SPECIAL CONDITIONS FOR BUILDING WORKS

BUILDING

1. DRAWINGS

   The tender must be based on the Departmental G.A.D. and execution of work shall be done as per detailed working drawings lo be supplied by the Department from time to time.

2. SITE CONDITIONS

   i) The tenderer must inspect and examine the site and its surroundings and satisfy himself before submission of his tender about the nature of the ground, sub-soil characteristics, the quantities and nature of the work, material necessary for completion of the work, the means to access to the working site, the H.F.L. & O.F.L., the accommodation he may require for his men and materials and in general he shall obtain all necessary information as to risks, contingencies overhead and other circumstances that may influence or affect his tender rates, and no claim whatsoever will be entertained after acceptance of his tender.

   ii) The contractor must accept the entire site, as it is, including changes, if any, during the period of construction, and any work that may be necessary to carry out the entrusted job, except those otherwise specifically mentioned or included in the priced schedule of work / B.O.Q. shall be deemed to have been included for in the rates quoted by the tenderer.

3. ACCESS ROAD

   The contractor shall, construct and maintain through out the contractual period of work as access road, without intervening the water flow of the cross-channel suitable for the loaded trucks for carriage of his construction materials from the nearby State Highway to the actual place of work-site at his own cost and for which no separate, payment will be made.

4. EXCAVATION AND EARTH WORK

   i) General

   The excavation will generally refer to open excavation of foundation wet or dry.

   ii) Excavation and Preparations of Foundation for Pilling and Concreting

   It shall include removal of all materials of whatsoever nature for all depths, whether wet or dry. necessary for the construction of foundation (including mass excavation) in accordance with lines, levels, shown on the Departmental drawings and the plan, dimension of the excavation shall be the theoretical dimensions Plus 0.16 meter on all sides or as directed by the Engineer-in-Charge. The Bottom of excavation shall be leveled both longitudinally and transversely or stepped as directed by the Engineer-in-Charge. If the contractor excavate greater depth or width than shown on the Departmental drawings or as directed by the Engineer-in-Charge, he shall at his own expenses fill the extra depth or width with cement concrete in proportion as directed by the Engineer-in-Charge but in no case with concrete of mix leaner than I:4:8 cement concrete.

   The contractor shall report to the Engineer-in-Charge when the excavations are ready for piling or laying of lean concrete or soling or to receive structural concrete. No concrete shall be placed in foundations until the contractor has obtained the approval of the Engineer-in-Charge. In case, the excavation is done through different strata of soil and if the same is payable as per provision in the schedule of items with quoted rates, the contractor shall get the dimensions of the strata decided and approved from the Engineer-in-Charge. If no specific provision is made in the Schedule of Items with rates appearing in the priced schedule of items of work it will be presumed that excavation shall be in all types of soil and the contractor's rate cover for the same. After the excavation is approved by the Engineer-in-Charge (and before commencement of piling work or laying of the concrete) the contractor shall get the depth and dimensions of the excavation and levels (and nature of strata if applicable as per Schedule of Items like hard rock, soft rock etc) and measurements recorded from the Engineer-in-Charge.

   iii) SHORING

The sides of the excavations should be timbered and shored in such a way as is necessary to secure them from falling and the shoring shall be maintained in position as long as necessary. The contractor shall be responsible for the proper design of the shoring to hold the sides of the excavation in position and ensure safety from slips and present damages to work and property and injury to persons. The shoring shall he removed as directed after the items for which is it required are completed.

iv) PROTECTION

All foundation pits and similar excavations shall be strongly fenced and marked with red lights at night in charge of watchman to avoid accidents. Adequate protective measures shall be taken to see that the excavation does not effect or damage adjoining road structures or any temporary structure erected at site for the work. All measures required for the safety of all people working in and near the foundation trenches and the people in the vicinity shall be taken by the contractor at his own cost. The Contractor will be entirely responsible for any injury and damage to property caused by his negligence or accident due to his constructional operations.

v) STACKING OF EXCAVATED MATERIALS

All materials excavated will remain the property of the department and rate for excavation includes shorting out of useful materials and stacking unserviceable materials as directed. Materials suitable and useful for backfilling or leveling of the site or other use shall be stacked in convenient place but not in such a way as to obstruct free movement of men and vehicles or encroach on the area required for construction purpose.

vi) BACKFILLING

All shoring and frame work shall be removed after their necessity ceases and trash of any sort shall be cleaned out from the excavation. All space between foundation concrete and the sides of excavation shall be refilled to the original surface with approved excavated materials in layers of 15 cm. to 20 cm. thick, watered and rammed. The filling shall be done after concrete is fully set and done in such a way as not to cause undue thrust on any part of the structures. Where suitable excavated materials are to be used for refilling, it shall be brought from the place where it was temporarily stacked for use in refilling. Measurement of excavations, lean concrete or soling, piling work, concrete and other works below ground level are to be jointly recorded. Black Cotton soil shall not be used for backfilling.

vii) DEWATERING

Rate for excavation shall include bailing or pumping out water which may accumulated in the excavation during the progress of work either from seepage, springs, rain or any other cause, and diverting surface flow, if any by bunds or other means. Pumping out water shall be done in such approved manner as to preclude the possibility of any damage to the foundation or trenches or masonry or any adjacent structure. When water is met in foundation trenches, pumping out water shall be from an auxiliary pit of adequate size dug, slightly outside the foundation excavations. The depth auxiliary pit shall be more than the working foundation trench levels. The auxiliary pit shall be refilled with approved excavated materials, after the dewatering is over.

The excavation shall be kept free from water.

a) During inspection and measurements.
b) During placement of reinforcements.
c) When concrete work is in progress and till it completion comes above the natural water level.
d) Till the Engineer-in-Charge considers that the concrete is sufficiently set.

viii RATE TO INCLUDE FOR EXCAVATION

Apart from other factors mentioned elsewhere in the contract, rates for the item of excavation shall also include for the following :

a) Clearing site.
b) Setting out works as required.
c) Providing shoring and shuttering to avoid sliding of soil and to protect adjacent Structure and subsequently removing the same.
d) Bailing out and pumping out water as required and directed.

e) Excavation at all depth (unless otherwise specified in the Schedule of Items) and removal of all materials of whatever nature wet or dry and necessary for the construction of foundation etc.and preparing bed for laying concrete.

f) Sorting out useful excavated materials and conveying beyond the structure and stacking them neatly in the size for backfilling or reuse as directed.

g) Necessary protection including labour, materials and equipment to ensure safety and protection against risk or accident.

h) Drilling of holes / pits for local inspection as directed to explore the nature of substratum if necessary.

i) Dismantling, cutting and removing under-ground drainage, concrete or masonry structure if any encountered during excavation.

j) The excess excavation required for fixing for work or working space and refilling the same on completion of all works.

k) Removing surplus excavated materials from site upto 450 metre including loading and unloading.

l) MEASUREMENT FOR EXCAVATION

Excavation for foundation shall be measured and paid as per drawing dimensions (or the actual work done at site whichever is less) of concrete (bed concrete where so specified) at the lowest level plus 0.46 metre in all sides. In regard to length and breadth, and depth shall be completed from the concerned excavation levels and ground levels taken before excavation. Any additional excavation required for working space for from work planking dewatering installation and shuttering etc. shall not be measured and paid for separately but rate quoted by the tenderer shall include for all these factors. No increase in bulk after excavation shall be made.

5. CONCRETE WORK

A) GENERAL

i) SUPERVISION

A competent person approved by the Engineer-in-Charge shall be employed by contractor whose first duty will be to supervise all stages in all preparation and placing of the concrete. All tests required shall be carried out as directed by the Engineer-in-Charge.

ii) APPROVAL OF CONCRETING ARRANGEMENT ETC.

Well before construction commences the contractor shall supply to the Engineer-in-Charge his approved drawing showing the general detailed arrangement for his concreting plant, system of form work, conveyance of the concrete to the point of pouring and all other devices which he proposes to use for the construction of the structure.

iii) SAMPLES AND TESTS

Every facility shall be provided to enable the Engineer-in-Charge to obtain samples and carry out tests on the materials and construction. If those test show that any of the materials for construction do not comply with the requirements of the relevant IS specification, the contractor shall be responsible for replacement of the defective materials, and or construction. The necessary cost of all such tests has to be borne by the contractor.

iv) REJECTED MATERIALS

All materials which have been damaged, contaminated or have deteriorated or do not comply in any way with the requirements of the relelvant IS specification shall be rejected immediately from the site at the contractors own expenses.

v) EQUIPMENT

Contractor shall keep of work site testing equipment for aggregate, concrete like test sieves, balance, slump cones, cube testing machine,.cube moulds, weightbatch, mixer machine with hoppers, vibrators, hoist, pile driving machineries etc. as required conforming to relevant IS specification.

B) MATERIALS

All materials shall be of approved quality.

i) CEMENT

a) Ordinary Portland Cement shall conform to the IS specification IS:269-1967, Portland Pozzolona Cement shall conform to IS:1489-1967. Unless specifically permitted by the Engineer-in-Charge Pozzolona cement shall not be used.
b) Cement shall be stored in dry Weather proof godowons (or shed) built at the cost of the contractor in the stocks which are not higher than 100 bags. Sufficient space shall be provided for circulation and rotation of bag in order to minimize the length of storage time of any of the bags. The floor of the godown shall consist of wooden planks resting on base prepared of dry bricks laid on edge and joints grouted with cement morter.
c) Cemet which is deteriorated, damaged or wet shall not be allowed to be used. All such cement shall he immediately removed from work site by the contractor. The cost of all such removal of cement shall be borne by the contactor.

ii) AGGREGATES
All aggregates shall confirm to IS:383-1970

iii) FINE AGGREGATE
a) The fine aggregate sand shall be hard, dense durable and clean with uncoated grains. The maximum size of particles shall be graded down. The sand shall be 4.75 mm. (3/ 16 in) and shall he graded down. The sand shall not contain any harmful materials such as iron, pyrites, coal, mica, silt, clay, alkali, sea shells, organic impurities, loam etc. or in case of reinforced cement work any material which might attack the reinforcement or detrimental to concrete. Aggregate which are chemically reactive with the alkalizes of the cement shall not be used. The maximum quantity of the deleterious materials shall not exceed the limits specified in the relevant IS specification. The finess modulus for such sand should normally not less than 2.

b) Grading the natural sand used for work shall have a grading conforming to one of the three grading zones of I, II & III of IS:383-1970.

iv) COARSE AGGREGATES
a) Coarse aggregate unless otherwise stated shall consist of hard, dense, durable, uncoaled crushed rock of Pakur or Pakur variety.
b) The aggregate shall be free from soft, friable than or long laminated pieces. Aggregate shall be free from injurious amounts of alkali organic matter and other deleterious materials. Flaky or weathered stones shall not be used. The maximum percentage of deleterious materials shall not exceed those specified in the relevant IS specifications. The Engineer-in-Charge at his direction may allow the use of Graded Aggregate of nominal size to conform to the grading in the IS:383-1970.
c) Contractor shall arrange to supply coarse aggregate, in single sizes. The single sizes shall be combined in suitable proportion to get desired over all grading of aggregates.
d) Size of Aggregates: Nominal maximum size of aggregate in R.C.C. piles, piers, shutters, slabs etc. should be restricted to 6 mm. less than the minimum clear distance between the main bars or 6 mm. less than the minimum cover to the reinforcement whichever is less. In no case the maximum size of the aggregate should be more than 40 mm.
e) In selecting the aggregate, the contractor shall satisfy himself that the source is suitable for regular supply and a watch shall be maintained that the particular shape and grading remain available uniformly throughout the progress of work. Unless authorised specified, this shall be obtained from Pakur.
f) Where directed by the Engineer-in-Charge, aggregate shall he washed by approved methods at contractor's expenses.
g) The sample of coarse aggregate for concrete work should be produced for the approval of Engineer-in-Charge and the whole work should be done with course aggregate conforming to the approved sample.
h) Stack - piling of aggregate

Unless otherwise directed with a view to maintain uniform water cement ratio, the aggregate shall be stocked in stack - piles. Where stock-pile are unused, the floor should be clear, the stock - piles should as far as possible be large, flat -topped and drained. It is recommended that the aggregate should not be drawn bottom 0.5 metre of the stock piles, since this is normally such than that above.

v) WATER

Water used for easing of aggregate, mixing and curing shall be potable, free from iniurious amounts of deleterious materials which are likely to affect the strengh and durability of concrete pH value of Water shall be between 6 to 8.

In addition, water shall not contain an excess of acid, alkali, sugar or salt. The permissible limits of those materials shall be as stipulated in IS. 456-2000.

C) MIXING AND PLACING OF CONCRETE, MEASUREMENT OF MATERIALS, CEMENT

i) Cement

Cement shall be bached by weight even though aggregate are hatched by volume. Where the weight of the cement is determined by accepting the maker's weight per bag, number of bags as directed by the Engineer-in-Charge shall be weighed separately to check the net weight. Where the cement is weighed on the site and not in bags. it should be weighed separately from aggregate.

ii) AGGREGATE

The aggregate shall be normally batched by weigh batcher, by volume may be allowed on the direction of the Engineer-in-Charge. The form shall of correct size to be certified by the Engineer-in-Charge before use. Heaping of aggregate on the form is prohibited and aggregate shall be filled level in form, and struck off with a horizontal timber or steel rule. Where sand in measured by volume, bulkage allowance as determined by the Engineer-in-Charge shall be accounted for while measurring sand.

iii) WATER

Water shall be measured either by volume in calibrated vessles having conical shape narrow at top, or it shall be weighed. Water shall not be assured using ordinary buckets which are wider at top and narrower at the base. The measurement of water to control and maintain water-cement ratio is of utmost importance.

The quantity of water shall be just sufficient to produce a.dense concrete of required workability for the job. An accurate and strict control shall be kept on the quantity of mixing water.

iv) WORKABILITY

In the case of reinforced concrete work, workability shall be such that the concrete surround and properly grips all reinforcements. The degree of consistency which shall depend upon the nature of work and methods of vibration of concrete shall be determined by regular slump tests. Following slumps shall be adopted for different types of works involved.

	Slumps
a) R.C.C. pier, abutment, columns, beams, girders, slabs etc.	25 mm to 75 mm

v) MIXING OF CONCRETE

a) Machine Mixing

Concrete shall be mixed in a mechanical mixer. Mixing shall be continued until there is uniform distribution of materials and the mass is uniform in colour and consistency.

Mixing shall be continued till individual particle of the coarse aggregates shown complete coating of mortar containing its proportionate amount of cement. The mixing time from the time of adding water shall be in accordance with IS:1951-61. but in no case mixing shall be done for less than two minutes. Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before putting in a new batch. Unless otherwise agreed to by the Engineer-in-Charge the first batch of concrete from the mixer shall contain only two thirds of the normal quantity. Mixing Plant shall be thoroughly cleaned before changing from one type of cement to other.

b) Hand Mixing
Hand mixing shall not be permitted except for un-important structural members and purely of the direction of the Engineer-in-Charge. When hand mixing is permitted, it shall be taken to ensure that the mixing is continued until the mass is uniform in colour and consistency. The contractor shall use 10% extra cement for hand.mixing for which no extra payment will be made.

vi) TRANSPORTING, PLACING, COMPACTION AND CURING OF CONCRETE

a) Transporting
Concrete shall be handled from the place of mixing at site to the place of final deposit as rapidly as practicable by method which will prevent contamination, segregation or loss of any of the ingredients. If segregation occurs during transport the concrete shall be remixed before use. The concrete shall be placed in position and compacted before the initial set of cement has commenced and shall not be subsequentsly disturbed. During hot or cold weather concrete shall be transported in deep containers to reduce loss of water by evaporation during hot weather and loss of heat during cold weather. Deep containers are specified on account of their lower surface area.

b) Placing of Concrete
Unless otherwise agreed to by the Engineer-in-Charge, Concrete shall not be dropped into position from height greater than 1.2 metre.

c) REMOVAL OF DEBRIS ETC.
All debris dust etc. shall be removed from the shuttering at the cost of the contractor before any concrete is placed. Care should be taken to see that shuttering is watertight and has been properly treated with approved composition to prevent absorption of water. No concrete shall be placed in any part of the strueture until the approval of the Engineer-in-Charge has been obtained.

d) TEMPARATURE OF CONCRETE
Concrete when deposited shall be a temperature of not less than 4.5°C and not more than 38°C. When concreting under water, the concrete shall not be placed in water having a temperature below 4.5°C The temperature of the concrete, when deposited under water, shall not be less than 16°C nor more than 18°C.

e) PROTECTION AND PLACING IN LAYERS
Concrete shall be placed into the form in layer not exceeding 450 mm. in thickness. Concrete after placing shall be protected by use of covering subject to approval of the Engineer-in-Charge during first stages of hardening against high winds hot sun and/or rain or surface water. No shock or vibrations shall be allowed to be imported to forms supporting fresh concrete. No such vibration shall be given in reinforcing bars portion of which are emboded in fresh compacted concrete.

f) COMPACTION

All concrete shall be compacted to produce it dense homogeneous mass. Concrete shall be thoroughly compacted during operation of placing by the use of Mechanical Vibrators. It shall be compacted in its final position within 30 minutes of its discharge from the mixer unless carried in properly designed agitators operating continuously when this time shall be within 2 hours of the addition of cement to the mix and within 30 minutes of its discharge from the agitator. Sufficient number of vibrators (including standby) of adequate capacities shall be used for compaction of concrete. Vibration shall be carried out by trained men and in presence of a qualified supervisor trained in the use of vibrators and vibrated concrete. In certain portions where vibration is not effective, careful rolling and tamping shall be earned out and sufficient men employed to ensure that thorough consolidation taken place.

Where manual compaction becomes necessary the workability of the mix should be controlled to suit such mode of compaction, subject of course to strength requirement if specified also being complied with. When concreting has to resume on a surface which has hardened, it shall be roughened swept clean, thoroughly wetted, and covered with a 13mm. layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself. This 13 mm. layer of mortar shall be freshly mixed and placed immediately before placing new concrete. Where concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes, care being taken to avoid dislodgement of any particulars of coarse aggregate. The surface shall then be thoroughly wetted, oil free, water removed and then coated with neat cement grout. The first layer of concrete to be placed on this surface shall not exceed 150 mm. in thickness, and shall be well ram mad against old work.

g) PACKING ROUND REINFORCEMENT;
In the case of reinforced concrete work, the concrete shall be carefully consolidated and packed round the reinforcement and care shall be taken to ensure that the reinforcement is not displaced during the placing and compaction of concrete. If reinforcement moves out of the place, it must be brought back to position immediately.

h) LAPSE OF APPROVAL FOR CONCRETING & METHOD OF CONTINUOUS CONCRETING

If concreting is not started within 2 hours of the approval being given, it shall have to be obtained again from the Engineer-in-Charge. Concreting shall be carried out continuously unto predetermined positions of construction joints.The position and arrangement for construction joints shall be approved by the Engineer-in-Charge. Fresh concrete shall not be placed against concrete which have been in position for more than 30 minutes unless a proper construction joint is formed. Rest, Panes for meals etc. shall be suitable to the approval of the Engineer- in-Charge.

i) PROTECTION & CURING
The contractor shall adequately protect freshly laid concrete from rapid drying due to strong sunshine, drying winds etc, and also from running of surface water and shocks. All concrete work shall be water-cured for a minimum period of 14 days after concreting as advised by the Engineer-in-Charge. Horizontal surface shall be kept covered with water pounded by means of builds and vertical surfaces like those of walls etc. by burlaps kept constantly wet with water sprays. More sprinkling of water of vertical surface without sacks or burlaps will not be allowed. In respect of concrete made out of Puzzolona cement, curing shall be continued for another 8 days.

j) TRAINED SUPERVISOR
It is essential that the contractor's supervisior who is in charge of the construction of all concrete work whether reinforced or not, shall be skilled in this class of work and shall superintend personally the whole construction and pay special attention to:

a) The quality, testing, proportioning and mixing of the materials particularly control of water-cement ratio.
b) Laying of materials in place and through consolidation of the concrete to ensure solidity and freedom for voids.
c) Sizes and positions of reinforcements.

D) CONSTRUCTION JOINTS:

i) GENERAL

The position of all the construction joints shall be determined by contractor in consultation with the Engineer-in-Charge before the work commences. The joints shall be vertical (in rafts, beams etc.) and horizontal (in walls, columns. etc.) as required, except in the case of inclined or curved member the joints shall be at right angles to the exist of the member. No Vertical Joint shall be formed without a proper stop-board at the joint. Where directed, the joints shall be of approved shape. All costs of the construction joint shall be included in the rates for the respective concrete items and no claim for extra amount on this accounts would be entertained.

E) TEST FOR CONCRETE

i) GENERAL

Tests shall be conducted in accordance with IS:516/1956 with uptodate amendments. It shall be the responsibility of the contractor to ensure that test moulds are prepared in work-man like manner. If in the opinion of the Engineer-in-Charge there is doubt regarding the quality of cement, the sample of cement shall be tested before being used in the work. The Engineer-in-Charge reserves the right to reject the structure (columns, copping, beams, girders, slabs etc.)

if the results obtained from concrete cube tests falls short according to criteria as laid down in IS:456/2000 with latest amendment, and in such case, the dismantling and reconstruction of the structure or and component thereof shall be done by the contractor at his own cost.

ii) TEST CUBES

a) Works test cubes shall be taken in sets of 6 cubes. The concrete for preparation of one set of 6 cubes shall he taken from the batch of mixed concrete discharged from mixture. The cubes shall be moulded in accordance with Indian Standard Code of Practice.

b) A minimum of one set of 6 cubes shall be taken for every 28 cum. or part thereof of concrete poured and they shall be considered as representative for the said quantity. This is an average figure, and may be decreased to cater to special conditions like different mixes, special structures etc. at the discretion of the Engineer-in-Charge.

c) The cubes shall be cured as per I.S. Code of Practice. The entire operation of casting, arranging and dispatch of cubes to Laboratory will be carried out by the contractor under the supervision of the Engineering-in-Charge. Out of '6 cubes, 2 cubes shall be tested at the age of 7 days and the other 4 at the age of 28 days in an approved Laboratory. Usually testing of the cube would be carried out at site by the cube testing machine of the contractor in presence of the Engineer-in-Charge or his authorized representatives. Out of the 4(four) sets to be tested at 28 days, the Engineer-in-Charge may arrange to have any two tested at any Government

Engineering Collage whose report shall be binding on all parties concerned. The contractor shall have to install at site the machine for testing concrete test cubes. In such case the same shall have to be got approved by the Department before undertaking any test and the accuracy and performance of such machine(s) shall be subject to checking and inspection by the Engineer-in Charge or any person authorized by him to do so.

d) The cubes will be initialed, and dated jointly by contractor's representatives and the Engineer-in-Charge or his authorized representative with a piece of wire or nail so that an indicating of the initials is left on the cube.

e) The contractor shall arrange transport the cubes to the approved laboratory and arrange to have the testing results for warded (in duplicate) directly from laboratory to the Engineer-in-Charge.

The contractor shall bear all expenses in connection with the preparation of test cubes like cost of mould, cost of concrete, labour and transport charges to the approved laboratory etc, including necessary laboratory testing charges.

f) A Register shall be maintained at site by the contractor with the following details entered initialed by the contractors and the Engineer-in-Charge.

1) Reference to specific structural member receiving the batch of concrete from which the cubes were cast.
2) Mark on cubes.

3) Grade and/or mix of concrete.
4) Date and time of casting.
5) Water cement ratio by weight and slump.
6) Crushing strengths as obtained at the age of 7 days for 2 cubes out of a set of 6 and at the age of 28 days for the 2 cubes. In case of doubt the remaining 2 cubes shall be tested at any recomended Engineering College.
7) Laboratory in which tested and reference to test certificate.
8) Any other information directed by the Engineer-in-Charge.

g) A record of the quality of concrete incorporated in the work that is represented by the quality of concrete of the set of cubes along with the description of the structural members where such concrete has been deposited shall be maintained. This record shall be initialed by the contractor and maintained by the Engineer-in-Charge.

F) VIBRATION OF CONCRETE:

a) Water Cement Ratio

The water-cement ratio (by weight) for all vibrated concrete (except controlled concrete) shall generally be 0.45 and it shall not be varied unless otherwise directed. In respect of Controlled concrete the water-cement ratio shall be as determined in the laboratory mix design suitable for vibrated concrete.

b) Placing

Concrete shall be placed in layers not over 15 cm. deep and each layer shall be vibrated into place by methods which will not permit the ingredients to separate.

c) Number and size of Vibrators

Vibrators shall be of sturdy-construction, adequately powered and capable of transmitting to the concrete not less than 3,500 impulses per minute when operating under load. The vibration shall be sufficiently tense to cause to the concrete to flow of settle reading into place and visible affect the concrete over a radius of at least 450 mm. (18") when used in concrete having slump of 25 mm. Sufficient number of vibration at least one vibrator for a rate of concreting of 1.5 cum (50 cft.) per hour shall be employed so that at the required rate of placement, vibration throught the entire valued of each layer of concrete and complete compaction are incurred.

d) Manipulation of Vibrators

Internal vibrators shall be kept constant moving in the concrete and shall be applied at points uniformly placed not further apart than the radius over which the vibrator is visibly effective. The vibrator shall not be held in one location long enough to draw a pool of grout from the surrounding concrete. The vibration shall be such that the concrete becomes uniform plastic and there shall be at least 200 second of vibration per Sq.metre (20 second of vibration per sq.ft) of surface of each layer of concrete computed on the basis of visibly affected radius and taking overlap into consideration.

G) Grades of Concrete

i) General

Before taking up the concrete work the contractor shall have to get mix design desired and approved by the Engineer-in-Charge and necessary tests conducted to satisfy the requirement specified for the respective grade of concrete. Contractor when there is any change in the quality or aggregates (both coarse and fine) and alteration made in the mix which should be got approved by the Engineer-in-Charge before being carried out for the work. The preliminary test and work test results should conform to the requirement of I.S.Code of Practice 456-2000 with latest amendment. Cube tests shall have to be done in accordance with IS:516-1959.

ii) Criterion Regarding Strength

Although the works test cubes are specified to be conducted at the age of 7 and 28 days. compressive strength specified at 28 days shall alone be the criterion for acceptance or rejection of concrete.

iii) Sample size and Acceptance Criteria

All tests shall be carried out in accordance with IS:516-1959. The criteria for acceptance of a concrete of a specific grade shall be in accordance with recommendation of IS:456-2000.

H) Execution of Concrete Work

No concrete work shall be done in absence of Engineer-in-Charge or his representative.

I) FORM WORK

i) General

Form work shall include all temporary or permanent forms required for forming the concrete together with all temporary construction required for their support.

ii) MATERIAL AND DESIGN

The form work shall be of approved dressed timber/plywood true to line and level not less than 3 cm. thick. Surface in contact with concrete are to be planed smooth except where otherwise stated. Where timber is used for form work it shall be well reasoned. Free from loose knots, projecting nails, splits or other defects that may not affect the surface of concrete. As an alternative, sufficiently rigid steel shuttering may be used. In every case, joints of the shuttering are to be such as to prevent the loss of liquid from concrete. In timber shuttering the.joints shall therefore be either tongued and grooved or the joints must he perfectly close and lined with kraft paper or other types of approved materials. In case of steel shuttering also the joints are to be similarly lined to ensure water titghtness. The inside surface of the forn work shall be properly greased to prevent adhension of concrete. The form work shall be so constructed as to remain sufficiently rigid during placing of the concrete.

All shuttering and framing must be adequately stayed and braced to the satisfaction of the Engineer-in-Charge for properly supporting the concrete during the period of hardening. The forms shall have sufficient strength and rigidity to hold concrete and withstand the pressure of ramming and vibration without excessive deflection from the prescribed lines when the concrete is vibrated. Suitable device shall be used to hold corners of adjacent ends and edges of panels of forms together for accurate alignment.

iii) lf dirccted by the Engineer-in-Charge suitable camber shall be provided in horizontal members e.g. R.C.C. beams, girders of the structure to counter act the effects of any defection. The formwork shall be so fixed as to provide for such camber.

iv) Forms shall be so constructed as to be removable in sections in the desired sequence without damaging the surfaces of concrete or disturbing other sections.

v) Unless otherwise specified or directed, chambers or fillets of size 25 mm. X 25 mm. shall be provided at all angles of the formwork to avoid sharp corners.

vi) The form work shall conform to the shape, lines and dimensions to suit the R.C.C. member as shown in drawings. Formwork shall be adequately designed to support the full weight of workers, freshly placed concrete, without yielding settlement or deflection and to ensure good and truly aligned concrete finished in accordance with drawings.

vii) Staging with sallbullah posts of adequate diameter to support the mould for concrete shall be sufficiently rigid with provision of stays and bracing. For the staging of sub-structure, the Salbullah posts shall be capable of sustaining dead load due to formwork, concrete etc. and working load on it without yieldig. Before actual erection of the staging of the sub-structure the contractor shall have to get the drawing showing their arrangement of staging and form work along with supporting calculations approved by the Engineer-in-Charge.

viii) The arrangements for side shattering including supporting arrangement to be done by the contractor shall have to be get approved by the Engineer-in-Charge.

ix) The load carrying capacity of the Iron / Salbullah timber posts which will be considered in the design of staging for super structure shall be ensured at site prior to the erection staging by suitable arrangement of load testing to the satisfaction of the Engineer-in-Charge.

x) CLEANING AND TREATMENT OF FORMS

All rubbish particularly chipping, sawings and saw- cast shall be removed from the Interior of the forms before the concrete is placed and the form work in contact with the concrete shall be cleaned and thoroughly treated with an approved composition. Care shall be taken that such approved composition is kept out of contract with the reinforcements. Interior of all moulds and boxes must be thoroughly washed out with a hose pipe or otherwise so as to be perfectly cleaned and free from all extraneous matter prior to the deposition of the concrete. Prior approval of the formwork shall be taken from the Engineer-in-Charge before placing of reinforcements in the formwork.

xi) Stripping

Forms shall be left in place until their removal is authorised by the Engineer-in-charge and shall then be removed which reaches adequate strength so as to avoid injury to concrete. In no circumstances shall forms be struck until concrete reaches strength of at least twice the stress to which the concrete maybe subjected to at the time of striking. The strength referred to shall be that of concrete using the same cement and aggregates with the same proportion and cured under conditions of temperature and moistures similar to those existing on the work. Where possible, the formwork should be left longer as it wound assist the curing.

xii) STRIPPING TIME

In normal circumstances (generally where temperatures are above 20ºC) and where Ordinary Portland Cement is used, the shuttering for the vertical sides shall be retained for a minimum period of 2 days unless otherwise directed at site by the Engineer-in-Charge.

xiii) TOLERANCES

The following shall be maximum permissible tolerances :

a) On general setting out for dimensions upto 4 metre in length a tolerance upto 3 mm. will be allowed.
b) On lengths of more than 4 metre, tolerance of not more than 5 mm. will be allowed.
c) On the cross sectional dimension of R.C. members, tolerance of more than 3 mm. will not be allowed.

If the work is not carried out within the tolerances set out above in (a) to (c), the cost of all rectification measure, dismantling and reconstruction as decided by the Engineer-in-Charge shall be borne by the contractor. In case of work dismantle, the same shall not be measured and paid for.

J) DEFECTIVE / POOR CONCRETE - PROCEDURE FOR DEALING WITH :

a) General

If in the opinion of the Engineer-in-Charge there is doubt as to the strength of the structure due to the works test cubes failing to attain specified strength or due to poor workmanship like honey combing etc. or displacing of concrete or similar circumstances or any reason attributing the negligence on the part of the contractor, then the decision of the Engineer-in-Charge regarding dismantling of such concrete or rectification of concrete allowed to be retained in its place shall be final and binding on the contractor.

b) WHERE CONCRETE IN STRUCTURE IS ALLOWED TO BE RETAINED :

When the works test strength as revealed by cube tests lies below the specified strengths, then if in the opinion of the Engineer-in-Charge the lower strength attained is acceptable to be retained in the structure then such concrete shall be allowed retained in the structure and payment for such concrete to the contractor shall be made at such reduced rate as may be decided by the Engineer-in-Charge whose decision shall be final and binding on the contractor. For deficiency in strength upto 5 percent from the specified strength rates will be reduces by 5 percent and for deficiency above 5 percent and upto 10 percent rates will be reduced by 10 percent. Concrete deficient in strength beyond 10 percent of the specified strength if allowed to be retained the limit of' reduction in rate will be limited to 15 percent of the rate.

c) CONCRETE ORDERED TO BE DISMANTLED

Where the Engineer-in-Charge does not accept the poor or defective concrete and order the same to be dismantled, then the contractor shall dismantle such concrete at his expense and reconstruct the same to the satisfaction of the Engineer-in-Charge. Concrete thus dismantled will not be measured and paid for.

d) CONCRETE RETAINED WITH RECTIFICATION
Where the Engineer-in-Charge in order to save time and where he considers adequate steps that defective concrete be strengthened as directed by him, the contractor shall carry out all rectification measures to the approval of the Engineer-in-Charge at contractor's expenses. The concrete of lower strength thus accepted shall however be paid for after nccessary reduction of rate as would be decided by the Engineer-in Charge.

e) QUANTITY OF DEFECTIVE CONCRETE REPRESENTED BY CUBES
In all cases of defective concrete as revealed by works test cubes strength failing below the specified strength the quantity of concrete thus affected and represented by the cubes shall be decided by the Engineer-in-Charge, whose decision shall be final and binding on the contractor.

f) HONEYCOMBING:
a) Where honeycombed surfaces are noticed in the concrete the contractor shall not patch up the same until examined by the Engineer-in-Charge and decision given regarding the acceptance with rectification or rejection of the same. If the contractor patches up such defects without the knowledge of the Engineer-in-Charge, the Engineer-in-Charge will be at liberty to order demolition of the concerned concrete member to the extent he considers necessary. In such case, the contractor at his expense shall re-construct the same. Demolished work shall not be measured and paid for and the cost of cement thus wasted shall he recovered at penal rate from the contractor.
b) If in the opinion of the Engineer-in-Charge the honeycombing is harmful to the structure and where so directed by the Engineer-in-Charge the full structural members affected by honeycomhing as decided by the Engineer-in-Charge, shall be dismantled and reconstructed to the approval of the Engineer-in-Charge at contractor's expenses. The demolished concrete will not be measured and paid for and the cost of cement thus wasted shall he recovered at penal rate from the contractor.
c) Where in the opinion of the Engineer-in-Charge the structural member containing honeycombing can be allowed to be remained with rectification, the rectification shall be carried out as directed by the Engineer-in-Charge by guniting (with cement sand mortar I : 3 proportion) the areas concerned at contractor's expenses.
d) Where such honeycombed area are not severe in the opinion of the Engincer-in-Charge and where so directed shall be patched up with cement-sand mortar consisting of I part of cement to 3 parts of sand after removing defective concrete down to sound concrete to the satisfaction of the Engineer-in-Charge all at the expense of the contractor.

g) OTHER DEFECTS
Any other defects in concrete shall be made good as directed by the Engineer-in-Charge at contractor's expenses.

K) CONTRACTOR'S RATES TO INCLUDE
The rate of contractor for providing and laying cement concrete in various grades or proportions shall apart from any other factors specified else where in the tender documents include for the following :-
a) For all factors and methods of work described in these specifications.

b) For all materials, labour, tools and plants etc. mixing, conveying and placing concrete in position, ramming, vibrating trowelling, curing, providing necessary shoring and removing the same after the works is complete. Shuttering and staging are described as separate items in the Priced Schedule of Items / B.O.Q. being attached with the tender unless otherwise stated. As such the rates for shuttering and staging shall not be included in the rate of concrete. The rates for shuttering and staging are inclusive of all the work mentioned in specification for form work. The reinforcement in case of reinforced concrete work will be paid for separately unless otherwise stated in the particular items. but the rate shall include for pouring concrete and packing around reinforcement.

c) The measurement of concrete will be as per detailed drawings, shape and sizes based on net structural sizes as per drawings.

d) Rates for concrete items shall cover for any shape on structural members like columns, girders, slabs, rafts etc.

e) Testing of work test cubes shall be done as required by Specification in a laboratory approved by the Engineer-in Charge and for tests of materials and work required in the opinion of the Engineer-in-Charge as described in these specification.

f) Fixing all inserts like pipes, plugs, forming holes etc. as described.

g) Weigh hatching using a Mechnical weigh batcher or a batching plant except where so specified for volumetric batching.

h) For taking out dowel bars etc. through shuttering.

i) For work at all levels.

L) STEEL REINFORCEMENT

i) MILD STEEL BARS

Mild steel reinforcement bars shall conform to IS:226-1962 "Standard Quality" or IS:432-1982 "Grade-I" of latest edition with up to date amendments.

ii) HIGH STRENGTH RIBBED DEFORMED BARS

Where deformed high strength reinforced bars are specified, the contractor shall use

TOR STEEL

As manufactured by M/S India Iron & Steel, M\S Hindusthan Steel or other, manufacturers under License from M/S Tor-IsteG Steel Corporation of Luxemburg conforming to IS: I786-1966 with Amendment No. I of August 1968 and Amendment No. 2 of December, 1970 & 1985 or to I. S. 1139-1966 with Amendment No. 1 of August, 1968 and Amendment No. 2 of 1970 & 1985 & as per IS: 800-2007.

iii) Cleaning of Reinforcement

Before steel reinforcement is placed in position, the surface of the reinforcement shall be cleaned of rust, grease and any oilier objectionable substance.

iv) Cutting of Reinforcement

Before the reinforcement bars are cut, the contractor shall study the length of bars required as per drawings and shall care out cutting only to suit the sizes required as per drawings.

Reinforcements shall be securely placed in position and firmly supported or edged by precast concrete blocks of suitable thickness at sufficiently close intervals so that they will not sag between the supports or get displaced during the placing of concrete or any other operation of the work. It is most important to maintain reinforcement in its correct position without displacement and to maintain the correct specified cover. Contractor shall be responsible to all costs for rectification required in case the bars are displaced out of their correct position.

M) BINDING WIRE

The reinforcement shall be securely bound wherever bars cross wherever required with 16 gauge soft black annealed steel wire.

N) WELDING

Welding of bars may be carried out as per I.S. Specification and code of Practice in place of placing. However no extra payment shall be allowed for the same.

O) BENDING OF REINFORCEMENT

Bends etc. on steel reinforcement shall be carefully formed. Care being taken to keep bends out of binding. Otherwise all rods shall be truly straight. If any bend shows signs of brittleness or cracking, the rod shall be removed immediately from the site. Minimum radius of 2 times diameter of the bars shall be used unless otherwise spacified in the drawing. In respect of standard hooks the radius of bend shall be 2 times the diameter of bar. Heating of reinforcement of bars to facilitate bending will not be permitted. The bars shall always be bend cold. In case of mild steel reinforcment bars of larger sizes if used, where cold bending is not possible, they may be bent by heating with written permission of the Engineer-in-Charge. Bars bent hot shall not be heated beyond cherry red colour and after bending shall be allowed to cool slowly without quenching.The bars damaged or weakened in any way in bending shall not be used on the work. High Strength deformed bars shall in no case be heated to facilitate bending.

P) INSPECTION OF REINFORCEMENTS

No concreting shall be commenced until the Engineer-in-Charge or his authorised representative has inspected the reinforcement in position and until his approval has been obtained. A notice atleast 24 hours before concreting shall be given to the Engineer-in-Charge or his authorised representative by the contractor for inspection of reinforcement. If in the opinion of the Engineer-in-Charge any material is not to accordance with the specification or the reinforcement is incorrectly spaced, bent or otherwise defective, the contractor shall immediately remove such materials from the site and replace with new ones and rectify any other defects in accordance with the instruction of the Engineer-in-Charge or his authorised representative and to his entire satisfaction.

Q) NET MEASUREMENTS

Reinforcement shall be placed as shown in the structural drawings and payment will be made on the net measurements from drawings. Only such laps, dowels. chairs and pins in reinforcement as approved by the Engineer-in-Charge or his authorised representative or shown in drawings shall be paid for. The contractor shall consider in his Tender for all wastage in reinforcement work which will not be paid for separately. All lap lengths shall be as per I.S. speecifieation or drawings.

R) COVER FOR REINFORCEMENT

Cover for reinforcement shall be as per IS: 21-1972 / Drawings.

S) RATE OF THE CONTRACTOR FOR REINFORCEMENT SHALL IN ADDITION TO ANY FACTORS

a) Recoiling, straightening (coiled bars, bent bars to facilitate transporting).
b) All cutting to lengths, labour in bending and cranking, forming hooked ends, handling, hoisting and every thing necessary to fix reinforcement in work as per drawing.
c) Cost of binding wire required as described.
d) Cost of pre-cast concrete cover blocks to maintain cover and holding reinforcement in position.
e) For fabrication and fixing reinforcement in any structural member irrespective of its location, dimensions and level.
f) Removal of rust and other undesirable substances. using wire brush etc. as described.
g) Work at all levels.

NOTES :

a)

Stone metal and chips of any size as required will have to be arranged by the contractor and cost will be deemed to have been included in the rate of respective items.

6. SPECIFICATION

1) Timber

All timber shall be of best quality well-seasoned and/or well treated for preservation and protection against decay etc. It shall be uniform in substance, straight in fibre, free from large or dead knots, sap, flaws, sun-cracks, shakes or blemishes of any kind. Any damage or splits across the grain shall not be permissible. The colour of the timber shall be uniform through out, firm and shining with a silky lustre when planed and shall not omit dull sound when struck.

2) Timber doors, windows etc. and their fittings

i) Door and Window works shall be curried out as per detailed drawings or as directed by the Engineer-in-Charge. Specified timber shall be used and it shall be sawn in the direction of the grains and shall be straight and square.

ii) Fitting shall be of Iron, brass and aluminium or as specified. These shall be well made reasonable smooth and free from sharp edges, corners flaws and other defects. Screw holes shall be counter sunk to suit the head of specified wood screws. Iron fittings shall be finished bright or black enamelled or copper oxidised. Brass fittings shall be finished bright (brass), oxidised, or chromium plated (Electro-plates) and aluminium fittings shall be finished bright or anodised or as specified. Fittlrgs shall be got approved by the Engineer-in-Charge before fixing. In case of renewal works, the new fittings, shall as far as possible match with the existing ones. Screws shall be driven with screw driver and not hammered in.

iii) 1st Class Brick works

Cement mortar shall be prepared by mixing sand and cement in specified proportion. Sand shall be measured on the basis of its dry volume. In case of damp sand, its quantity shall be increased suitable to allow for bulkage.

iv) Damp Proof Course

Damp Proof Course shall be laid to specified thickness over walls for the full thickness of the super-structure walls. The surface shall be levelled and prepared before laying the cement concrete. Edges of damp proof course shall be straight even vertical side shuttering shall consist of wooden frame and shall be strong and properly fixed so that it does not got disturbed during compaction and the mortar does not lead through. The concrete mix shall be of workable consistency and shall be tamped thoroughly to make a dense mass. When the sides are removed, the surface should come out smooth without any honey-combing. The damp proof course shall be laid continuous and surface shall be double chequered. Damp proof course shall be cured for at last seven days, after which it shall be allowed to dry. Water proofing materials of approved quality shall he added to the concrete mixture in accordance with the manufacturer's specifications.

v) Cement Plaster

The proportion for mortar for exterior or interior plaster shall be specified in the items of work. The plaster shall be of thickness as specified and the surface shall be similarly cured as for cement concrete. The moulding shall be carried out as shown in the drawing and shall be separately measured in overall length unless otherwise specified in the items. Interior corners and edges of openings if so directed by the Engineer-in-Charge shall be rounded off or chamfered with the same mortar for which no extra payment will be allowed. All cement concrete surface should be chipped off properly before taking up the plastering work.

I/We have inspected the site of work and have made myself / ourselves fully acquainted with local conditions in and around the site of works. I/We have carefully gone through the Notice Inviting Tender including the Corrigendum Notices and other Tender documents mentioned therein. I/We have also carefully gone through the PWD(WB) Schedule and special terms and conditions and agreed to execute all the terms of the priced schedule as per General Conditions Specification as laid down in the said schedule. My / Our tender is offered taking due consideration of all factors and if the same are accepted I/We promise to abide by all the stipulations of the Tender Documents and carry out and complete the work to the satisfaction of the Department.

Postal Address of the Tenderer :-

(Signature of the Tenderer)

SD/-

Chief Engineer.

W.B.P.H.I.D.C.L

Date _____

Signature Not Verified

Digitally signed by SAMARENDRA NATH CHATTERJEE
Date: 2016.12.20 13:44:35 IST
Location: West Bengal