4.3.14 The standard sectional weights referred to as in Table 5.4 in para 5.3.4 in CPWD Specifications will be considered for conversion of length of various sizes of M.S. Bars, Steel Bars and T.M.T. bars into Standard Weight.
- 4.3.15 Records of actual Sectional weights shall also be kept dia-wise and lot-wise. The average sectional weight for each diameter shall be arrived at from samples from each lot of steel received at site. The decision of the Engineer-in-Charge shall be final for the procedure to be followed for determining the average sectional weight of each lot. Quantity of each diameter of steel received at site of work each day will constitute one single lot for the purpose. The weight of steel by conversion of length of various sizes of bars based on the actual weighted average sectional weight shall be termed as Derived Actual Weight. However, for the stipulated issue of steel reinforcement up to and including 10mm diameter bars, the actual weight of steel issued shall be modified to take into account the variation between the actual and the standard coefficients and the contractors' accounts will be debited by the cost of modified quantity.
- 4.3.16 (a) If the Derived Weight as in sub-para (4.3.16) above is less than the Standard Weight as in Sub-para (4.3.15) above then the Derived Actual Weight shall be taken for payment provided, it is within the following tolerances specified in IS1786-2008, otherwise whole lot will be rejected.

Tolerances on Nominal Mass

Nominal Size in mm	Tolerance on Nominal mass Percent		
	Batch	Individual sample*	Individual sample for coil**
a) Upto and including 10	±7	-8	±8
b) Over 10 upto and Including 16	±5	-6	±6
c) Over 16	±3	-4	±4

* For individual sample plus tolerance is not specified.

**For coils batch tolerance is not specified.

- (a) If the Derived Actual Weight is found more than the Standard Weight, the Standard Weight as per in sub-para (4.3.15) above shall be taken for payment. In such case nothing extra shall be paid for the difference between the Derived Actual Weight and the Standard Weight.

Note :- (1) TMT Steel reinforcement bars shall be used as per guidelines issued by CPWD Directorate vide O.M. No. CSQ/SE(TAS)/Steel/2024/262-H dated 14/08/2024.

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

Annexure- I(c)**Testing requirement for individual reinforcement bar diameter of Particular Grade of steel:**

Tests required for Fe 415D, Fe500D, Fe550D grade of steel and Low alloy steel reinforcement bars:

A. FOR BAR SET-I

1. Tests as per IS 1786 (latest version) and specified therein

1.1 Chemical Properties

Ladle analysis of steel for above grades for maximum percentage of constituents

- i. Carbon (C), (ii) Sulphur (S) and (iii) Phosphorous (P) and (iv) Nitrogen and Carbon Equivalent

1.2 Physical Properties

- (i) 0.2 percent proof stress / yield stress, minimum, N/mm².
- (ii) Ratio of Tensile Strength (Ts) to Actual Yield Strength (or 0.2 % of yield stress (Ys)) of the test piece N/mm².
- (iii) Elongation, percent, Minimum, on gauge length $5.65\sqrt{A}$, where A is the cross-sectional area of the test piece.
- (iv) Total elongation at maximum force, percentage, minimum on gauge length $5.65\sqrt{A}$, where A is the cross-sectional area of the test piece.
- (v) Bend test and re-bend test.
- (vi) The mean area of ribs (in mm²) per unit length (in mm) above the core of the bar, projected on a plane normal to the axis of the bar.
- (vii) Pull-out testing in accordance with IS 2770 (Part 1)

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>	
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P) EE

2. Additional requirement

2.1 Permissible limit for Manganese and Copper as follows:

Constituent	Permissible Limit (% of cast metal quantity)		
	Fe 415 D	Fe 500 D	Fe 550 D
Manganese (Mn)			
Maximum	1.60	1.60	1.60
Copper (Cu)			
Maximum	0.80	0.80	0.80
Minimum	0.20	0.20	0.20
Notes: The above composition shall be obtained as per latest version of IS 228 1. Manganese using Periodate Spectrophotometric Method (Part 12), and 2. Copper using Thiosulphate Iodide Method (Part 15) or Spectrophotometric (Diethyl Dithiocarbonate) Method (Part 21)			

2.2 Tempered Martensite Ring Test as per Annexure-I (d).

2.3 The process of manufacturing steel shall comply with the provisions of ISO9001: 2015 and ISO14001: 2004.

(B)FOR BAR SET-II

1. The test requirements given in para 1.1 and 1.2 above.

Annexure-I(d)

1. CRITERIA FOR CLASSIFICATION OF BARS

The steel bars manufactured in India shall be classified as specified hereunder for the purposes of their use in works of CPWD.

1.1 Process of Classification

Steel Bars shall be classified as *Bar Set I* and *Bar Set II*. The bars shall be placed under one of these categories based on *Type Test* (the test performed to select the bars) performed as specified hereunder. These tests to be performed are those specified in the latest version of **IS 1786** published by the Bureau of Indian Standards, and the additional tests mentioned in Para 2 of this document.

The *Type Test* shall be performed at any one of the National Test Houses, IITs, NITs, and NCCBM, subject to:

- (a) The test samples being collected from the manufacturing facility by the representative engineer of CPWD,
- (b) The availability of the required test facility at the said laboratory, and
- (c) The test being witnessed by representative engineer of CPWD.

1.2 Classification of Steel Bars

The bar shall be classified as:

- (1) *Bar Set I*, if it complies with the requirements given in the latest version of **IS: 1786**, and those given in Para 2 of this document, and
- (2) *Bar Set II*, if it complies with the requirements given in the latest version of **IS 1786**.

2. ADDITIONAL REQUIREMENTS

Four additional requirements as specified hereunder.

2.1 Chemical Composition Requirement

The permissible limits of additional elements shall be as per **Table 1**.

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>	
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P) EE

Table 1: Permissible limits of additional elements

Constituent	Permissible Limit (% of cast metal quantity)		
	Fe 415 D	Fe 500 D	Fe 550 D
Manganese (Mn)			
Maximum	1.60	1.60	1.60
Copper (Cu)			
Maximum	0.80	0.80	0.80
Minimum	0.20	0.20	0.20
Notes: The above composition shall be obtained as per latest version of IS 228 : (1) Manganese using Periodate Spectrophotometric Method (Part 12), and (2) Copper using Thiosulphate Iodide Method (Part 15) or Spectrophotometric (Diethyl Dithiocarbonate) Method (Part 21).			

2.2 TM Ring Requirement

The following two requirements shall be met with:

- (1) Does the *Tempered Martensite(TM)* Ring satisfy the visual analysis as per **Step 1** of **Table 2**; and
- (2) The thickness of the TM Ring obtained as per **Step 2** of **Table 2** shall be between $0.07f$ and $0.15f$, where f is the *original nominal diameter* of the bar.

(a) Test Procedure

The following is the procedure:

- (1) The test setup to capture the *Cross-Sectional Phase Distribution (CSPD)* of the TMT bars shall be as shown in **Figure 1**.
- (2) Steel bars may be cut using handsaw or an abrasive cutter with continuous supply of coolant to limit the temperature of steel, and thereby avoid any transition or changes in *Tempered Martensite(TM)* and *Ferrite-Pearlite (FP)* phases (**Figure 2**). The sharp edges of cut bars should be smoothened using

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

silicon carbide abrasive sheets. A metal polishing machine can be used to achieve effective smoothening.

- (3) The smoothened steel specimen shall be moulded in cold setting epoxy with good surface finish. Setting time of epoxy is about 10-15 minutes.
- (4) The moulded specimen surface shall be course polished using abrasive sheets of 80, 150, 220, 320, and 600 grit sizes in sequence. Specimens shall be micro-etched using Nital (5% Nitric acid in alcohol) to capture the CSPD.

(b) Measurements

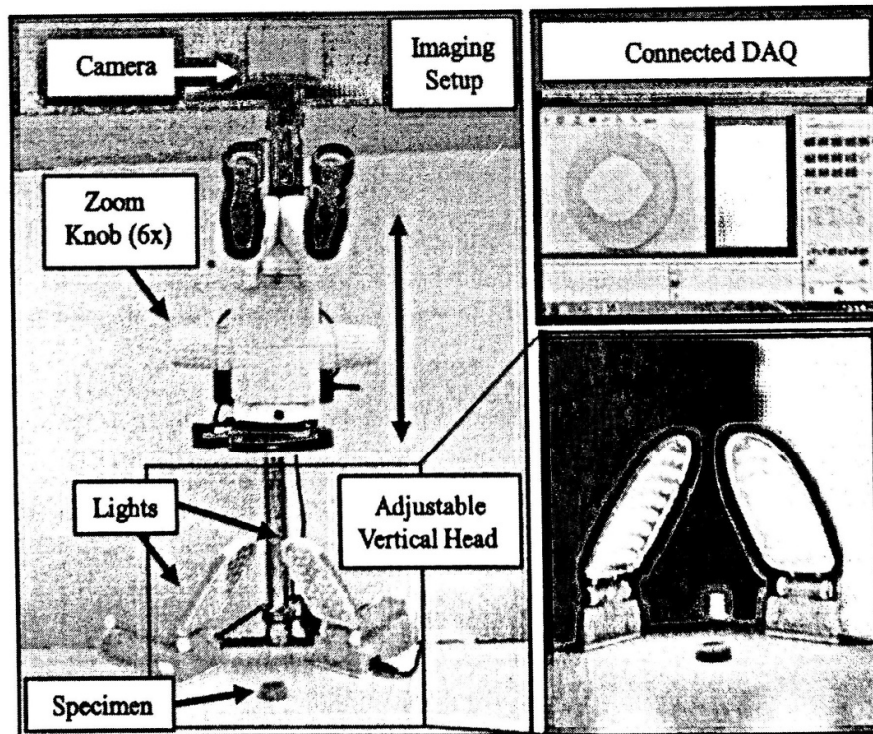
The procedure for obtaining the CSPD of the TM Ring along the perimeter shall be as per Table 2.

2.3 Marking Requirement

All bars shall have marks introduced during rolling, which indicate the *name of manufacturer or brand name, and grade of steel.*

2.4 Manufacturing Process Requirement

The process of manufacturing steel shall comply with the provisions of ISO 9001:2015 and ISO 14001:2004.



(a)

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

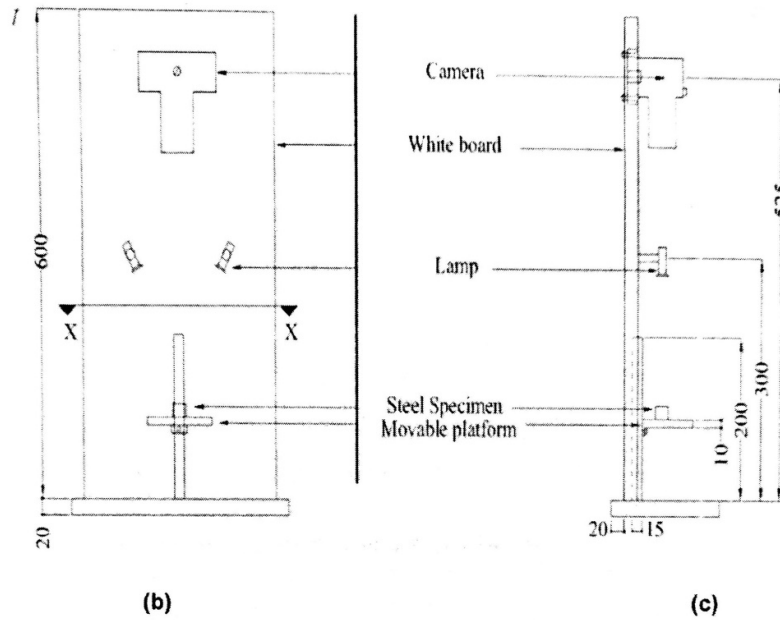


Figure 1: Test setup for CSPD of the TMT bars: (a) Imaging Setup, (b) Schematic Front View (c) Schematic Side View

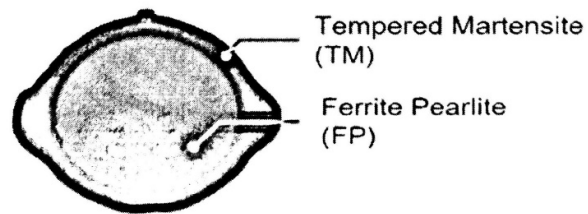
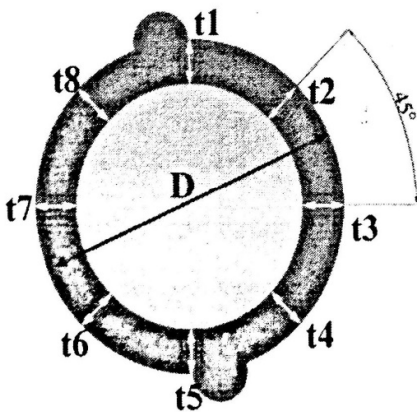


Figure 2: Cross-section of the steel bar showing the TM and FP areas

Table 2: Method of obtaining CSPD of TM Ring

Step 1: Visual Analysis of etched Cross-Section			
			
	A	B	C
	Acceptable	Not acceptable	Not acceptable
1.	Is a dark grey peripheral region and light grey core seen as in Case A?		
	Yes/No		
2.	Does the dark grey peripheral region form a continuous outer ring?		
	Yes/No		
Step 2: Dimension Analysis of TM-Ring thickness			
3.	Diameter $D(mm)$ of the steel bar		
4.	Geometry		
		t_1	
		t_2	
		t_3	
		t_4	
		t_5	
		t_6	
		t_7	
		t_8	
		Measured t_{min} (mm)	
		Measured t_{max} (mm)	
5.	Is the measured $t_{min} \geq 0.07 f$?		
	Yes / No		
	Is the measured $t_{max} < 0.15 f$?		
	Yes / No		

ADDITION NIL CORRECTION NILINSERTION NIL CUTTING NIL AE (P)

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3. GUIDELINES FOR USE OF STEEL BARS IN DIFFERENT PROJECTS

Considering the importance of quality in construction of public structures, the basis for use of bars in different projects of CPWD shall be as given in **Table 3**.

Table 3: Use of Bar Sets I and II in CPWD Projects

S.No.	Consideration	Bar Set I	Bar Set II
1.	Earthquake Zones	All zones	Only <i>Earthquake Zone II</i>
2.	Environment Conditions		
	(a) Coastline	All conditions	Beyond 10 km from the coastline of India
	(b) Exposure Conditions	All exposure conditions as per IS 456 (latest version)	Only <i>Mild</i> and <i>Moderate</i> Exposure Conditions as per IS 456 (latest version)
3.	Structure Category	All categories	Only <i>Normal Buildings</i> as per Table 4 and standalone <i>Normal Structures</i> as per Table 5 .
4.	Heights of Buildings and Structures	All heights	Only structures up to 12 m height excluding <i>staircase headroom</i> and <i>liftmachine rooms</i>

Table 4: List of Normal Buildings

Residential or Non-Residential Buildings with occupancy less than 100 persons, *excluding*:

- (1) Educational buildings,
- (2) Buildings of strategic importance,
- (3) Buildings and structures identified by Government of India and State Governments to be critical for governance or Disaster Management,
- (4) Hospital buildings,
- (5) Buildings that house the control or operations of utilities (for example, water, power, and sewage disposal), and lifeline (for example, communication and transportation facilities) structures,
- (6) Buildings related to defense and space applications,
- (7) Buildings identified by Government of India, State Governments and UT Administrations to be of *Special Importance*, and
- (8) Any other building identified with the approval of DG, CPWD.

ADDITION **NIL** CORRECTION **NIL**

INSERTION **NIL** CUTTING **NIL**

AE (P)

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Table:5 List of Standalone Normal Structures

Water Tanks and Water Sumps up to 50,000 liters, and Pump Rooms of area less than 20 m ²
Septic Tanks, Sewage Treatment Plants, and Effluent Treatment Plants up to 10,000 liters/day
Bridges and Culverts of spans up to 6 m
Earth Retaining Structures up to 4 m
Compound Walls, Entry Gates, and Small Reception Rooms
Storm Water Drains
Cable Trenches
Parking Structures of single storey
Security Cabins and Sentry Post
Any other structure identified with the approval of Technical Sanctioning Authority of CPWD

ADDITION	NIL	CORRECTION	NIL
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INSERTION	NIL	CUTTING	NIL	AE (P)	EE
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5.0 SECRECY

- 5.1 The contractor shall take all steps necessary that all persons employed on any work in connection with the contract have notice that the Indian Official Secrets Act 1923 applies to them & will continue so to apply even after the execution of such works under the contract.
- 5.2 The contract is confidential and must be strictly confined to the contractor's own use (except so far as confidential disclosure to sub-contractors or suppliers as necessary) and to the purpose of the contract.
- 5.3 All documents, copies thereof & extracts there from furnished to the contractor shall be returned to the Engineer-in-Charge on the completion of the work / works or the earlier determination of the contract.

6.0 LABOUR AND SECURITY

- 6.1 There is no space available at site for labour huts etc. Contractor will have to arrange accommodation and other facilities for labourers at his own cost and nothing extra shall be paid on this account.
- 6.2 The contractor shall employ only Indian Nationals after verifying their antecedents and loyalty. The contractor shall, on demand submit list of his agents, employees and work people concerned & shall satisfy as to the bonafides of such people.
- 6.3 Normally contractor shall be allowed to carry out work between 7 AM to 6 PM. However, he may also be allowed to carry out the work beyond 6 PM & upto 7 AM if the site conditions / circumstances so demand. However, if the work is carried out in more than one shift or at night, no claim on this account shall be entertained.

7.0 TRANSPORTATION AND OFFICE INFRASTRUCTURE:

- 7.1 In order to complete the work within the scheduled time if the contractor shall be required to do the work in more than one shift and accepted by the department the contractor will provide vehicular facilities to the CPWD site staff to reach the site and their residence at his own cost for their services required beyond the normal office hours. In case the contractor fails to provide the facilities Engineer-in-Charge shall be at liberty to make the arrangement themselves and deduct the respective cost from the contractor's bills.
- 7.2 For Quality Control Measures, Preparation of Bills and Monitoring the Quality, the contractor shall provide (min. two number) Computer having Intel core i5 3rd generation processor, Latest MS-Windows, A-3 Colored Inkjet & A-4 LaserJet Printers, Scanners, UPS etc. with required number of data entry operators in the site office.
- 7.3 The contractor shall make arrangement for Helmets and leather shoes (meant of construction work at sites) for all field staff of the department during the entire period of construction for safety reasons. One helmet and two pairs of shoes per staff member (maximum ten members) of the departments per year shall be arranged by the contractor.
- 7.4 The contractor shall establish fully furnished site office with toilet facility. The electricity and water charges shall be paid by the agency. It is clarified that nothing extra shall be payable for office infrastructure. The site office shall be removed after the work is completed by the contractor.

8.0 DOCUMENTATION

The Contractor shall render all help and assistance in documenting the total sequences of this project by way of photography, slides, audio / video recording & other records etc. Nothing extra shall be payable to Contractor on this account. However, cost of photographs, slides, audio / video graph etc. shall be borne by the Department. The original films shall be the property of the Department. No copy shall be prepared without the prior approval of the Engineer-in-Charge.

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>	
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P) EE

9.0 PROGRAM CHART: -

- 9.1 The Contractor shall submit a Programme Chart (Time and Progress) for each milestone along with performance guarantee and get it approved from the department. The chart shall be prepared in direct relation to the time stated in the contract documents for completion of the items of the work. It shall indicate the forecast of the dates of commencement and completion of various trades of sections of the work and may be amended as necessary by agreement between the Engineer-in-charge and the contractor within the limitations of time imposed in the contract documents, and further to ensure good progress during the execution of the work. The contractor shall in all cases in which time allowed for any work exceeds one month (save for special jobs for which a separate program has been agreed upon) complete the work as per milestones given in Schedule 'F'.
- 9.2 The work has to be completed in stages as indicated in the **Table of Milestones under Schedule 'F' as per Part-B of NIT** and the program should be prepared in such a manner to achieve these Milestones as indicated therein or earlier.
- 9.3 The program chart should include the following: -
- Descriptive note explaining sequence of various activities.
 - Network (PERT / CPM / BAR CHART) prepared on MS project which will indicate resources in financial terms, manpower and specialized equipments for every important stage.
 - Program for procurement of materials by the contractor.
 - Program of procurement of machinery / equipments having adequate capacity, commensurate with the quantum of work to be done within the stipulated period, by the contractor.
- 9.4 If at any time, it appears to the Engineer-in-Charge that the actual progress of work does not conform to the approved program referred above, the contractor shall produce a revised program showing the modifications to the approved program by additional inputs to ensure completion of the work within the stipulated time.
- 9.5 The submission of revised program or approval by the Engineer-in-Charge of such program or the furnishing of such particulars shall not relieve the contractor of any of his duties or responsibilities under the contract. This is without prejudice to the right of Engineer-in-Charge to take action against the contractor as per terms and conditions of the agreement.

Notwithstanding the fact that the contractor will have to pay to the labourers and other staff engaged directly or indirectly on the work according to the provisions of the labour regulations and the agreement entered upon and/or extra amounts for any other reason.

10.0 PROGRESS AND MONITORING OF WORK:

- 10.1 Apart from the above integrated program chart, the contractor shall be required to submit monthly progress report of the work in a computerized form by 5th day of each month. The progress report shall contain the following, apart from whatever else may be required as specified:
- Construction schedule of the various components of the work through a bar chart for the next three quarters (or as may be specified), showing the milestones, targeted tasks and up to date progress.
 - Progress chart of the various components of the work that are planned and achieved, for the month as well as cumulative up to the month, with reason for deviations, if any in a tabular format.
 - Plant and machinery statement, indicating those deployed in the work.
 - Man-power statement, indicating individually the names of all the staff deployed on the work, along with their designations.
 - Financial statement, indicating the broad details of all the running account payment received up to date, such as gross value of work done, advances taken, recoveries effected, amount withheld, net payments details of cheque payment received etc.
- 10.2 For completing the work in time, the Contractor might be required to work in two or more shifts (including night shifts). No claim whatsoever shall be entertained on this account, not with-standing

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

the fact that the Contractor may have to pay extra amounts for any reason, to the labourers and other staff engaged directly or indirectly on the work according to the provisions of the labour and other statutory bodies regulations and the agreement entered upon by the Contractor with them.

- 10.3 The work should be planned in a systematic manner so that chase cuttings in the walls, ceilings and floors is minimized. Wherever absolutely essential, the chase shall be cut using chase cutting machines. Chases will not be allowed to be cut using hammer / chisel. The electrical boxes should be fixed in walls simultaneously while raising the brick work. The contractor shall ensure proper co-ordination of various disciplines viz. building works, sanitary & water supply & electrical installations etc.
- 10.4 The contractor shall conduct his work, so as not to interfere with or hinder the progress or completion of the work being performed by other contractor(s) or by the Engineer-in-Charge and shall as far as possible arrange his work and shall place and dispose off the materials being used or removed so as not to interfere with the operations of other contractor or he shall arrange his work with that of the others in an acceptable and coordinated manner and shall perform it in proper sequence to the complete satisfaction of Engineer-in-charge.
- 10.5 The Contractor shall do proper sequencing of the various activities by suitably staggering the activities so as to achieve early completion. The agency may deploy adequate equipment, machinery and labour as required for the completion of the entire work within the stipulated period specified. Also, ancillary facilities shall be provided commensurate with requirement to complete the entire work within the stipulated period. Nothing extra shall be payable on this account. Adequate number/sets of equipment in working condition, along with adequate stand-by arrangements, shall be deployed during entire construction period. It shall be ensured by the Contractor that all the equipment, Tools & Plants, machineries etc. provided by him are maintained in proper working conditions at all times during the progress of the work and till the completion of the work. Further, all the constructional tools, plants, equipment and machineries provided by the Contractor, on site of work or his work shop for this work, shall be exclusively intended for use in the construction of this work and they shall not be shifted / removed from site without the permission of the Engineer-in-Charge.
- 10.6 All material shall only be brought at site as per program finalized with the Engineer-in-Charge. Any pre-delivery of the material not required for immediate consumption shall not be accepted and thus not paid for.

11.0 ENGAGING SPECIALISED AGENCIES FOR WORKS:

11.1 List of Specialized Works:

1. Structural design
2. Water proofing treatment works
3. Steel work in space frames for long span structures
4. Firefighting system
5. Fire detection and fire alarm system
6. Lifts
7. Public address system; conferencing system,
8. Stage lighting
9. Projector and other special equipment for theatre
10. Substation equipment
11. Sewage Treatment Plant
12. CCTV and allied equipment.
13. VRV/VRF Type Air-Conditioning Systems
14. LAN System
15. IPPBX System
16. GRIHA Consultancy

The Contractor shall engage specialized agencies having adequate technical capability and experience of having executed at least one work of similar items of 80% or more magnitude or two works of similar items of value minimum 60% or three works of similar items of value minimum 40%

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>		
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P)	EE

individually for executing the above items of the work and/or any other items of work where specialized firm is required to be engaged as per contract conditions. For determining the required magnitude, the value of the work executed may be suitably enhanced with the prevailing approved cost index.

- 11.2 The Specialized agency for the work shall be got approved from the Engineer-in-Charge well before actual commencement of the item of work. The contractor shall submit the list of specialized agencies except for Internal Electrical Installation, proposed to be engaged by him along with necessary performance certificates, within 30 days from the date of issue of acceptance letter to substantiate technical capability and experience of the agency for prior approval of the Engineer-in-Charge.
- 11.3 For Internal Electrical Installation work as contained in the Electrical component work, the Electrical Agency to be engaged as an associate electrical contractor for the Internal E.I./External E.I work should be enlisted contractor of CPWD in appropriate class as per the value of the work. The firm will be required to submit the credentials of the associate electrical contractor including their registration documents, electrical contractor license, GST documents apart from submission of the MOU. However, contractor shall submit MOU to Executive Engineer (Elect.) in-charge, signed with eligible Electrical Contractor/Agency along with consent letter of Electrical Agency **within the period specified in Part-C**. It will be obligatory on the part of main contractor to sign the tender documents for all the components.
- 11.4 If the main contractor fails to associate agency/agencies for execution of minor components of work within prescribed time or furnishes incomplete details or furnishes details of ineligible agencies even after the tenderer is given due opportunity, the entire scope of such component of works shall be withdrawn from the tender and the same shall be got executed by the Engineer-in-Charge at the risk and cost of the main contractor.
- 11.5 For the specialized item of door & window fittings, water supply and sanitary installations; the contractor shall engage such vendors/installers as approved by the manufacturers. Provisions mentioned under Sr. No. 11.1 above shall not be applicable for the items mentioned herein above.

12.0 SAMPLE TOILET:-

The contractor shall construct one **Sample toilet in Building** complete in all respects including all Civil works and Electrical fittings/ fixtures, not later than **150 days**. The sample accommodation shall be inspected and approved by the Engineer-in-Charge. Slight changes with regard to the fixtures/ fittings/ details/ dimensions etc. may occur as per the actual requirement or in order to enhance the functionality of the product or the unit. Thus, the procurement for all the internal fittings/fixtures/ fabricated material and other material etc. shall be done by the contractor only after the approval of the sample toilet. A penalty @ **Rs.5,000/- per week** shall be levied on the contractor in case of their failure to construct the sample toilet within the stipulated period mentioned above.

13.0 DEFECT LIABILITY:-

- 13.1 The contractor's liability during the defect liability period from the final date of completion as per **Clause 17** shall be limited to rectification of defects including replacement as follows which in the opinion of Engineer-in-Charge are not manmade.

Sl. No.	Description	Defect Liability
(i)	Concrete/ RCC	(a) Rectification of structural / superficial / non-structural cracks. (b) Rectification of dampness / seepage in roof slab / junctions & sunken portion. (c) Rectification of cracks in beam, shade, column.
(ii)	Brick work/ Concrete Block Masonry	(a) Rectification of cracks in panel wall / portion. (b) Cracks / settlement of dwarf walls. (c) Rectification of efflorescence/ leaching.
(iii)	Joinery	(a) Replacement of warped joinery. (b) Cracks in panels, rails / styles etc.
(iv)	Builders Hardware	(a) Repairs / Replacement of loosened / pre-mature failure of fittings.

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

Sl. No.	Description	Defect Liability
		(b) Tightening / Replacement of sag in mosquito proofing.
(v)	Steel & Iron work	(a) Rectification / Replacement of defective part of rolling shutter. (b) Redoing of defective portion in fabrication / welding including painting. (c) Steel windows, grills, gates etc. – defects to be rectified.
(vi)	Roof treatment	(a) Rectification of leakage / seepage of roof slab including covering at junction till guarantee period.
(vii)	Plastering	(a) Rectification of structural / superficial cracks if any. (b) Rectification of protruding / peeling off plaster if any. (c) Rectification of efflorescence
(viii)	Flooring	(a) Rectification of sinking portion of plinth protection including saucer drain. (b) Settlement of foundation & floors, hollow sounding, cracks in tiles/stones.
(ix)	Plumbing / Sanitary fittings	(a) Making good of leakage through soil / waste pipe joints. (b) Replacement of looking mirror if found wavy. (c) Rectification of leakage of overhead tanks. (d) Leakage / seepage of sunken floor, blockage of taps / pipes, non-functioning of cistern.
(x)	Finishing	(a) Making good of defective / dissimilar patches of painting to match with remaining surfaces, peeling of paint.
(xi)	Internal Water Supply	(a) Repairs / Replacement of defective taps / fittings. (b) Repair to leakage of water pipe lines including joints. (c) Removal of blockage of pipe lines.
(xii)	Roads	(a) Repair of sunk portion of road & potholes, if any
(xiii)	Sewage	(a) Rectification of slope / system if found defective during use. (b) Rectification of major blockage in Sewer lines. (c) Cracks & settlement of sewage lines.
(xiv)	Drains	(a) Repair to Drains. (b) Settlement of Drains
(xv)	External Water Supply	(a) Repairs to installations & fittings.
(xvi)	General	(a) All manufacturing defects of structures / fixtures / fittings / equipment other than listed above including any defects of shrinkage or other faults that appear in the work within Defect Liability Period after a certificate of it's completion is given by the Engineer-in-Charge shall be rectified by the contractor.

14.0 SAFETY MEASURES

14.1 Contractor shall take all precautionary measures to avoid any damage to adjoining property. All necessary arrangement shall be made at his own cost.

14.2 Warning / Caution Boards

All temporary warning / caution boards / glow signage display such as "Construction Work in Progress", "Keep Away", "No Parking", Diversions & protective Barricades etc. shall be provided and displayed during day time by the Contractor, wherever required and as directed by the Engineer-in-Charge. These glow signage and red lights shall be suitably illuminated during night also. The Contractor shall be solely responsible for damage and accident caused, if any, due to negligence on his part. Also, he shall ensure that no hindrance, as far as possible, is caused to general traffic during execution of the work. This signage shall be dismantled & taken away by the Contractor after the completion of work, only after approval of the Engineer – in – Charge. Nothing extra shall be payable on this account.

14.3 Sign Boards

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

The Contractor shall provide and erect a display board of size and shape as required and paint over it, in a legible and workman like manner, the details about the salient features of the project, as required by the Engineer-in-Charge. The Contractor shall fabricate and put up a sign board in an approved location and to an approved design indicating name of the project, client / owner, architects, structural consultants, Department etc. besides providing space for names of other Contractors, Associate contractors and specialized agencies. Nothing extra shall be payable on this account.

- 14.3.1 Necessary protective and safety equipment shall be provided to the Site Engineer, Supervisory staff, labour and technical staff of the contractor by the Contractor at his own cost and used at site.
- 14.3.2 No inflammable materials including P.O.L shall be allowed to be stored in huge quantity at site. Only limited quantity of P.O.L may be allowed to be stored at site subject to the compliance of all rules / instructions issued by the relevant authorities and as per the direction of Engineer -in- Charge in this regard. Also all precautions and safety measures shall be taken by the Contractor for safe handling of the P.O.L products stored at site. All consequences on account of unsafe handling of P.O.L shall be borne by the Contractor.

15.0 Special condition for Hardware and Sanitary Wares:

- 15.1 Engineer-in-Charge will take a decision regarding model numbers of equivalent Door/window hardware, sanitary ware & Water Supply accessories at the time of execution, in case the material, from the manufacturer whose model number is mentioned, is not available. However, in case, the equivalent model so approved, is cheaper than the model already mentioned in item/approved makes list, the price adjustment will be made based on the difference in market rate. In case, the rate of subsequently approved model is more, no extra payment will be made on this account.

16.0 Ultrasonic Pulse Velocity Method of Test for RCC

- 16.1 The underlying principle of assessing the quality of concrete is that comparatively higher velocities are obtained when the quality of concrete in terms of density, homogeneity and uniformly is good. The consistency of the concrete as regards its general quality gets established. In case of poorer quality lower velocities are obtained. If there are cracks, voids or flaws inside the concrete which come in the way of transmission of pulse, lower velocities are obtained.
- 16.2 The quality of concrete in terms of uniformity, incidence or absence of internal flaws, cracks and segregation etc. indicative of the level of workmanship employed, can thus be assessed using the guidance given in table below, which have been evolved for characterizing the quality concrete in structure in term of the ultrasonic pulse velocity.

Velocity criterion for Concrete Quality Grading.

Sl. No.	Pulse velocity by Cross Probing (km/sec)	Concrete Quality Grading
1.	Above 4.5 Excellent	Excellent
2.	4.5 to 3.5 Good	Good
3.	3.5 to 3.0 Medium	Medium
4.	Below 3.0 Doubtful	Doubtful

Note : In Case of “doubtful” quality it may be necessary to carry further tests.

- 16.3 Pulse velocity method of test of concrete is to be conducted for CPWD works as a routine test. The acceptance criteria as per the above table will be applicable which is as per IS 13311 (part-1): 1992. From the above “Good” and “Excellent” grading are acceptable and below these grading the concrete will not be acceptable.
- 16.4 5% of the total number of RCC members in each category i.e. beam, column, slab and footing may be tested by UPV test method for establishing quality of concrete. It is suggested that test be conducted on RCC beam near joint with column, on RCC column near joint with beam, on RCC footings and rafts. On RCC rafts a suitable grid can be worked out for determining number of tests. In addition,

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doubtful areas such as honeycombed locations, locations, where continuous seepage is observed, construction joints and visible loose pockets will also be tested.

- 16.5 The test results are to be examined in view of the above acceptance criteria "Good" and "Excellent" and wherever concrete is found with less than required quality as per acceptance criteria, repairs to concrete will be made. Honeycombed areas and loose pockets will be repaired by grouting using Portland Cement Mortar/Polymer Modified Cement Mortar/Epoxy Mortar, etc. after chipping loose concrete in appropriate manner. In areas where concrete is found below acceptance criteria and defects are not apparently visible on surface, injecting approved grout in appropriate proportion using epoxy grout /acrylic Polymer modified cements slurry made with shrinkage compensating cement / plain cement slurry etc. will be resorted to for repairs.(refer relevant chapters from CPWD Hand Book on Repairs and Rehabilitation of RCC Buildings).Repair to concrete will be done till satisfactory results are obtained as per the acceptance criteria by retesting of the repaired area. If satisfactory results are not obtained dismantling and relaying of concrete will be done.

17.0 CONDITIONS OF CONTRACT SPECIFIC TO GREEN BUILDING PRACTICES

The contractor shall strictly adhere to the following conditions as part of his contractual obligations:

17.1 Site

- 17.1.1 The contractor shall ensure that adequate measures are taken for the prevention of erosion of the top soil during the construction. The contractor shall prepare and implement the Erosion and Sedimentation Control Plan (ESCP) provided to him after approval by the Engineer- in- Charge as part of the larger Construction Management Plan (CMP). The contractor shall obtain the Erosion and Sedimentation Control Plan (ESCP) Guidelines if required from the Engineer in Charge and then prepare "working plan" for the following month's activities as a CAD drawing showing the construction management, staging & ESCP. At no time soil should be allowed to erode away from the site and sediments should be trapped where necessary.

The contractor shall ensure that all the top soil excavated during construction works is neatly stacked and is not mixed with other excavated earth. The contractor shall take the clearance of the Engineer in Charge before any excavation. Top soil should be stripped to a depth of 20 cm (centimeters) from the areas to be disturbed, for example proposed area for buildings, roads, paved areas, external services and area required for construction activities etc. It shall be stockpiled to a maximum height of 40 cm in designated areas, covered or stabilized with temporary seeding for erosion prevention and shall be reapplied to site during plantation of the proposed vegetation or as directed by the engineer in charge. Top soil shall be separated from subsoil, debris and stones larger than 50 mm (millimeter) diameter. The stored top soil may be used as finished grade for planting areas.

- 17.1.2 The Contractor should follow the construction plan as proposed by the Architect / Engineer in Charge to minimize the site disturbance such as soil pollution due to spilling. If required use of staging and spill prevention and control plan to restrict the Spilling of the contaminating material on site needs to be resorted. Protection of top soil erosion by collection storage and reapplication of top soil, constructing sediment, contour trenching, mulching etc., may also be directed by the engineer in charge.

- 17.1.3 No excavated earth shall be removed from the campus unless suggested otherwise by Engineer in Charge. All subsoil shall be reused in backfilling/landscape, etc. as per the instructions of the Engineer in Charge. The surplus excavated earth shall be disposed of by the contractor as per the direction of the engineer in charge at his own cost for reuse. A certificate of reuse as required by the Engineer-in-Charge shall be submitted by the contractor.

- 17.1.4 The contractor shall not change the natural gradient of the ground unless specifically instructed by the Engineer in Charge. This shall cover all natural features like water bodies, drainage gullies, slopes, mounds, depressions, etc. Existing drainage patterns through or into any preservation area shall not be modified unless specifically directed by the Engineer-in-Charge.

- 17.1.5 The contractor shall not carry out any work which results in the blockage of natural drainage.

ADDITION	NIL	CORRECTION	NIL	
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- 17.1.6 The contractor shall ensure that existing grades of soil shall be maintained around existing vegetation and lowering or raising the levels around the vegetation is not allowed unless specifically directed by the Engineer-in-Charge.
- 17.1.7 Contractor shall reduce pollution and land development impacts from automobiles use during construction.
- 17.1.8 Overloading of trucks is unlawful and creates the erosion and sedimentation problems, especially when loose materials like stone dust, excavated earth, sand etc. are moved. Proper covering shall be used by the contractor. Also, no overloading shall be permitted.

17.2 Construction Phase and Worker Facilities

- 17.2.1 The contractor shall specify and limit construction activity in pre-planned/designated areas and shall start construction work after securing the approval for the same from the Engineer in Charge. This shall include areas of construction, storage of materials, and material and personnel movement.

17.2.2 Preserve and Protect Landscape during Construction

- a The contractor shall ensure that no trees, existing or otherwise, shall be harmed and damage to roots. These shall be prevented during trenching, placing backfill, driving or parking heavy equipment, dumping of trash and protected from oil, paint, and other materials detrimental to plant health. These activities shall be restricted to the areas outside of the canopy of the tree, or, from a safe distance from the tree/plant by means of barricading. Trees will not be used for support; their trunks shall not be damaged by cutting and carving or by nailing posters, advertisements or other material. Lighting of fires or carrying out heat or gas emitting construction activity within the ground, covered by canopy of the tree is not at all permitted.
 - b The contractor shall take steps to protect trees or saplings if any identified for preservation within the construction site using tree guards of approved specification.
 - c Contractor should limit all construction activity within the specified area as per the Construction Management Plan (CMP) approved by Engineer in Charge.
 - d The contractor shall avoid cut and fill in the root zones, through delineating and fencing the drip line (the spread limit of a canopy projected on the ground) of all the trees or group of trees. The zones of movement of heavy equipment, parking, or excessive foot traffic shall be separated from the fenced plant protection zones.
 - e The contractor shall ensure that maintenance activities during construction period shall be performed as needed to ensure that the vegetation remains healthy.
- 17.2.3 Contractor shall be required to develop and implement a waste management plan, quantifying material diversion goals. He shall establish goals for diversion from disposal in landfills and incinerators, if required, and adopt a construction waste management plan to achieve these goals. A project wide policy of "Nothing leaves the Site" shall be followed. The Contractor's ingenuity is especially called towards meeting this prerequisite/ credit (as per IGBC LEED India, New Construction v1.0 & GRIHA, MNRE) and may consider recycling cardboard, metal, brick, acoustical tile, concrete, plastic, clean wood, glass, gypsum wallboard, carpet and insulation, designating a specific area(s) on the construction site for segregated or commingled collection of recyclable material, and track recycling efforts throughout the construction process, identifying construction haulers and recyclers to handle the designated materials at his cost. The diversion may include donation of materials to charitable organizations and salvage of materials on-site.
- 17.2.4 Contractor shall collect all construction waste generated on site. He may consider at segregating wastes based on their utility and examine means of sending such waste to manufacturing units which use them as raw material or other site which require it for specific purpose. Typical construction debris could be broken bricks, steel bars, broken tiles, spilled concrete and mortar etc.
- 17.2.5 The contractor shall provide potable water and other amenities for all workers as per the contract.

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- 17.2.6 The contractor shall provide the minimum level of sanitation and safety facilities for the workers at site as described in CPWD General Conditions of contract. The contractor shall ensure cleanliness of workplace with regard to the disposal of waste and effluent; provide clean drinking water and latrines and urinals as per applicable provisions. Adequate toilet facilities shall be provided for the workmen within easy access of their place of work. The total no. to be provided shall not be less than 1per 30 employees in any one shift. Toilet facilities shall be provided from the start of building operations, connection to a sewer shall be made as soon as practicable. Every toilet shall be so constructed that the occupant is sheltered from view and protected from the weather and falling objects. Toilet facilities shall be maintained in a sanitary condition. A sufficient quantity of disinfectant shall be provided and natural or artificial illumination shall also be provided.
- 17.2.7 The contractor shall ensure that air pollution due to dust/generators is kept to a minimum, preventing any adverse effects on the workers and other people in and around the site. The contractor shall ensure proper screening, covering stockpiles, covering brick and loads of dusty materials, wheel-washing facility, gravel pit, and water spraying. Contractor shall also ensure the following activities to prevent air pollution during construction:
- Clear vegetation only from areas where work will start right away
 - Vegetate / mulch areas where vehicles do not ply.
 - Apply gravel / landscaping rock to the areas where mulching / paving is impractical
 - Identify roads on-site if applicable that would be used for vehicular traffic. Upgrade vehicular roads (if these are unpaved) by increasing the surface strength by improving particle size, shape and mineral types that make up the surface & base and add surface gravel to reduce source of dust emission to limit amount of fine particles (smaller than 0.075mm) to 10 – 20%
 - Water spray, through a simple hose for small projects, to keep dust under control. Fine mists should be used to control fine particulate. However, this should be done with care so as not to waste water. Heavy watering can also create mud, which when tracked onto paved public roadways, must be promptly removed. Also, there must be an adequate supply of clean water nearby to ensure that spray nozzles don't get plugged.
 - Water spraying shall be done on:
- 17.2.7.1 Any dusty materials before transferring, loading and unloading
- 17.2.7.2 Area where demolition work is being carried out
- 17.2.7.3 Any un-paved main haul road
- 17.2.7.4 Areas where excavation or earth moving activities are to be carried out
- The contractor shall ensure that the speed of vehicles within the site is limited to 10 km/hr.
 - All material storages should be adequately covered and contained so that they are not exposed to situations where winds on site could lead to dust / particulate emissions.
 - Spills of dirt or dusty materials will be cleaned up promptly so the spilled material does not become a source of fugitive dust and also to prevent of seepage of pollutant laden water into the ground aquifers. When cleaning up the spill, ensure that the clean-up process does not generate additional dust. Similarly, spilled concrete slurries or liquid wastes should be contained / cleaned up immediately before they can infiltrate into the soil / ground or runoff in nearby areas
 - Provide hoardings of not less than 3m high along the site boundary, next to a road or other public area at his cost.
 - Provide dust screens, sheeting or netting to scaffold along the perimeter of the building at his cost
 - Cover stockpiles of dusty material with impervious sheeting at his cost.
 - Cover dusty load on vehicles by impervious sheeting before they leave the site at his cost.
- 17.2.8 Contractor shall be required to provide an easily accessible area that serves the entire building and is dedicated to the separation, collection and storage of materials for recycling including (at a minimum) paper, corrugated cardboard, glass, plastics, and metals. He shall coordinate the size and functionality of the recycling areas with the anticipated collections services for glass, plastic, office

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paper, newspaper, cardboard, and organic wastes to maximize the effectiveness of the dedicated areas. Consider employing cardboard balers, aluminum can crushers, recycling chutes, and collection bins at individual workstations to further enhance the recycling program

- 17.2.9 The contractor shall ensure that no construction leachate (e.g. cement slurry etc.), is allowed to percolate into the ground. Adequate precautions will be taken to safeguard against this including reduction of wasteful curing processes, collection, basic filtering and reuse. The contractor shall follow requisite measures for collecting drainage water run-off from construction areas and material storage sites and diverting water flow away from such polluted areas. Temporary drainage channels, perimeter dike/swale, etc. shall be constructed to carry the pollutant-laden water directly to the treatment device or facility (municipal sewer line).
- 17.2.10 Staging (dividing a construction area into two or more areas to minimize the area of soil that will be exposed at any given time) should be done to separate undisturbed land from land disturbed by construction activity and material storage.
- 17.2.11 The contractor shall comply with the safety procedures, norms and guidelines (as applicable) as outlined in the document Part 7 Constructional practices and safety, 2005, National Building code of India, Bureau of Indian Standards. A copy of all pertinent regulations and notices concerning accidents, injury and first-aid shall be prominently exhibited at the work site. Depending upon the scope & nature of work, a person qualified in first-aid shall be available at work site to render and direct first-aid to casualties. A telephone may be provided to first-aid assistant with telephone numbers of the hospitals displayed. Complete reports of all accidents and action taken thereon shall be forwarded to the competent authorities.
- 17.2.12 The contractor shall ensure the following activities for construction workers safety, among other measures at his cost.
- Guarding all parts of dangerous machinery.
 - Precautionary signs for working on machinery
 - Maintaining hoists and lifts, lifting machines, chains, ropes, and other lifting tackles in good condition.
 - Durable and reusable formwork systems to replace timber formwork and ensure that formwork where used is properly maintained.
 - Ensuring that walking surfaces or boards at height are of sound construction and are provided with safety rails or belts.
 - Provide protective equipment; helmets etc.
 - Provide measures to prevent fires. Fire extinguishers and buckets of sand to be provided in the fire-prone area and elsewhere.
 - Provide sufficient and suitable light for working during night time.
- 17.2.13 The storage of material shall be as per standard good practices as specified in Part 7, Section 2 - Storage, Stacking and Handling practices, NBC 2005 and shall be to the satisfaction of the Engineer in Charge to ensure minimum wastage and to prevent any misuse, damage, inconvenience or accident. Watch and ward of the Contractor's materials shall be his own responsibility. There should be a proper planning of the layout for stacking and storage of different materials, components and equipments with proper access and proper maneuverability of the vehicles carrying the materials. While planning the layout, the requirements of various materials, components and equipments at different stages of construction shall be considered.
- 17.2.14 The contractor shall provide for adequate number of garbage bins around the construction site and the workers facilities and will be responsible for the proper utilization of these bins for any solid waste generated during the construction. The contractor shall ensure that the site and the workers facilities are kept litter free. Separate bins should be provided for plastic, glass, metal, biological and paper waste and labelled in both Hindi and English with suitable symbols.
- 17.2.15 The contractor shall prepare and submit 'Spill prevention and control plans' before the start of construction, clearly stating measures to stop the source of the spill, to contain the spill, to

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dispose the contaminated material and hazardous wastes, and stating designation of personnel trained to prevent and control spills. Hazardous wastes include pesticides, paints, cleaners, and petroleum products.

- 17.2.15.1 Contractor shall collect & submit the relevant material certificates for materials if directed by the Engineer in charge with high recycled (both post-industrial and post-consumer) content, including materials like RMC mix with fly-ash, glass with recycled content, calcium silicate boards etc.
- 17.2.16 Contractor shall collect the relevant material certificates for rapidly renewable materials such as bamboo, wool, cotton insulation, agri-fiber, linoleum, wheat board, strawboard and cork etc.
- 17.2.17 Where possible, the contractor shall select materials / vendors, harvested and manufactured regionally, within a 800-km radius of the project site.
- 17.2.18 Contractor shall adopt an IAQ (Indoor Air Quality) management plan to protect the HVAC system during construction, control pollutant sources, and interrupt pathways for contamination. He shall sequence installation of materials to avoid contamination of absorptive materials such as insulation, carpeting, ceiling tile, and gypsum wallboard. He shall also protect stored on-site or installed absorptive materials from moisture damage.
- 17.2.19 The contractor shall ensure that a flush out of all internal spaces is conducted prior to handover. his shall comprise an opening of all doors and windows for 14 days to vent out any toxic fumes due to paints, varnishes, polishes, etc.
- 17.2.20 Contractor shall make efforts to reduce the quantity of indoor air contaminants that are odorous or potentially irritating harmful to the comfort and well-being of installer and building occupants. Contractor shall ensure that the VOC (Volatile Organic Compounds) content of paints, coatings and primers used must not exceed the VOC content limits mentioned below in case items of such paints are/is available in schedule of quantities.
- Paints**
Non-flat - 150 g/L Flat (Mat) - 50, g/L Anti corrosive/ anti rust - 250 g/L
- Coatings / Clear wood finishes**
Varnish - 350 g/L Lacquer - 550 g/L Floor coatings - 100 g/L Stains - 250 g/L
- Sealers**
Waterproofing sealer - 250 g/L Sanding sealer - 275 g/L Other sealers - 200 g/L
- 17.2.21 The VOC (Volatile Organic Compounds) content of adhesives and sealants used if prescribed in the schedule of quantities must be less than VOC content limits mentioned:
Architectural Applications VOC Limit (g/l less water) Indoor Carpet adhesives - 50 g/L, Carpet Pad Adhesives - 50 g/L, Wood Flooring Adhesive - 100 g/L, Rubber Floor Adhesives - 60 g/L, Sub Floor Adhesives – 50 g/L, Ceramic Tile Adhesives - 65 g/L, VCT and Asphalt Tile adhesives - 50 g/L, Dry Wall and Panel Adhesives - 50 g/L, Structural Glazing Adhesives - 100 g/L, Multipurpose Construction Adhesives – 70 g/L, Substrate Specific Application VOC Limit (g/l less water), Metal to Metal - 30 g/L, Plastic Foams - 50 g/L, Porous material (except wood) - 50 g/L, Wood - 30 g/L, Fiber Glass – 80 g/L
- 17.2.22 Wherever required, Contractor shall meet and carry out documentation of all activities on site, supplementation of information, and submittals in accordance with IGBC LEED India New Construction v1.0 or GRIHA program standards and guidelines. Towards meeting the aforementioned building environmental rating standard(s) expert assistance shall be provided to him up on request.
- 17.2.23 Water Use during Construction Contractor should spray curing water on concrete structure and shall not allow free flow of water. Concrete structures should be kept covered with thick cloth / gunny bags and water should be sprayed on them. Contractor shall do water pounding on all sunken slabs using cement and sand mortar.

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

- 17.2.24 The Contractor shall remove from site all rubbish and debris generated by the Works and keep Works clean and tidy throughout the Contract Period. All the serviceable and non-serviceable (malba) material shall be segregated and stored separately. The malba obtained during construction shall be collected in well formed heaps at properly selected places, keeping in a view safe condition for workmen in the area. Materials which are likely to cause dust nuisance or undue environmental pollution in any other way, shall be removed from the site at the earliest and till then they shall be suitable covered. Glass & steel should be dumped or buried separately to prevent injury. The work of removal of debris should be carried out during day. In case of poor visibility artificial light may be provided.
- 17.2.25 The contractor shall provide O & M Manuals wherever applicable.
- 17.2.26 The contractor shall make himself conversant with the Site Waste Management Program Manual and actively contribute to its compilation by estimating the nature and volume of waste generated by the process/installation in question.
- 17.2.27 MATERIALS & FIXTURES FOR THE PROJECT
- a) Contractor will produce wherever feasible certificate regarding distance of the source of the relevant material.
 - b) Unless otherwise stated cement used at site for reinforced concrete, precast members, mortar, plaster, building blocks, etc shall be PPC (Portland Pozzolana Cement). The PPC must meet the requirements of IS 1489 (Part I) as regards to fly ash content in cement. The contractor shall obtain from the PPC manufacturer the certificate regarding fly ash content in the PPC in each batch of consignment.
 - c) The contractor has to comply as per MoEF issued notification 8.0.763(E) dated 14th Sept.1999 containing directive for greater fly ash utilization. Every construction agency engaged in the construction of buildings within a radius of 50 km radius of a Thermal Power Plant, have to use of 100% fly ash based bricks/blocks in their construction.
 - d) The contractor shall ensure that all paints, polishes, adhesives and sealants used both internally and externally, on any surface, shall be Low VOC products. The contractor shall get prior approval from the Engineer in Charge before the application of any such material.
 - e) All plumbing and sanitary fixtures installed shall be as per the prescription of the Engineer in Charge and shall adhere to the minimum LPM (litres per minute) and LPF (litres per flush) mentioned. The contractor shall employ 100% zero ODP (ozone depletion potential) insulation; HCFC (hydro-chlorofluorocarbon)/ and CFC (chlorofluorocarbon) free HVAC and refrigeration equipments and / halon-free fire suppression and fire extinguishing systems.
 - f) The contractor shall ensure that all composite wood products/agro-fibre products used for cabinet work, etc do not contain any added urea formaldehyde resin.
- 17.2.28 RESOURCES CONSUMED DURING CONSTRUCTION
- a. The contractor shall ensure that the water and electricity is not wasted during construction. The Engineer in Charge can bring to the attention any such wastage and the contractor will have to ensure that such bad practices are corrected.
 - b. The contractor shall install necessary meters and measuring devices to record the consumption of water, electricity and diesel on a monthly basis for the entire tenure of the project.
 - c. The contractor shall ensure that all run-off water from the site, during construction is collected and reused to the maximum.
 - d. The contractor shall use treated recycled water of appropriate quality standards for construction, if available.

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- e. No lights shall be turned on during the period between 6:00 AM to 6:00 PM, without the permission of the Engineer in Charge.

17.2.29 CONSTRUCTION WASTE

Contractor shall ensure that wastage of construction material is within 3%.

- a) All construction debris generated during construction shall be carefully segregated and stored in a demarcated waste yard. Clear, identifiable areas shall be provided for each waste type and measures employed to segregate the waste on site into inert, chemical, or hazardous wastes.
- b) All construction debris shall be used for road preparation, back filling, etc, used if described in the schedule of quantities and as per the instructions of the Engineer in Charge, with necessary activities of sorting, crushing, etc.
- c) No construction debris shall be taken away from the site, without the prior approval of the Engineer in Charge.
- d) The contractor shall recycle the unused chemical/hazardous wastes such as oil, paint, batteries, and asbestos.
- e) If and when construction debris is taken out of the site, after prior permissions from the Engineer in Charge, then the contractor shall ensure the safe disposal of all wastes and will only dispose of any such construction waste in approved dumping sites.

17.2.30 Documentation

- a) The contractor shall, during the entire tenure of the construction phase, submit the following records to the Engineer in Charge on a monthly basis:
 - i) Water consumption in litres
 - ii) Electricity consumption in 'kwh' units
 - iii) Diesel consumption in litres
 - iv) Quantum of waste (volumetric/weight basis) generated at site and the segregated waste types divided into inert, chemical and hazardous wastes.
 - v) Digital photo documentation to demonstrate compliance of safety guidelines as specified here and in the Appendix on Safety Conditions.
- b) The contractor shall, during the entire tenure of the construction phase, submit the following records to the Engineer in Charge on a fortnightly basis:
 - i) Quantities of material brought into the site, including the material issued to the contractor by the Engineer in charge.
 - ii) Quantities of construction debris (if at all) taken out of the site
 - iii) Digital photographs of the works at site, the workers facilities, the waste and other material storage yards, pre-fabrication and block making works, etc as guided by the Engineer in Charge.
- c) The contractor shall submit a document after construction of the buildings, a brief description along with photographic records to show that other areas have not been disturbed during construction. The document should also include brief explanation and photographic records to show erosion and sedimentation control measures adopted. (Document CAD drawing showing site plan details of existing vegetation, existing buildings, existing slopes and site drainage pattern, staging and spill prevention measures, erosion and sedimentation control measures and measures adopted for top soil preservation during construction)
- d) The contractor shall submit to the Engineer in Charge after construction of the buildings, a detailed as built quantification of the following:
 - i. Total materials used,
 - ii. Total top soil stacked and total reused
 - iii. Total earth excavated

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>	
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P) EE

- iv. Total waste generated,
 - v. Total waste reused,
 - vi. Total water used,
 - vii. Total electricity, and
 - viii. Total diesel consumed.
- e) The contractor shall submit to the Engineer in Charge, before the start of construction, a site plan along with a narrative to demarcate areas on site from which top soil has to be gathered, designate area where it will be stored, measures adopted for top soil reservation and indicate areas where it will be reapplied after construction is complete.
- f) The contractor shall submit to the Engineer in Charge, a detailed narrative (not more than 250 words) on provision for safe drinking water and sanitation facility for construction workers and site personnel.
- g) Provide supporting document from the manufacturer of the cement specifying the fly-ash content in PPC used in reinforced concrete.
- h) Provide supporting document from the manufacturer of the pre-cast building blocks specifying the fly ash content of the blocks used in an infill wall system.
- i) The contractor shall, at the end of construction of the buildings, submit to the Engineer in Charge, submit following information, for all material brought to site for construction purposes, including manufacturer's certifications, verifying information, and test data, where Specifications sections require data relating to environmental issues including but not limited to:
- i) Source of products: Supplier details and location of the supplier.
 - ii) Project Recyclability: Submit information to assist Owner and Contractor in recycling materials involved in shipping, handling, and delivery, and for temporary materials necessary for installation of products.
 - iii) Recycled Content: Submit information regarding product post industrial recycled and post consumer recycled content. Use the "Recycled Content Certification Form", to be provided by the Commissioning Authority appointed for the Project.
 - iv) Product Recyclability: Submit information regarding product and product's component's recyclability including potential sources accepting recyclable materials where ever applicable.
- j) Provide final certification of well-managed forest of origin to provide final documentation of certified sustainably harvested status: Acceptable wood "certified sustainably harvested" certifications shall include:
- a) Wood suppliers' certificate issued by one of the Forest Stewardship Council-accredited certifying agencies;
 - b) Suppliers' invoice detailing the quantities of certified wood products for project;
 - c) Letter from one of a certifying agency corroborating that the products on the wood supplier's invoice originate from certified well-managed forests.
- i) Clean tech: Provide pollution clearance certificates from all manufacturers of materials
- ii) Indoor Air quality and Environmental Issues: Submit emission test data, sourced from the manufacturers, produced by acceptable testing laboratory listed in Quality Assurance Article for materials as required in each specific Specification section.
- a) Certifications from manufacturers of Low VOC paints, adhesives, sealant and polishes used at this particular project site.
 - b) Certification from manufacturers of composite wood products/agro fibre products on the absence of added urea formaldehyde resin in the products supplied to them to this particular site.
 - c) Submit environmental and pollution clearance certificates for all diesel generators installed as part of this project.

Provide total support to Engineer in Charge and Green Building Consultants appointed by the Engineer- in-Charge in completing all Green Building Rating related formalities, including signing of forms, providing signed letters in the contractor's letterhead whenever required.

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>	
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P) EE

17.2.31 Equipment

- a) To ensure energy efficiency during and post construction all pumps, motors and engines used during construction or installed, shall be subject to approval and as per the specifications of the Engineer in Charge.
- b) All lighting installed by the contractor around the site and at the labour quarters during construction shall be CFL bulbs of the appropriate illumination levels. This condition is a must, unless specifically prescribed.

The contractor is expected to go through all other conditions of the LEED & GRIHA rating stipulations.

Failure to adhere to any of the above mentioned items, without approval of the Engineer in Charge, shall be deemed as a violation of contract and the contractor shall be held liable for penalty as per terms of the agreement.

18.0 Conditions for Ready Mix Concrete :-

- (a) The contractor can use concrete from RMC plants also with prior approval of the Engineer-in-charge, instead of preparing the same in central batching plant at site within agreement item of Batch Mix Plant without any extra cost, looking to expedite the progress and need of work. However, for procuring RMC from approved plant the contractor shall follow the following conditions. Nothing extra shall be payable to the contractor for procuring RMC from the external plant.
- (b) For procurement of ready mix concrete from approved RMC plants, the contractor shall, within 5 days of award of the work, submit list of at least three RMC plant companies of repute along with details of transit mixer and pumps etc. to be deployed indicating name of owner / company, it's location, capacity, technical establishment, past experience and text of MOU proposed to be entered between purchaser (the contractor) and supplier (RMC Plant). The Engineer-in-Charge shall give approval in writing (subject to draw of MOU). The contractor shall draw the MOU with approved RMC plant owner / company and submit to Engineer-in-Charge within a week of such approval. The contractor will not be allowed to purchase ready mixed concrete without completion of above stated formalities for use in this project. Notwithstanding the approval granted by Engineer-in-charge in aforesaid manner, the contractor shall be fully responsible for quality of concrete including input control, transportation and placement etc.
- (c) The Engineer-in-charge will reserve right to inspect at any such stage and reject the concrete if he is not satisfied about quality of product. The contractor should therefore draw MOU / agreement with RMC owner / company very carefully, keeping all terms and conditions / specifications forming a part of this tender document. Including the following controls.
 - i. The Engineer-in-charge reserves the right to exercise control over the ingredients, water and admixtures purchased, stored and to be used in the concrete including conducting of tests for checking quality of Materials, recordings of test results and declaring the Materials fit or unfit for use in production of mix.
 - ii. Calibration checks of the RMC.
 - iii. Weight and quantity check on the ingredients, water and admixtures added for batch mixing.
 - iv. Time of mixing of concrete.
 - v. Testing of fresh concrete, recordings of results and declaring the mix fit or unfit for use. This will include continuous control on the workability during production and taking corrective action. For exercising such control, the Engineer-in-charge (if required) shall periodically depute his authorized representative at the RMC plant. It shall be responsibility of the contractor to ensure that all-necessary requirement manpower & facilities are made available to Engineer-in-charge and / or his authorized representative at RMC plant.

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>		
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P)	EE

- (d) The ready mix concrete should be produced in RMC plant using fully automatic batching plant having capacity to produce 30 cum/hr. The plant should have computerized control and shall give print out of all the ingredients.
- (e) All required relevant records of RMC shall be made available to the Engineer-in-charge or his authorized representative. Engineer-in-charge shall, as required specify guidelines & additional procedures for quality control & other parameters in respect of materials and production & transportation of concrete mix, which shall be binding on the contractor & the RMC plant.
- (f) 43 grade PPC as per schedule of the contract (conforming to relevant IS Codes) of brand / make / source as approved by Engineer-in-charge shall only be used for production of concrete.
- (g) The RMC produced concrete be accepted by Engineer-in-Charge at site after receipt of the same after fulfilling all the requirements of mix mentioned in the tender documents.
- (h) Ready mix concrete shall be arranged in quality as required at site of work by transportation in a transit mixer. [The general conditions of transit mixer and other requirement shall conform to IS:5892.] Ready mix concrete shall be supplied as per the pre-agreed schedule approved by Engineer-in-charge.
- (i) All other operations in concreting work like Mixing, Slump, transportation, laying / placing of concrete, compaction, curing etc. not mentioned in this particular specification for Design Mix Concrete shall be as per IS : 456-2000 or amended thereafter.
- (j) For design mix concrete of RCC other than those specified above, the contractor shall use the Design mix concrete produced by a central batching and mixing plant at his own cost. The contractor, if he so desires, can arrange the design mix concrete also from Ready mix concrete producer after obtaining written approval of the Engineer-in-charge. Nothing extra whatsoever shall be payable on this account.
- (k) Ready mix concrete shall be arranged in quantity as required at site of work. The ready mix concrete shall be supplied as per the pre-agreed schedule approved by Engineer-in-charge. Nothing extra shall be payable on this account.
- (l) The item of design mix cement concrete (produced at site as well as arranged from RMC producer) shall be inclusive of all the ingredients including admixtures if required, labour, machinery, transportation etc. (except reinforcement and shuttering which will be measured & paid as per provision of contract) required for a design mix concrete of required strength and workability. The rate quoted by the agency shall be net & nothing extra shall be payable on account of changes in quantities of concrete ingredients like cement and aggregates and admixtures etc. as per approved mix design except for quantity of extra cement payable as per schedule of quantity. Other operations in concreting work like Mixing, Slump, transportation, laying / placing of concrete, compaction, curing etc. not mentioned in this particular specification for Design Mix of Concrete shall be as per IS : 456-2000.

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>		
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P)	EE

PARTICULAR SPECIFICATIONS (Civil)**1.0 EARTH WORK: -**

1.1 Earth work shall be executed as per **CPWD specifications 2019 Volume-I**, with upto date correction slips. In addition to that following specifications shall also be followed:

1.2 EARTH WORK FOR MAJOR EXCAVATION

1.2.1 Excavation shall be undertaken to the width of the Basement/Retaining wall footing including necessary margins for construction operation as per drawing or directed otherwise. Where the nature of soil or the depth of the trench and season of the year, do not permit vertical sides, the contractor at his own expense shall put up the necessary shoring, strutting and planking or cut slopes with or without steps, to a safer angle or both with due regard to the safety of personnel and works and to the satisfaction of the Engineer. Measurement of plan area of excavation for payment shall be permitted only.

1.2.2 All the major excavation shall be carried out by mechanical excavator. No extra payment shall be made for that.

1.2.3 The contractor shall make at his own cost all necessary arrangements for maintaining water level, in the area where works are under execution low enough so as not to cause any harm to the work shall be considered as inclusive of pumping out or bailing out water, if required, for which no extra payment shall be made. This will include water coming from any source, such as rains, accumulated rain water, floods, leakages from sewer and water mains subsoil water table being high or due to any other cause whatsoever. The contractor shall make necessary provision of pumping, dredging bailing out water coming from all above sources and excavation and other works shall be kept free of water by providing suitable system approved by the Engineer-in-charge. In order to avoid possibility of basement floor of main building being getting uplifted/damaged due to water pressure, the contractor shall lower the ground water table below the proposed foundation level by boring tube wells all around the proposed building using well point sinking method or any suitable method as approved by Engineer-in-charge. Sub soil water table shall be maintained at least 50 cm. below the P.C.C. level during laying of P.C.C. water proofing treatment, laying of basement raft and beams including filling of earth/sand under the basement floor. The water table shall not be allowed to rise above base of raft level until completion of outer retaining walls including water proofing of vertical surface of walls and back filling along the walls upto ground level and until the structure attains such height to counter balance the uplift pressure. However, the contractor should inspect the site and make his own assessment about sub-soil water level likely to be encountered at the time of execution and quote his rates accordingly. Rate of all items are inclusive of pumping out or bailing out water, if required. Nothing extra on this account whatsoever shall be paid to him. The sequence of construction shall be got approved by the Engineer-in-charge.

1.2.4 The contractor shall take all necessary measures for the safety of traffic during construction and provide, erect and maintain such barricades including signs, markings, flags, lights and flagman, as necessary at either end of the excavation/embankment and at such intermediate points as directed by the Engineer-in-charge for the proper identification of construction area. He shall be responsible for all damages and accidents caused due to negligence on his part.

1.2.5 **The contractor shall provide suitable barricading with suitably painted single row of G.I. Sheets about 3'- 0" wide (90 cms) and 3.0 metre high with proper fixing arrangements for giving stable support as per direction of the Engineer-in-charge. All management (including watch and ward) of barricades shall be the full responsibility of the contractor. The barricades shall be removed only after completion of the work or part of the work. The contractor's rate shall include all above items of work and nothing extra shall be paid to the contractor over and above his quoted rates.**

2.0 R.C.C. WORK: - The contractor shall use Ready Mix Concrete (RMC) **OR** Site Batched Design Mix Cement Concrete.

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

2.1 General Requirement of READY MIX CONCRETE (RMC) :-

- (a) The contractor shall has to use **Ready Mix Concrete (RMC)** as per IS: 4926. The contractor shall ensure that transit mixtures shall transport the concrete to site. All the precautions shall be taken during the transportation and handling of concrete to achieve the desired strength, durability, etc. as envisaged in the Mix Design. Contractor has to get the approval from Engineer-In-Charge regarding source of RMC by giving the details of such plants indicating name of owner / company, its location, technical establishment, past experience and text of Memorandum of Understanding (proposed to be entered between purchaser and supplier). The Engineer-in-Charge, after satisfying himself about quality / capability of the company shall give approval in writing (subject to drawing of MOU). The MOU shall be drawn with RMC plant owner / company and submitted to Engineer-in-Charge within a week of such approval. The contractor will not be allowed to purchase RMC without completion of above formalities for use in the project. Notwithstanding the approval granted by Engineer-in-Charge in aforesaid manner, the contractor shall be fully responsible for quality of concrete including input control, production, transportation and placement etc. The Engineer-in-Charge will reserve the right to deploy his supervisor at plant site to inspect at any such stage and reject the material / concrete etc. if he is not satisfied about quality of material / product.
- (b) All measuring equipment shall be maintained in a clean and serviceable condition and their accuracy shall be checked at least once a month.
- (c) Only single sized good quality stone aggregate shall be brought to site of work from the approved source. The grading of the stone aggregate shall be controlled by blending the aggregate of different sizes in the required proportions at site of work
The aggregate of different sizes shall be stock-piled separately, preferably a day before use.
The grading of coarse and fine aggregates shall be checked as frequently as possible and as directed by the Engineer-In-Charge to ensure that the specified grading and quality of aggregate is maintained.
- (d) It is important to maintain the Water Cement Ratio constant at its specified or approved value by making adjustment for the moisture contents of both fine and coarse aggregates.
The moisture contents in the aggregate shall be determined as frequently as possible in keeping with the weather conditions and as per the provisions of IS: 2386 (Part-III).
- (e) All other operations in concreting work like mixing, slump, laying, placing of concrete, compaction, curing etc. not mentioned in this particular specifications for Ready Mix of Concrete shall be as per CPWD Specifications.

2.2 DESIGN MIX OF CONCRETE:

2.2.1 The RCC work shall be done with Design Mix Concrete. Wherever letter M has been indicated, the same shall imply for the Design Mix Concrete. The Design Mix Concrete will be designated based on the principles given in IS: 456, 10262 & SP 23. The Conditions & Specifications stated herein shall have precedence over all conditions & specifications stated in relevant I.S. Codes/C.P.W.D. Specifications. The concrete mix shall be designed for the specified target mean compressive strength in order to ensure that work test result do not fall below the acceptance criteria specified for the concrete mix. The Contractor shall design mixes for each class of concrete indicating that the concrete ingredients and proportions will result in concrete mix meeting the requirements specified.

- (a) The contractor has to submit design mix without use of admixtures.
- (b) Admixture may be added (by maintaining the minimum cement content as given in CPWD Specifications) in case of specific technical requirement so as to meet the workability / slump requirement or for any other reason but nothing extra is to be paid to contractor on account of adding admixtures.

2.2.2 The sources of coarse aggregate, fine aggregate, water, admixture & cement to be used in concrete work shall be identified by the contractor & he will satisfy himself regarding their conforming to the relevant specifications & their availability before getting the same approved from the Engineer-In-Charge.

- (a) **Coarse Aggregate:-** As per CPWD Specifications
- (b) **Fine Aggregate:-** As per CPWD Specifications
- (c) **Water:-** It shall conform to requirements laid down in IS:456-2000 / Para 3.1.1 of CPWD Specifications. If on testing, water from the source is not found fit for construction, the necessary arrangement for treatment of water shall have to be made by

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INSERTION	NIL	CUTTING	NIL	AE (P)	EE

- (d) **Cement:-** the contractor at the site and nothing extra shall be payable for the same.
Portland Pozzolona Cement (Fly ash based), required in the work from reputed manufacturers of cement as per the approved make in 50 kg bags bearing manufacturer's name and ISI marking, along with manufacturers test certificate for each lot. Portland Pozzolona Cement is to be used for RCC works only subject to fulfillment of conditions of circular No. CDO/SE(RR)/ Fly ash (MAN) 02 dated 09.04.09 shall be used for Design Mix Concrete and shall conform to IS: 1489-Part-I. However, if the contractor uses higher grade of cement nothing extra shall be paid.
- (e) **Admixture/ Plasticizer:-** The admixture shall conform to IS: 9103. Whenever required, the admixture of approved quality & approved make only shall be used to attain the required workability. Nothing extra on account of use of Admixture / Plasticizer shall be payable.

2.2.3 Water Cement Ratio and Slump :-

- 2.2.3.1 In proportioning a particular mix, the manufacturer/producer/contractor shall give due consideration to the moisture content in the aggregates, and the mix shall be so designed as to restrict the maximum free water cement ratio to less the 0.5.
- 2.2.3.2 Due consideration shall be given to the workability of the concrete thus produced. Slump shall be controlled on the basis of placement in different situations. For normal methods of placing concrete, maximum slump shall be restricted to 100mm when measured in accordance with IS:1199.
- 2.2.3.3 The minimum cement content, maximum free water-cement ratio and minimum grade of concrete are individually related to exposure as per Table 5 of IS: 456, 2000 and as per **CPWD Specifications 2019 (Vol-I)** with upto date correction slips.

Grade of Concrete: - The compressive strength of various grades of concrete with various parameters shall be as follows: -

GRADE DESIGNATION	COMPRESSIVE STRENGTH ON 15 Cm. CUBES min. 7 DAYS (N/mm ²)	SPECIFIED CHARACTERISTIC COMPRESSIVE STRENGTH AT 28 DAYS (N/mm ²)
(i) M-20	As per Design	20
(ii) M-25	As per Design	25
(iii) M-30	As per Design	30
(iv) M-35	As per Design	35

NOTE:-

- (i) In the designation of a Concrete mix letter M refers to the mix and the number of the specified characteristic compressive strength of 15 cm - Cube at 28 days expressed in N/mm².
- (ii) It is specifically highlighted that in addition to the above requirements, the maximum cement content for any grade shall be limited to 530 kg. / cubicmetre.

2.2.4 Characteristic Compressive Strength compliance Requirement

Specified Grade	Mean of the Group of 4 Non-overlapping consecutive test results in N/mm ² (Min)	Individual Test Results in N/mm ² (Min)
(1)	(2)	(3)
M15 Or Above	$\geq F_{ck} + 0.825 \times \text{established standard deviation (rounded off to nearest 0.5 N/mm}^2\text{)}$ Or $F_{ck} + 3\text{N/mm}^2$, whichever is greater where f_{ck} is characteristic compressive strength of CC cube at 28 days.	$\geq F_{ck} - 3 \text{ N/mm}^2$

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

Note : (i) In the absence of established value of standard deviation, the values given in Table as mentioned below may be assumed, and attempt should be made to obtain results of 30 samples as early as possible to establish the value of standard deviation.

(ii) For concrete of quantity up to 30 m³ (where the number of samples to be taken is less than four as per frequency of sampling given in para 2.4, the mean of test results of all such samples shall be $f_{ck} + 4 \text{ N/mm}^2$, minimum and requirement of minimum individual test result shall be $f_{ck} - 2 \text{ N/mm}^2$, minimum. However, when the number of samples is only on as per para 2.4, the requirement shall be $f_{ck} + 4 \text{ N/mm}^2$, minimum

2.2.5 The Contractor shall engage one of the following approved laboratories / test house for designing the concrete mix in accordance with relevant IS Code and to conduct laboratory tests to ensure the target strength & workability criteria for a given grade of concrete: -

a) MANIT, Bhopal. b) Govt. Engineering College, Sagar. c) I.I.T., Delhi. d) Govt. Engineering College, Raipur. e) National Council for Cement & Building Materials, Ballabgarh, Haryana. f) G.S.I.T.S., Indore g) MITS, Gwalior h) Govt. Engineering College, Jabalpur

In the event of all the above laboratories being unable to carry out the requisite design/testing; the Contractor shall have to get the same done from any other reputed laboratory with prior approval of ADG, Bhopal.

Note:- Admixture / Plasticizer to be used in concrete should be PCE (Poly Carboxyl Ether) based.

The various ingredients for mix design / laboratory tests shall be sent to the lab / test houses through the Engineer-in-charge and the samples of such aggregates sent shall be preserved at site by the department.

2.2.6 The contractor shall submit the report on design mix from any of above approved laboratories for approval of Engineer in Charge within 30 days from the date of issue of letter of acceptance of the tender. No concreting shall be done until the design mix is approved. In case of White Portland Cement and the likely use of admixtures in concrete with ordinary Portland/White Portland Cement, the contractor shall design and test the concrete mix by using trial mixes with white cement and / or admixtures also, for which nothing extra shall be payable.

2.2.7 In case of change of source or characteristic properties of the ingredients used in the concrete mix during the work, the contractor as per the directions of the Engineer-in-charge shall submit a revised laboratory mix design report conducted at laboratory established at site.

2.2.8 All cost of mix designing and testing, connected therewith, including charges payable to the laboratory shall be borne by the Contractor including redesigning of the concrete mix whenever required & as directed by Engineer-In-Charge.

2.2.9 The mix design for a specified grade of concrete shall be done for a target mean compressive strength $T_{ck} = F_{ck} + 1.65s$

Where F_{ck} = Characteristic compressive strength at 28 days.
 s = Standard deviation which depends on degree of quality control.

The assumed values of standard deviation for different grades of concrete shall be as follows: -

GRADE OF CONCRETE	STANDARD DEVIATION
M-20	4.0
M-25	4.0
M-30	5.0
M-35	5.0

Note: The above values correspond to the site control having proper storage of cement; weight batching of all materials; controlled addition of water; regular checking of all materials, aggregate gradings and moisture content; and periodical checking of workability and strength. Where there is deviation from the above the values given in the above table shall be increased by 1 N/mm².

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

2.2.10 TRIAL BATCHES

- (a) The designed mix proportions shall be checked for target mean compressive strength by means of trial batches.
- (b) Minimum three sets of separate preliminary tests shall be carried out for each trial batch of concrete mix. Each test shall comprise of six specimens and only one test-set of six specimens shall be made on any particular day.
- (c) The quantities of materials for each trial mix shall be sufficient for at least six specimens (cubes) and the concrete required for carrying out workability tests.
- (d) The workability of trial mix No.1 shall be measured and mix shall be carefully observed for freedom from segregation, bleeding and its finishing characteristics. The water content, if required, shall be adjusted corresponding to the required changes in the workability.
- (e) With the modified Water Content, the mix proportions shall be recalculated by keeping with water cement ratio unchanged. The mix proportion, as modified, shall form the Trial Mix No.2 and tested for the specified strength and workability.
- (f) In addition, trial mix No.3 and 4 shall be designed by keeping water contents same as that determined for trial mix 2 but varying the water cement ratio by ± 10 percent of the specified value and tested for their design characteristics.
- (g) Out of the six specimen of each set, three shall be tested at seven days and remaining three at 28 days. The preliminary tests at seven days are intended only to indicate the strength to be attained at 28 days, while the design mix shall be approved only on the basis of test strength at 28 days.

2.2.11 APPROVAL OF DESIGN MIX

The design mix shall be considered satisfactory and approved if at least three preliminary test-sets individually satisfy the following strength and workability criteria:

- (a) The average strength of each test-set is not less than the specified target mean compressive strength (Tck).
- (b) The strength of any specimen cube is not less than 0.85 Tck.
- (c) The concrete mix is of required degree of workability and acceptable concrete finish.

2.3 General Requirement of Batch Mix Concrete:-

- (a) The contractor shall have to use BATCH MIX CONCRETE. The contractor shall ensure that transit mixtures shall transport the concrete to site. All the precautions shall be taken during the transportation and handling of concrete to achieve the desired strength, durability, etc. as envisaged in the Mix Design.
- (c) All measuring equipment shall be maintained in a clean and serviceable condition and their accuracy shall be checked at least once a month.
- (d) Only single sized good quality stone aggregate shall be brought to site of work from the approved source. The grading of the stone aggregate shall be controlled by blending the aggregate of different sizes in the required proportions at site of work
The aggregate of different sizes shall be stock-piled separately, preferably a day before use.
The grading of coarse and fine aggregates shall be checked as frequently as possible and as directed by the Engineer-In-Charge to ensure that the specified grading and quality of aggregate is maintained.
- (e) It is important to maintain the Water Cement Ratio constant at its specified or approved value by making adjustment for the moisture contents of both fine and coarse aggregates.

The moisture contents in the aggregate shall be determined as frequently as possible in keeping with the weather conditions and as per the provisions of IS: 2386 (Part-III).

2.4 OTHER OPERATIONS: -

All other operations in concreting work like mixing, slump, laying, placing of concrete, compaction, curing etc. not mentioned in this particular specifications for Ready Mix of Concrete shall be as per CPWD Specifications.

2.5 SAMPLING:-**2.5.1 General :**

Samples from fresh concrete shall be taken as per IS 1199 and cubes shall be made, cured and tested at 28 days in accordance with IS 516. 15.1.1 In order to get a relatively quicker idea of the

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quality of concrete, optional tests on beams for modulus of rupture at 72 + 2 h or at 7 days, or compressive strength tests at 7 days may be carried out in addition to 28 days compressive strength test. For this purpose the values should be arrived at based on actual testing. In all cases, the 28 days compressive strength specified in Table 2 of code of practice, IS:456 2000 shall alone be the criterion for acceptance or rejection of the concrete.

(a) **FREQUENCY OF SAMPLING: -**

- (i) A random sampling procedure shall be adopted to ensure that the sampling is spread over the entire period of concreting and cover all mixing units. The concrete work shall be notionally divided into lots as under for the purpose of sampling conditions.
 - Footings, rafts etc.
 - Columns and walls at all levels.
 - Beams at all levels.
 - Slabs at all levels.
- (ii) At least one test sample shall be taken for each lot of concrete work.
- (iii) Each grade of concrete shall form different lot for testing.
- (iv) The minimum frequency of sampling of concrete of each grade shall be in accordance with **CPWD specification 2019, Vol I** with upto date correction slips.
- (v) The concrete work shall be assessed on day to day basis & samples shall be taken as specified.
- (vi) Work strength test shall be conducted in accordance with IS: 516 on random sampling.

However, the minimum frequency of sampling of concrete of each grade shall be in accordance with the following:

Quantity of Concrete in the work m³	Number of Samples
1 - 5	1
6 - 15	2
16 - 30	3
31 - 50	4
51 and above	4 plus one additional sample for each additional 50 cum or part thereof.

NOTE- At least one sample shall be taken from each Shift. Where concrete is produced at continuous production unit, frequency of sampling may be decided by Engineer-in-charge in such a manner so as to ensure that each concrete batch shall have a reasonable chance of being tested.

2.5.2 Test Specimen

Three test specimens shall be made for each sample for testing at 28 days. Additional samples may be required for various purposes such as to determine the strength of concrete at 7 days or at the time of striking the formwork, or to determine the duration of curing, or to check the testing error. Additional samples may also be required for testing samples cured by accelerated methods as described in IS 9103. The specimen shall be tested as described in IS 516.

2.5.3 Test Results of Samples: -

The test results of the sample shall be the average of the strength of three specimens. The individual variation shall not be more than $\pm 15\%$ percent of the average. If variation is more, the test results shall be treated as invalid. 90% of the total tests shall be done at the laboratory established at site by the contractor and remaining 10% in any other laboratory as directed by the Engineer-in-Charge.

2.5.4 Acceptance Criteria

2.5.5 Compressive Strength

The concrete shall be deemed to comply with the strength requirements when both the following conditions are met:

- a) The mean strength determined from any group of four consecutive test results complies with the appropriate limits in col 2 of Table given under para 2.2.4 above.
- b) Any individual test result complies with the appropriate limits in col 3 of Table given under para 2.2.4 above.

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>	
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P) EE

2.5.6 Quantity of Concrete Represented by Strength Test Results

The quantity of concrete represented by a group of four consecutive test-results shall include the batches from which the first and last samples were taken together with all intervening batches. Where the mean rate of sampling is not specified the maximum quantity of concrete that four consecutive test results represent shall be limited to 60 m³.

2.5.7 Concrete of each grade shall be assessed separately.

2.5.8 Concrete is liable to be rejected if it is porous or honey-combed, its placing has been interrupted without providing a proper construction joint, the reinforcement has been displaced beyond the tolerances specified, or construction tolerances have not been met. However, the hardened concrete may be accepted after carrying out suitable remedial measures to the satisfaction of the Engineer-in-Charge.

2.6 Measurement –

- (i) As per **CPWD Specifications 2019(Vol-I)** with upto date correction slips
- (ii) In respect of all projected slabs at all levels including cantilever, canopy, the payment for the RCC work shall be made under the item RCC slabs. The payment for shuttering at the edges shall be made under item of centering and shuttering for RCC slabs. Nothing extra shall be paid for the side shuttering at the edge of these projected balconies / projected verandah slabs.

2.7 **Tolerances** - As per CPWD Specifications.

2.8 Rates: -

- (i) The rate includes the cost of materials, labour and T&P, including mixing, placing, transportation involved in all the operations described above except for the cost of centring, shuttering & reinforcement which will be paid for separately. It includes finishing i.e. making the top surface of smooth/in required level with trowel etc.
- (ii) In case of rejection of concrete on account of unacceptable compressive strength, governed by para "Standard of Acceptance" as above, the work for which samples have failed shall be redone at the cost of contractor. However, the Engineer-in-charge may order for additional tests (like cutting cores, ultrasonic pulse velocity test, load test on structure or part of structure, etc) to be carried out at the cost of contractor to ascertain if the portion of structure wherein concrete represented by the sample has been used, can be retained on the basis of results of individual or combination of these tests. The Contractor shall take remedial measures necessary to retain the structure as approved by the Engineer-in-charge without any extra cost. However, for payment, the basis of rate payable to contractor shall be governed by the 28 days cube test results and reduced rates shall be regulated in accordance with CPWD Specifications.

2.9 RCC Work (Ordinary)

2.9.1 The work shall be done in accordance with **CPWD Specifications 2019 (Vol-I)** with upto date correction slips.

2.9.2 Water Cement ratio for Ordinary RCC work shall not be more than 0.5. Contractor shall use concrete mixture of proper design having arrangement for measuring water for mixing of concrete.

2.10 Form Work

2.10.1 The work shall be done in general as per CPWD Specifications.

2.10.2 Only M.S. centering / shuttering and scaffolding material unless & otherwise specified shall be used for all R.C.C. work to give an even finish of concrete surface. However, marine-ply shuttering in exceptional cases as per site requirement may be used on specific request from contractor to be approved by the Engineer-in-Charge. But nothing extra shall be paid on this a/c.

2.10.3 Nothing extra shall be paid for the centering and shuttering, circular in shape whenever the formwork is having a mean radius exceeding 6m in plan.

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

2.10.4 Nothing extra shall be paid for grid beams and the corresponding slabs having clear span more than 1.20 metres.

2.10.5 In order to keep the floor finish as per architectural drawings and to provide required thickness of the flooring as per specifications, the level of top surface of R.C.C. shall be accordingly adjusted at the time of its centering, shuttering and casting for which nothing extra shall be paid to the contractor except the places where different type of flooring is provided in the same room.

As per general engineering practice, level of floors in toilet / bath, balconies, shall be kept 12 to 20mm or as required, lower than general floors shuttering should be adjusted accordingly. Nothing extra is payable on this account.

2.10.6 Steel shuttering as approved by the Engineer-in-Charge shall be used by the contractor. Minimum size of shuttering plates shall be 600mm x 900mm except for the case when closing pieces are required to complete the shuttering panels.

Dented, broken, cracked, twisted or rusted shuttering plates shall not be allowed to be used on the work. The shuttering plates shall be cleaned properly with electrically driven sanders to remove any cement slurry or cement mortar or rust. Proper shuttering oil or de-bonding compound shall be applied on the surface of the shuttering plates in the requisite quantity before assembly of steel reinforcement.

2.11 Reinforcement:-

2.11.1 The reinforcement shall be done as per CPWD Specifications.

2.11.2 The rate of item of reinforcement of RCC work includes all operations including straightening, cutting, bending, welding, binding with annealed steel wire or welding and placing in position at all the floors with all leads and lift complete as per CPWD Specifications.

2.11.3 The contractor shall provide approved type of support for maintaining the bars in position and ensuring required spacing and correct cover of concrete to reinforcement as called for in the drawings, spacer blocks of required shape and size. Chairs and spacer bars shall be used in order to ensure accurate positioning of reinforcement. **Spacer blocks shall be casted well in advance with approved proprietary pre-packed free flowing mortars (Conbextra as manufactured by M/s Fosroc Chemicals India Ltd. or of approved equivalent)** of high early strength and same colour as of surrounding concrete. However, Cover Guard Bars shall also be used to maintain proper cover of RCC Columns in addition to spacer blocks as mentioned above. Pre-cast cement mortar/concrete blocks/blocks of polymer shall not be used as spacer blocks unless specially approved by the Engineer-in-charge, rate of RCC items is inclusive of cost of such cover blocks & Cover Guard Bars.

2.12 Pre-Cast RCC Work

2.12.1 The work shall be done in accordance with CPWD Specifications.

2.12.2 Pre-cast reinforced concrete units shall be of grade or mix as specified. Provision shall be made in the mould to accommodate fixing devices such as hooks etc. and forming of notches and holes. Each unit shall be cast in one operation. A sample of the unit shall be got approved from Engineer-in-charge before taking up the work.

2.12.3 Pre-cast units shall be clearly marked to indicate the top of member and its location.

2.12.4 Pre-cast units shall be stored, transported and placed in position in such a manner that these are not damaged.

2.12.5 The compaction of the concrete shall be done by vibrating, table or external vibrator, as approved by Engineer-in-charge. The rate quoted for the item shall include the element for framework and mechanical vibration.

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

- 2.12.6 Rate for item includes cost of all materials, labour, and all operations involved. Cost of M.S. frames, lugs including their welding, lifting hooks is also included.
- 2.12.7 In the item of providing and fixing precast reinforced cement concrete in shelves the cost of cutting chases and making good the same shall be inclusive in the item and nothing extra shall be paid on this account.

3.0 BRICK WORK:-

- 3.1 The masonry work shall be carried out with good quality well burnt FPS bricks of class designation 75 / AAC blocks / Fly ash bricks as per CPWD Specifications. Exposed brick work for ground level to plinth level shall be executed with selected FPS bricks of class designation 75.
- 3.2 The rate shall also include for leaving chases / notches for dowels / cramps for all kinds of cladding to come over brick work.
- 3.3 Brick work provided around shaft or lift walls or around slab cutouts shall be measured in the brick for corresponding floor level. Nothing extra shall be paid on this account.
- 3.4 M.S. Strip/ Bar provided at every third course of half brick masonry shall be in single piece. If required, welding joint can be used without overlaps. Nothing extra shall be paid for welding and overlaps.

4.0 STONE / MARBLE WORK

- 4.1 General: - The execution of stones work shall be in general as per **CPWD Specifications 2019 (Vol.-I)**, with up-to-date correction slips.

4.2 Granite/ Marble Works

- 4.2.1 The granite/ marble stonework shall, in general, be carried out as per the CPWD Specifications. The specifications for dressing, laying, curing, finishing, measurements, rate etc. for the granite/ marble stone flooring shall be same as that of works for the Marble flooring, skirting and risers of steps under Flooring Sub Head of the CPWD Specifications. The wall lining / veneer work with granite/ marble stone shall be as per the CPWD Specifications for Marble work Sub Head.
- 4.2.2 The decision of the Engineer-in-Charge as regards the approval of the samples for the various types of the granite/ marble stones shall be final and binding on the Contractor. No claim of any kind whatsoever shall be entertained from the Contractor on this account. The Contractor shall then procure and get the mock up prepared at site of work for approval of quality of workmanship and the granite/ marble stone as specified. The mock up shall be prepared in lift lobby, toilet etc. on one of the floors. The size of the stones shall be as per the architectural drawings. If the quality of the workmanship and the material is as per the required standards, the mock up shall be allowed as part of the work and measured for payment and shall not be dismantled. Otherwise, it shall be dismantled by the contractor as directed by the Engineer-in-Charge and taken away from the site of the work at his own cost. Nothing extra shall be payable on this account.
- 4.2.3 That the curvilinear profile of the entrance steps for the building shall be negotiated in segmental manner (using trapezoidal shaped granite stone pieces with straight edges for treads and rectangular stone pieces for the risers) and not in curved profiles as specified earlier. However, the granite/ marble stone slabs shall be cut to required sizes and shapes, as per the architectural drawings, to negotiate the curved steps in segmented manner. The risers shall also be cut to required sizes and shapes and the edges chamfered at the joints, all as per the architectural drawings. However, the Contractor shall prepare the detailed shop drawings for the same and commence work only after the approval by the Engineer-in-Charge. The rate shall also include any consequent wastage, incidental charges involved in this work. Nothing extra shall be payable on this account. For the purpose of payment, the actual area of each type of granite/ marble stone as laid shall be measured.
- 4.2.4 For the steps (risers and treads) in the linear profile, the granite/ marble stone shall be provided in single pieces up to 2.0m as per the architectural drawings, unless otherwise specifically permitted by

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

the Engineer-in-Charge. Wherever grooves are required to be provided the same is to be done as per architectural drawings and as directed by the Engineer-in-charge. Wherever required, the joints shall be provided as per the architectural drawings. Nothing extra shall be payable on these accounts.

- 4.2.5. The granite/ marble slabs used for providing and fixing in the sills, soffits and jambs of doors, windows, ventilators and similar locations shall be in single piece unless otherwise directed by the Engineer-in-Charge. Wherever stone slab other than in single piece is allowed to be fixed, the joints shall be provided as per the architectural drawings and as per the directions of the Engineer-in-Charge. In the cabin areas, the joints in sills shall preferably be provided in line with the partition wall. Depending on the number of joints, as far as possible, the stone slabs shall be procured and fixed in slabs of equal lengths as per the architectural drawings and as directed by Engineer-in-Charge.
- 4.2.6 While fixing the granite/ marble slabs in sills, soffits and jambs of doors, windows, ventilators etc., rebates shall be made by overlapping the stones at the required places for fixing shutters for doors, windows and ventilators etc. as shown in the architectural drawings and as per the directions of the Engineer-in-Charge. Epoxy based adhesives shall be used for fixing the granite/ marble stones to each other, or wherever required. The authorized overlap as per the architectural drawings or as directed by the Engineer-in-Charge shall be measured for payment under the same item. However, any extra mortar thickness required due to the overlap arrangement shall be deemed to have been included in the rate of this item. Nothing extra shall be payable on this account. The granite/ marble stone slab shall be fixed over low-level storage cabinets using necessary adhesive as per the manufacturer's specification. The stone shall have uniform thickness and shall be provided in sizes as per the architectural drawings. The stone slab shall have uniformly leveled surface after fixing. All the joints shall be finished smoothly in a workmanlike manner.
- 4.2.7 The granite/ marble work shall be adequately protected by a layer of Plaster of Paris, which shall be maintained throughout and removed just before handing over of the works for which nothing extra shall be payable.
- 4.2.8 **Acceptance Criteria:** - The stone/tile work shall carry Five years guarantee after completion of work against unsound material, workmanship as per guarantee bond. Five years guarantee in prescribed Performa attached **as per Part-B of NIT** must be given by the specified firm, which shall be counter signed by the contractor, in token of his overall responsibility. If any defect is noticed during the guarantee period, the contractor should rectify it within seven days and if not attended to the same will be got done from another agency at the risk and cost of contractor. However, this security deposit can be released in full if bank guarantee of equivalent amount is produced and deposited with the department
- 4.3 **Samples for Stone Work**
Samples of each item of stone work either individually or in combination shall be prepared for approval of Engineer-in-charge before commencement of work.

5.0 WOOD WORK

- 5.1 The wood work in general shall be carried out as per **CPWD Specifications 2019 (Volume-I)**, with up-to-date correction slips.
- 5.2 The factory shall be got approved from the Engineer-in-charge before commencement of work for factory made wood work. The sample of timber to be used shall be deposited by the contractor with Engineer-in-charge before commencement of work.
- 5.3 The shape and size of beading shall be as per drawings. The joints of beading shall be mitred.
- 5.4 Timber shall be of specified species, good quality and well-seasoned. It shall have uniform colour, reasonably straight grains and shall be free from knots, cracks, shakes and sapwood. It shall be close grained. The contractor shall deposit the samples of species of timber to be used with the Engineer-in-Charge for testing before commencement of the work.

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INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P)	EE

- 5.5 Wood work shall not be painted, oiled or otherwise treated before it has been approved by the Engineer-in-charge. All portion of timber including architrave abutting against masonry, concrete, stone or embedded in ground shall be painted with approved wood preservative or with boiling coal tar.
- 5.6 The contractor(s) shall produce cash voucher and certificates from approved Kiln Seasoning Plants about the timber used on the work having been kiln seasoned and chemically treated by them, falling which it would not be so accepted as kiln seasoned and/or chemically treated.
- 5.7 Transparent sheet glass conforming to IS: 2835 – 1977 shall be used. Thickness being governed as under unless otherwise specified in the item in wood work/steel work:

Area of Glazing	Thickness
(a) For glazing area up to 0.50 sqm	4.0 mm
(b) For glazing area more than 0.50 sqm	6.0 mm

- 5.8 Factory made wooden flush door shutters shall be carried out as per **CPWD specifications 2019 (Vol.-I)** with upto date correction slips).
- 5.9 The work shall be executed through specialized agencies to be approved by the Engineer in Charge.
- 5.10 The contractor shall propose well in advance to Engineer-in-Charge, the names and address of the factory where from the contractor intends to get the shutters manufactured along with the credential of the firm. The contractor shall place the order for manufacturing of shutters only after obtaining approval of the Engineer in Charge whose decision in this case shall be final & binding. In case the firm is not found suitable he shall propose another factory. The factory may also be inspected by a group of officers before granting approval; shutters shall however he accepted only if these meet the specified test.
- 5.11 Contractor will arrange stage wise inspection of the shutters at factory by the Engineer-in-Charge or his authorized representative. The contractor will have no claim if the shutters brought at site in part or full lot are rejected by the Engineer-in-Charge due to bad workmanship / quality. Such defective shutters will not be measured and paid. The contractor shall remove the same from the site of work within 7 days after the written instruction in this regard are issued by the Engineer-in-Charge.
- 5.12 The shutters should be brought at site without primer / painting.

6.0 FIRE RATED DOORS

Fire rate doors shall conform to specifications lay down by NBC and/or relevant BIS codes etc.

7.0 STEEL WORK

All steel work shall be carried out as per **CPWD specifications 2019 (Volume-I)** with up-to-date correction slips.

8.0 FLOORING

- 8.1 All work in general shall be carried out as per **CPWD specifications 2019 (Volume-I)** with up-to-date correction slips.
- 8.2 Whenever flooring is to be done in patterns of tiles and stones, the contractor shall get samples of each pattern laid and approved by the Engineer-in-charge before final laying of such flooring. Nothing extra shall be payable on this account.
- 8.3 Different stones / tiles used in pattern flooring shall be measured separately as defined in the nomenclature of the item and nothing extra for laying pattern flooring shall be paid over and above the quoted rate. No additional wastage, if any, shall be accounted for any extra payment.
- 8.4 Samples of flooring stones/ Tile (Kota/ Marble/ Granite/ Ceramic tiles/ Vitrified tiles etc.) shall be deposited well in advance with the Engineer-in-Charge for approval. Approved samples should be

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kept at site with the Engineer-in-Charge and the same shall not be removed except with the written permission of Engineer-in-Charge. No payment whatsoever shall be made for these samples.

- 8.5 The Marble/ Kota/ Granite or any other stone shall be fully supported by the details establishing the quarry and its location.

- 8.6 Full width Marble/ Kota/ Granite stone over kitchen platform shall be provided which shall not be less than 900mm long except to adjust for closing pieces. The marble / stone flooring in treads and risers of staircase shall not be less than 1500mm long except to adjust the closing pieces. Nothing extra shall be paid on these accounts

8.7 Vitrified Tile Flooring

The tiles shall be of approved make and shall generally conform to Table 12 of IS15622.

The full body Vitrified tiles of specified sizes shall be used & sample of tiles shall be got approved from the Engineer-in-Charge. All tiles shall be rectified and double charge minimum. The Mandatory tests for vitrified tiles shall be got done as per CPWD Specifications (volume-1)/relevant BIS Code.

8.8 Ceramic Tiles Flooring

The tiles shall be procured from the approved manufactures of the specified shade & colour.

The floor & wall tiles shall be conforming to IS:15622 for floor and wall tiles respectively.

Tiles for dado shall be 300mm x 450mm (minimum size) or more (GROUP-III) as approved.

Tiles for flooring shall be 300mm x 300mm (minimum size) or more (GROUP-V) as approved.

Test shall be conducted to satisfy the quality of material as per CPWD Specifications

- 8.9 The rate of items of flooring is inclusive of providing sunken flooring in bathrooms, kitchen etc. and nothing extra on this account is admissible. The proper gradient shall be given to flooring for toilets, verandah, kitchen, courtyard, etc. as per the directions of Engineer-in-charge.

- 8.10 The entire responsibility for the quality of work will however rest with the building contractor only and he shall submit a Guarantee Bond as per Proforma **as per Part-B of NIT**. 10% (ten percent) of the cost of all tile items in addition to normal security deposit of the whole work, would be retained as security deposit and the amount so deducted would be released after **Five years** from the date of completion of the entire work under the agreement, if the performance of the items is found satisfactory. If any defect is noticed during the guarantee period, the contractor should rectify it within seven days and if not attended to the same will be got done from another agency at the risk and cost of contractor. However, this security deposit can be released in full if bank guarantee of equivalent amount is produced and deposited with the department.

9.0 WATER PROOFING FOR SUNKEN FLOORS:-

- 9.1 The work shall be got executed from the specialized agency as approved by the Engineer in Charge.
- 9.2 Total quantity of the water proofing compound required shall be arranged only after obtaining the prior approval of the make by Engineer-in-charge in writing. Materials shall be kept under double lock and key and proper account of the water proofing compound used in the work shall be maintained. It shall be ensured that the consumption of the compound is as per specified requirements.
- 9.3 The finished surface after water proofing treatment shall have adequate smooth slope as per the direction of the Engineer-in-charge.
- 9.4 Before commencement of treatment on any surface, it shall be ensured that the outlet drain pipes / spouts have been fixed and the spout openings have been chased and rounded off properly for easy flow of water.

9.5 GUARANTEE BOND FOR ALL WATER PROOFING ITEMS:-

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>	
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P) EE

Ten years Guarantee bond in prescribed proforma **as per Part-B of NIT** shall be submitted by the contractor which shall also be signed by both the specialized agency and the contractor to meet their liability / liabilities under the guarantee bond. However, the sole responsibility about efficiency of water proofing treatment shall rest with the building contractor. **10% (Ten per cent) of the cost of water-proofing work shall be retained as Security Deposit in addition to normal security deposit of the whole work and the amount so deducted would be released after ten years from the date of completion of the entire work under the agreement, if the performance of the treatment is found satisfactory.** If any defect is noticed during the guarantee period, the contractor shall rectify it within 15 days of receipt of intimation of defects in the work. If the defects pointed out are not attended to within the specified period, the same will be got done from another agency at the risk and cost of contractor.

10.0 FINISHING:-

- 10.1 The work shall be done in accordance with **CPWD specifications 2019 (Volume-II)** with up-to-date correction slips and/or manufacturers specifications wherever applicable.
- 10.2 All painting material of approved brand and manufacturer shall be brought to the site of work in the original sealed containers. The material brought to the site of work shall be sufficient for at least 30 days of work. The material shall be kept under the joint custody of contractor and representative of the Engineer-in-charge. The empty containers shall not be removed from the site till the completion of the work without permission of the Engineer-in-charge.
- 10.3 In the item of finishing walls with water proofing cement paint, only the plain/flat area shall be measured for payment and nothing extra shall be paid on account of pointed wall surface.

11.0 SANITARY INSTALLATIONS /WATER SUPPLY / DRAINAGE:-

- 11.1 The contractor shall submit schematic drawing of water supply and sanitary installation showing details of layout, including internal water supply and drainage details, showing the detail of water supply lines including fittings diameter wise and fixtures connecting to soil waste through traps and connection of W.C. to main shaft pipe for drainage including its ventilation system for approval of Engineer-in-Charge.
- 11.2 For the work of water supply and sanitary installations, the contractor shall engage the approved licensed plumbers and submit the name of proposed plumbing agencies with their credentials for approval of the Engineer-in-Charge.
- 11.3 The work in general shall be carried out as per **CPWD specifications 2019 (Volume-II)** with up-to-date correction slips.
- 11.4 The tendered rates shall include the cost of cutting holes/cores in walls, floors, RCC slabs etc. wherever required and making good the same for which nothing extra shall be paid.
- 11.5 The Centrifugally spun cast iron pipe IS: 3989-1984 wherever necessary shall be fixed to RCC columns, beams etc. with rawl plugs of approved quality and nothing extra shall be paid for on this account.
- 11.6 The pig lead to be used in the jointing should be as per CPWD specifications.
- 11.7 Nothing extra for providing & fixing CP Brass caps /extension pieces wherever required for CP Brass fittings shall be paid beyond the rates payable for corresponding CP Brass fittings.
- 11.8 The entire responsibility for the quality of work will however rest with the building contractor only. If any defect is noticed during the guarantee period, the contractor should rectify it within seven days and if not attended to the same will be got done from another agency at the risk and cost of contractor. However, this security deposit can be released in full if bank guarantee of equivalent amount is produced and deposited with the department.

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>		
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P)	EE

- 11.9 Providing, fixing, testing and commissioning of Hubless Centrifugally cast iron pipes and fittings (Epoxy coated inside & outside) as per ISO: 6594/ IS: 15905 standard and jointing with stainless steel shielded couplings with a double stainless steel bolt and screw housing incorporating a EPDM rubber gasket as per IS: 15905/ ASTM 1277 standard inclusive of all necessary specials like bends, tees, offsets, junctions, cowls, end plug, inspection pipes etc. laid under floor/ fixed on walls and in pipe shafts. The rate shall be including angle supports, hanger, nuts bolts, anchor fasteners, fixing clamps/ channels with U-Bolts etc. complete. Hubless cast iron pipes & fitting shall have tested for noise level which shall not be more than 25 dB (A) at 2 L/s.
- 12.0 ALUMINIUM DOORS, WINDOWS, VENTILATORS ETC. GLAZING SPECIFICATIONS :**
- 12.1 Extent and Intent:** - The work shall be carried out for providing and installing anodized/powder coated aluminium doors, windows, claddings, louvers, glazing and other items as called for on the drawings. The drawings and specifications cover the major requirements only. The supplying of additional fastenings, accessories, fixtures and other items not mentioned specifically herein, but which are necessary to make a complete installation shall be a part of this contract. Hinges for open able panel shall be stainless steel friction hinges / stays selected for specified wind load and dead loads or specifically extruded in-built hinges.
- 12.2 General:** - Aluminium doors, windows etc. shall be of sizes, section details as shown on the Architectural drawings. The details shown on the drawings indicate generally the sizes of the component parts and general standards. These may be varied slightly to suit the standard adopted by the manufacturers. Before proceeding with any manufacturing, the contractor shall prepare and submit complete manufacturing and installation drawings for approval of the Engineer-in-Charge and no work shall be performed until the approval of these drawings is obtained.
- 12.3 Shop Drawings:** - The contractor shall submit the shop drawings of doors, windows, louvers, cladding and other aluminium work, based on the architectural drawings to the Engineer-in-Charge for his approval. The shop drawing shall show full size sections of doors, windows etc. thickness of metal (i.e. wall thickness) details of construction, sub frame/rough ground profile, anchoring details hardware as well as connection of windows, doors and other metal work to adjacent work. Samples of all joints and methods of fastening and joining shall be submitted to the Engineer-in-Charge for approval well in advance of commencing the work.
- 12.4 Samples:** - Samples of doors, windows louvers etc. shall be fabricated, assembled in the factory and submitted to Engineer-in-Charge for his approval. They shall be of sizes, types etc. as decided by Engineer-in-Charge. All samples shall be provided at the cost of the contractor.
- 12.5 Sections:** - Aluminium doors and windows shall be fabricated from extruded sections of profiles as detailed on drawings. The sections shall be extruded by the manufacturers approved by the Engineer-in-Charge. The aluminium extruded sections shall conform to BIS designation IIE/IIV 9 WP alloy, with chemical composition technical properties, as per IS: 733 and IS: 1285. The permissible tolerance of the extruded sections shall be such as not to impair the proper and smooth function/ operations and appearance of doors and windows.
- 12.6 Fabrication:** - Doors, windows etc. shall be fabricated to sizes at factory and shall be of section, sizes, combinations and details as shown on the drawings. All doors, windows etc. shall have mechanical joints. The joints shall be designed to withstand a minimum wind load of 150 Kg. per Sqm. The design shall also incur that the maximum deflection of any member shall not exceed 1/175 of the span of the member. All members shall be accurately machined and fitted to form hairline joints prior to assembly. The joints accessories such as cleats, brackets etc. shall be of such material as not to cause any bimetallic action. The design of the joints and accessories shall be such that the accessories are fully concealed. The fabrication of doors, windows, etc. shall be done in suitable sections to facilitate easy transportation, handling and installation. Adequate provision shall be made in the door and window members for anchoring to support and fixing of hardware and other fixture as approved by the Architect.

ADDITION	NIL	CORRECTION	NIL	
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- 12.7 Anodizing/ powder coating:** -All aluminium sections shall be Powder coated (minimum 50 micron thickness) as per requirement as per IS: 7088 and to required colour as specified in the item as per IS: 1868 grading as specified in item schedule after cutting the member to requisite sizes before the final assembly. Powder coating shall be of minimum 50 micron thickness. Anodizing confirming to specified grade with minimum average thickness of 15 microns when measured as per IS: 612. The anodic coating shall be properly sealed by steams or in boiling water are cold sealing process as per IS:1868/IS: 6057. Polythene tape protection shall be applied on the anodised section before they are brought to site. All care shall be taken to ensure surface protection during transportation, storage at site and installation. The tape protection shall be removed on installation. The sample will be tested in the approved laboratory and cost of samples; etc. shall be borne by the contractor.
- 12.8 Protection of finish:** - All aluminium members shall be wrapped with approved self-adhesive non-staining. PVC tapes.
- 12.9 Handling and Stacking:** -
- 12.9.1 Fabricated materials shall be carried in an approved manner to protect the material against any damage during transportation. The loading and unloading shall be carried out with utmost care. On receipt of material at site, it shall be carefully examined to detect any damaged pieces. Arrangements shall be made for expeditious replacement of damaged pieces/ parts. Materials found to be acceptable on inspections shall be repacked in crates and stored safely.
- 12.9.2 In the case of composite windows and doors, the different units are to be assembled first. The assembled composite units should be checked for line, level and plumb before final fixing is done. Units may be serial numbered and identified as out how to be assembled in their final locations if situation so warrants.
- 12.9.3 The contractor shall be responsible for assembling composite, bedding and filling the grove with polysulphide sealant inside and outside, at transoms and mullions placing the doors, windows etc. in their respective openings. After the doors/ windows have been fixed in their correct assigned position, the open hollow sections abutting masonry concrete shall be fitted with approved polysulphide sealant densely packed and finished neat.
- 12.9.4 The contractor shall be responsible for doors, windows, etc. being set straight, plumb, level and for their satisfactory operation after fixing is complete.
- 12.10 Installation:**
- 12.10.1 Just prior to installation the doors, windows, etc. shall be uncreated and stacked on edge on level bearers and supported evenly. The frame shall be fixed into position true to line and level using adequate number of expansion machine bolts, anchor fasteners, of approved size and manufacture and in an approved manner. The holes in concrete/masonry members for housing anchor bolts shall be drilled with an electric drill.
- 12.10.2 The door/ windows assembled as shown on drawings shall be placed in correct final position on the opening and marks made on concrete members at jambs, sills and heads against the holes provided in frames for anchoring. The frame shall then be removed from the opening and laid aside. Neat holes with parallel sides of appropriate size shall then be drilled in the concrete members with an electric drill at the marking to house the expansion bolts. The expansion bolts shall then be inserted in the holes, struck with a light hammer till the nut is forced into the anchor shell. The frame shall then be placed in final position in the opening and anchored to the support through cadmium plated machine screws of required size and anchored to the support through cadmium plated machine screws of required size threaded to expansion bolts. The frame shall be set in the opening by using wooden wedges at supports and be plumbed in position. The wedges shall invariably be placed at the meeting at points of glazing bars and frame.
- 12.11 EPDM Rubber / Neoprene gaskets:** The contractor shall provide and install EPDM Rubber / Neoprene gaskets of approved size and profile at all locations as shown and as called for to render the doors, windows etc. absolutely air tight and weather tight. The contractor shall produce samples of the gaskets for approval and shall procure the same after approval only.

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

12.12 Fittings: Hinges, stays, handles, tower bolts, locks and other fittings shall be of quality and manufacturer as approved by the Engineer-in-Charge.

12.13 Manufacturer's Attendance: The manufacturer immediately prior to the commencement of glazing shall adjust and set all windows and doors and accept responsibility for the satisfactory working of the opening frames.

12.14 Poly-sulphide: The gaps between frames and supports and also any gaps in the door and windows sections shall be raked out as directed and filled with poly-sulphide of approved colour and make to ensure complete water tightness. The poly-sulphide shall be of such colour and composition that it would not stain the masonry/concrete work, shall receive paint without bleeding, will not sag or run and shall not set hard or dry out under any conditions of weather. The sample of poly-sulphide to be used for this purpose shall be got approved from the Engineer-in-Charge before its actual use.

12.15 Details of Test :

12.15.1 The various tests on aluminium sections shall be conducted in accordance with the relevant IS codes.

12.15.2 The minimum number of tests for anodizing/powder coating and corrosion resistance shall be as given below: -

Sr. No.	Details	No. of Tests
1.	Doors, windows and ventilators	One test for every 1000 kg or part thereof.

12.15.3 The samples of major member of each unit of doors/ windows shall be selected at random by Engineer-in-Charge as such that all the aluminium section shall be got tested.

12.16 Acceptance Criteria: - The entire responsibility for the quality of work will however rest with the building contractor only. The aluminium work shall carry Five years guarantee after completion of work against unsound material, workmanship and defective anodizing/ powder coating as per Guarantee Bond. Five years guarantee in prescribed Performa attached under **as per Part-B of NIT** must be given by the specified firm, which shall be counter signed by the contractor, in token of his overall responsibility. If any defect is noticed during the guarantee period, the contractor should rectify it within seven days and if not attended to the same will be got done from another agency at the risk and cost of contractor. However, this security deposit can be released in full if bank guarantee of equivalent amount is produced and deposited with the department.

12.17 Rates: -

12.17.1 The rates of the item shall include the cost of materials, labour required in all the above operations.

12.17.2 The rates exclude the cost of stainless steel friction hinges / stays selected for specified wind load and dead loads or specifically extruded in-built hinges, and rest of the fittings shall also be paid separately.

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>	
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P) EE

LIST OF FIELD TESTS

- i) Particle size and shape
- ii) Slump test
- iii) Flakiness & Elongation Index tests
- iv) Compressive strength (concrete or bricks) test
- v) Rebound Hammer test
- vi) Bulking of sand
- vii) Silt content of sand
- viii) Temperature measuring with thermometer with brass protected end 0-200° C

FIELD TESTING EQUIPMENT AND INSTRUMENTS**A. Testing Equipment at Field Laboratories**

- i) Balances
 - a) 7kg to 10 kg. Capacity, Semi-self indicating type-Accuracy 10 gm
 - b) 500 gm. Capacity, Semi-self indicating type Accuracy 1 gm
 - c) Pan Balance – 5 Kg. Capacity, accuracy 10 gm.
 - d) Weighing scale platform type 100kg capacity.
- ii) Sieves: as per IS 460-1962.
 - a) I.S. Sieves – 450 mm internal dia of sizes 100 mm, 80 mm, 63 mm, 50mm, 40 mm, 25 mm, 20 mm, 12.5 mm, 10 mm, 6.3 mm, 4.75 mm complete with lid and pan.
 - b) IS Sieves – 200 mm internal dia(brass frame) consisting of 2.36 mm, 1.18 mm, 600 microns, 425 microns, 300 microns, 212 microns, 150 microns, 90 microns, 75 microns with lid and pan.
- iii) Sieve shaker capable of 200 mm and 300 mm dia sieves, motorized operated with timing switch assembly.
- iv) Equipment for slump test – Slump Cone, Steel Plate, tamping rod, steel scale, scoop.
- v) Duly calibrated 100 tonnes compression testing machine, electrical-cum manually operated.
- vi) Graduated measuring cylinders 200 ml capacity
- vii) Enamel trays (for efflorescence test for bricks and other tests)
 - a) 300 mm X 250 mm X 40 mm
 - b) Circular plates of 250 mm dia
 - c) 600 mm X 450 mm X 500 mm
 - d) 450 mm X 300 mm X 40 mm.
- viii) ISI marked 150X150X150 mm concrete cube moulds as per site requirement – 18 Nos.
- ix) Graduated cylinder 1000 ml. Capacity.
- ~~x) Pumps & pressure gauges for hydraulic testing of pipes.~~
- ~~xi) Moisture meter~~
- xii) Oven
- ~~xiii) PH Meter~~
- xiv) Any other equipment for site tests as outline in BIS and as directed by the Engineer-in-charge.

B. Field Testing Instruments

- i) Steel tapes – 3 m
- ii) Steel tapes – 30 m
- iii) Digital Vernier Calipers
- iv) Digital Micrometer Screw 25 mm gauge
- v) A good quality plumb bob
- vi) Spirit level minimum 30 cms long with 3 bubbles for horizontal vertical
- vii) Wire gauge (circular type) disc.
- viii) Foot rule
- ix) Long nylon thread
- x) Rebound hammer for testing concrete
- xi) Magnifying glass
- xii) Screw driver 30 cms long
- xiii) Ball pin hammer, 100 gms
- xiv) Plastic bags for taking samples
- xv) Depth gauge
- xvi) Digital Distance meter
- xvii) Leveling machine
- xviii) Theodolite
- ~~xix) Total survey station~~

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

xx) ~~Ultrasonic Pulse velocity meter~~

xxi) Any other equipment for site tests as outline in BIS and as directed by the Engineer-in-charge.

Note: The above list is only indicative and not exhaustive. (If the contractor fails to bring any of the equipments mention under A & B of above necessary recovery shall be made from the contractor.

C. Minimum required T&P

1	Fully Automatic Batching Plant (15.00 cum)	1 No.
2	Steel Centering and shuttering	500 sqm
3	Excavator Cum Loader	2 Nos.
4	Concrete mixer with hopper	1 No.
5	Plate Vibrator	1 No.
6	Needle Vibrator	1 No.
7	Bar Bending Machine	1 No.
8	Bar Cutting Machine	1 No.
9	Compressor 5 cum	1 No.
10	Core cutting machine	1 No.
11	Floor Grinding Machine	1 No.
12	Welding machine	1 No.
13	Grinder, Drilling machine etc.	1 No.
14	Water Pump	1 No.
15	Chase cutter	1 No.
16	Concrete Pump	2 Nos.
17	Bitumen extractor	1 No.
18	Any other equipment for site tests as outline in BIS and as directed by the Engineer-in-charge	

ADDITION NIL CORRECTION NIL

INSERTION NIL CUTTING NIL AE (P)

EE

PROFORMA FOR TESTS CARRIED OUT

NAME OF THE WORK :
 AGREEMENT NO. & DATE :

DIVISION/
 SUB-DIVISION

Sl. No.	Item	Quantities as per agreement	Frequency as per specification	No. of tests required	R.A. bill No.	Upto date quantity	No. of tests required	No. of tests actually done	Remarks
1	2	3	4	5	6	7	8	9	10

Signature of Contractor

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

**GUARANTEE BOND TO BE EXECUTED BY THE CONTRACTOR
FOR REMOVAL OF DEFECTS AFTER COMPLETION IN RESPECT OF
WATER-PROOFING WORKS (All Water - Proofing Items).**

The agreement made this..... day of (Two Thousand _____ only) betweenS/o(hereinafter called the GUARANTOR of the one part) and the PRESIDENT OF INDIA (hereinafter called the Government of the other part)

WHEREAS THIS agreement is supplementary to a contract (Hereinafter called the Contract) dated and made between the GUARANTOR OF THE ONE PART AND the Government of the other part whereby the contractor inter alia undertook to render the building and structures in the said contract recited completely water and leak-proof.

AND WHEREAS THE GUARANTOR agreed to give a guarantee to the affect that the said work will remain water and leak proof, for ten years from the date of completion of work.

NOW THE GUARANTOR hereby guarantee that work executed by him will render the structures completely leak proof and the minimum life of such water proofing treatment shall be ten years to be reckoned from the date of the completion of work.

The decision of the Engineer-in-charge with regard to nature and cause of defect shall be final and binding on Guarantor.

During this period of guarantee, the guarantor shall make good all defects and in case of any defect being found render the building water proof to the satisfaction of the Engineer-In-Charge calling upon him to rectify the defects failing which the work shall be got done by the Department by some other contractor at the Guarantor's cost and risk. The decision of the Engineer-in-charge as to the cost payable by the Guarantor shall be final and binding.

That if the guarantor fails to execute the water proofing or commits breach there under, then the guarantor will indemnify the principal and his successor against all loss, damage, cost expense or otherwise which may be incurred by him by reason of any default on the part of the GUARANTOR in performance and observance of this supplementary agreement. As to the amount of loss and/or damage and / or cost incurred by the Government, the decision of the Engineer-in-charge will be final and binding on both the parties.

IN WITNESS WHEREOF these presents have been executed by the obligator and by for and on behalf of the PRESIDENT OF INDIA on the day, month and year first above written.

SIGNED, sealed and delivered by OBLIGATOR in the presence of :-

1. 2.

SIGNED FOR AND BEHALF OF THE PRESIDENT OF INDIA BY in the presence of :-

1. 2.

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>	
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P) EE

Annexure –I**LIST OF PREFERRED MAKES OF MATERIALS (CIVIL)**

Note :

1. Unless otherwise specified, the brand/make of the material as specified in the item nomenclature or in the particular specifications or in the list of approved materials attached in the tender, shall be used in the work.
2. The Contractor shall obtain prior approval from the Engineer-in-charge before placing order for any specific material/ Brand/ Make.
3. Whenever the specified brand of material is not available than, the Engineer-in-charge may approve any material equivalent to that specified subject to proof being offered by the Contractor for its equivalence and its non-availability to his satisfaction.

MATERIALS:		BRAND/MAKE
1.	AAC Block	Ecorex, Aerocon, Siporex, Ultratech, Ecolite, Concretite, J.K. Laxmi (Cement Ltd.), BILTECH, Kansal, Dlite Blocks, Orillite – Kota.
2.	AAC Block Adhesive	Ferrous crete(Ferro-1188), ARDEX ENDURA (White Star), Ultratech (Fixed-Block)
3.	Acrylic Distemper, Emulsion, Synthetic Enamel Paint and Primer, Multi surface paint	Asian paints, ICI Dulux, Berger, Nerolac
4.	Epoxy Adhesive	FOSROC, Aquomix , Choksey, BAL-ENDURA
5.	Aluminium Composite Panel	Alpolic, Aluco Bond, Reynobond, Euro bond, Alstrong, Aludecor.
6.	Aluminium Extrusions / sections	Hindalco, Indian Aluminium Co., Jindal
7.	Annealed Float Glass	Saint Gobain, Modi Guard, Asahi
8.	Bitumen	Indian Oil, Hindustan Petroleum, Bharat Petroleum
9.	Calcium Silicate Board / Tiles	Aerolite, Hilux, Starpan
10.	CC Pavers / Grass Pavers	Nitco, Hindustan, Ultra, KJS Concrete, Duracrete, Mehtab Tiles, Kaptim
11.	Cement (Ordinary Portland Cement / Portland Pozzolana Cement)	ACC, Ultratech, Ambuja, Birla, J K Cement, Shree cement
12.	Centrifugally Cast Iron Pipe & Fittings	NECO, SKF, BIC, RIF, KAPILANSH, HIF, Electrosteel, RPMF
13.	Ceramic Tiles	Kajaria, Somany, Nitco, Johnson, RAK Ceramics
14.	Chequered / Tactile Tiles	Dura, Eurocon, Modern, Hindustan, Johnson, Eavison, NITCO
15.	CI Manhole Cover	BIC, SKF, NICO, Hepco, Kapilansh, RIF
16.	CI Double flanged non-return valves	Kirloskar, Sant, Kartar
17.	TMT Steel Reinforcement Bars	SAIL, RINL, TATA, JSW and JSPL

ADDITION	NIL	CORRECTION	NIL	
INSERTION	NIL	CUTTING	NIL	AE (P) EE

18.	CP fittings	Jaquar, Marc, Kohler, Grohe, Hindware, Prayag
19.	CPVC Pipes & Fittings	Astral, Ashirvad, Prince, Supreme, Finolex, VECTUS
20.	Curtain Carrier / Drapery Rod	Marvel, Vista levlor, Johnson.
21.	Dash fastener, Expansion Bolt	Hilti, Bosch Fischer
22.	Hydraulic Door closer, Floor springs	Dorma, Hettich, Hafele, Geze, dorset
23.	Ductile Iron Pipe (Water Supply)	Electro steel, Kesoram, KDUPL, Electro Spun, TATA DUCTURA
24.	EPDM Gasket	Hanu, Anand, Lescuyer
25.	GRC / Tactile Tile	Unistone, Eurocon, Dazzle
26.	Epoxy Grouting Compound	Pidilite, Ferrous Crete(Ferro-102), MYK, LATICRETE
27.	Epoxy Primer & Paints	Berger, Pidilite, CICO, BASF, SIKKA, Asianpaints
28.	Fire Check door	Navair, Godrej, Shakti
29.	Float Glass Mirror	Modifloat, Saint Gobain, Asahi
30.	Flush Doors (ISI Mark only)	Century, Kitlam, Archid, Greenply, Marino, Duro, Jayna, Gujcon, Durian
31.	Fly ash bricks	NTPC Sipat Bilaspur (C.G.) make or equivalent
32.	Friction Stay	Earl-Bihari, Geze, Hettich, Securistyle
33.	Galvanized/Stainless Steel Anchor Fasteners	Shakti, Arrow, Hilti, Fischer
34.	GI Pipe & fittings	Tata, Zenith, Jindal, Prakash Surya, Swastik
35.	GI Sheet	Sail, TATA, Jindal
36.	Gun Metal Gate Valve	Zoloto, Leader, SANT
37.	Glass Mosaic Tile	Bisazza, Italia, Palladio, Mridul
38.	Gypsum Board (False Ceiling)	Boral Gypsum, India Gypsum, Saint-Gobain
39.	Gypsum Plaster	Asianpaints, Fosroc, BASF, Sika, Saint-Gobain, Pidilite
40.	FRP Door	Fiberways, Jayna, Shiv Shakti
41.	Hardener	Hardcrete of Snowcem India, Pidilite, CICO.
42.	HDPE Pipes	VECTUS, Emco, Polyfins, Pioneer, Plyfab, Prayag
43.	Jet Assembly for EWC/Health Faucet	Jaquar, Marc
44.	Kitchen loft tank	Sintex, Tirupati Structurals Ltd, KMS Plast world P.Ltd. Planet Plastics, Sri Kamakshi Traders, Sreyah Novel InC.
45.	Laminate and Veneers	Merino, Greenlam, Formica, Kitlam,
46.	Locks / Latch	Godrej, Harrision, Dorma, Yale, dorset, Hafele
47.	Marine Plywood / BWP Ply	Duro, Century, Greenlam
48.	Melamine Polish	Asianpaints, Pidilite, ICI Dulux, Berger
49.	Metal False Ceiling	Nitobond, Armstrong, Trac, Durlum, Lafarge, Hunter

ADDITION NIL CORRECTION NILINSERTION NIL CUTTING NIL AE (P)

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		Douglas, BSR Calsi Ceilings Anutone
50.	Mineral Fibre	Armstrong, Daiken, Anutone, Diamond, Credence
51.	GRG Ceiling	Armstrong, Daiken, Anutone, Diamond, Credence, BSR Calsi Ceilings
52.	M.S. Pipe (Railing)	Jindal, Tata, RINL, Prakash Surya
53.	M.S. Tubes	Tata, Apollo, Prakash Surya
54.	Multi-coat Synthetic Plaster/ Textured Exterior wall paint	Spectrum, Heritage, BASF, Sika Ultratech, Asianpaints, Fosroc
55.	PL.AL.PL. Pipes	Kitech, Vectus, Jindal
56.	Plywood,	Greenply, Century, Duro
57.	Polycarbonate Sheet	Bayer, Macrolux, Danpalon, Danpalon India
58.	Polysulphide / Silicon Sealant	Pidilite, Fosroc, Tuffseal
59.	POP (Plaster of paris)	JK, Laxmi, Sriram Nirman, Sakarni
60.	PPR Pipes	SFMC, SAFE, Poiner Industries, Vectus
61.	Precast CC interlocking Tiles	Hindustan, Paver India, KK
62.	Precoatd Profile Sheet	Tata, Bhushan or equivalent
63.	Pre-laminated Particle Board	Ecoboard, Action-Tesa, Duro, Century Ply, Greenlam, Albihari
64.	Pressed steel door frame	M/s Engineers & Fabricator, Raipur, M/s J.K. Enterprises, Jaipur, M/s Jangid Engineering Works, Jaipur, M/s Swastik Super Industries, Mohali, M/s SKS Steel Industries, New Delhi.
65.	PVC Cistern	Steelbird, Jindal, Seabird, Prayag, Commander
66.	PVC Connection Pipe	Supreme, Prince, Finolex, Prayag
67.	PVC Rain Water Pipe & Fitting (SWR) Pipes	Finolex, Kisan, Kasta, Supreme, Astral, Prince, Vectus, Prayag
68.	Ready Mix Concrete (RMC)	Lafarge, Alchon, ACC, L&T, Grasim, Ultratech, RMC Ind
69.	PVC Shutter	Polygreen, Rajshri, Plastogreen, Sintex
70.	PVC Water storage Tank (Only ISI)	VECTUS, Water well, Plasto, Sintex, Gangotri, Prayag
71.	Sluice Valve	Kirloskar, Venus, Kalpana, SANT, KARTAR, Zolto
72.	Solid PVC frames and shutters	Polygreen, Rajshri, Plastogreen, Sintex
73.	Stainless Steel	Jindal, Salem
74.	Stainless steel Sink with or without Draining board.	Nirali, Hindware, Frankee, Neelkanth, Jaquar, Prayag

ADDITION NIL CORRECTION NILINSERTION NIL CUTTING NIL AE (P)

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75.	Stainless steel Door/Window fittings & Fixtures	Dorma, Ozone, Hettich, Kich, Geze, dorset
76.	Structural steel section	SAIL, RINL, TATA, JSW Steel Ltd., Jindal Steel & Power Ltd.
77.	Super plasticizer / admixture	Sika, Fosroc, Chouksey Chemicals, BASF, Asian paints
78.	Tensile Fabric	Bluestone, Encon, Structure Flex
79.	Tile Adhesive	Ferrous Crete (Ferro-1122), Ardex Endura (Gold Star), PIDILITE (Fevimate XL), WEABR(Saint-Gobin) Sika, Thermoshield, Asian paints
80.	Towel Ring/Towel Rod/Towel Rack	Marc, Jaquar, Kohler, Grohe
81.	Tubular Seallar Window	M/s Engineers & Fabricator, Raipur, M/s J.K. Enterprises, Jaipur, M/s Swastik Super Industries, Mohali (Punjab) M/s Jangid Engg. Jaipur
82.	UPVC Pipes & Fittings	Astral Flowguard, Ashirvad, Prince, Supreme, Finolex, VECTUS, Prayag
83.	Urinal, Washbasin, Orrisa Pattern W.C., Wall mounted European W.C.Seat with Cistern	Hindware, Jaquar, Cera, Kohler, Grohe
84.	Vitrified Tile	Johnson -Marbonite, Somany, Kajaria, NITCO, RAK
85.	Wall Putty	JK, BIRLA, SARAPUTTY, Asian paints
86.	Waste Pipe	Kamal, Viking, Jaquar
87.	Water Proofing Compound (Liquid)	Pidilite, Cico, Impermo, Fosroc, BASF, Ardex Endura, Sika, Asian paints
88.	White Cement	JK White, Birla White, Grasim
89.	Auditorium Chairs/Wooden furniture	Godrej, featherlite, Durion, Steelcase
90.	UPVC Windows	Fenesta, Aluplast, Kommerling, Duraplast, Rajshri
91.	WPC door and frame	Rajshri
92.	Wooden Acoustic panel with frame work	BSR Calsi Ceilings

Note : 1) In case approved make for any material/item is not specified in the NIT, the decision of finalizing a particular brand shall rest with Engineer in charge or his successor there off.
2) In case of non-availability of a particular material/item from specified manufacturers/makes, the decision of Engineer in charge or his successor there off in selection of alternate manufacture/ make is final.

ADDITION NIL CORRECTION NIL

INSERTION NIL CUTTING NIL AE (P)

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Annexure –II

The contractor gives an authority letter addressed to the Engineer-in-charge on a non-judicial stamp paper of Rs. 100 in the format given below :-

Authority Letter for Payment to Third Party

To,

**The Executive Engineer(Jabalpur)
C.P.W.D., Jabalpur**

Sub:- **Authority for payment to third party.**

I/We authorize the **The Executive Engineer(Jabalpur), CPWD, Jabalpur** to pay directly on my / our behalf to (name of third party) an amount of Rs. (Rupees in words) for the work done or supplies made by (name of third party). I/We shall be responsible for the quality and quantity of the same under the provisions of agreement No.

Signature of Contractor

Note :-

1. The total payment to third party (or parties) shall not exceed 10% of the agreement cost of the work.
2. Full reasons for proposing such third party payment shall be recorded and prior written approval of the next higher authority shall be obtained before making such payment.

ADDITION	<u>NIL</u>	CORRECTION	<u>NIL</u>	
INSERTION	<u>NIL</u>	CUTTING	<u>NIL</u>	AE (P) EE