TECHNICAL SPECIFICATIONS FOR CIVIL WORKS

1. The details of work to be done need to be mentioned in the tender schedule.

2. The following technical specifications shall govern the main items of work covered under the contract.

➢ EARTHWORK EXCAVATION

General procedure for earth work excavation

i. The excavation is to be carried out in any type of soil, soil mixed with boulders. The rate for this item includes excavation, conveying and filling the excavated earth in the low-lying portions to form a level ground.

ii. ii. The excavation shall be open cut excavation and shall be made to the full dimensions required and shall be finished to the required lines and levels as per the drawings issued for the work. The excavated earth while filling the other portions shall be spread in layers of 20cm thickness. Each layer has to be rolled with rollers as per specification. The areas of excavation and filling shall be in lines of the drawing provided.

➢ CEMENT CONCRETE WORKS

Concrete Mix

The strength of concrete mixes to be adopted in the work under this contract shall be as specified in the approved drawings. The sampling and testing of the concrete cubes shall be done; as per the relevant BIS Specification. The results shall conform to the requirements specified in the relevant BIS.

No additional payment will be made to the Contractor for variations in the proportion of ingredients if any being used in the manufacture of concrete. The rates agreed to in the schedule for concrete items shall be valid for any proportion of ingredients.

➢ AGGREGATES

a) General - Coarse Aggregates

The term coarse aggregate for the purpose of these specifications designates aggregates of size larger than 4.75 mm up to the maximum size of aggregate specified. The coarse aggregates for concrete shall consist of hard, dense, durable uncoated crushed rock fragments and shall be free from injurious amounts of soft, thin elongated or laminated pieces, alkaline or organic matter and other deleterious substances. Rounded pebbles and flaky and decayed stones will not be accepted. The broken stones shall be free from all dust and washed to ensure that all faces of the broken stones are perfectly clean. Aggregates shall comply with the requirements as per IS 383-1970.

b) Fine aggregate (Natural sand or Manufactured sand)

The use of river sand or manufactured sand is permitted. In case of river sand, the source from which it is obtained shall be subject to the approval of the Engineer in charge. The fine aggregate, whether it is river sand, crushed sand, or a mixture of both in proportions as approved by the Engineer in charge, shall comprise of all aggregate particles, as per the relevant specification in the BIS, having a maximum size up to 4.75mm. The manufactured sand shall be made out of approved stone. The agreed rate for concrete/mortar shall be inclusive of charges for washing the fine aggregate for removing the impurities. The fine aggregate, whether natural or manufactured, shall consist of hard, dense, durable and uncoated rock fragments. The fine aggregate for concrete shall be graded within limits as specified in IS. 383 and the Fineness Modulus may range between 2.60 to 3.20. No extra will be paid for the grading as required above or for variations thereon.

c) Water

Water for mixing concrete shall be clean and free from injurious oils, acids, alkalies, organic matter, salts or other impurities and to be arranged by the contractor at his own cost. The Contractor shall make his own arrangements for getting and pumping water required for earth filling and compacting, washing aggregates, mixing concrete, curing etc. and shall provide pumps, pipe lines etc. required for this purpose at his own cost. The nearby river water if found salty and unusable will not be permitted to use for works and contractor has to make his own arrangements for fetching fresh water.

➢ FORMS FOR CONCRETE

Forms to confine the concrete and shape it to the required lines shall be procured by the Contractor at his own cost and used wherever necessary.

The forms shall have sufficient strength and rigidity to hold the concrete and withstand the necessary pressure, ramming and vibration without any deflection from the prescribed lines. The surface of all forms in contact with the concrete shall be clean, rigid, tight and smooth. Suitable devices shall be used to hold corners, adjacent ends and edges of panels or other forms together in accurate alignment. The forms and their joints should be tight as otherwise there is danger of loss of mortar which may result in honeycomb. The forms shall be strong and braced sufficiently to stay in alignment especially when concrete is to be vibrated. The type of forms to be used for various works shall be subject to the approval of Engineer in charge and shall be conforming to latest IS specifications.

Forms to be used more than once shall be maintained in serviceable condition and shall be thoroughly clean and smooth before being reused. Where metal sheets are used for lining forms, the sheets shall be placed and maintained in such a condition that there will not be any lumps or wrinkles or any other imperfections. Where plywood is used for forms, the joints between the sheets shall be smooth and perfect and no patching of the plywood is allowed under any condition. The forms shall be left in place until their removal is authorised by the Engineer in charge and shall then be removed with care so as to avoid injury to the concrete. Whatever may be the material of form work used for the work no special/extra claims will be granted to the contractor.

Vibration of concrete

i. Concrete shall be placed with the aid of mechanical vibrating equipment and supplemented by hand spading and tamping. In no case, vibrators shall be used to transport concrete inside the forms.

ii. The duration of vibration shall be limited to that necessary to produce satisfactory consolidation without causing objectionable segregation in consolidating each layer of concrete. The vibrating head shall be allowed to penetrate and re-vibrate the concrete in the upper portion of the underlying layer.

iii. Fresh layers of concrete shall not be placed until the layers previously placed have been worked thoroughly as specified. The disturbance of reinforcement embedded in concrete beginning to set or already set shall be avoided.

iv. As far as possible, flexible shaft immersion type vibrators or needle vibrators of vibration frequency approved by the Engineer in charge, shall be used for vibration of concrete.

Finishing

Finishing of formed and unformed surfaces shall be performed only by skilled workmen. All exposed concrete surfaces shall be cleaned of all encrustations of cement mortar or grout and unsighted stains shall be removed.

Plastering

i. Plastering is calculated in sqm.

ii. Deductions for openings are made as per standards followed in Kerala Cricket Association.

iii. The thickness shall be as specified in the schedule.

iv. The materials for mortar shall be first dry mixed by measuring with boxes to have the required proportion (as specified) and then water added slowly and gradually and mixed thoroughly. Surface to be plastered should be cleaned and watered prior to application of plaster. Mortar shall be dashed and pressed to the surface and then brought to a smooth and uniform surface by means of float and trowel.

v. Plastering should be started from top of the structure.

vi. The plastered surface shall be kept wet for 10 days. The surface should be protected from rain, sun, frost, etc.

vii. The work shall be tested frequently with a straight edge and plumb bob. At the end of the day the plaster shall be, cut, clean to line. When the next days' plastering is started the edge of the old work shall be scraped cleaned and wetted with cement slurry. At the end of the day the plastering shall be closed on the body of wall and not nearer than 15 cms to any corner.

viii. Curing shall be started as soon as the plaster has hardened sufficiently not to damage when watered. Any defective plaster shall be cut out in rectangular shape and replaced.

ix.

Curing and Protection

i. All concrete shall be suitably protected from injury until final acceptance giving particular care to all permanently exposed corners and edges.

ii. The exposed finished surfaces of concrete shall be protected from the direct rays of the sun for at least 72 hours after placement.

iii. Water curing shall be used on all concrete and shall be applied by spraying, pending or by covering with damp cloth or burlap maintained in a moist condition. Forms shall be kept sprinkled with water until removal.

iv. Early drying shall be prevented, as the concrete will not reach its potential quality. Concrete shall be kept moist at least for 21 days. The unformed top surfaces of formed concrete such as tops of walls and beams etc. shall be moistened by wet burlap or other effective means as soon as the concrete is hardened sufficiently to prevent damage. These surfaces and steeply sloping or vertical formed surfaces shall be kept completely and continuously moist prior to and during form removal by applying water to the top surfaces and allowing it to run down between the forms and the concrete. The water used for curing shall be free from excessive amount of silt, colouring matter or impurities, which may stain the finished works. No fire or excessive heat shall be permitted near or in direct contact to the concrete at any time.

v. The construction joint shall be cured in the same manner as other concrete and shall also be kept moist for at least 72 hours prior to placing additional concrete upon joints. If damp sand or wet quilts or mats are used for curing it shall be removed completely later. It is the responsibility of the contractor to cure the concrete for the days specified by the Engineer in Charge continuously with no extra cost. Failure as a result of not complying with this shall have to be rectified by the contractor at his own expense.

Specifications for Other Construction Materials

Paints: All primers, paints etc. shall be from approved manufactures and shall conform to the latest Indian Standards for various paints. Ready mixed paints as received from the manufacturer, without any admixture, shall be used, except for addition of thinner, if recommended by the manufacturer. All paints shall have the prior approval of the Engineer before use on the work.

Cement Mortar

i. Cement mortar shall be of proportion specified for each type of work in the Schedule. It shall be composed of Portland cement and sand. The ingredients shall be accurately gauged by measure and shall be well and evenly mixed together in a mechanical pan mixer care being taken not to add more water than is required.

ii. No mortar that has begun to set shall be used. River sand / M sand shall be used. If hand mixing is allowed, then it shall be done on water proof platform. The gauged materials shall be put on the platform and mixed dry. Water will then be added and the whole is mixed again until it is homogenous and of uniform colour.

iii. Not more than one bag of cement shall be mixed at one time and it shall be consumed within half an hour of its mixing.

List of Materials of approved Brand and/or Manufacturer

1. **Cement :** The contractor shall procure 53 grade (confirming to IS specifications) ordinary Portland cement as required in the work, from reputed manufacturers of cement having a production capacity of one million tonnes or more per annum (such as ACC, Ultratech, Birla Jute and Cement Corporation of India, Zuari, Chettinadu, Malabar etc.), as approved by the Ministry of Industry, Government of India /Govt of Kerala and holding license to use ISI certification mark for their product. (The grade and IS Code ref shall be modified, if grade of cement used is different)
2. **Paints:** Jotun, Asian Paints, Berger, Deluxe or equivalent.

(Note: - When equivalent materials are used instead of the proposed brands the same has to be got approved by the Engineer-in- Charge) Approval of the Engineer in charge shall be obtained before using any material for the work.

➢ STEEL FOR STRUCTURAL WORK

General

Structural Steel of required dimension as per specification shall be provided and placed in position as indicated in the drawings or as directed by the Engineer in charge wherever required.

Quality

All steel used for Structural work shall be clean, free from oil, grease, dust, mortar scales, kinks, rust or any rolling defect or bends other than those required as per drawings. Members shall be cut to the shapes and joined as per standards for getting required dimensions as per drawings and as directed by the Engineer in charge. If required, the Engg. –in – charge may ask for testing of standard specimen of steel.

- **WELDING**

The welders engaged for the structural welding should be an expert in the art of welding. If the quality of welding work is found unsatisfactory, he will not be permitted for the work and the work done by him (if any) should be got rectified at the risk and cost of the Contractor including the cost of all consumables. The flux and all other welding wastes on the finished products should also to be removed completely by grinding, scraping, buffing etc. All welding shall be done by electro-arc method, using a process which will exclude air from molten metal. Welded components subject to vibration and fatigue should be fabricated with full penetration welds. Fillet welds longer than 5/6" applied manually, shall be made with two or more passes. All butt welds shall be full penetration weld and iron lathes thicker than 5/8" double type of joint shall be used. After every pass the welding joints should be cleared with pneumatic chipper or by grinding or by welding hammer, etc and clear the complete weld. Any blowholes seen on the welding joints should be grinded and re-welded. All deposited weld metal shall have elastic limits and ultimate tensile strength not less than those of the respective base metals welded. All welding should be done as per relevant IS standard for structural welding.

The Contractor shall prepare a shop and field welding procedure including any stress relief annealing, and pre-heat requirements and shall submit the procedure to the Engineer for approval. The procedure shall be in accordance with best modern welding practice and such as to minimize residual stresses and distortion of the finished members of the structure. Penning where required, shall be done by the use of 2 Boyer, Air Hammer, or equivalent and at a uniform air pressure of 95 to 100 P.S.I. using and elongated round-nosed tool travelling 13" Pneumatic approximately. Each pass of the weld metal, except for the first and last shall be peeled for distance of 2" on each side of the weld.

All features including necessary labour for carrying out field tests on materials shall be provided by the Contractor without any extra cost. The Contractor should be well conversant with all aspects of structural fabrication works. Previous experience with proven record in

carrying out similar works timely as per schedule, will be considered as an added advantage when finalizing the offers.

Placing of Structural steel members

Before the structural steel members are placed, the surface of the members and the surfaces of any metal supports shall be cleared of all rust, scale, dirt, grease, or other foreign substances and a coat of zinc chromate primer of approved brand shall be applied.

Reinforcement bars shall be accurately placed and tied in position so that they will not be displaced during the placing of the Concrete and special care shall be exercised to prevent any disturbance of the reinforcement bars in concrete that has already been laid. Metal chairs, metal hangers, metal spacers or other material supports satisfactory to the Engineer in charge shall be furnished and used by the Contractor for supporting the reinforcement bars wherever necessary in the opinion of the Engineer in charge to prevent future damage to the concrete or unsightly rust stains on exposed concrete surface.

Alternatively, instead of adopting lap joints and tying with binding wires, the rods may be welded. The type of welded joint to be used will be as determined by the Engineer in charge.

- **STEEL FOR REINFORCEMENT**

T.M.T. (Fe -500 confirming to IS) specifications reinforcement of required diameter shall be provided and placed in position as indicated in the drawings or as directed by the Engineer in charge wherever required.

Quality

All steel used as reinforcement shall be clean, free from oil, grease, dust, mortar scales, kinks, rust or any rolling defect or bends other than those required as per drawings. Bars shall be bend cold to the shapes and dimensions as per drawings and as directed by the Engineer in charge. If required, the Engineer in charge may ask for testing of standard specimen of steel.

Placing of Reinforcement Before the reinforcement bars are placed, the surface of the bars and the surfaces of any metal supports for reinforcement bars shall be cleared of all rust, scale, dirt, grease, or other foreign substances and after being placed the reinforcement bars shall be maintained in a clean condition until they are completely embedded in concrete.

Reinforcement bars shall be accurately placed and tied in position so that they will not be displaced during the placing of the Concrete and special care shall be exercised to prevent any disturbance of the reinforcement bars in concrete that has already been laid. Metal chairs, metal hangers, metal spacers or other material supports satisfactory to the Engineer in charge shall be furnished and used by the Contractor for supporting the reinforcement bars wherever necessary in the opinion of the Engineer in charge to prevent future damage to the concrete or unsightly rust stains on exposed concrete surface.

Alternatively, instead of adopting lap joints and tying with binding wires, the rods may be welded. The type of welded joint to be used will be as determined by the Engineer in charge. Metal reinforcement shall not be straightened or bent in a manner that will injure or weaken the material.

Bar with kinks or bends not shown on the plans shall not be used. Heating the reinforcement bars to facilitate bending will not be permitted. When, however, heating is permitted in case of large bars, the temperature of the steel shall not exceed that which is corresponding to a cherry red colour.

Wire for tying reinforcement shall be of soft annealed steel. The wire may be 16 or 18 SWG. The minimum allowable clearance between parallel round bars shall not be less than 1.5 times the diameter and square bars twice the side dimension or 1.5 times the maximum size of aggregate. Bar splices as indicated on the drawings or as directed should only be allowed. The lapped ends should be so placed as to ensure full bond on each bar. Splicing shall not be done in the region of maximum bending moment and splicing of adjacent bars shall be avoided as much as possible. Sufficient concrete cover shall be provided to protect reinforcement from corrosion as indicated in the drawings.

All protruding bars from concrete or masonry to which other bars are to be spliced and which will be exposed to action of the weather for an indefinite period shall be protected from rusting by thin coat of neat cement grout. Accurate records shall be kept at all times of the number, size, lengths and weights of bars placed in position for different parts of the work and the quantity shall be in kg or tonnes of computed weight of the bars placed. Unless otherwise shown on the drawings, the minimum thickness of concrete covering on any reinforcement material measured from the outside surface of concrete to the surface of bars shall be as per IS 456-2000.

➢ Programme Schedule

i. Detailed schedule of the programme of the work shall be submitted by the contractor before commencing the work.

ii. The Contractor will be required to execute extra items of work also if found necessary during the course of execution. Extra items will include only items of work highly necessary for the proper execution and completion of the work and were not provided for in the Original Contract. Extra items of work shall be taken up only on written instructions of the Engineer-in-charge.

iii. The contractor shall conduct all necessary tests, including the cube test to measure the compressive strength of concrete, the pile load test, and any other required tests associated with different stages of the work.

iv. The rates for extra items will be worked out based on the DSR at the time of inviting the bids, irrespective of the time of execution of the extra items of work. This means the rates of labour, materials and other charges shall be same in the schedule of rates on which the tender was based. The rate once fixed for an item will not be varied during the currency of the contract. The rates for the extra items are worked out based on the schedule of rates, applicable to the original accepted schedule. This means revision or increase of labour charge, cost of materials and other charges, if any, will not be considered for calculation of rates of extra items.

v. The Contractor has to maintain facilities at site for first aid including adequate supply of sterilized dressings and cotton wool in a readily accessible place. The Contractor shall report all cases of accidents to the Departmental Officers and the Police, immediately after such accident occurs. He will also have to arrange medical aid necessary, any pay such as compensation as is payable according to Workmen Compensation Act at his own risk and cost. The Kerala Cricket Association reserves the right to withhold reasonable amount from the Contractor's bill towards such payment till the issue is settled. Kerala Cricket Association will not pay any such compensation or medical claim or any other type of claims on any ground.

vi. The quantity stated in this schedule is only approximate and the same can be increased or decreased as per the actual necessity at site. The contractor must execute the quantity of work actually specified by the agreement authority during the course of this work without any change in agreed rate. The tender should be quoted accordingly.

vii. If any loss results to the Kerala Cricket Association due to the fault of bidder to pay the requisite deposit, sign contract agreement or start the work, the same will be recovered from him any way including through recovery proceedings. The Kerala Cricket Association reserves the right to recover from the contractor or bidder any amount due to the Kerala Cricket Association on this contract as well as by other transactions.

viii. The contract is on item rate quoting basis and bidder is required to quote rates for each and every item in the tender. No claim for revision of rates agreed to will be allowed on any account during the currency of this contract or during the extended period of contract if any due to revision of departmental schedule of rates or any other reasons.

ix. The Kerala Cricket Association will not be responsible to provide any facilities outside the site.

x. Electricity charges for the entire works should be paid by the contractor itself and the water required for the works can be collected from the source at site by the risk and cost of the contractor.

xi. All other conditions currently in Kerala Cricket Association shall be binding on this contract also.

Secretary,

Kerala Cricket Association K.C A Complex, T.C 28/152, Sasthamkovil Road, Thycaud, Thiruvananthapuram, 695014

Name & Address of Tenderer: