

ITEM REF.	DESCRIPTION
	<p style="text-align: center;">GENERAL SPECIFICATIONS</p> <p>The works under this contract shall be executed in accordance with the specifications given in the following documents issued by the Institute for Construction Training and Development (ICTAD), “Savsiripaya”, Wijerama Mawatha, Colombo-07, as applicable. The specifications given in this document, if any, shall take precedence over the ICTAD documents wherever relevant.</p> <ol style="list-style-type: none"> 1. Specification for Building Work - Sri Lanka (Vol. I) 3rd Edition (Revised July 2004). ICTAD Publication No. SCA/4 (Vol. 1) 2. Specification for Building Work - Sri Lanka (Vol. 2) Sanitary Installation. 2nd Edition (Revised October 2001). ICTAD Publication No. SCA/4 (Vol. II). 3. Specification for Irrigation and Land Drainage Works - Sri Lanka 2nd Edition (Revised Nov 1999). ICTAD Publication No. SCA/3/1 4. Specification for Water Supply & Sewerage and Storm Water Drainage Works - Sri Lanka 2nd Edition (Revised April 2002). ICTAD Publication No. SCA/3/2. 5. Specification for Reclamation Works - Sri Lanka 2nd Edition (Revised December 1999). ICTAD Publication No. SCA/3/3. 6. Specification for Ground Water Exploration and Exploitation Works - Sri Lanka 2nd Edition (Revised May 1999). ICTAD Publication No. SCA/3/4 7. Specification for Electrical and Mechanical Works associated with Building & Civil Engineering - Sri Lanka. ICTAD Publication No. SCA/8 2nd Edition (Revised August 2000). 8. Specification for Site Investigation for Building Works and Sample Bill of Quantities – 1st Edition (April 1997). ICTAD Publication No. ICTAD/DEV/17 <p>And any other standard specifications approved by the Government.</p> <p>Eligible bidders are expected to be fully acquainted with the above documents and hence these will not be issued to the bidders with this document.</p> <p>Bidders may purchase same if necessary, from ICTAD, “Savsiripaya”, Wijerama Mawatha, Colombo 07.</p>

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	<p>Good Practice</p> <p>Good Practice demands where and to the extent that materials, products and workmanship are not fully specified in the aforesaid documents, it shall be implied that they are to be:</p> <ul style="list-style-type: none"> • Suitable for the purpose of the Works stated in or reasonably inferred from the Contract Documents. • In accordance with good building practice, including the relevant provisions of current BSI documents. <p>6.1.1.1 Norms & Standards</p> <p>The equipment, accessories, material, installation testing and commissioning shall be done in accordance with following norms & standards.</p> <p>a. The British Standard Specifications For and Codes of Practice.</p> <p>6.1.1.2 Submittals</p> <p>1 The contractor shall submit all necessary information, design calculations and shop drawings to the consultant before deliver from the factory for approval.</p> <p>The contractor shall prepare all necessary shop and erection drawings and data covering equipment to be installed. These data shall include manufacturer's certified drawings showing details of size.</p> <p>GENERAL</p> <p>INTRODUCTION</p> <p>The project site is located in the Jaffna District.</p> <p>General Description of the Works</p> <p>The project involves the Renovation of, Pavilion Buildings, Mini Gimnasium, Playground and 400m Track and other associated works as specified.</p> <p>For the full scope of work reference is made to the following chapters of these Specifications, the Drawings and the Bill of Quantities.</p>

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	<p>MOBILISATION AND DEMOBILISATION</p> <p>General</p> <p>This chapter of the Specifications refers to certain particulars of the Contractor's general obligations under the Condition of Contract hereunder all temporary works, provisions of construction plants and equipment required for execution of the Works together with other temporary works and supplies specified in this section. On completion of the Contract all temporary works, plants, equipment and surplus material shall be removed unless otherwise specified and the Contractor shall clean up all the premises of the Works.</p> <p>Mobilization</p> <p>Working Areas</p> <p>The working areas include:</p> <p>A. The areas on which building area and their immediate vicinity.</p> <p>The extent of immediate vicinity is not defined, but may in general be understood as the area within 50m from the work site.</p> <p>B. Areas for stockpiling of building materials.</p> <p>C. Areas for site offices, stores, garage and workshops and for the movement of Contractor's equipment at Site.</p> <p>The Contractor may occupy working areas mentioned above at the commencement of the works and at no cost to him.</p> <p>In case additional areas are required, the Contractor must make his own arrangements with property owners for obtaining access to the necessary working areas of category B and C and the Contractor shall include all costs in this connection in his prices.</p> <p>The Employer will endorse applications from the Contractor to Government agencies for obtaining permission to use their land as working area</p> <p>Unless otherwise agreed with the property owners (public and private) the working areas - when abandoned - shall be brought back to the same conditions as before occupied by the Contractor.</p>

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	<p>Clearance of the Sites</p> <p>The Contractor shall clear the working areas as necessary to carry out the construction. In order to preserve the vegetation the Contractor shall not be permitted to remove any trees unless approved by the Engineer's Representative and the respective landowner.</p> <p>Temporary Works</p> <p>The Contractor shall provide, install and maintain all temporary offices, stores, workshops, labour camp, housing facilities for his staff together with all temporary roads, electricity supply, water supply, sanitary installations, telephone services and communication systems and other utilities required for the proper execution of the work.</p> <p>Plant and Equipment</p> <p>Mobilization of Contractor's constructional plant and equipment shall include:</p> <ol style="list-style-type: none"> a. Assembly, preparation and loading for shipment of all plant and equipment at the Contractor's home station or source of supply: b. Transportation of plant, equipment and material from the home station or source of supply to the site; and c. Unloading and installation of all plants and equipment ready for use. <p>Safety Gear</p> <p>The Contractor shall provide and maintain the following safety gear for the Engineer's Representative and his staff during the execution of works, unless expressly specified otherwise:</p> <ul style="list-style-type: none"> - 2 pair of safety shoes - 2 nos. of raincoats - 2 nos. of boots - 2 nos. of helmets <p>All above items shall be of a recognised brand and subject to approval of the Engineer's Representative.</p>

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	<p>As-Built Drawings</p> <p>As soon as possible after completion of each as-built drawing, the Contractor shall deliver to the Engineer's Representative one print of the drawing for checking. One additional print shall be provided on request, if the Engineer's Representative finds errors and wishes to mark up the drawing with necessary amendments. The Engineer will confirm acceptance of each drawing when satisfied that it correctly records the as-built details. At the end of the contract, the contractor will handover the as-built drawing (three sets of hard copy and one digital copy) to the Employer.</p> <p>SETTING OUT AND SURVEYING</p> <p>General</p> <p>The works specified in this Chapter of the Specifications comprise all services in connection with setting out and surveying.</p> <p>According to these specifications and instructions from the Engineer the Contractor shall furnish all materials, equipment, tools and labour, which are required for the services mentioned in this chapter of the Specifications.</p> <p>Project Setting Out System</p> <p>Horizontal measurements for setting out shall be based on the Project Setting Out System. Vertical measurements shall refer to chart datum (CD) 0.0 as defined by the Engineer.</p> <p>The Project Setting out System is based on grid coordinates and main reference lines as shown on the drawings.</p> <p>The Contractor's Setting Out</p> <p>Ground markers shall be established for the above-mentioned main reference lines.</p> <p>The Contractor shall protect, and maintain these permanent ground markers during the period of the Contract. The Contractor shall install, protect and maintain during the period of the Contract, such additional permanent and/or temporary ground markers as are necessary for the execution of the Works, or as required by the Engineer.</p> <p>Sufficient working space shall be available around each ground marker to enable the survey instruments to be erected and operated.</p>

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	<p style="text-align: center;">PARTICULAR SPECIFICATIONS</p> <p>The Particular Specification shall be read in conjunction with the General Specification where applicable. In the event the Particular Specification is in conflict with the General Specification, the Particular Specification shall prevail.</p> <p>Note:</p> <p>In the specifications if any materials/fittings are described by using a trade name, it is only for the purpose of indicating the minimum level of quality and standard required. The Bidder may use any other material/fitting, which are considered as equivalent in quality and standard to those specified therein subject to the approval of the “Engineer”.</p> <p>SPECIFICATION FOR EXCAVATION AND EARTHWORK</p> <p>A. EARTH FILLING</p> <ul style="list-style-type: none"> • Stripping of Top Soil <p>Where the existing ground surface is covered with vegetation top soil or other unsuitable material, it shall be removed together with roots, rubbish or objectionable materials etc. Vegetation or other unsuitable material so removed shall be disposed within 5.0 kms of the site.</p> <ul style="list-style-type: none"> • Borrow Material <p>Borrow material shall comply with the following specifications:</p> <ol style="list-style-type: none"> a) It shall be tested for its suitability by a recognized testing organization acceptable to the Engineer. It shall be well graded soil mixture with gravel and sand – not less than 70% silt and clay – not more than 30% b) The Contractor shall forward from each borrow pit at different levels, the test results of particle size distribution and Proctor compaction tests by a recognized testing organization to the Engineer for approval. c) It shall be free of vegetation, roots and such other deleterious material. d) Maximum dry density at optimum moisture content (Standard Proctor Density) shall not be less than 1.6 gm/cm³. e) Maximum size of particles shall not exceed 120 mm.

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	<ul style="list-style-type: none"> <li data-bbox="326 268 667 300">• Placing of Fill Material <p data-bbox="367 331 1433 636">The distribution and gradation of the material throughout the fill shall be carried out as directed by the Engineer, so as to ensure that the fill will be free from lenses, pockets, streaks, or layers of material differing substantially in texture or gradation from the surrounding material. The borrow excavation and placing operation shall be such that the materials when compacted will blend sufficiently to secure the best practicable degree of compaction and stability. Successive loads of material shall be dumped and spread so as to produce the best practicable distribution of material and for this purpose the Engineer may designate the locations in the fill areas where individual loads shall be deposited.</p> <p data-bbox="367 667 1433 867">The fill material shall be placed in layers not exceeding 225-mm thickness in loose state. The fill shall be compacted at each lift to not less than 90% of the Standard Proctor Density for the building area. For the earth filling along the road way and access roads, the fill shall be compacted at each lift to not less than 95% of the standard Proctor density. The thickness of the 1st layer may be increased to facilitate compaction with the approval of the Engineer.</p> <p data-bbox="367 877 1114 909">The method of compaction shall be approved by the Engineer.</p> <ul style="list-style-type: none"> <li data-bbox="326 940 594 972">• Moisture Control <p data-bbox="367 1003 1433 1140">The moisture content of the fill material prior to and during compaction shall be maintained and distributed uniformly through each layer. The allowable placement moisture content will be determined by the Contractor on Engineer's approval so that fill placement can be made under optimum moisture content of the fill material.</p> <ul style="list-style-type: none"> <li data-bbox="326 1171 574 1203">• Density Control <p data-bbox="367 1234 1433 1308">To determine the dry density requirements of the compacted fill, field and laboratory tests shall be made on samples of compacted material taken on a 10-m grid.</p> <ul style="list-style-type: none"> <li data-bbox="326 1339 688 1371">• Method of Measurement <p data-bbox="367 1402 1433 1539">The quantity of fill material shall be determined by measuring the depth by auguring and multiplying by the area each auger hole represents. All such quantities shall be added to determine the total quantity. Interim payments shall be made on quantities estimated by the Engineer.</p> <ul style="list-style-type: none"> <li data-bbox="326 1570 769 1602">• General Construction Methods <p data-bbox="367 1633 1433 1770">The Engineer shall have complete control over the excavation, moving, filling and disposition of all material and shall determine the suitability of material to be placed in fill areas. All material determined unsuitable shall be placed in spoil area and / or removed from site as directed by the Engineer.</p>

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	<p>The Contractor shall inform and satisfy as to the character, quality and distribution of all materials to be excavated filled, spoiled and borrowed.</p> <p>Should the Contractor through negligence or other fault excavate or fill beyond the designated lines, he shall replace/remove such excavation/fill in an approved manner and conditioned at his own expense.</p> <p>B. SURFACE TREATMENTS</p> <p>SPECIFICATION FOR ANTI-TERMITE TREATMENT</p> <p>1. Type of Chemical</p> <p>An aqueous solution should of a specially formulated Organophosphate based termiticide be used for this treatment programme. This chemical should have a property which combines with soil particles and remain within the treated area. Thereby creating a chemical carrier in the soil which should avoid infestation of subterranean termites in the future.</p> <p>2. Method of Treatment</p> <p>This treatment should be carried out in two stages. The initial stage should involve the spraying of the termiticide to all trenches and bases of the columns / footings.</p> <p>The second stage should be carried out after the back-filling of earth and prior to the laying of the concrete floor. This would involve the injection of the termiticide along the inner and outer perimeter of the building at 1 meter intervals and approx. 1.5 Litres per hole. The depth of a hole would be approx. 0.5 meters. Thereafter the entire floor area would be sprayed using the same termiticide and approx. 5 Litres per square meter.</p> <p>3. Method of Application</p> <p>The termiticide would be injected and applied under pressure of 250-350 p.s.i. using a motorized portable pressure pump.</p> <p>4. Warranty</p> <p>The Contractor shall submit prior to acceptance of the work written certificate of warranty of 10 years from the date of completion of the treatment and if any outbreak of termites is experienced within this period, Contractor should carry out the necessary treatment free of charges.</p>

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	<p data-bbox="326 289 1003 323">SPECIFICATION FOR CONCRETE WORKS</p> <p data-bbox="326 365 1263 396">Note: Contractor shall also refer to the notes given on the structural drawings</p> <p data-bbox="326 434 691 466">A. IN-SITU CONCRETE</p> <p data-bbox="326 504 1354 569">Grade of concrete used in the construction and the suggested mixes shall be as per the relevant sections of BS or otherwise specified by the Engineer.</p> <p data-bbox="326 695 797 726">B. READY MIXED CONCRETE</p> <p data-bbox="326 766 971 842">01. Reinforced Cement Concrete Requirement of Ready Mixed Concrete</p> <p data-bbox="386 879 813 911">1.1 Specification of Concrete Mix.</p> <p data-bbox="444 949 1430 1014">The concrete used shall be ready mixed concrete in accordance with the requirements of BS 5328 and also conform to the following.</p> <ul style="list-style-type: none"> <li data-bbox="444 1052 821 1083">(a) It shall be a designed mix. <li data-bbox="444 1087 1252 1152">(b) Cement used shall be ordinary Portland cement conforming to BS 12:1989 <li data-bbox="444 1157 1256 1188">(c) Coarse and fine aggregates used shall conform to BS 882:1983. <li data-bbox="444 1205 1130 1236">(d) Nominal maximum size of aggregate shall be 20mm. <li data-bbox="444 1274 1256 1306">(e) Concrete shall be of grade , grade 30 or grade 35A as specified. <li data-bbox="444 1323 943 1354">(f) Minimum cement content 275 kg/m³. <li data-bbox="444 1379 1430 1444">(g) The rate of sampling shall be such that on an average a sample for strength testing shall be taken for every 50m³ of concrete placed. <li data-bbox="444 1449 1247 1480">(h) Slump shall be not less than 100mm and not to exceed 160mm. <li data-bbox="444 1518 995 1549">(j) Maximum free water / cement ratio 0.60. <li data-bbox="444 1566 954 1598">(k) Maximum cement content 400 kg/m³. <li data-bbox="444 1614 1089 1646">(l) Any admixture used shall be with prior approval. <p data-bbox="444 1692 1430 1757">The Contractor shall submit the designed mix specification to the Engineer for prior approval.</p>

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	<p>02. Trial Mixes for Designed Mixes</p> <p>2.1 General</p> <p>Trial mixes shall be prepared for each grade of concrete in accordance with BS 1881, unless there are existing data showing that the proposed mix proportions and manufacture will produce a concrete of the strength and quality required having adequate workability for compaction by the method to be used in placing.</p> <p>2.2 Preliminary Trial Mixes & Compliance</p> <p>When required in accordance with Clause 2.1 the Contractor shall, before the commencement of the concreting, have preliminary trial mixes prepared, preferably under full scale production conditions or if this is not possible, in an approved laboratory using a sufficient number of samples to be representative, of the aggregates and cement to be used.</p> <p>2.3 Trial mixes during the work</p> <p>Where a trial mix is required after commencement of the work, procedure in Clause 2.2 shall be adopted for full-scale production conditions as approved.</p> <p>2.4 Workability</p> <p>The workability of each batch of the trial mixes shall be determined by the slump test as described in BS 1881 or by an alternative approved method.</p> <p>2.5 Variations to approved mix</p> <p>When a mix has been approved, no variation shall be made in the proportions, the original source of the cement and aggregates or their type, size on grading zone without the consent of the Engineer. Further tests may be required.</p> <p>03. Testing Work Concrete</p> <p>3.1 Samples</p> <p>Concrete for the works shall be sampled in accordance with BS 1881.</p> <p>3.2 Workability</p> <p>The workability of concrete shall be determined by the slump test as described in BS 1881 or by an alternative approved method.</p>

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	<p data-bbox="386 268 646 302">3.3 Tests for Strength</p> <p data-bbox="444 340 1433 472">Sampling and testing of works concrete shall be carried out in accordance with BS 1881. Compliance of the concrete with the specified characteristic compressive strength shall be determined in accordance with Clauses 3.16 and 3.17 of BS 5328 Part 4: 1990.</p> <p data-bbox="386 510 646 543">3.4 Records of Tests</p> <p data-bbox="444 581 1433 678">The Contractor shall keep a detailed record of the results of all tests on concrete and concrete materials. Each test shall be identified with the work to which it relates.</p> <p data-bbox="326 737 667 770">04. Batching Concrete</p> <p data-bbox="386 808 540 842">4.1 General</p> <p data-bbox="444 879 1406 913">Unless otherwise specified the requirements in Clauses 4.2 and 4.3 shall be met.</p> <p data-bbox="386 972 703 1005">4.2 Tolerance in Weights</p> <p data-bbox="444 1043 1433 1173">The weights of the quantities of each size of aggregate and of cement shall be within a tolerance of 2% of the respective weights per batch after due allowance has been made for the presence of freewater water in the aggregates which shall be determined by the Contractor by an approved method.</p> <p data-bbox="386 1232 816 1266">4.3 Moisture content of aggregates</p> <p data-bbox="444 1304 1433 1371">The moisture content of aggregates shall be measured immediately before mixing and as frequently thereafter as is necessary to maintain consistency of mix.</p> <p data-bbox="326 1455 643 1488">05. Mixing Concrete</p> <p data-bbox="386 1526 630 1560">5.1 Type of Mixer</p> <p data-bbox="444 1577 1433 1707">The mixer shall be of the batch type, unless otherwise approved, and shall have either been manufactured in accordance with BS 1305 or shown by tests in accordance with BS 3963 to have mixing performance within the limits of Table 6 of BS 1305.</p> <p data-bbox="386 1766 776 1799">5.2 Tolerance of Mixer Blades</p> <p data-bbox="444 1816 1433 1913">Mixing blades of pan mixers shall be maintained within the tolerance specified by the manufacturers or mixers, and the blades shall be replaced when it is no longer possible to maintain the tolerance by adjustment.</p>

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	<p data-bbox="391 270 678 302">5.3 Cleaning of Mixers</p> <p data-bbox="444 325 1435 527">Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before another batch of concrete is mixed. Unless otherwise specified by the Engineer, the first batch of concrete through a mixer shall contain the normal batch quantity of cement and sand, but only two thirds of the normal quantity of coarse aggregate. Mixing plant shall be thoroughly cleaned between the mixing of different type of cement.</p> <p data-bbox="326 590 675 621">06. Transporting Concrete</p> <p data-bbox="380 644 1435 741">The method of transporting concrete shall be submitted for approval. Concrete shall be transported in uncontaminated water-tight containers in such a manner that loss of material and segregation are prevented.</p> <p data-bbox="386 779 678 810">6.1 Pumping Concrete</p> <p data-bbox="444 833 1435 905">The use of pumped concrete and the methods employed in its use shall be subject to approval.</p> <p data-bbox="334 1003 1000 1035">C. REINFORCEMENT IN INSITU CONCRETE</p> <p data-bbox="402 1083 1105 1115">Reinforcing steel shall conform to the following standards:</p> <p data-bbox="402 1150 1435 1222">Grade $f_y = 460 \text{ N/mm}^2$ – Deformed high yield steel bar reinforcement conforming to BS 4449: 1997</p> <p data-bbox="402 1257 1435 1329">Grade $f_y = 250 \text{ N/mm}^2$ – Plain round steel bar reinforcement conforming to BS 4449:1997</p> <p data-bbox="402 1362 1435 1459">Contractor shall produce a certificate of origin from the manufacture and a test certificate of compliance with the relevant Sri Lankan and British Standard from an approved Laboratory at the Contractor's own cost.</p>

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	<p data-bbox="334 268 1214 302">SPECIFICATION FOR PLAY GROUND CONSTRUCTION</p> <p data-bbox="334 333 506 361">1.0 General</p> <p data-bbox="412 396 1433 489">The Contractor shall establish the limits of clearing or clearing and grubbing and designate all trees, shrubs plants and other objects that are to remain and obtain the Engineer's prior approval for the same.</p> <p data-bbox="324 531 646 558">2.0 Clearing and Grubbing</p> <p data-bbox="412 594 1433 659">All surface objects, stumps and roots shall be cleared within the area of the playground construction.</p> <p data-bbox="324 701 521 728">3.0 Setting Out</p> <p data-bbox="412 764 1433 884">After the site has been cleared the limits of the playground shall be set out as shown in the drawings. Pegs or stakes showing the limits of the playground shall be fixed at a suitable distance outside the actual limits of the area and such pegs or stakes shall be painted in a distinctive colour for visibility.</p> <p data-bbox="324 947 691 974">4.0 Formation of Playground</p> <p data-bbox="412 1026 1433 1146">Where the Ground Formation Level is below the existing ground level. Contractor shall excavate the original ground to a formation level as shown in the drawing. It shall be ensured that the ground formed by excavation is of the required gradient of the design profile.</p> <p data-bbox="412 1173 1433 1390">Where the Ground formation Level is above the existing ground level the Contractor shall place the fill material in layers not exceeding 225 mm loose thickness, for compaction using 8-10 tonne smooth wheel roller or any other roller of comparable compactive effort. If rollers of higher / lower compactive effort are used, the lift thickness may be increased/decreased based on field trials of compaction. It must however, be ensured that the thickness of each layer is adequately compacted. The playground fill shall be compacted at or near the optimum moisture content.</p> <p data-bbox="412 1417 1433 1570">The moisture content of the material shall be checked at the time of the compaction and at a frequency as specified by the Engineer. If the material is too wet, then it shall be dried by aeration and if it is too dry, the material shall be sufficiently wetted prior to compaction. Each successive layer shall be placed only after the degree of compaction of the previous layer has been tested and found satisfactory.</p> <p data-bbox="412 1598 1433 1663">Alternatively, each successive layer placed after the previous layer has been compacted using a specified number of passes of the roller as had been determined by field trials.</p> <p data-bbox="412 1690 1433 1843">Compaction shall commence at the edges and proceed towards the centre except at super elevated sections where the compaction shall commence at the lower edge and proceed towards the higher edge. Material shall be compacted up to the formation level to a density not less than 90% of the maximum dry density as determined by the slandered Proctor compaction test.</p> <p data-bbox="412 1871 1292 1898">The playground shall be finished to levels, and slopes as shown in the drawings.</p>

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	<p>5.0 Preparation of Ground</p> <p>5.1 Storm Water Drainage System</p> <p>After the Ground Formation Level is Completed, Trenches, trenches shall be excavated to a depth of 250 mm for Trench Type - 03 to place the perforated pipes and filter material as shown in the drawings.</p> <p>Approved geo textile membrane shall be placed along the trenches before placing the filter material comprising crushed hard rock, i.e. single sized aggregate (20mm) , in the trench. Laying of perforated pipes and placing of filter material shall be completed as shown in the drawings. After laying the perforated pipes and placing the filler material. Top surface of the trench shall be covered with geotextile membrane as shown in the drawing.</p> <p>5.2 RCC Drain inside the Track</p> <p>A trench having a depth of 450 mm (Average, internal) and width of 300 mm (Internal) and 100mm thick base and wall with T10@ 150mm c/c both ways including Gavarnie Iron grating as per the drawings.</p> <p>5.3.1 Geotextile</p> <p>Membrane</p> <p>5.3.1 General</p> <p>The geo textile fabric shall meet or exceed the following requirement in full. Product not meeting these requirements shall not be accepted.</p> <p>A representative sample of the geotextile membrane proposed to be used by the Contractor shall be submitted together with appropriate product information, technical data, and certificates of the quality for the Engineers approval before commencing of the work.</p> <p>Prior to installation of geotextile membrane the Contractor shall submit a representative 4 m² sample proposed of material for Engineer's approval. The " sample will be retained for comparative testing of material randomly sampled from site. Material delivered to site not conforming to the requirements of the retained representative sample will be rejected from the site.</p> <p>5.3.2 Physical Property</p> <p>The geotextile shall be of nonwoven needle punched type comprising 100% polypropylene continuous fibers. Geotextile manufacturer from staple (Short) fibers or heat bonded shall not be accepted. The manufacturer shall certify compliance of this requirement.</p>

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	<p>Geotextile submitted for approval shall be proven to resist damage and retain more than 80% of residual tensile strength when subjected to compaction of 300 mm of crushed stone placed directly above the geotextile. Geotextile failing this test shall be rejected from site, or upgraded in quality until minimum damage requirements are fulfilled.</p> <p>Tile geotextile shall have high level U V stabilization and retain at least 70% of residual tensile strength after 3 months exposure to natural sunlight. Independent performance test to verify this must be submitted as evidence of geotextile superior performance.</p> <p>Where the geotextile is required as a filter in fine silty soil conditions, the geotextile porosity shall be greater than 80%.</p> <p>5.3.3 Mechanical and Hydraulic Properties</p> <p>The geotextile delivered to site shall meet the technical values of the following properties. The geotextile manufacturer shall provide a Quality Statement and independent certifications from an ISO Accredited Test Laboratory that the geotextile delivered to site meet or exceed the following requirements in full. Geotextile not meeting the required technical values shall be rejected.</p> <table border="1" data-bbox="337 951 1419 1438"> <thead> <tr> <th>Property</th> <th>Test Standard</th> <th>Unit</th> <th>TS 70</th> </tr> </thead> <tbody> <tr> <td>Ultimate tensile strength</td> <td>ISO 10319</td> <td>kN/m</td> <td>24</td> </tr> <tr> <td>Tensile elongation @ maximum strength (md/ed)</td> <td>ISO 10319</td> <td>%</td> <td>80/40</td> </tr> <tr> <td>CBR puncture</td> <td>ISO 12236</td> <td>N</td> <td>3850</td> </tr> <tr> <td>Effective opening size (Wet sieving)</td> <td>ISO 12956</td> <td>mm</td> <td>0.09</td> </tr> <tr> <td>Vertical water flow @ 50mm head</td> <td>ISO 11058</td> <td>l/m²/s/(mm/s)</td> <td>55</td> </tr> <tr> <td>Horizontal Water flow in plane 20 kpa</td> <td>ISO 12958</td> <td>g/m/h</td> <td>16</td> </tr> <tr> <td>Mass / area</td> <td>ISO 9864</td> <td>g/m²</td> <td>325</td> </tr> <tr> <td>UV Resistance tensile Strength</td> <td>Outdoor Testing</td> <td colspan="2">Retain > 70% of original strength after 3 months exposure to natural sunlight</td> </tr> </tbody> </table> <p>Geotextile that complies to Mechanical and Hydraulic properties given in the above table may be tested, under the discretion of the Engineer, at an independent geotextile testing laboratory (according to the test standard given in the Specification). The technical values tested must be within the variance given below.</p> <table data-bbox="402 1675 1386 1871"> <tbody> <tr> <td>Mechanical properties</td> <td>tolerance range Confidence level 95%</td> <td>- 10 % of average value</td> </tr> <tr> <td>Hydraulic properties</td> <td>tolerance range Confidence level 95%</td> <td>- 30% of average Value</td> </tr> </tbody> </table>	Property	Test Standard	Unit	TS 70	Ultimate tensile strength	ISO 10319	kN/m	24	Tensile elongation @ maximum strength (md/ed)	ISO 10319	%	80/40	CBR puncture	ISO 12236	N	3850	Effective opening size (Wet sieving)	ISO 12956	mm	0.09	Vertical water flow @ 50mm head	ISO 11058	l/m ² /s/(mm/s)	55	Horizontal Water flow in plane 20 kpa	ISO 12958	g/m/h	16	Mass / area	ISO 9864	g/m ²	325	UV Resistance tensile Strength	Outdoor Testing	Retain > 70% of original strength after 3 months exposure to natural sunlight		Mechanical properties	tolerance range Confidence level 95%	- 10 % of average value	Hydraulic properties	tolerance range Confidence level 95%	- 30% of average Value
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	<p>The geotextile manufacture must be ISO 9001:2000 certified. Certificate of compliance must be provided to substantiate this requirement.</p> <p>5.3.4 Geotextile Quality Assurance Requirement</p> <p>The quality of geotextile supplied to site shall be verified by the provision of the following information, documentation and <i>QA/QC</i> testing.</p> <p>The Contractor shall submit to the Engineer, a statement of quality certifying that materials to be delivered to site meet or exceed the specified requirements. Submission must also include appropriate product literature, independent test certificates, and other documentation supporting the technical evaluation of the products. The Contractor shall preferably include such documentation together with the submitted with the Tender.</p> <p>Prior to delivery of materials to site. The supplier shall submit a representative geotextile sample minimum 4m² (full width x length), to be retained by the Engineer for purposes of comparative testing together with materials sampled from product delivered to site. Product delivered to site is required to meet or exceed the quality level of the representative sample and meet or exceed the requirement of the Specification.</p> <p>To facilitate site quality assurance, each roll of geotextile delivered to site shall be clearly labeled with brand name, grade and production batch number and this information is required to be clearly printed at regular intervals along the outer edge of each geotextile roll. Geotextile not meeting this requirement will be rejected from site.</p> <p>Geotextile delivered to site shall be sampled for testing at an ISO/ IEC 17025 and GA1 -LAP accredited laboratory with the experience and equipment suitable to conduct <i>QC/QA</i> test according to the specified standards. The contractor shall ensure the credential of such laboratory by proof of certified accreditation from the laboratory and shall be liable for the expense of testing. The contractor shall stipulate the laboratory proposed for testing together with the submission of product samples, product grade, batch and lot number.</p> <p>5.3.5 Installation</p> <p>Installation of the geotextile shall be accordance with the manufacturer's instructions. The Contractor shall provide a method statement detailing installation procedure.</p> <p>5.4 Final Ground Preparation</p> <p>After the Engineer approves the levels and the lines of prepared areas of the ground, available sandy soil (Presently stacked in the ground) shall be spread on the entire ground (excluding running track) to form 150 mm thick layer after compaction to the levels and gradients shown in the drawings.</p> <p>On top of the sandy soil layer the top soil mixture with approved gradation and containing 50% sand 25 % red or yellow colour lateritic origin soil which contains clay content around 30%, 10% composed material, and 15% coir dust shall be spreader and adequately compacted to a depth which after compaction) will provide the normal depth of 100 mm and maintaining the levels and gradients in entire ground. Top soil shall be free from refuse, stumps, roots, weeds and gravels or any hard material greater than 4 mm in size which would be detrimental to proper development of growth of grass and playing conditions of the playground.</p>

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	<p>On the running track. The top soil mixture containing 50% sand .25% composed material, 25% coir dust shall be spread on top of the filter material to form a 150 mm thick layer.</p> <p>Spreading shall not be carried out when the ground or the top soil is excessively wet or in a condition considered detrimental to the work. Top soil shall be compacted to a density not less than 80% of the maximum dry density as determined by the Standard Proctor compaction test before the commencement of the turfing.</p> <p>Turfing in Playground</p> <p>The upper grass surface shall be smooth, true and absolutely level, and free from surface unevenness and possibly laid to a slight fall for water disposal.</p> <p>The species of turf grass shall be carefully chosen for correct playing characteristics, resistance to wear and disease and suitability for its particular climatic and physical environment. An appropriate cultivar or mix of cultivars will be specified by the Engineer and supplied by specialist growers. 'Bermuda 'and 'Digiteria' are commonly chosen species.</p> <p>Grass sprigs shall be healthy living stems, with attached roots of accepted turf forming grass specified and approved by the Engineer, harvested without adhering soil and obtained from approved Sources In turfing by sprigging, the Contactor shall notify the Engineer at least 7 days before sprigs are to be harvested, and the source shall be approved by the Engineer before harvesting begins. Not more than 24 hrs shall elapse between harvesting and planting sprigs, except that when weather or other uncontrollable condition that interrupt the work.</p> <p>Fertilizing, watering and mulching shall be done as required and with the Engineer's approval. Unless otherwise specified or directed sprigs shall be planted at approximate intervals of 150 mm apart.</p> <p>All turfed areas shall be watered and cared for and maintained in a satisfactory condition for four months after completion of the entire work.</p>

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	<p data-bbox="326 268 987 304">SPECIFICATION FOR WATER PROOFING</p> <p data-bbox="370 346 565 378">1. GENERAL</p> <p data-bbox="370 415 553 447">1.1 Warranty</p> <p data-bbox="414 485 1433 615">1.1.1 Insulation, water proofing and tanking shall be applied in accordance with the directions of the manufacturer of the materials and components, and the complete systems shall be fitted in the works by experienced specialist crew.</p> <p data-bbox="414 653 1433 852">1.1.2 Notwithstanding maintenance requirements for the Works, the Contractor shall warrant the Employer with the assurance of a reputable local insurance company that roofs and tanks shall remain waterproof, vapour proof and damp-proof in respect of workmanship and materials for a minimum period of 10 years calculated from the time that the works are certified as substantially completed.</p> <p data-bbox="414 890 1433 1020">1.1.3 The form of guarantee offered by the Specialist applicator shall be submitted for the Consultant's approval prior to commencement of waterproofing. The guarantee shall in no way indemnify the Contractor against the improper performance of the waterproofing system.</p> <p data-bbox="370 1058 548 1089">1.2 Structure</p> <p data-bbox="414 1127 1433 1184">1.2.1 All structural components that retained or excluded water or any other liquid should be applied with approved water proofing material.</p> <p data-bbox="414 1222 1433 1278">1.2.2 Roof slab should be externally water proofed and insulated by an agent approved by the Consultant.</p> <p data-bbox="414 1316 1433 1449">1.2.3 It shall be the Contractor's responsibility to ensure that the specialist applicator takes note of the type of the structure, nature and the location of waterproofing to be applied, including any movement joints provided, when designing his waterproofing system.</p> <p data-bbox="414 1486 1433 1619">1.2.4 The laying of a waterproofing system on a concrete surface will be taken as signifying the acceptance of that surface, both in terms of surface quality, spacing and arrangement of movement joints and the construction joints by the Contactor and his specialist applicator.</p>

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	<p>1.3 Application</p> <p>1.3.1 Where applicable, aprons and other sections for roof / tank penetrations, trims, side laps, bends and corners shall be incorporated, corrected finished and uniformly lined.</p> <p>1.3.2 The water proofing system shall be dressed up all pipes and other penetrations to a minimum height of 250 above the top of the concrete slab.</p> <p>1.3.3 Sharp corners are to be filled with screed or other fillets and water proofing should be laid with generous over lap as per manufacturer's instructions.</p> <p>1.3.4 When water proofing is to be applied on exposed areas, colours have to be approved by the Consultant.</p> <p>1.3.5 Where finishes such as concrete paving or tiles etc., are specified to be laid water proofing membranes laid on concrete floors, the floor shall be tested for water tightness prior to laying of these tiles/paving etc. Sumps, tanks, etc., shall also be tested after the application of water proofing systems. The cost of carrying out these tests including that of blocking any outlets etc. shall be borne by the contractor. Where it is seen that water tightness has not been achieved, the contractor shall take whatever remedial measures as are ordered by the Consultant and the cost of all such measures shall be borne by the Contractor.</p> <p>1.4. Joints with abutting walls, columns, piping etc.</p> <p>1.4.1 Joints with abutting structures shall be carried out with materials as specified in the relevant Clause of, other trades, such as weather sealant etc., all as generally shown otherwise in typical details on the drawings.</p> <p>1.4.2 Special joints, not shown on drawings or particular sections there of requiring special attention, are deemed to be included in the Contractor's Tender, and are to be executed in a workman like manner and in consent with and to the satisfaction of the Consultant.</p>

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	<p data-bbox="326 289 1292 352">2 TYPE WP1 - WATER PROOFING SYSTEM TO ROOF SLABS AND MACHINE FLOOR AREAS</p> <p data-bbox="370 386 686 417">2.1. Description of Work</p> <p data-bbox="412 457 1433 554">2.1.1 The roof slab shall be thoroughly washed and cleaned to be free of dust, loose mortar particles, paint, films etc. slab should be dry and at least 28 days old.</p> <p data-bbox="412 590 1252 621">2.1.2 All curing compounds must be removed prior to application.</p> <p data-bbox="412 657 1433 753">2.1.3 The water proofing solution shall be applied on the surface in conformity with the water proofing materials Supplier/Manufacturer's specification under the direction of the Supplier/Manufacturer's representative.</p> <p data-bbox="412 789 1433 886">2.1.4 After the specified period of curing, the relevant area shall be ponded with water for at least 3 days for observation of leaks. Application to be repeated if any leaks are observed.</p> <p data-bbox="412 921 1433 1018">2.1.5 If no leaks or dampness is observed in the floor slab, floor tiling or other finish should follow taking care not to disturb the top surface of water proofing.</p> <p data-bbox="370 1054 548 1085">2.2. Materials</p> <p data-bbox="412 1121 849 1152">2.2.1 Water Proofing Membrane</p> <p data-bbox="524 1188 1433 1390">The system shall be a built-up Waterproofing system of non-metallic roofing compound of laminar bituminied construction intended for this project. The contractor may submit alternative reputable options together with the relevant specification and method statement to the approval of the Consultant; such options shall in all means conform to the Warranty requirements specified under Clause 1.1.</p> <p data-bbox="524 1425 1433 1591">The water Proofing solution shall be a non toxic, clear material which will penetrate into concrete and react with free calcium and water in concrete at ambient temperatures. The solution form a non water soluble calcium silicate hydrate gel complex which shall seal pores, capillaries & cracks upto 2.0 mm width.</p> <p data-bbox="524 1627 1433 1759">Waterproofing membrane shall be U.V. resistant mineralized atactic polypropylene (APP) modified bituminous polyester sheet, with approximate weight 4.0 kg/m² and 4.0mm thick suitable for Torched-on applicant over the substrate after application of the approved primer.</p> <p data-bbox="524 1795 1433 1856">An interruption of work the edges of the sheets have to be finished in such a manner that rain water and dust cannot penetrate underneath.</p>

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	<p data-bbox="412 289 756 317">2.2.2 Thermal Insulation</p> <p data-bbox="526 359 1433 457">Thermal Insulation shall consists of extruded polystyrene moulded roofing board with self – interlocking system , self extinguishing grade, density 32-35 kg/m³, 25mm thick.</p> <p data-bbox="526 495 1433 594">On top of the Waterproofing membrane, polyurethane or extruded polystyrene boards 50mm thick with Thermal conductivity of 0.027W/m⁰C @ 250C (approx.).</p> <p data-bbox="526 632 1433 695">Method should comply with the following standards ASTM D-1622, ASTM C-518, ASTM C-272 and ASTM S-696.</p> <p data-bbox="526 732 1433 800">The boards shall have rebated edges all round for interlocked laying, In sizes 600x1200mm, tightly laid in stretcher bond.</p> <p data-bbox="526 837 1433 905">The compressive strength of the insulation boards shall be not less than 40kpa according to ASTM C165 procedure B.</p> <p data-bbox="526 942 1271 970">Insulation boards shall be protected against rain and humidity.</p> <p data-bbox="370 1008 548 1035">2.3. Execution</p> <p data-bbox="412 1073 1433 1205">2.3.1 Before laying the levelling screed, the concrete surface shall be cleaned by removal of loose materials to the entire satisfaction of the Engineer. Concrete which is contaminated by oil or grease shall be chiseled away and refilled.</p> <p data-bbox="412 1243 1433 1520">2.3.2 60mm thick, grade 25 concrete covering screed shall be laid over the gauge 1000 polythene sheet as shown on the drawing 50x50mm (3mm dia.) galvanized steel wire-mesh shall be incorporated in the concrete screed layer. 10mm thick expansion joints shall be provided in covering screed to limit the concrete screed panel size approximately to 4.0 Sq.m (Expansion joints shall be coincided with the joints of the tile layer (if any) above and later filled by the approved joint sealant (DOWCORNING 790 SILICONE BUILDING SEALANT)).</p> <p data-bbox="412 1558 1433 1656">2.3.3 Alternatively Reinforced concrete floating slab shall be constructed instead of concrete screed if there is any possibility of installation of mechanical plants of equipment.</p>

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	<p data-bbox="412 289 1433 352">2.3.4 Concrete slab shall be grouted with a cement / water slurry before laying of the levelling screed.</p> <p data-bbox="412 394 1433 562">2.3.5 1:3 cement : sand levelling screed shall be mechanically batch mixed and laid with a minimum thickness of 25mm; the falls to be achieved are not less than 1:200 or as shown on the drawings. Screeds shall be laid with even slopes and internal and external corners shall have cover fillets with a radius of at least 70mn. The screed shall be finished with a wooden float.</p> <p data-bbox="412 604 1433 730">2.3.6 The screed shall be covered with wet saw dust, sand or equal method and kept damp for 5 days, or as ordered by the Consultant. Screed shall be protected from rainfall. Waterproofing membrane shall not be applied until the surface is thoroughly dried out.</p> <p data-bbox="370 800 727 831">2.4. Certificate & Warranty</p> <p data-bbox="412 873 1433 1041">2.4.1 The Contractor shall submit prior to acceptance of the work, written certificate stating that all materials and workmanship in connection with specified work have been furnished and installed in complete conformance with these specifications, and with the approved manufacturer's requirements for this work.</p> <p data-bbox="412 1083 1433 1251">2.4.2 The Contractor shall jointly with the Manufacturer/Supplier of the specialist waterproofing materials furnish a warranty to the Employer valid for a period of 10 years after handing over of the work, against dampness and / or moisture penetration through surfaces due to defective material and / or defective workmanship.</p> <p data-bbox="412 1314 1433 1388">2.4.3 The warranty shall provide not only the materials necessary to remedy a problem but also the labour and equipment to apply the material.</p>

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	<p data-bbox="354 289 1430 321">3 TYPE WP 2 - WATERPROOFING SYSTEM TO BASEMENT FLOOR SLAB</p> <p data-bbox="354 363 542 394">3.1. Execution</p> <p data-bbox="412 443 732 474">3.1.1 Concrete Screed</p> <p data-bbox="526 512 1430 642">Concrete screed shall be mechanically batch mixed and laid over the well compacted and approved formation of the sub base or otherwise directed by the Consultant. The concrete grade 15 shall be laid to produce a concrete screed of 75mm thick.</p> <p data-bbox="526 680 1430 743">The screed shall be covered with wet saw dust, sand or equal method and kept damp for at least 5 days, or as instructed by the Consultant.</p> <p data-bbox="526 781 1430 844">Before laying of the Waterproofing membrane, the concrete surface shall be thoroughly cleaned and dried out.</p> <p data-bbox="412 879 922 911">3.1.2 Waterproofing membrane (WP2)</p> <p data-bbox="526 949 1430 1079">The prepared concrete surface shall be waterproofed by means APP bituminous polyester sheet with approximate weight 4.0 kg/m² and 4.0 mm thick suitable for torched – on application over the substrata after application of approved primer.</p> <p data-bbox="526 1117 1430 1226">Application of the Waterproofing membrane shall strictly be in accordance with the manufacturer’s instruction maintaining sufficient over lap at joints.</p> <p data-bbox="526 1264 1430 1327">At interruption of work the edges of the sheets have to be finished in such a manner that rain water or duct shall not penetrate underneath.</p> <p data-bbox="526 1365 1430 1461">The Contractor shall ensure timely submission to the Consultant of details, type, make and composition of the Waterproofing systems together with certified proof from the manufacturer of proposed system.</p> <p data-bbox="412 1499 691 1530">3.1.3 Screed cover</p> <p data-bbox="526 1568 1430 1631">Mechanically batch mixed cement, sand (1:3) screed shall be laid over the waterproofing membrane having a minimum layer thickness of 15mm.</p> <p data-bbox="526 1669 1430 1732">Waterproofing membrane should be laid 6m beyond the construction joints of the raft slab and should be covered with the protective screed.</p>

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	<p data-bbox="354 300 1336 327">4 TYPE WP3 - WATERPROOFING SYSTEM TO BASEMENT WALLS</p> <p data-bbox="354 373 683 401">4.1. Surface Preparation</p> <p data-bbox="412 438 1435 537">4.1.1 Wall shall be well cleaned and free from damp, laitance, dust and dirt; if contaminated by oil or grease, of whatever nature, the patches shall be chiseled away and made good.</p> <p data-bbox="354 577 841 604">4.2. Waterproofing membrane (WP3)</p> <p data-bbox="412 642 1435 846">4.2.1 The prepared concrete surface shall be waterproofed by means of a 1.5mm thick (minimum thickness) P.V.C. film/self adhesive bitumen laminated, supplied in roll from or other approved system. The laminate or other approved system shall be applied in strict accordance with the manufacturer's instructions, including the necessary prime coats, tact coats etc.</p> <p data-bbox="412 884 1435 982">4.2.2 Application of the Waterproofing membrane shall strictly be in accordance with the manufacturer's instruction maintaining sufficient over lap at joints.</p> <p data-bbox="412 1020 1435 1089">4.2.3 At interruption of work the edges of the sheets have to be finished in such a manner that rain water or duct shall not penetrate underneath.</p> <p data-bbox="412 1127 1435 1226">4.2.4 The Contractor shall ensure timely submission to the Consultant of details, type make and composition of the Waterproofing systems together with certified proof form the manufacturer of the proposed system.</p> <p data-bbox="354 1297 578 1325">4.3. Screed cover</p> <p data-bbox="412 1362 1435 1432">4.3.1 Mechanically batch mixed cement, sand (1:3) screed shall be laid over the waterproofing membrane having a minimum layer thickness of 15mm.</p>

ITEM REF.	DESCRIPTION
	<p data-bbox="326 289 1433 352">5 TYPE WP4 – WATERPROOFING SYSTEM TO CONCRETE SLABS BEFORE FINISHING</p> <p data-bbox="370 394 688 426">5.1. Description of Work</p> <p data-bbox="414 464 1433 562">5.1.1 This Chapter describes the water proofing of interior as well as exterior concrete slabs before receiving the ultimate finish such as screed, screed with tiling, screed with masonry slabs, asphaltic concrete etc.</p> <p data-bbox="414 596 1433 695">5.1.2 Waterproofing shall be carried out in specified areas of the concrete floor slab and upto 300mm above (turn-ups) the finished floor level on masonry walls</p> <p data-bbox="414 728 1433 800">5.1.3 The floor slab shall be thoroughly washed and cleaned to be free of dirt, loose mortar particles, paints, films etc.</p> <p data-bbox="414 833 1433 932">5.1.4 Provide 25mm x 25mm angle fillet with cement/sand (1:3) mortar and 300mm wide glass coat at joints in-between concrete slab and the masonry walls.</p> <p data-bbox="414 966 1433 1140">5.1.5 Apply two coats of water proofing membrane, 450mm strip on the existing water proofed concrete slab and 300 mm strip on the thinly plastered masonry wall in conformity with the water proofing material supplier/ manufacturer’s printed literature and under the direction of the supplier/ manufacturer’s representative.</p> <p data-bbox="414 1173 1433 1245">5.1.6 Screed for protection should follow as soon as possible as directed thereafter, taking care not to disturb or damage the membrane in any way.</p> <p data-bbox="370 1316 548 1348">5.2 Materials</p> <p data-bbox="414 1381 1433 1480">5.2.1 The material used shall be a liquid applied polyurethane elastomeric seamless waterproofing membrane, 1.5mm thickness or with adequate flexibility and sound bond properties.</p>

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	<p>5.3 Execution</p> <p>5.3.1 Surface Preparation</p> <p>5.3.2 Surface to be coated shall be structurally sound, even semi-smooth finish and free of dirt, loose mortar, particles, paint, films, protective coatings, efflorescence, laitance etc. Concrete/ Cement Screed to receive the application shall be carefully formed to provide an even surface, free from marks and in a condition to receive the coating to manufacture's printed literature.</p> <p>5.3.3 Concrete or brickwork, whether plastered or not, shall be well cleaned and free from damp, laitance, dust and dirt; if contaminated by oil or grease of whatever nature, the patches shall be chiseled away.</p> <p>5.3.4 Uneven areas, rough areas and chiseled parches to be treated with an approved epoxy-resin based un-pigmented primer, and to be leveled with a homogeneously mixed approved 2-component epoxy-mortar, applied while the primer is not fully hardened (wet –in-wet-method).</p> <p>5.3.5 The smooth and evenness of the surfaces of concrete or brick work to which the water proofing system is to be applied shall be to the entire satisfaction of the Consultant.</p> <p>5.3.6 The primer shall be a cement paste (cement + water + resin dispersion) applied as a grouting for key of the mortar. The mortar shall consist of cement + sand + resin dispersion. The compressive strength of the fully hardened mortar shall not be less than 20 N/mm².</p> <p>5.3.7 Both primer and mortar shall be of an approved make and be mixed and applied in strict accordance with the manufacturer's instructions.</p> <p>5.3.8 The mortar to be finished smooth and straight using steel floats in a rotating movement and under even pressure, with rounded or covered fillets/edges as the position or purpose dictates.</p>

ITEM REF.	DESCRIPTION
	<p>5.4 Waterproofing WP4</p> <p>5.4.1 Application Apply all materials under the direction of the Supplier/ Manufacturer's representative and conforming to the Manufacture's printed literature.</p> <p>5.4.2 Water proofing of concrete slabs before receiving the ultimate finish shall be carried out as detailed below.</p> <p>5.4.3 In these areas, the prepared concrete floor and abutting up-stands/fillets shall be water proofed by means of application of polymer modified cementitious water proofing coatings or other approved method in accordance with the manufacturer's instructions.</p> <p>5.4.4 The water proofing system shall be applied in strict accordance with the manufacturer's instructions, including primers etc. the system shall be suitable to receive the screed.</p> <p>5.4.5 The Contractor shall ensure that all penetrations of the relevant floors/slabs shall be water proofed in a workmanlike manner and as per instructions by the manufacturers or, lacking that, by the Consultant.</p> <p>5.5 Certificate & Warranty</p> <p>5.5.1 The contractor shall submit prior to acceptance of the work, written certificate stating that all materials and workmanship in connection with specified work have been furnished and installed in complete conformance with these specifications, and with the approved manufacturer's requirements for this work.</p> <p>5.5.2 The contractor shall jointly with the Manufacturer/Supplier of the specialist waterproofing materials furnish a warranty to the Employer valid for a period of 10 years after handing over of the works, against dampness and/or moisture penetration through treated surfaces due to defective material and/or defective workmanship.</p> <p>5.5.3 The warranty shall provide not only the materials necessary to remedy a problem but also the labour and equipment</p>

ITEM REF.	DESCRIPTION
	<p data-bbox="354 289 1300 321">6 TYPE WP5 – WATERPROOFING TO SUMPS, TANKS AND PONDS</p> <p data-bbox="354 359 686 390">6.1. Description of Work</p> <p data-bbox="412 428 1435 527">6.1.1 Floor and walls of all sumps and tanks shall be coated with polymer modified cementitious water proofing coatings. The method of application and quality of material shall be to the approval of the Consultant.</p> <p data-bbox="412 567 1435 665">6.1.2 The surface to receive the water proofing shall be smooth, free from dust and dirt. Splayed or rounded fillets shall be provided between horizontal and vertical surfaces and at all junctions of vertical or horizontal surfaces.</p> <p data-bbox="412 705 1435 772">6.1.3 The joints in each application shall overlap one another and shall not coincide with the joints in previous coats.</p> <p data-bbox="412 812 1435 879">6.1.4 The Contractor shall ensure that the coating are not damaged in any way and will provide protection at all times during the execution of the Works.</p> <p data-bbox="354 919 548 951">6.2. Materials</p> <p data-bbox="412 989 1435 1289">6.2.1 The water proofing material shall be according to the manufacturer's recommendations and as approved by the Engineer, consisting of application of Polymer modified cementitious approved water proofing coating containing catalytic chemicals which migrate into the concrete using moisture present in the concrete as the migrating medium and which cause the moisture and the un-hydrated cement in the concrete to react causing the growth of non-soluble crystals of dendritic fibres in the voids and capillary tracks of the concrete that allow passage of water, thereby rendering the concrete itself waterproof.</p> <p data-bbox="412 1329 768 1360">6.2.2 Storage of materials</p> <p data-bbox="524 1400 1435 1499">All materials shall be stored in original undamaged containers with manufacturer's seals and labels intact. Materials shall be stored off the ground in a dry enclosed area.</p>

ITEM REF.	DESCRIPTION
	<p>6.3 Execution</p> <p><u>Surface Preparation</u></p> <p>6.3.1 General</p> <p>All surfaces shall be examined for form tie holes and defects such as honeycombing, rock pockets, cracks etc. These areas shall be repaired in accordance with these specifications and the manufacturer's printed instructions.</p> <p>6.3.2 Concrete finish</p> <p>Concrete surfaces shall have an open capillary system to provide tooth and suction and shall be clean; free from scale, excess form oil, laitance, curing compounds and any other foreign matter. Smooth surfaces or surfaces covered with excess form oil or other contaminants shall be washed or water-blasted as required to provide a clean absorbent surface. Horizontal surfaces shall not be troweled or power troweled, and shall be left with a rough float finish or broom finish. Vertical surfaces may have a sacked finish.</p> <p>6.3.3 Surface Moisture</p> <p>Waterproofing shall be applied to "green" concrete as soon as possible after forms have been stripped or to older pours which have been thoroughly moistened with clean water prior to application. Free water shall be removed prior to application.</p> <p><u>Application</u></p> <p>6.3.4 General</p> <p>Apply all materials under the direction of the manufacturer's representative.</p> <p>6.3.5 Construction of joints and surface defects:</p> <p>Comply with waterproofing material manufacturer's printed directions in the preparation, and treatment of construction joint and surface defects.</p>

ITEM REF.	DESCRIPTION
	<p data-bbox="412 289 987 321">6.3.6 Coves, sealing strips and control joint:</p> <p data-bbox="524 359 1430 491">Comply with waterproofing material manufacturer's printed directions in the preparation, built-in provisions and treatment of coves, sealing strips and control joints. Typically, provide continuous coves at all inside corners (horizontal and vertical), except at perimeter edge beams of towers.</p> <p data-bbox="412 529 760 560">6.3.7 Surface application</p> <p data-bbox="524 598 1430 730">After all repair, patching and sealing strip placement has been prepared in accordance with manufacturer's recommendations and approved by manufacturer's representative, treat concrete surfaces with first coat slurry mix of crystalline waterproofing compound.</p> <p data-bbox="412 768 636 800">6.3.8 Brushing</p> <p data-bbox="524 840 1430 905">Use a short bristle brush or broom to work the slurry well into the concrete filling all hairline cracks and surface pores.</p> <p data-bbox="412 942 680 974">6.3.9 Second Coat</p> <p data-bbox="524 1012 1430 1077">Apply second coat while first coat is still "green" but after it has reached an initial set, all as recommended by the waterproofing material manufacturer.</p> <p data-bbox="423 1150 509 1182"><u>Curing</u></p> <p data-bbox="412 1220 621 1251">6.3.10 General</p> <p data-bbox="524 1289 1430 1421">Curing shall begin as soon as the waterproofing materials have set up sufficiently so as not to be damaged by a fine spray. Treated surfaces shall be fog sprayed three times a day for a three-day period. Allow material to set 12 days before filling the structure with liquid.</p> <p data-bbox="524 1459 1430 1524">Follow manufacturer's specifications if poor air circulation retards curing process, to insure complete curing in enclosed spaces.</p> <p data-bbox="524 1562 1430 1694">Protect treated surfaces from damage due to wind, sun, rain and temperatures below 35 degrees F, for a period of 48 hours after application. Arrange protections to permit proper curing conditions for waterproofing material.</p>

ITEM REF.	DESCRIPTION
	<p data-bbox="412 289 634 317">6.3.11 Clean-up</p> <p data-bbox="526 373 1433 506">Remove all surplus materials from the premises and leave all areas broom-clean. In the case of temporary protections, remove all such items carefully to avoid damage to treated surfaces. Assemble all such materials and remove from premises followed by broom-cleaning as noted.</p> <p data-bbox="412 579 613 606">6.3.12 Testing</p> <p data-bbox="526 663 1433 764">The waterproofed areas shall be ponded with water and kept for 3 days to check any seepage of water or dampness. If seepage or dampness occurs the water proofing shall be repeated followed by testing at no extra cost.</p> <p data-bbox="526 804 1433 1003">After the testing of waterproofing, (1:3) cement, and sand screed shall be done as soon as possible thereafter, taking cares not to disturb or damage the membrane in any way. For the areas to be ceramic floor tiling shall immediately follow the waterproofing treatment and testing using this cement/ sand screed as the backing. Other areas shall be finished smooth with neat cement.</p> <p data-bbox="526 1043 1433 1108">The Contractor shall ensure that all penetrations for piping, gulleys etc., shall be water proofed in a workmanlike manner.</p> <p data-bbox="526 1148 1433 1213">The Contractor shall satisfy the Consultant that the waterproof coating is not of a toxic nature, giving no elements toxic to drinking water.</p> <p data-bbox="526 1253 1433 1354">If the latter should occur, the Contractor shall provide and apply extra coat(s) of non-toxic sealant to walls and floors of drinking water sumps, all in accordance with the manufacturers' instructions.</p>

ITEM REF.	DESCRIPTION
	<p>6.4 Certificate & Warranty</p> <p>6.4.1 The contractor shall submit prior to acceptance of the work, written certificate stating that all materials and workmanship in connection with specified work have been furnished and installed in complete conformance with these specifications, and with the approved manufacturer's requirements for this work.</p> <p>6.4.2 The contractor shall jointly with the Manufacturer/Supplier of the specialist waterproofing materials furnish a warranty to the Employer valid for a period of 10 years after handing over of the works, against dampness and/or moisture penetration through treated surfaces due to defective material and/or defective workmanship.</p> <p>6.4.3 The warranty shall provide not only the materials necessary to remedy a problem but also the labour and equipment to apply the material.</p> <p>7 TYPE WP6 – WATERPROOFING TO PITS, GULLYS ETC</p> <p>7.1. Waterproofing WP6</p> <p>7.1.1 All pits, gulleys, gutters and such other structures as the Consultant shall designate, shall be internally treated with two coats of black tar paint, in accordance with BS 1070.</p> <p>7.2 Application</p> <p>7.2.1 Concrete or masonry, whether plastered or not, which is to be coated with tar paint shall be well cleaned, and free from damp, dust and dirt. The paint shall be applied to bottoms of pits, benchings therein and sides over full height.</p>

ITEM REF.	DESCRIPTION
	<p data-bbox="370 289 1349 321">8 TYPE WP7 – WATERPROOFING TO TOILET FLOORS AND WALLS</p> <p data-bbox="370 359 623 390">8.1. Scope of Work</p> <p data-bbox="412 428 1442 527">8.1.1 Waterproofing shall be carried out in specified area of the concrete floor slab and up to 225 mm above the finished floor level on thinly plastered masonry walls in toilet areas.</p> <p data-bbox="370 567 695 598">8.2 Description of Work</p> <p data-bbox="412 636 1442 699">8.2.1 The floor slab shall be thoroughly washed and cleaned to be free of dirt, loose mortar particles, paints, films etc.</p> <p data-bbox="412 737 1442 869">8.2.2 The water proofing membrane shall be applied on the dampened surface in conformity with the water proofing material Supplier/ Manufacture’s printed literature and under the direction of the Supplier/ Manufacture’s representative.</p> <p data-bbox="412 907 1442 1008">8.2.3 After the water proofing membrane is sufficiently cured the relevant area shall be ponded with water for at least 3 days for observation of leaks. If any leaks are observed the application of the membrane shall be repeated.</p> <p data-bbox="412 1045 1442 1146">8.2.4 If no leak or dampness is observed in the floor slab, floor tiling or other finish should follow as soon as possible thereafter, taking care not to disturb or damage the membrane in any way.</p> <p data-bbox="370 1184 545 1215">8.3 Material</p> <p data-bbox="412 1253 1442 1354">8.3.1 The material used shall be a 2 part polymer cement waterproofing slurry (master Builders Technology’s “Barralastic” or equivalent approved) to 1.5mm thickness with adequate flexibility and sound bond properties.</p>

ITEM REF.	DESCRIPTION
	<p>8.4 Execution</p> <p>8.4.1 Surface Preparation</p> <p>Surface to be coated shall be structurally sound, even semi-smooth finish and free of dirt, loose mortar, particles, paint, films, protective coatings, efflorescence, laitance etc. Concrete/ Cement Screed to receive the application shall be carefully formed to provide an even surface, free from marks and in a condition to receive the coating to manufacture's printed literature.</p> <p>8.4.2 Application</p> <p>Apply all materials under the direction of the Supplier/ Manufacturer's representative and conforming to the Manufacture's printed literature</p> <p>8.5 Certificate & Warranty</p> <p>8.5.1 The contractor shall submit prior to acceptance of the work, written certificate stating that all materials and workmanship in connection with specified work have been furnished and installed in complete conformance with these specifications, and with the approved manufacturer's requirements for this work.</p> <p>8.5.2 The contractor shall jointly with the Manufacturer/Supplier of the specialist waterproofing materials furnish a warranty to the Employer valid for a period of 10 years after handing over of the works, against dampness and/or moisture penetration through treated surfaces due to defective material and/or defective workmanship.</p> <p>8.5.3 The warranty shall provide not only the materials necessary to remedy a problem but also the labour and equipment.</p>

ITEM REF.	DESCRIPTION
	<p data-bbox="367 289 1390 352">9 TYPE WP8 - WATER PROOFING TO CONCRETE RETAINING WALL AND RUBBLE RETAINING WALL</p> <p data-bbox="367 394 630 426">9.1. Scope Of Work</p> <p data-bbox="412 464 1393 527">9.1.1 Water proofing shall be carried out on internal face of concrete retaining wall and rubble retaining wall.</p> <p data-bbox="367 569 548 600">9.2 Materials</p> <p data-bbox="412 638 1430 701">9.2.1 The material used shall be clay stabilized, jointless Bitumen water proofing compound (“Aquashield B X” of Finco Limited or equivalent approved)</p> <p data-bbox="412 739 1430 802">9.2.2 Water proofing application to manufacturer’s printed literature or equivalent to Engineers approval.</p> <p data-bbox="367 844 553 875">9.3 Execution</p> <p data-bbox="412 913 764 945">9.3.1 Surface Preparation</p> <p data-bbox="526 982 1430 1182">Surface to be coated shall be structurally sound, even semi-smooth finish and free of dirt, loose mortar, particles, paint, films, protective, coatings, efflorescence, laitance etc. Concrete / Cement Screed to receive the application shall be carefully formed to provide an even surface, free from marks and in a condition to receive the coating to manufacture’s printed literature.</p> <p data-bbox="412 1220 672 1251">9.3.2 Application</p> <p data-bbox="526 1289 1430 1352">Apply all materials under the direction of the Supplier / Manufacturer’s representative and conforming to the Manufacturer’s printed literature.</p>

ITEM REF.	DESCRIPTION
	<p>9.4 Certificate And Warranty</p> <p>9.4.1 The Contractor shall submit prior to acceptance of the work, written certificate stating that all materials and workmanship in connection with specified work have been furnished and installed in complete conformance with these specifications, and with the approved Manufacturer's requirements for this work.</p> <p>9.4.2 The Contractor shall jointly with the Manufacturer / Supplier of the specialist water proofing materials furnish to warranty to the Employer valid for a period of 10 years after handing over of the works, against dampness and / or moisture penetration through treated surfaces due to defective material and / or defective workmanship.</p> <p>9.4.3 The warranty shall provide not only the materials necessary to remedy a problem but also the labour and equipment to apply the material.</p> <p>10 DISTINCTION OF WATERPROOFING SYSTEMS</p> <p>10.1. General</p> <p>10.1.1 In order to distinguish between the various systems of water proofing in relation to the Finishing Schedules and/or drawings; the following denomination shall be adhered to:</p> <p>10.1.2 WP 1: For roofs and machine floor areas. WP 2: For basement slab. WP 3: For basement walls. WP 4 : For concrete slabs before finishing (heavy duty), comprising toilet floors, balconies, gutters etc. WP 5: For sumps, tanks and ponds. WP 6: For pits, gulleys etc., comprising but not limited to all pits, inspection pits, pumps-pits etc., inside and outside the building for drainage, waste, sewerage and rainwater assembly and/or transport. WP7 : For Toilet Floors and Walls WP8 : For RCC and Rubble Retaining Walls</p>

ITEM REF	DESCRIPTION
	<p data-bbox="321 275 1425 359">SPECIFICATION FOR STRUCTURAL METAL WORKS FOR STEEL IN FRAMED STRUCTURES</p> <p data-bbox="321 390 1133 422">Note: Contractor shall also refer to the Notes given on the drawings.</p> <p data-bbox="321 459 1438 982"> (a) Structural steel should be of Gr.43 to conform to BS 7668: 1994 (b) All welding consumable should conform to BS 5135: 1984 (c) All bolts & nuts should conform to BS 4190: 1967 or BS 3692: 1967 . Washers should comply to BS 4320: 1968 . (d) After fabrication, all steel components should be wire brushed to remove any surface rust. The surfaces of the components should also be thoroughly cleaned to be free of dirt, oil, grease etc. Bolts, nuts, washers, cleats, shoe plates etc. should also be wire brushed and cleaned in the same manner. (e) All fabricated steel components including Bolts, nuts, washers cleats, shoe plates etc. should be applied with 2 coats of quick- drying Zinc Phosphate metal primer. (f) Lipped Channel Purlin shall conform to British standard specification to cold rolled steel section to BS 2994: 1976 </p> <p data-bbox="321 1020 565 1052">Existing Structures</p> <p data-bbox="321 1077 643 1108">1.1 Corrosion Protection</p> <p data-bbox="334 1140 537 1171">1.1.1. General</p> <p data-bbox="362 1188 1438 1444"> 1) All steel works surfaces, except where the members are to be encased in concrete, shall be suitably prepared, degreased, primed and painted in accordance with CP 2008. 2) For all other existing steelwork such as encased surface preparation shall comprise sand blasting SA 2½. of photographic standards included in ISO 8501-1:19888, BS 7079 part A1 or hand and power tool cleaning, such as scraping, wire brushing, machine-brushing and grinding is designated by St 2 of photographic standards included in ISO 8501-1:19888. </p> <p data-bbox="402 1461 1438 1528">Prior to hand and power tool cleaning, any heavy layers of rust shall be removed by chipping. Visible oil, grease and dirt shall also be removed.</p> <p data-bbox="402 1545 1414 1612">After hand and power tool cleaning, the surface shall be cleaned from loose dust and debris.</p> <p data-bbox="334 1671 678 1703">1.1.2. Surface Preparation</p> <p data-bbox="362 1719 1438 1923">1) After inspection and approval all steel work to be encased in concrete shall be thoroughly cleaned, by effective means, rust, spatter, slag, or flux deposit, oil, dirt and other foreign matter. Cleaning shall be by power tools and/or shot blasting. All other steelwork not encased in concrete shall be degreased as agreed with the Engineer, and sandblasted to SA 2½. Where sandblasting is not possible, surface preparation shall be at least St2 standard.</p>

ITEM REF	DESCRIPTION
	<p>2) Any surface laminations, shelling, cracks, crevices, inclusions, surface flaws, burrs or sharp edges shall be removed before coating.</p> <p>3) Friction grip bolted, end bearing and similar contact surfaces shall be cleaned by power tools/brushing, before assembly, but not painted.</p> <p>4) If rusting occurs after the completion of the surface preparation, the surface shall again be cleaned as specified.</p> <p>1.1.3. Coating/Painting System</p> <p>The contractor shall submit paint manufactures certificates and other relevant technical details to the Engineer for approvals.</p> <p>Paints are usually applied one coat on top of another, each coat having a specific function or purpose.</p> <p>The primer is applied directly on to the cleaned steel surface. Its purpose is to wet the surface and to provide good adhesion for subsequently applied coats. Primers for steel surfaces are also usually required to provide corrosion inhibition.</p> <p>The intermediate coats (or undercoats) are applied to build the total film thickness of the system. This may involve the application of several coats.</p> <p>The finishing coats provide the first-line defence against the environment and also determine the final appearance in terms of gloss, colour, etc.</p> <p>The various superimposed coats within a painting system have, of course, to be compatible with one another. They may be all of the same generic type or may be different, e.g. acrylated-rubber-based intermediate coats may be applied on to an epoxy primer. However, as a first precaution, all paints with in a system should normally be obtained from the same manufacturer.</p> <p>1) After surface preparation, inspection and approval, all steelwork shall be primed and painted.</p> <p>2) The priming coat shall, except where masked, be completed prior to despatch from the workshop.</p> <p>3) Surfaces encased in concrete shall not be painted.</p> <p>4) Each coat shall be applied as recommended by the manufacturer at an interval that ensures the proper hardening or curing of the previous coat and shall provide specified dry film thickness without detriment to the surface finish.</p>

ITEM REF	DESCRIPTION
	<p>5) Generally various surfaces shall be primed and painted as follows:</p> <ol style="list-style-type: none"> a) Surfaces to be encased in concrete shall not be painted. b) All other structural steel except where encased (see above) shall be primed. c) Finishing paint shall be required for all other steelwork and roof structure where it is exposed to view and in the areas without ceilings. Where the structure is protected by fireproof spray the finishing paint shall not be required. <p>1.1.4. Surface Treatment for Bolts and HSFG Bolt Connections</p> <p>The treatment for the surfaces of bolts, nuts, screws and other parts of connections shall ensure that such surfaces have a standard of protection against corrosion at least equal to that provided for the steelwork being connected. All bolts exposed to weather must be hot dip galvanised. All other bolts must be zinc plated. No black bolts are to be used. Facing surfaces of structural connections joined by HSFG bolts shall be masked for temporary protection. The masking shall be removed immediately before the assembly and shall be of such type as to prevent contamination by adhesives. The edges on both facing surfaces shall be painted for a width of 15mm inside the perimeter of the connection. Clevises where load indicating washers are used shall be sealed with paint after final tightening of the bolts.</p> <p>1.1.5. Welded Work and Other Surfaces in Contact</p> <p>The prepared surface within 20 mm of welds to steelwork and other steel surfaces to be in contact with each other shall be masked for temporary protection prior to assembly. Alternatively, after the specified surface preparation has been carried out, approved primer coatings that have been proved to have no deleterious effects on the production of satisfactory welds and the subsequent paintwork may be used in lieu of masking.</p> <p>1.1.6. Internal Surfaces of Sealed Tubes</p> <p>The internal surfaces of hermetically sealed steel tubes shall be exempt from the specified requirements for corrosion protection but shall be protected against ingress of water or other corrosive substances prior to sealing and at all other times.</p> <p>1.1.7. Painting at Site</p> <ol style="list-style-type: none"> 1) Before the assembly of the steelwork at the site the Contractor shall clean, prepare and prime all components of connections not otherwise treated and touch up all areas of previously primed members damaged during delivery. 2) The unpainted areas shall then be surface prepared and the zinc rich priming coat and the finishing undercoat applied to such areas as specified. The final coat of finishing paint shall then be applied to the whole of the steelwork to be so treated including all connections. After the erection any areas of the structure damaged during the erection processes, including site welding, shall be prepared and painted by the Contractor to all the requirements of this Specification.

ITEM REF	DESCRIPTION
	<p>3) On the parts of structural members that are completely inaccessible after the assembly, the second finishing coat shall be applied before the assembly.</p> <p>4) After the assembly of the steelwork all exposed bolt heads shall be cleaned and painted as specified. The paintwork wherever damaged or deteriorated shall be touched up and made good by the Contractor.</p> <p>1.1.8. Hot Dip Galvanising</p> <p>1) Where noted "Galvanised" on the drawings or as specified, steelwork may be chemically de-scaled and cleaned so that all rust, mill scale, oil, grease and other foreign matter is removed leaving a clean surface of metal. Galvanizing shall conform to BS 729.</p> <p>2) All holding down bolts cast in concrete must be hot dip galvanized after the fabrication.</p> <p>3) Steel shall then be immersed in a bath of molten zinc so that when withdrawn, the zinc coating solidifies to a dry film thickness of 100 micrometres. Allow for a 48-hour curing period before transporting steelwork.</p> <p>1.1.9. Acceptability and Inspection of Coatings</p> <p>1) The finished coating shall be generally smooth, of a dense and uniform texture and free from sharp protuberances, voids, bubbles, pinholes, sags, dimpling or curtaining.</p> <p>2) Any coat damaged by subsequent processes or which has deteriorated to an extent such that proper adhesion of the coating may not be obtained or maintained shall be re-cleaned to the original standard and recoated with the specified sequence of coats.</p> <p>3) The completed coating shall be checked for continuity by an approved magnetic thickness gauge and Holiday detector by the Construction Supervisory Staff as well as the paint manufacturer's representative. DFT of each coat shall be checked.</p> <p>4) The completed coatings shall also be checked for adhesion by driving a sharp carpenter's chisel flat through the coating and along the steel surface. The coatings shall be acceptably bonded if no separation is apparent between coats and if it can be seen adhering in the depressions on the exposed metal surface.</p>

ITEM REF	DESCRIPTION
	<p data-bbox="318 258 915 291">SPECIFICATION FOR METAL WORK</p> <p data-bbox="318 331 1130 365">Note: Contractor shall also refer to the Notes given on the drawings.</p> <p data-bbox="383 405 529 438">1. General</p> <p data-bbox="423 472 1390 506">Aluminum glazed units shall be supplied with all hardware furniture and fittings.</p> <p data-bbox="423 539 1430 609">The Contractor shall submit to the Engineer the shop drawings and technical data and other relevant information for approval of the Engineer.</p> <p data-bbox="423 642 1430 745">The Contractor shall include in his rates the cost of tests generally required for ascertaining the suitability of aluminium extrusions, anodizing, strength of joints, gaskets and weather stripping, strength of joints and air and water infiltration.</p> <p data-bbox="383 779 548 812">2. Materials</p> <p data-bbox="423 846 1430 915">All sections shall be extruded from AA 6063 aluminium alloy and sections shall be designed to give rebated internal and external faces.</p> <p data-bbox="334 957 1430 1060">Aluminium sections for mullions, frames, transoms, heads and the sills and the other members should strictly comply with the requirements laid down in the following British Standard.</p> <p data-bbox="334 1094 1430 1163">B.S. 1161: 1977 (1991) – Specification for aluminium alloy sections for structural purposes.</p> <p data-bbox="334 1192 1370 1262">B.S. 1470: (1987) – Wrought aluminium and aluminium alloys plate, sheet and strip.</p> <p data-bbox="334 1291 1419 1394">B.S. 1474: (1987) – Wrought aluminium and aluminium alloys for general engineering purpose and external architectural application bars, extruded down tubes and sections.</p> <p data-bbox="318 1436 529 1470">Powder Coating</p> <p data-bbox="318 1503 1430 1640">Powder coating shall conform to BS 6496: 1984 (1991). The powder coating shall be of thickness 60-80 microns and of approved colour. The Contractor shall submit a ten (10) year guarantee for the powder coated finish. The Contractor shall allow for cost of required tests for checking the coating as directed.</p> <p data-bbox="318 1698 509 1732">Wind Loading</p> <p data-bbox="318 1766 1430 1835">The fabricated aluminium doors and windows shall be capable of withstanding a wind pressure load not less than 1500 Pascals (75 M.P.H.)</p>

ITEM REF	DESCRIPTION
	<p>Weather Stripping</p> <p>The weather stripping shall be vinyl or other plastic materials which are dimensionally stable and are resistant to ultra violet rays, water absorption and are suitable to be used in marine atmosphere.</p> <p>Screws Nuts etc.</p> <p>All screws, nuts, washers, bolts, rivets and other fastening devices should be of stainless steel. Aluminium alloy fasteners may be used in lieu of stainless steel fasteners with the written approval of the Engineer.</p> <p>Ironmongery</p> <p>Ironmongery used shall satisfactorily perform the function for which it is intended. They shall be of aluminium die cast alloy, stainless steel or other non-corrosive materials compatible with aluminium. The Engineer shall duly approve all items of ironmongery before fixing in position.</p> <p>Glass</p> <p>Glass shall be 5mm thick clear glass suitable for single glazing and having a thickness (minimum 5mm) as specified. Glass shall conform to the relevant British Standard including following:</p> <p>B.S. 952 Part 1: 1995 – The classification of glass for glazing and terminology for work and B.S. 952 Part 2 of 1980.</p> <p>Assembly</p> <p>The design of windows should permit free movement of air from exterior environment to the immediate spaces between the window frame and ventilator to achieve pressure equalization. The windows should have snap on reusable extruded aluminium glazing beads and easily removable bottom rails.</p> <p>The glazing beads should not extend underneath the glass. The design of windows should permit re-glazing without disassembly of all ventilator extrusions from the frame.</p> <p>All openable window sash corners should be mitered angle reinforced or mechanically staked and Epoxy painted. If frames with incompatible extrusions are used, then these extrusions should be mortised and tenoned. A permanent watertight joint should be made to the junctions of the side frame members with all horizontal members. Window panels must be provided with minimum three weep holes, one at the center and one each between the jamb and the setting block. Fixing of aluminium units to concrete shall be done with high quality Rawl Plugs with stainless steel sections and other approved fixing devices. Where friction stays are used the shop drawings shall clearly indicate the size of such stays.</p>

ITEM REF	DESCRIPTION
	<p>The joint between window frames, external door frames and concrete or masonry work shall be adequately caulked with a suitable caulking compound. Polysulphide or Silicon sealant may be used for this purpose. The Contractor shall furnish all literature and instructions published by the manufacturer of the sealant along with the Tender. Only caulking compound approved by the Engineer in writing shall be used.</p> <p>Air and Water Infiltration</p> <p>The Contractor shall submit test certificates from the manufacturer of aluminium extrusions guaranteeing that the products comply with standards applicable to the country of origin of these materials.</p> <p>Fabrication and installation of aluminium units shall be thoroughly watertight.</p> <p>The degree of resistance to air leakage shall be Grade A (superior resistance) recommended for air-conditioned buildings.</p> <p>SPECIFICATION FOR WOOD WORK</p> <p>1. GENERALLY</p> <p>(a) Timber used shall be of the specified species and of the best quality, thoroughly well kiln seasoned sawn square and free from sap, shakes, cracks and edges. It shall be free from decay and insect attack.</p> <p>(b) Where a choice of more than one species is allowed only one variety shall be used for any particular class of work.</p> <p>(c) All timber sizes indicated in the description shall be finished sizes after planing.</p> <p>2. CARPENTRY</p> <p>The following species of timber shall be used.</p> <p>Roof Timber</p> <p>Alubo, Liyan, Kolon, Mee, Palu , Balau , Bitis or other approved.(Bitis and Balau are imported species)</p> <p>Ceiling Timber</p> <p>Balau , Bitis or other approved</p>

ITEM REF	DESCRIPTION
	<p>3. JOINERY</p> <p>The following species of timber shall be used.</p> <p>Valance Board</p> <p>Gammalu, Kirihembiliya, CCA presure treated Kempas, Balau, Bitis or other approved.</p> <p>Unless otherwise specified in the respective Trades/Sections, the timber for all trades shall be as specified in Wood Work</p> <p>SPECIFICATION FOR PARTITIONS</p> <p>1. General</p> <p>Aluminum glazed units shall be supplied with all hardware furniture and fittings.</p> <p>The Contractor shall submit to the Engineer the shop drawings and technical data and other relevant information for approval of the Engineer.</p> <p>The Contractor shall include in his rates the cost of tests generally required for ascertaining the suitability of aluminium extrusions, anodizing, strength of joints, gaskets and weather stripping, strength of joints and air and water infiltration.</p> <p>2. Materials</p> <p>All sections shall be extruded from AA 6063 aluminium alloy and sections shall be designed to give rebated internal and external faces, unless specifically mentioned otherwise on the drawings.</p> <p>Aluminium sections for mullions, frames, transoms, heads and the sills and the other members should strictly comply with the requirements laid down in the following British Standard.</p> <p>B.S. 1161: 1977 (1991) – Specification for aluminium alloy sections for structural purposes.</p> <p>B.S. 1470: (1987) – Wrought aluminium and aluminium alloys plate, sheet and strip.</p>

ITEM REF	DESCRIPTION
	<p data-bbox="435 268 1406 401">B.S. 1474: (1987) – Wrought aluminium and aluminium alloys for general engineering purpose and external architectural application bars, extruded down tubes and sections.</p> <p data-bbox="391 436 643 468">3. Powder Coating</p> <p data-bbox="435 504 1430 636">Powder coating shall conform to BS 6496: 1984 (1991). The powder coating shall be of thickness 60-80 microns and of approved colour. The Contractor shall submit a ten (10) year guarantee for the powder coated finish. The Contractor shall allow for cost of required tests for checking the coating as directed.</p> <p data-bbox="391 701 618 732">4. Wind Loading</p> <p data-bbox="435 768 1430 835">The fabricated aluminium doors and windows shall be capable of withstanding a wind pressure load not less than 1500 Pascals (75 M.P.H.)</p> <p data-bbox="391 913 675 945">5. Weather Stripping</p> <p data-bbox="435 980 1430 1079">The weather stripping shall be vinyl or other plastic materials which are dimensionally stable and are resistant to ultra violet rays, water absorption and are suitable to be used in marine atmosphere.</p> <p data-bbox="391 1129 643 1161">6. Screws Nuts etc.</p> <p data-bbox="435 1197 1430 1295">All screws, nuts, washers, bolts, rivets and other fastening devices should be of stainless steel. Aluminium alloy fasteners may be used in lieu of stainless steel fasteners with the written approval of the Engineer.</p> <p data-bbox="391 1352 602 1383">7. Ironmongery</p> <p data-bbox="435 1419 1430 1554">Ironmongery used shall satisfactorily perform the function for which it is intended. They shall be of aluminium die cast alloy, stainless steel or other non-corrosive materials compatible with aluminium. The Engineer shall duly approve all items of ironmongery before fixing in position</p> <p data-bbox="391 1610 505 1642">8. Glass</p> <p data-bbox="435 1677 1430 1745">Glass shall be 6mm clear glass suitable for single glazing as specified. Glass shall conform to the relevant British Standard including following:</p> <p data-bbox="435 1780 1430 1848">B.S. 952 Part 1: 1995 – The classification of glass for glazing and terminology for work and B.S. 952 Part 2 of 1980.</p>

ITEM REF	DESCRIPTION
	<p data-bbox="388 268 558 300">9. Assembly</p> <p data-bbox="435 338 1430 470">The design of windows should permit free movement of air from exterior environment to the immediate spaces between the window frame and ventilator to achieve pressure equalization. The windows should have snap on reusable extruded aluminium glazing beads and easily removable bottom rails.</p> <p data-bbox="435 508 1430 604">The glazing beads should not extend underneath the glass. The design of windows should permit re-glazing without disassembly of all ventilator extrusions from the frame.</p> <p data-bbox="435 684 1430 1192">All openable window sash corners should be mitered angle reinforced or mechanically staked and Epoxy painted. If frames with incompatible extrusions are used, then these extrusions should be mortised and tenoned. A permanent watertight joint should be made to the junctions of the side frame members with all horizontal members. Window panels must be provided with minimum three weep holes, one at the center and one each between the jamb and the setting block. Fixing of aluminium units to concrete shall be done with high quality Rawl Plugs with stainless steel sections and other approved fixing devices. Where friction stays are used the shop drawings shall clearly indicate the size of such stays. The joint between window frames, external door frames and concrete or masonry work shall be adequately caulked with a suitable caulking compound. Polysulphide or Silicon sealant may be used for this purpose. The Contractor shall furnish all literature and instructions published by the manufacturer of the sealant along with the Tender. Only caulking compound approved by the Engineer in writing shall be used.</p> <p data-bbox="388 1272 773 1304">10. Air and Water Infiltration</p> <p data-bbox="435 1341 1430 1438">The Contractor shall submit test certificates from the manufacturer of aluminium extrusions guaranteeing that the products comply with standards applicable to the country of origin of these materials.</p> <p data-bbox="435 1476 1370 1507">Fabrication and installation of aluminium units shall be thoroughly watertight.</p> <p data-bbox="435 1545 1430 1612">The degree of resistance to air leakage shall be Grade A (superior resistance) recommended for air-conditioned buildings.</p>

ITEM REF	DESCRIPTION
	<p data-bbox="326 275 1321 310">SPECIFICATIONS FOR ROOF COVERING & ROOF PLUMBING</p> <p data-bbox="326 380 938 411">1. SHEETING FOR ROOFING AND FASCIA</p> <p data-bbox="370 449 1435 716">Sheeting Material be Zinc-Aluminium coated corrugated roll – formed high tensile steel sheet to As 1397- G550 – Az 200 or as otherwise specified on the detailed drawings. Finish of sheeting shall be factory pre-printed with an oven baked Silicone/polyester finish of an approved colour. Total coated thickness of the sheeting shall be not less than 0.6mm. Type of profile shall be suitable for internal support spacing of approximately 1800mm. Contractor is required to fabricate given design of ridge capping. The design installation of sheeting shall be conform to AS 1562 and the manufacturer’s Specification.</p> <p data-bbox="370 758 1435 856">12 x 45 mm Zinc coated self tapping fasteners with neoprene washers shall be fixed on each rib on purlins at top bottom and laps of sheets, and on every other rib on intermediate purlins.</p> <p data-bbox="370 930 1256 961">The rates for corrugated roofing and fascia shall include for the following:</p> <ul data-bbox="370 999 1435 1203" style="list-style-type: none"> (a) Hoisting fixing complete with all nails spikes, screws, clips etc. and all straight and square cutting and waste. (b) Bending sheets around angles forming roll edges at barges and the like. (c) Mitered hips and angles. <p data-bbox="326 1272 1175 1304">2. FLASHINGS, FASCIA, CAPPINGS AND RIDGE CAPPINGS</p> <p data-bbox="370 1344 1435 1442">Standard and/or non standard flashings fascia cappings and ridge cappings shall be provided in materials finished to match sheeting specification stated in 1.0. However the total coated thickness of coping material shall be not less than 0.47mm.</p> <p data-bbox="370 1482 1094 1514">The rates for the flashing shall be included for the following:</p> <ul data-bbox="370 1551 1273 1728" style="list-style-type: none"> (a) Bending to required shape. (b) Angles, edges and ends. (c) Notching over roofing ribs dressed into corrugation as the case may be. (d) Forming and dressing into or around walls on obstructions and the like.

ITEM REF	DESCRIPTION
	<p>3. GUTTERS</p> <p>Standard size gutters to manufacturer's specifications and printed literature and conforming to AS 2179 shall be provided. The total coated thickness of gutter material shall be not less than 0.47mm the selection and installation of the gutters shall conform to AS 2180.</p> <p>The rates for gutters shall include for the followings:</p> <ul style="list-style-type: none"> a) Jointing and fixing where necessary. b) Extra and special filling such as bends, angles, end caps, gutter outlet, mitred end, joiners gutters boxes and the like. <p>4. INSULATION</p> <p>The rate for insulation shall include for the following:</p> <ul style="list-style-type: none"> (a) Gauge 18 GI welded wire mesh wires at 75mm X 75mm centers both ways laid over the top of purlins. Slack of mesh should be such that once the roofing is installed fiber glass blanket should retain its nominal thickness between purlins. (b) Double sided reinforced aluminium foil insulation, laid over the welded wire mesh. A150mm. Lap at joint of aluminium foil should be provided for. The insulation shall have the capacity of emission of 90% of its heat receiving to outside . (c) Laying of fibre glass blanket not less than 50mm thickness and an nominal density not less than 16kg/m³ laid over aluminium foil butting firmly against adjacent blankets. <p>5. SANDWICH PANEL</p> <p>Wall and roof cladding material for insulation areas shall be capable or resisting all wind loads and live loads to satisfy the Sri Lankan and British Standards. Cladding panels shall have the minimum insulation thickness to satisfy local temperature and weather conditions. Cladding material shall be made with steel sheet with minimum base metal thickness of 0.31mm and coated thickness to be 0.35mm and spray painted with approved colour coating. The supplier shall specify the corrosion resistant capacity. The details of anticorrosive paints and layer thicknesses shall be forwarded to the consultant for prior approval by the supplier.</p>

ITEM REF	DESCRIPTION
	<p data-bbox="326 268 1127 306">SPECIFICATION FOR SANITARY INSTALLATIONS</p> <p data-bbox="375 342 1333 407">All toilet fittings should be British made “ARMITAGE SHANKS” or Architect approved equivalent.</p> <p data-bbox="326 468 1117 499">1. WATER CLOSET & CISTERN FOR UPPER FLOORS</p> <p data-bbox="375 535 1430 600">Imported <u>Vitreous China white Fire Clay Ceramic</u> Water Closet, size 665xx455x780mm, Architect approved type, complete with seat.</p> <p data-bbox="375 636 1430 739">Imported <u>Vitreous China</u>, closed coupled wash down/suction type white Fire Clay Ceramic Cistern 4-6 litre capacity, Architect approved type, complete with all necessary fittings and fixtures for flushings, securely fixed to wall.</p> <p data-bbox="326 821 1127 852">2. WATER CLOSET & CISTERN FOR GROUND FLOOR</p> <p data-bbox="375 888 1430 953">Imported <u>Vitreous China white Fire Clay Ceramic</u> Water Closet, size 665xx455x780mm, Architect approved type, complete with seat.</p> <p data-bbox="375 989 1430 1092">Imported <u>Vitreous China</u>, closed coupled wash down/suction type white Fire Clay Ceramic Cistern 4-6 litre capacity, Architect approved type, complete with all necessary fittings and fixtures for flushings, securely fixed to wall.</p> <p data-bbox="326 1173 997 1205">3. SQUATTING PAN & HIGH LEVEL CISTERN</p> <p data-bbox="375 1241 1430 1306">Imported Vitreous China white Fire clay Ceramic Squatting Pan with integral foot rests, Architect approved type.</p> <p data-bbox="375 1341 1430 1470">Imported <u>Vitreous China white Fire Clay Ceramic</u> Cistern 4-6 liter capacity, Architect approved type, complete with all necessary fittings and fixtures for flushing, securely fixed to wall with bottom of cistern approximately 900mm above level of Squatting Pan and flush pipe connected to Squatting Pan.</p>

ITEM REF	DESCRIPTION
	<p>4. PEDESTAL TYPE WASH BASIN</p> <p>Imported Vitreous China white Fire Clay Ceramic Pedestal type Wash Basin with one tap hole Size 560 x 450mm, Architect approved type, complete with chromium plated pillar tap and captive waste.</p> <p>Wash basin should be secured to the wall by two screws through holes located in the rear of the Wash Basin and two screws to the floor through holes located at the rear of the pedestal.</p> <p>5. URINALS</p> <p>Imported <u>Vitreous China</u> white Fire Clay Ceramic bowl type Urinals and separators including necessary fixtures and accessories, manually operated flush valves, plastic bottle traps (exposed) and cistern, all as directed by the Engineer.</p> <p>6. KITCHEN SINK</p> <p>Kitchen sink should be inset type Imported one, made entirely from high grade 18/10 chromium nickel steel as per detail drawing to engineers approval. All sinks are to be fitted with a polyurethane sealer around the edge to stop water seepage.</p> <p>7. HAND SPRAY UNIT</p> <p>Hand spray units shall be of 'GROHE' make or Architect approved equivalent.</p> <p>8. TAPS, VALVES, COCKS</p> <p>Taps, Valves, Cocks etc. shall be of 'GROHE' make or Architect approved equivalent.</p>

ITEM REF	DESCRIPTION
	<p data-bbox="326 289 1149 323">SPECIFICATION FOR ELECTRICAL INSTALLATION</p> <p data-bbox="326 363 480 392">1. General</p> <p data-bbox="380 428 1430 527">1.1 The electrical installation shall be for 400v, 3 phase / 230v single phase 50 Hz. A.C. Supply all accessories used in the installation shall be for the appropriate working voltage.</p> <p data-bbox="380 562 1430 661">1.2 Execution of work in very respect shall be to the satisfaction of the Employer / Engineer and conform to the 17th edition of IEE (London) regulations. Any deviation shall have to be approved by the Engineer.</p> <p data-bbox="380 697 1430 753">1.3 The positions of electrical fittings etc. shown in the drawings are approximate and exact positions of the same to be decided at site.</p> <p data-bbox="380 789 1430 888">1.4 When procuring main cable, Contractor shall take in to account the actual physical measurement to avoid joints. Special orders shall be placed with the manufacturers for cable length more than 100 meters.</p> <p data-bbox="380 924 1430 980">1.5 Before conduit pipes are laid on ceilings a conduit layout drawing shall be prepared by the Contractor for the approval of the Engineer.</p> <p data-bbox="380 1016 1430 1073">1.6 It is the responsibility of the Contractor to repair and make good after installation all walls, slabs, etc. disturbed to the satisfaction of the Engineer.</p> <p data-bbox="380 1108 1430 1207">1.7 All items shall be of reputed makes and samples shall be forwarded to the Engineer prior to purchasing, for approval. In case of main switch board, a reputed manufacturer approved by the Engineer, shall assemble the board.</p> <p data-bbox="380 1243 1430 1299">1.8 All imported materials and fittings shall have the country of origin / country of manufacture and the applicable standard number marked.</p> <p data-bbox="380 1335 1430 1535">1.9 Rates shall include for:- (a) Labour, transport and profit. (b) All accessories such as clips, screws, junction boxes, 3 core flexible cables, ceiling roses, G.I. chains, fan hooks etc. (c) Testing and commissioning.</p> <p data-bbox="370 1604 1430 1661">For items in Bills of Quantities where the units are in l.metres, payments will be made according to the length measured after the installations at the rate quoted in the B.O.Q.</p> <p data-bbox="380 1755 1430 1812">1.10 The complete electrical installation shall be fully re-wirable type in concealed rigid PVC pipes.</p>

ITEM REF	DESCRIPTION
	<p>1.11 Fixing Heights</p> <p>Fixing heights from floor levels, unless directed otherwise shall be as follows:</p> <ul style="list-style-type: none"> • MCCBs 1.5m • Distribution Boards 2.1m • Main Distribution Boards 2.1m • Lamp fittings 2.5m • Ceiling fans 2.4m • Switches and fan regulators 1.5m • Socket outlets for general use 0.3m <p>2. Equipments Specifications</p> <p>2.1 MDCs / DBs</p> <p>Shall be poly carbonate or steel powder coated flush mounted type and be of a reputed make conforming to BS 5486 or equivalent. It shall be with a Hinged door; bus bars neutral bar and earth bar shall be of hard drawn copper.</p> <p>2.2 Miniature Circuit Breakers (MCB)</p> <p>MCB shall be of a reputed make having thermal over load and magnetic short circuit protections and shall conform to BS 3871 DIN rail type. The breaking capacity shall be more than 6KA and type 2 shall be used for the lighting circuits and motor circuit type 3 shall be used.</p> <p>2.3 Residual Current Devices (RCDs) (RCCBs)</p> <p>Shall be current balance type complying with BS 4293 sensitivity shall be 30mA or as specified in the drawings.</p> <p>2.4 Moulded Case Circuit Breakers (MCCB)</p> <p>MCCB's shall be of reputed makes conforming to BS 4752. It shall have on breaking capacity more than 50KA and shall have adjustable thermal over load and magnetic circuit protection. Individuals MCCB's shall be enclosed in a metal enclosure with a suitable neutral links. Operating handles shall be project outside the enclosure. It shall be of fixed type having bus bar connecting type terminals to fix cables with crimped cables and sockets.</p>

ITEM REF	DESCRIPTION
	<p>2.5 PVC Cables</p> <p>All cables shall be 450/750 Volt grade PVC insulated PVC / XLPE sheathed copper complying with BS 6004. Brown/ Black/ Gray color shall be used for the phase conductor and Blue color shall be used for the neutral conductor for the protective conductor (Earthing) PVC insulated copper wire shall be used, green or green and yellow color. Jointing of cables are not accepted.</p> <p>2.6 10 Amps. Switches</p> <p>They shall be white colour complying with BS 1360.</p> <p>2.7 Socket Outlets</p> <p>13A socket outlets shall be flush types with switch, white in color complying with BS 1363. 15A and 5A socket outlets shall be flush types with switch, white in color complying with BS 546.</p> <p>2.8 PVC conduit pipes Switch boxes, Round blocks and Junction boxes</p> <p>They shall be complying with BS 4607 or equivalent. Switch boxes shall be PVC junction moulded types and hand made boxes shall not be used. Switch boxes shall be brass fixing screws. In places where are not buried they shall be clipped at 500mm intervals.</p> <p>2.9 Screws and Panel Pins</p> <p>All screws and panel pins shall be brass, brass plated items shall not be used.</p> <p>2.10 Ceiling Roses</p> <p>Ceiling roses shall be plate type and shall confirm to BS 67 or equivalent. Connections to all lamps, fans shall be through a ceiling rose unless otherwise instructed.</p> <p>2.11 Lamp Holders</p> <p>All lamp holders shall be bayonet type conforming to BS 5042 or any other type specified CG holders shall be brass types.</p>

ITEM REF	DESCRIPTION
	<p data-bbox="367 285 683 317">2.12 Incandescent Bulbs</p> <p data-bbox="436 348 1430 415">All incandescent bulbs shall be with bayonet cap type and shall comply with BS 161 or any other type specified. All lamp fittings shall provided with a bulb.</p> <p data-bbox="367 495 618 527">2.13 Exhaust Fans</p> <p data-bbox="444 564 1430 699">Wall mounted exhaust fans shall be of a reputed make suitable for 430 Volts, 50Hz connections. The motor shall be a totally enclosed type having speed, preferably less than 1500 r.p.m. literature giving the performance of air flow and noise level shall be submitted for approval.</p> <p data-bbox="367 758 721 789">2.14 Underground Cables</p> <p data-bbox="444 821 1430 1125">Underground cables shall be 600/1000 volts grade PVC insulated PVC sheathed single wire armoured. PVC overall sheathed copper cable conforming to BS 6346. It shall be laid 600mm below ground level and covered with concrete cable tiles cables trench shall not be closed without the consent of the Client / Consultant. When there is more than one cable in the same trench the distance between the cables shall be at least 50mm. Rate shall include cost of cable and sockets, cable glands PVC taps etc. When procuring under ground cables B.O.Q. quantities shall not be taken. No extra payments will be paid for under ground joints.</p> <p data-bbox="367 1192 699 1224">2.15 Main Switch Board</p> <p data-bbox="444 1255 1430 1390">The switch board shall be metal clad rigid freestanding cubical type conforming to BS 5486 or equivalent. It shall be provided with all the equipment as indicated in the drawings together with all current transformers. Auxiliary fuses protection relays, labels, small wiring etc. The final painting shall be powdered epoxy paint.</p> <p data-bbox="444 1428 1430 1528">The switchboard shall be flush fronted with front and rear access, suitable for indoor use, sectionalized as necessary to facilitate transport and erection. The height shall not be more than 2 metres.</p> <p data-bbox="444 1598 1430 1732">The Bus Bars shall be H.D.H.C. tinned copper. The phase and neutral bars shall have the same cross-section areas, with current carrying capacity not less than that of the incoming circuit breaker. They shall be supported to withstand the short circuit currents as indicated.</p>

ITEM REF	DESCRIPTION
	<p>A tinned copper earthing bar complying with BS 1432 sized to withstand the short time current of the switch board shall be provided for the full length of the switch board, all metal work other than the current carrying parts shall be bonded to the earthing bar including the cable armouring of all the incoming and outgoing cables.</p> <p>H.D.H.C. tinned copper complying to BS 159 and covered with heat shrink sleaving easy phase identification shall be used to all the circuit breakers over 200A capacity.</p> <p>All interval wiring shall be carried out neatly and shall wherever possible be housed in wiring trunking. All live terminals and components within the panel shall be shielded in such a manner to prevent contact with them. All the wiring shall be numbered and labeled for easy identification.</p> <p>2.16 Earth Fault Relay</p> <p>Earth fault relay shall be an electronic or electromechanical type having adjustable time and current settings. It shall have buttons for testing purposes. The time and current setting rangers are subjected to the approval of the client. A separate core balance type current transformers shall be provided to direct the earth leakage circuit.</p> <p>SPECIFICATION FOR SPLIT TYPE AIR CONDITIONERS</p> <ol style="list-style-type: none"> 1. The air conditioners shall be of wall mounted/ceiling suspended units from reputed manufactures. The A/C plant should be of the direct expansion type and shall consist of an indoor unit of specified capacity and a matching outdoor unit. 2. The indoor unit shall consist of an evaporator coil, centrifugal forward curved fan, air filter (washable type), expansion valve/capillary tube and wireless remote control. The noise level should not exceed ISO-NC40 requirements. 3. The outdoor unit shall consist of high efficiency/energy efficient compressor and air cooled condenser. The compressor shall be provided with excess current/temperature protection and standard safety controls including high pressure and low pressure cut outs and phase failure relay. 4. The cabinets of indoor and outdoor units shall be of heavy gauge galvanised steel with bonding primer and baked-enamel finish coat.

ITEM REF	DESCRIPTION										
	<p>5. A/C units shall operate on 400V/3 phase/50Hz. Electrical power will be provided up to the out door unit by others.</p> <p>6. The refrigerant pipes shall be insulated and be encased in PVC box casing.</p> <p>7. All motors should be provided with thermal over load protection.</p> <p>8. The louvers of the indoor unit shall operate in the fixed mode or in auto swing mode.</p> <p>9. The contractor is required to submit the following details along with the offers.</p> <p>(a). Make and country of origin.</p> <p>(b). Country of assembly (if different from country of origin)</p> <p>(c). Ex stock availability</p> <p>(d). Original technical brochure (not photocopy) from manufacturer.</p> <p>(e). User manuals and Maintenance manuals</p> <p>(f). Guarantees</p> <p>(h). Details of Local Agent for the offered make</p> <p>(g). Maintenance and after sales services provided</p> <p><u>Information on Maintenance Costs</u></p> <p>Full comprehensive maintenance charges after warranty per annum (exclusive of taxes)</p> <table data-bbox="446 1276 1052 1598"> <tr> <td>1st year</td> <td>WARRANTY</td> </tr> <tr> <td>2nd year</td> <td>Rs.</td> </tr> <tr> <td>3rd year</td> <td>Rs.</td> </tr> <tr> <td>4th year</td> <td>Rs.</td> </tr> <tr> <td>5th year</td> <td>Rs.</td> </tr> </table>	1 st year	WARRANTY	2 nd year	Rs.	3 rd year	Rs.	4 th year	Rs.	5 th year	Rs.
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4 th year	Rs.										
5 th year	Rs.										

ITEM REF	DESCRIPTION
	<p data-bbox="326 289 1154 323">SPECIFICATION FOR FIRE PROTECTION SYSTEMS</p> <p data-bbox="326 365 526 394">1. General.</p> <p data-bbox="415 434 1430 533">The contractor shall supply all necessary equipment, install, wire, test and commission the following sub-systems of the fire protection and fighting system of the said project.</p> <ul style="list-style-type: none"> <li data-bbox="415 573 818 602">A. Self contained exist signs. <li data-bbox="415 606 1159 636">B. Carbon Dioxide and Carbon Dioxide fire extinguisher. <li data-bbox="415 640 854 669">C. Photo luminescent exit signs. <p data-bbox="326 737 954 766">2. Incidental Work Provided by Contractor.</p> <ul style="list-style-type: none"> <li data-bbox="423 806 1430 869">3.1 All angle iron brackets, rag bolts etc., required for the installation of items or equipment. <li data-bbox="423 909 1430 1008">3.2 Any other materials, fittings or labor which may deem to be necessary for the satisfactory completion of the works and efficient functioning of the systems. <li data-bbox="423 1047 1430 1110">3.3 Obtaining all required certificates of conformity from all relevant authorities for the systems installed. <li data-bbox="423 1150 1430 1213">3.4 On completion of the project the supplier shall provide 'as fitted/built' records by way of fully dimensioned drawings, manufactures catalogs etc. <p data-bbox="326 1299 594 1329">4. Coordination.</p> <p data-bbox="415 1369 1430 1467">The contractor will cooperate and coordinate his work in such a manner that it will be completed on the date specified and will not impede the work of any of the other contractors at site.</p> <p data-bbox="326 1541 1057 1570">5. Regulations, Codes of practice, Shop drawings etc.</p> <p data-bbox="415 1610 1430 1814">All work will be carried out to be in keeping with the rules and regulation of the relevant authorities and will comply with the latest codes of practice in this field. All equipment shall comply with standards acceptable to the fire department. It will be the duty of the contractor to obtain the certificate of the Chief Fire Office (CFO) of the City of Colombo, stating that the systems & equipment installed by him are in compliance with those set out by the CFO.</p>

ITEM REF	DESCRIPTION
	<p>9. Fire Extinguisher.</p> <p>The contractor shall supply and fix at the locations indicated in the drawings carbon dioxide (CO₂), dry powder and carbon dioxide/water fire extinguishes (CO₂/H₂O). The CO₂ extinguishes shall have a charge weight of 2 kg., manufactured to BS 5423. The C/H₂O extinguishes shall have a water capacity of 8 liters with a 60 g. CO₂ cartridge, manufactured to BS 5423 -1980. Samples of all extinguishes must be submitted for approval prior to their incorporation in the works.</p> <p>10. Exit Signs.</p> <p>The contractor shall supply, and install approved photo luminescent “EXIT” signs complying with BS 5499-1 1990, at all locations as indicated in the drawings.</p> <p>11. Free Maintenance & Guarantee.</p> <p>The contractor shall maintain, on a free of charge basis all the equipment installed, for a period of 12 months from take over of the system for beneficial use.</p> <p>Any item found to be defective during this period shall be replaced or repaired on a free of charge basis.</p> <p>Such items of equipment repaired or replaced during the fee maintenance period, shall be guaranteed for a period of one (1) year from the date of replacement or repair.</p> <p>The contractor shall provide the owner three (3) set of all instruction and/or maintenance documents for all the equipment installed.</p> <p>The contractor shall attach the following pricing to his bid:</p> <ol style="list-style-type: none"> 1. Value of annual service contract for the maintenance of the equipment on completion of the fee maintenance period. 2. A priced list of spare parts recommended of five (5) years operation of the system. <p>The contractor shall also at the end of the installation provide the certificate of conformity form the CFO of the City of Colombo for all systems and equipment installed by him.</p>

ITEM REF.	DESCRIPTION
	<p data-bbox="326 275 959 310">SPECIFICATION FOR PLASTIC EDGING</p> <p data-bbox="326 380 922 415">A. Edgings to Nosing of Steps in Staircases</p> <p data-bbox="412 443 1430 541">Nosing of steps in staircase shall be finished with a 25mm wide plastic edging with necessary end caps etc. providing a high degree of slip resistance and increased visibility. Type shall be Schulter-Trep – S or equivalent approved.</p> <p data-bbox="326 611 943 646">B. Edgings between Different Floor Finishes</p> <p data-bbox="412 674 1430 846">To prevent the formation of trip-edge between two different types, e.g. ceramic tiled floor and ordinary cement rendered floor a plastic strip of size approximately 14mm wide x 9mm thick shall be glued with an approved type adhesive and any gap filled with a silicon sealant of the appropriate grade, forming a smooth transition between the two types of finishes.</p> <p data-bbox="326 915 521 951">C. Samples</p> <p data-bbox="412 978 1430 1045">Samples of all types of plastic edgings shall be submitted for prior approval of the Architect.</p> <p data-bbox="326 1150 927 1186">SPECIFICATION FOR IRONMONGERY</p> <p data-bbox="326 1255 1430 1323">(a) All ironmongery for joinery work (Except locks) shall be manufactured shall be of heavy quality oxidized brass conforming to BS 240.</p> <p data-bbox="326 1360 1430 1428">(b) All locks latches etc. shall be of an approved imported quality (“Union”, “Yale” or equivalent) to Engineer’s approval.</p>

ITEM REF	DESCRIPTION
	<p data-bbox="326 296 1430 373">SPECIFICATION FOR SUSPENDED GRID CEILING SYSTEM INCLUDING CEILING PANELS</p> <p data-bbox="326 438 597 470">A. Ceiling Panels</p> <p data-bbox="412 510 1430 709">All ceiling panels should be of the Plain finish gypsum boards of size 600x1200x12.5mm thick to withstand temperature and humidity conditions upto 90° F (32° C) / and 90% relative Humidity without visible sagging, warping or shrinking. All panels should have 30mm fire resistance according to BS 476. Technical and other relevant information should be submitted by the contractor and sample to be approved by the Architect.</p> <p data-bbox="326 747 751 779">B. Suspended Ceiling System</p> <p data-bbox="412 816 1430 879">All components shall be formed from hot dipped galvanized steel of commercial quality with an allowable maximum deflection should be 1/360 of the span.</p> <p data-bbox="412 917 1430 980">The exposed grid system should have 38mm main tees and cross tees, unless otherwise noted in drawings</p> <p data-bbox="412 1018 1430 1081">Should meet ASTM C 635 standard specifications for metal suspension systems for Acoustical Tile and lay-in panel ceilings, or equivalent.</p> <p data-bbox="326 1119 537 1150">C. Assembly</p> <p data-bbox="412 1188 1430 1287">All grid system and the ceiling panels should be assembled to form the ceiling design shown in drawings. Dropped panels of the ceiling are to be formed where air conditioning or any other piping or ducting systems are required.</p> <p data-bbox="412 1325 1430 1388">Rate shall include for hold down clips, hanging wires, cover strips and all necessary trimming at wall ends, forming and trimming around openings for light fittings etc.</p>

ITEM REF	DESCRIPTION
	<p data-bbox="326 275 964 310">SPECIFICATION OF EXTERNAL WORK</p> <p data-bbox="326 352 935 384">A. Earth Work in Embankment Construction</p> <p data-bbox="370 443 565 474">1. Description</p> <p data-bbox="412 512 1435 611">This work shall consist of clearing of the site of structures all vegetation, removal of topsoil and unsuitable soil, cutting to form side drains and filling and compaction with approved soil in forming the embankment.</p> <p data-bbox="370 684 540 716">2. Materials</p> <p data-bbox="412 747 1435 816">Fill soil shall be soil having a maximum dry density of 1600 kg/m³, based on Standard conditions of compaction in accordance with BS 1377 of 1975.</p> <p data-bbox="370 890 773 921">3. Construction Requirements</p> <p data-bbox="326 957 1435 1056">a) The site shall be cleared of all structures, vegetation, top soil and unsuitable material within the Right of Way (ROW) of the proposed road and such material shall be removed from the site to designated dumping grounds.</p> <p data-bbox="326 1094 1435 1192">b) Side drains shall be cut along the bottom of embankment fill to levels and dimensions indicated in drawings or as directed by the Engineer, and all suitable soil from such cutting shall be used for embankment filling.</p> <p data-bbox="326 1230 1435 1299">c) Prior to construction of the embankment, any retaining walls or pipe culverts shall be constructed as specified elsewhere in these specifications.</p> <p data-bbox="326 1337 724 1369">d) Embankment Construction</p> <p data-bbox="412 1404 1435 1572">The soil used shall be spread in layers not exceeding 300mm and compacted using an 8-10 ton roller to obtain a minimum of 95% of the maximum dry density as determined by the standard compaction test specified in BS 1377 of 1975. During compaction the soil moisture shall be maintained at or around the optimum level required for maximum compaction, determined in accordance with BS 1377.</p> <p data-bbox="412 1610 1435 1677">The filling and compaction of the embankment shall be finished smooth to lines and levels specified.</p>

ITEM REF	DESCRIPTION
	<p>B. Random Rubble Masonry in Retaining Walls</p> <p>1. Description</p> <p>This work shall consist of construction in Random Rubble (RR) masonry retaining walls and such other structures to lines, levels and dimensions shown in drawings or as directed by the Engineer.</p> <p>Materials Rubble shall be obtained from approved quarries and they shall be of hard and durable rock and of maximum dimension not exceeding 400mm.</p> <p>Cement mortar shall be of ordinary Portland cement and sand mixed with water, in the proportions specified.</p> <p>2. Construction Requirements</p> <p>The RR shall be set in cement mortar of specified mix proportions and they shall be without hollow spaces. Smaller stones shall be used to roughly fit the spaces between the larger stones and chips shall be wedged in where necessary to prevent thick beds of mortar. The RR shall be finished neatly to given dimensions. Finished RR masonry shall be maintained in a wet condition for a period of at least 3 days after completion.</p>

ITEM REF	DESCRIPTION
	<p data-bbox="326 243 1133 279">SPECIFICATIONS FOR SOFT LANDSCAPE WORKS</p> <p data-bbox="326 321 553 352">A. Tree Planting</p> <p data-bbox="378 390 1430 590">Well formed, healthy, small standards, not less than 2m in height; with a sturdy, reasonably straight stem approximately 1m in height from ground level to lowest branch, a minimum stem diameter of 15mm when measured between 500mm and 800mm from the ground, and a well-balanced branching head, to be supplied and planted in 0.7 x 0.7 x 0.7m pits, including soil improvement, staking (1 stake per tree) and trying (2 ties per tree).</p> <p data-bbox="391 653 675 684">A.1 Root Balled Trees</p> <p data-bbox="448 716 1430 814">The trees selected for root balling should be “root pruned” in advances (3 to 6 months). The root-ball to be wrapped in polythene and hessian (sacking) to prevent drying out and loss of soil during transport.</p> <p data-bbox="448 852 1430 919">Planting pit should be prepared according to the root-ball size. Tree should be placed at its former level and the pit firmly back filled with good top soil.</p> <p data-bbox="448 957 1203 989">Trees should be held firmly with props till they are established.</p> <p data-bbox="326 1035 578 1066">B. Hedge Planting</p> <p data-bbox="391 1098 1430 1192">Mixes of shrubs and ground cover plants to be supplied and planted, with necessary pit-trench excavation and soil improvement according to detailed plans and instructions.</p> <p data-bbox="326 1245 480 1276">C. Turfing</p> <p data-bbox="391 1308 1430 1375">Turfing to be done as per general specifications herewith attached, using turfs of Axsonapus Compress (Buffalow grass).</p> <p data-bbox="391 1413 837 1444">General Specifications for Turfing:</p> <ol data-bbox="415 1476 1430 1854" style="list-style-type: none"> <li data-bbox="415 1476 1430 1577">i. The ground shall be prepared, including soil improvements and / or replacement as necessary to give at least 3” fertile sandy loam (to soil) with a fine filth (if not already existing) over the sub soil to the approval of the Engineer. <li data-bbox="415 1650 1430 1854">ii. The grass shall be healthy, of close texture, even density, green in colour and not exceeding 1” height. Turfs shall be of rectangular shape and of uniform thickness (minimum soil thickness 1”) shall be delivered to site within 24 hours of lifting shall be off-loaded at site by hand, and if stacked, shall be placed grass to grass on cleared ground to a maximum height of 3 feet. They shall be used within 3 days. Turf samples shall be approved by the Engineer.

ITEM REF	DESCRIPTION
	<p>iii. Turfs shall be laid on the prepared soil bed and firmed into position in consecutive rows with broken joints (as in stretcher bond brick work), closely butted and to the correct levels. Where necessary, the turfs shall be lightly and evenly firmed with wooden beaters. A dressing of finely sifted top soil shall be applied and well-brushed into the joints. Any inequalities in finished levels owing to variation in turf thickness or uneven consolidation of soil shall be adjusted by raking and/or packing fine soil under the turf. The laying of the turfs shall be approved by the Engineer.</p> <p>D. General Top-Soiling</p> <p>Loamy top-soil mix 100mm thick layer to be supplied and spread over areas for planting after sub soil grading following for approximately 50mm shrinkage and settlement in order to achieve 50mm layer after settlement.</p> <p>E. Maintenance</p> <p>The planted trees and turfed areas shall be maintained by the Contractor for a period of six (06) months after handing over or until the growth of the trees and turf is established, which ever is the latest. Maintenance shall consist of watering, mowing weed control, stone picking, spiking (for aeration), replacing dead plants and top dressing with fertilizer.</p>