



PROPOSED RUDRA PLAY GROUND COMPLEX AT MARINE DRIVE COLOMBO 06.

GENERAL NOTES

- 1) The preamble notes which include General notes, Pricing Preamble and B.O.Q. are collectively referred to herein as the Bills Of Quantities and shall jointly constitute the Bills Of Quantities referred to in the Conditions Of Contract. The specifications and the Drawings are to be read in conjunction with the Bill Of Quantities.
- 2) The Bills Of Quantities have been prepared generally in accordance with the principles laid down in the Method of measurement of Building works (First Revision) SLS 573:1999 published by Sri Lanka Standards Institution and rates shall include for everything required for completion of each item of work in accordance with the specifications and drawings. The relevant clause of this preamble notes shall be deemed to apply equally to work subsequently ordered for execution by the Bidder, either under Provisional Sum orders or variation orders, except where specifically varied therein.

Unit Rates and extensions shall be given in Sri Lankan Rupees to a maximum of two significant places of decimals

- 3) The works as executed will be measured for payment in accordance with the method adopted in the Bill Of Quantities and under the item as therein set forth. The net measurement or weight of the finished work in place will always be taken, and except where otherwise stated or where separate items are provided, no allowance will be made for cutting, waste, laps, circular works, etc., and no deductions will be made for grout nicks, joggle holes, rounded arises or for shrinkage for fitting ironwork and the like. Payment will be made only for only those materials, which are specified and permanently installed in the works to the approval of the Engineer.

4) Material transport , storage and handling.

Construction materials supplied and delivered to the site by the bidder which become surplus to the requirements of the works shall become the property of the bidder who shall reimburse the Employer any money that was paid to the Bidder for the Supply and delivery to the site of the surplus materials.

Construction vehicles and equipment should be parked at suitable locations without parking along road sides. Appropriate signage should be posted on affected roadways, and residents/commercial establishments should be informed of any traffic diversions and restriction of entry during construction. Only small amounts of material to be delivered at

site, and construction to be carried out considering space restrictions of the site to hold large material stock piles. Head transport should be encouraged whenever there is no adequate place for material.

Construction of the proposed building and related facilities should not generate hazardous or toxic waste and therefore do not create any potential hazard to human health due to contamination. If accidental spills do occur (if any) during construction of materials such as paints, solvents, bituminous material or any other hazardous or toxic constituents, the contractor should take appropriate measures to clean up such spills immediately and waste material should be disposed appropriately.

The contractor should take precautionary measures to minimize and control spoilage of material during storage and handling and during construction processes. There should be provisions for proper storage of construction materials to reduce the amount of waste caused by damage or exposure to elements.

5) Construction equipment and machinery

Construction equipment and machinery should be maintained in good condition and regularly. Use of heavy construction equipment and plants should be discouraged. All equipment and machinery (such as compactors and vibrators) should be operated with exhaust silencers to limit generation of noise not to exceed 75 dB. The use of high noise generating pneumatic construction equipment should be restricted. It will be ensured that the levels of intermittent vibration (in ppv) would be less than the 2.25 mm/sec at 1 Hz to avoid human discomfort and inconvenience as per the Interim Standards for Vibration of the Operation of Machinery, Construction Activities and Vehicle Movement & Traffic.

6) Inspection of site

Bidders are requested to visit the site to acquaint themselves with all existing conditions, and with the nature and extent of work to be done under the contract as no extras will be allowed on the plea of want of information due to neglect of their part in this regard.

Hence bidders are advised to inspect the site and acquaint themselves regarding the following in addition to any other information that may be required.

1. Extent and nature of the work to be done
2. Site conditions
3. Storage facilities etc.
4. Transport facilities.
5. Weather conditions in the locality
6. Limitation of working hours

7. Transporting and handling materials etc., including security clearances.

7) Type of Contract

The contract shall be a measure and Pay fixed Rate Contract

8) Quality of Materials & General Standards of Works

All materials used in the work shall be the best quality of their respective kinds as specified in the B.O.Q., the “Particular Specification”, “Special Specification” or in the General specifications (i.e. the specifications listed in the bidding document) and shall obtain the same from manufacturers’, agents or suppliers approved by the Engineer and shall comply strictly with the test prescribed herein or in the standard specifications (Both General any or Special particulars). When such specifications or tests are not laid down in the said specifications the material and works shall comply with the latest issue of the relevant British Standards or other standards approved by the Engineer.

Where trade names, Brands and/or catalogue numbers are referred to; this is done in order to establish a standard, quality, or other reference benchmark and sole preference for any manufacturer is not intended. Similar items may be used, provided they are equivalent and provided the characteristics of type, quality, appearance, finish, Method of Construction and/or performance are proved by the Bidder to be not less than the specified and subject to the condition that the approval is first obtained from the Engineer.

Where the Bidder wishes to use materials or components etc. obtained from manufacturers other than those mentioned in these specifications or on lists of approved manufacturers, it shall be incumbent upon him to prove to the complete satisfaction of the Engineer that the products which he proposes to substitute are equal in quality and appearance to those mentioned or described in the B.O.Q. or specifications, and that the manufacturer is a reputable business of long standing, producing quality products.

Unless otherwise stated, the cost of the tests required by this specification or the relevant British or other approved Standards shall be deemed to be included in the contract sum and rates.

Test certificates covering all materials for which certificates are required and are supplied for the works shall be submitted to the Engineer for approval.

No materials shall be used in the works unless the same has been approved by the Engineer.

Approval by the Engineer of materials inspected by him or acceptance by the Engineer of certificates of Tests in-lieu of inspection shall vitiate the right of the Engineer to reject after delivery to site or incorporation in the works, material found to be unsuitable or not in accordance with this specification.

Before ordering materials of any description, the contractor shall submit, for the approval of the Engineer the names of the manufacturers or suppliers proposed, and shall afterwards

send to the Engineer, copies in duplicate of the orders placed by the contractor for the said materials.

9) Units and Extension of Bill Of Quantities

All sizes and quantities have been entered in the Bills Of Quantities in Metric /Imperials Units. Figures involving decimals, including sums of money are written in the British tradition, namely, with a full stop in the decimal position and commas between each successive group of three digits to the left of the decimal position.

10) Rates and Sums to be for Work Complete

Notwithstanding any limits which may be implied by the wording of the individual items and/or explanation in this preamble it is to be clearly understood by the Bidder that the rates and sums which he enters in the Bills Of Quantities shall be for the works finished complete in every respect, he shall be deemed to have taken full account of all requirements and obligations, where expressed or implied, covered by all parts of the contract, and to have priced the items herein accordingly. The rates and sums must therefore include for all incidental and contingent expenses and risks of every kind necessary to construct. Full allowance shall be made in the rates and/or sums against the various items in the Bills Of Quantities for all costs involved in the following inter-alia, which are referred to and/or specified herein except where separate are provided.

1. All site investigations, which may be necessary;
2. All setting Out and Survey work;
3. Temporary fencing, watching, and lighting;
4. Paying fees and giving notice to authorities;
5. Payment of all patent rights and royalties;
6. Reinstatement of the site;
7. Safety precautions and all measures to prevent and suppress fire and other hazards;
8. Interference to the works by persons, vehicles, and the like who may use the existing facilities;
9. Works in connection with the protection and safety of adjacent structures;
10. Supplying, Maintaining and removing on completion Contractor's own accommodation, Offices, stores, workshops, Transport, Welfare services and all charge in connection therewith; except those for which a separate BOQ item is provided;
11. Working in the dry except where otherwise permitted by the specification;
12. Maintaining internal roads;
13. The supply, Inspection, sampling and testing of materials and of the works under construction, including the provision and use of equipment;
14. Except where separate items are provided for bringing construction plant to the site and removing on completion, for providing, transporting to site, setting to work operating (including all fuel and consumable stores), maintaining and removing from the site upon completion all construction plant and equipment necessary for the execution of the work, including the cost of all tests and other requirements in respect to such plant and equipment;

15. The recruitment, bringing to and from the site accommodating and feeding and all incidental costs and expenses involved in the provision of all necessary skilled and unskilled labour and supervision, except for whom a separate BOQ item is provided;
16. All statutory taxes and levy, surcharges etc. including stamp duty payable on the contract, which will have to be borne by the Bidder.
17. Establishment charges, Overhead Charges and profit.
No claim will be considered for further payment in respect of any work or method of execution, which may be described in the contract or is inherent in the construction of the work and detailed on the drawings on account of
 1. Any omission from the wording of the items or from a clause in the preamble or
 2. No mention of such work or method of execution having been in the preamble

11) Rates and Sums to Bear Proper Relation to work Described

The rates and sums entered by the Bidder against all items in the Bills Of Quantities must bear a proper relationship to the cost of carrying out the work described in the contract; all on costs and similar charges which are applicable to the contract as a whole are to be spread over all the rates in the Bills Of Quantities, whilst those which are applicable only to particular sections of the contract are only to be spread over items to which these sections refer.

However, the Bidder shall ascertain the exact nature and extent of work to be performed with reference to the Drawings, Specifications and Conditions of Contract as the case may be.

12) Provisional Sum Items

Provisional sums will be dealt with as provided for in the Conditions Of Contract.

Provisional sums are represented by the words “Provisional Sum” or “PS” entered under the description.

A “Provisional Sum” item is per item for which the cost of carrying out particular work (The cost of supply material needed for the work or the quantum of labour needed) for which a bidder, after making all reasonable inquiries may not to be able to coat for definite of amount at the time of bidding.

A “Provisional Sum” item is included in the B.O.Q. where the bidder is unable to give a definite price the certain aspect of the work where the employer has not decide about the choice of item.

13) “Provisional Quantity” , “Lump Sum” & “ Items”

Certain items in the Bills Of Quantities are designated as “Provisional Quantities” or “Lump sum” or merely as an “Item” in the description column.

“Provisional Quantities” may be used to indicate that the quantities for the work covered by such items are “provisional”, or that the provision of such facilities as are described in the item may not in the event be required under the contract. All items so designated will be used only at the direction and discretion of the Engineer, and if not used either wholly or in part shall, as to the amount not used, be deducted from the Contract Price.

Where such items are designated as of a “Lump Sum” or “Item”, the Bidder shall enter a lump sum, which shall be the price for the work if executed, as distinct from a “Provisional Sum” as defined herein. No claim will be entertained in respect of overhead charges or any other costs, which may allegedly result from the omission of all, or part of the work covered by such “Provisional Quantity” or “Lump Sum” Items.

14) Day Works Schedules

For a work of a minor or incidental nature for which a realistic rate analysis may not be possible to arrive at, the Engineer may instruct that portion of the work to be executed on a day works schedule, provided a Day work schedule is included in the contract.

15) Payment of Items in a Monthly Basis

Payment under items, which are measured on a monthly basis, will not be certified by the engineer until the facilities described in the items and the Specification has been provided to the satisfaction of the Engineer. Payment will continue until such time as the Engineer shall signify that facilities are no longer required.

16) Protection Of Work and Clearing upon Completion

The Bidder shall allow, in his rates, for protection of completed work from subsequent operations, making good all damage to complete work, for clearing away all rubbish as it accumulates, and leaving the site in a tidy condition to the satisfaction of the Engineer.

The bidder shall maintain gullies, pipelines and manholes adjacent to the site during construction. Proper disposal of removed material is required to ensure that they are not trapped in the catchment and transported back the drainage paths and also to avoid undesirable nuisance, odor, and health risks etc.

17) The Unit and Lump Sum prices of the Bill Of Quantities (referred to as the contract rates) shall, except in so far as is otherwise provided for under the contract, be deemed to cover all obligations set out in the contract, and all matters or things necessary for the proper completion and maintenance of the works, and shall be fixed and binding upon the Bidder.

18) Unit Prices when applied to the quantity of work performed under the contract shall, and other sums specifically determined under the Provisions of the Contract, constitute full remuneration to the Bidder under the contract.

- 19) The quantities set out in the Bill Of Quantities are provisional and cover the approximate scope of the work which is anticipated that the contractor may be required to perform. The actual quantities to be used for final measurement purposes will be determined by the Engineer by measurement of the work completed by the Bidder.

20) Abbreviations

Abbreviations used in this Bill Of Quantities denote the following.

Sqr	-	Square
Ft	-	Feet
Ft ²	-	Square feet
m	-	metre
m ²	-	square metre
m ³	-	cubic metre
mm	-	milli metre
cm	-	centimetre
kg	-	kilogramme
h	-	hour
Nr	-	Number (to indicate a quantity)
No.	-	Number(to indicate an item number, page number etc)
B.O.Q.	-	Bill Of Quantities
Ele.	-	Elevation
G.L.	-	Ground Level
G.W.T.	-	Ground Water Table
c/c	-	center to center
@	-	each
Gr	-	Grade
Approx	-	approximately
Thk.	-	thick
R.C.C.	-	Reinforced Cement Concrete
M.S.	-	Mild Steel
T.S.	-	Tor Steel
R	-	Mild Steel
Y/T	-	Tor Steel
C.I.	-	Cast Iron
W.I.	-	Wrought Iron
F/w	-	Formwork
R/F	-	Reinforcement
Wk	-	Week
Mon	-	Month
L.day	-	Labour day
MM	-	Man Month
Rs.	-	Sri Lanka Rupees
Cts.	-	Cents
n.e.	-	not exceeding

PRICING PREAMBLE

Unless otherwise specified in the respective trade sections, the following pricing preamble shall be inclusive for respective trades.

DEMOLITIONS

Rates for **Demolition** shall include demolishing, dismantling and removing etc. with the **minimum damage** to the material in the process of dismantling, temporary supporting and protecting existing work and adjacent properties against damage, dust and weather and stacking and transport to specified location all serviceable materials as directed and disposal of debris from site including spraying water periodically to reduce the amount of dust.

All serviceable materials in demolished structures shall be the property of the Client.

Precautions should be taken during piling up of debris so as not to disrupt existing drainage pathways, pavements walkways etc.

Demolition of existing pavements has to be carried out with the minimum use of machinery and sprinkling of water should be done appropriately.

Debris management must be done so as not to cause any inconvenience to the public. Debris from demolition of existing structures should be either reused, used as filling or disposed to Colombo Municipal Council dumping yard.

Warning signs should be provided as safety measures. Also, no slippery conditions along roadsides and pavements and walking surfaces have to be ensured.

EXCAVATION AND EARTHWORK

- a. Unless otherwise measured separately rates shall include for:
 - Part return fill in, well rammed and consolidated
 - Disposal of surplus earth away from the site
 - Compact bottom of excavations
 - Earth work supports
 - Working space
 - Dewatering of ground and other water
 - Dewatering of rain water and collecting water
 - Stacking of excavated earth for removal
 - Handling and re-handling of earth
- b. The measurement for excavation will be only the net contact areas.
- c. The measurement for earthwork shall be the net volume of earth after compacting to the approval of the Engineer.

EARTH FILLING

Rate for Hard Earth Filling shall include for:

- Filling in layers, (not more than 1'0") well ramming and consolidating.
- The earth shall be free of vegetation, roots, boulders easily decomposable materials, chemicals, industrial waste, plastic etc.
- The maximum size of particle shall not exceed 75mm.
- The earth shall be well graded and contain silt and clay (fines) not more than 30%.

CONCRETE WORK

- a. Unless otherwise stated all concrete shall be grade 25 (20mm aggregate) ready mix or as specified in the relevant item.
- b. Ready mix design to be submitted to the prior approval of the Engineer together with relevant technical details.
- c. All concrete shall be cast as to receive only that finishing on its exposed faces as specified in the respective items.
- d. All concrete shall be made dense with a vibrator and finished to receive respective finishes.
- e. Rates shall be include for plant for mixing, handling, hoisting, depositing, Compacting, Vibrating, Curing, Making good after removal of form work and for any tests when necessary.
 - Wherever the grade of concrete has been specified in the drawings it shall super seed the clauses above and the drawings shall be final.
 - Rates for concrete shall include receiving any filler coats and sealants, specified finish and shall be the Engineers Approval.
 - Sealant work deemed to include preparation, cleaners, primers and sealers.
- f. Rates shall be include for Continuous curing of exposed reinforced concrete slabs with ponding water or covering with polythene sheets. In case of columns, beams, staircase, Plinth beam & Ground beam etc , covering the exposed concrete surface with gunnies and spraying water and keeping wet for a period of 14 days .
- g. Rate for concrete shall include for providing admixtures to concrete if required as per specification.

FORMWORK

- a. Rates shall include for
 - All necessary boarding, supports, applications of mould oil as necessary, erecting, framing, cutting angles, cleaning, wetting and treatment before placing concrete and striking or removal etc.
 - Formwork to be measured net contact surface between concrete & formwork.
 - Formwork to beams, columns, and casings deemed to include ends.
- b. The contractor shall provide sufficient formwork and moulds to ensure the adequate progress of work and the Engineer may direct the contractor to provide at Contractor's expense such additional formwork and moulds as they may deem necessary if in his opinion the proper progress of the work is retarded by their absence.

- c. Rate to be included erecting and dismantling of scaffolding and formwork.
- d. Form work for footing, column, beams, lintel, walls, and slabs are of 15mm thick ply-boards.

REINFORCEMENT

- a. The size of reinforcement bars should comply with BS 8110 described in the drawings or elsewhere shall be the minimum size and the rolling margin and any other tolerance shall be wholly above this size. Hooks and laps have been measured and including with the quantities for reinforcements.
- b. Rate shall include for cutting, bending, fabricating, placing in position, holding and supporting including temporary fixing supports, hangers and binding wire, ties, spaces, chairs.
- c. All reinforcement shall be free from dirt, oil, paint, grease or loose rust before fixing in position and shall be brushed with a stiff wire brush if so directed by the Engineer.

MASONRY WORK

BRICK WORK / BLOCK WORK

- a. Brick should be of superior quality subject to take prior approval by the Engineer.
- b. Mortar used for brick work shall be 1:5 cement and sand mixture unless otherwise specified.
- c. Brick work / block work walling has been measured net as laid without deduction for lintels.
- d. The Rate for Brick / Block walling are to include for isolated and attached piers, bonding at angles and intersections. Rate shall also include for filling ends of hollow blocks and necessary cutting.
- e. The rate for Brick / Block walling are to include for cutting or forming chases or groves and making good, building in or cutting and pinning in and making good ends of lintels, timbers, steel work, pipe holder bats and the like and building in or cutting holes for and making good around pipes, ducting and fittings.
- f. Standard size of a brick should be 215mmx112.5mmx65mm.
- g. Sills, thresholds, copings, and steps are deemed to be horizontal unless otherwise stated.
- h. Pointing - In general
 - Deemed to be with a struck or flush joint as the work proceeds unless stated otherwise.
- i. Bond
 - Deemed to be stretcher bond for half brick walls and English Bond for walls over half brick thick unless stated otherwise.
- j. Rate to include for:
 - All joggles, cramps, ties etc.
 - Plumbing Angles
 - Setting & joint
 - Extra stone for curved work
 - Extra materials for curved work
 - Centering

- Rough and fair square cutting
- Leveling uncaused work
- Dressed margins to rubble work
- Labour on return and ends.
- Mortises, holes, stops and arises
- Raking out joints to form lay

WATERPROOFING

- a. Waterproofing work to be carried out by a specialist waterproofing sub-contractor. The contractor shall submit a 10 year guarantee for material and workmanship in the name of the internationally accepted format.
- b. The Contractor shall submit the most suitable water proofing system with specifications as specified to suit for different surface at location technically acceptable to the Engineer.
- c. Water Proofing work is deemed to include:
 - Cutting to line , notching, bending and extra material for lapping
 - Working into recessed duct covers, shaped inserts, outlet pipes and the like
 - Work to falls and cross falls
 - Temporary screeds
- d. Damp proof courses have been measured net as laid and rates shall include for overlaps.
- e. Rate shall include for cleaning with wire brush where necessary on the concrete surface and remove dust etc. prepare the concrete surface to receive the treatment.
- f. Rate shall include for ponding test kept for a period of 48 hours.

METAL WORK

Notes for Aluminum Doors, Windows & Fanlights, are as follows

- a. The Aluminum alloy to be used shall conform to the requirements of BS 1474:1987 - AA 6063 surface treatment shall conform to BS 1615 & BS 3987.
- b. Physical Properties:
 - Minimum tensile strength 150 Mpa.
 - Percentage elongation 7%.
- c. For powder coated aluminium profiles (minimum powder coating thickness of 60 ± 5 microns).
- d. Minimum section thickness 1.8mm for door frame, 1.5mm for window frame and 1.20mm for partition.
- e. Joints shall be made mechanically sound by welding or by concealed mechanical connectors. A water tight joint shall be made at the junctions and side frames members and water will not be trapped anywhere in or around frames.
- f. All ironmongery shall be of the same material and satisfactorily performed the function for which intended and shall be securely attached.
- g. Caulking compound shall be the best quality available for caulking between the contact surfaces of the structure and the aluminum windows conforming the adhering qualities, temperature resistance from 50F - 160F and humidity changes of 5% - 100%.

DUPLICATE

- h. Screws used in the construction of frames shall be high tensile stainless steel or a non-corrosive material compatible with aluminum.
- i. Neoprene weather stripping shall be of the highest commercial standards for normal temperature, water and abrasion resistance.
- j. Frames shall be fixed to the structural opening with proper fixing devices. If any discrepancies occurring between approved drawings and site conditions these shall be brought to the notice of the Engineer.
- k. Material and dimensions should be confirmed before any fabrication and installation.
- l. A Ten year guarantee period is required and this to be transferred to the Client after practical completion.
- m. At the same time of bidding, all the Bidders shall specifically be requested to submit the following information.
 - The specifications and thickness of aluminum extrusions bidder proposes to use on the work.
 - Full size cross sections.
 - Documentary evidence from the Profile Manufacturer to the effect that the proposed profile will serve for the intended purpose.
 - A Manufacturer's test certificate be produced as evidence that the powder coating is of required thickness.
- n. The item descriptions should be read along with the annexed detail drawings.
 - Doors - 100mm x 1.8mm thick,
 - Casement - 70mm x 1.5mm thick,
 - Sliding - 80mm x 1.5mm thick,
 - Partition - 76mm x 1.2mm thick

STRUCTURAL METAL WORK

Rates shall be included for

- a. Supplying, fabricating, hoisting, fixing in position with 7mm welding joints or nut & bolts, gusset plates, base plates, sole plates, rag bolts, cleats and all necessary accessories to keep in order as per detailed drawing.
- b. All steel section grade should be 275 and all the nut and bolt should be grade 8.8

c. Corrosion control approach

All steel structures shall be sufficiently and adequately protected from Corrosion / rusting and anti-corrosion system suited for marine environment and shall be as per International standard ISO 12944 or and ISO 9223. All shall refer to the Corrosively Zones and be aware of the Loss of metals as specified in same. All shall refer to the Corresponding Corrosion zones and specified Minimum DFT (Dry Film Thickness) of the total paint Film. Engineer reserves the right to increase the DFT as per situational analysis.

Surface preparations

All ferrous Iron members shall be cleaned to ISO SA 2.5 surface standard Rz 40-70 Microns and free of all rusts and oils and contaminations. All Hot dip galvanized metals shall undergo Pre Chemical cleaning process Caustic cleaning / acid pickling / water rinsing and Fluxing Prior Hot Dip Galvanizing For Electro Galvanized Tubes and Box bars available in the market shall be free of Oil / Grease and contaminations by fresh water washing and using oil cleaners and Detergents.

In Coastal areas surface contamination Salt Sea Breeze water soluble layers shall be fresh water washed and cleaned prior paint applications.

Selection of Coatings

As Colombo City is Sunny / Hot / Sea Coastal and Monsoonal Rains and preference will be given for Protective and marine Coatings and all concerned shall be responsible to obtain Engineers approval and submit Product Data sheets and safety data sheets.

Critical for selection of primer coat, intermediate coats and final as follows

Primer coat for Marine City Conditions and dry hot temperatures of 100- 120 C

- 1) Product shall be of reputed Brands with availability of product data sheets to support the performance and volume solids preferred over 55%
- 2) Primers (1st coat) shall be suitable for applying DTM Direct to Metal of Ferrous and Nonferrous (Including GI) and guarantee adhesion.
- 3) Re-coatability is an essential criterion to prevent (Long Overcoating maximums) to prevent Inter-coat detachments
- 4) Surface Tolerance capability should be ideal for Sire applications
- 5) Per coat DFT above 75 Microns DFT to 200 Microns DFT without sagging
- 6) Each coat to have different colour code for Inter coat identification
- 7) Pot Life of Epoxy resin and Hardener shall be having higher period say 3 Hours
- 8) No need to use sweep blasting of Zinc coat or No need use Etching primer (Phosphoric acid) or adhesion promotion etching which burn reduce the Zinc coat.

Intermediate coat cum Priming coat for Marine City Conditions and dry hot temperatures of 100- 120 C.

- 1) Product shall be of reputed Brands with availability of product data sheets to support the performance and volume solids preferred over 60%
- 2) Good Build up properties and Good adhesion.
- 3) Re-coatability is an essential criterion to prevent (Unlimited or Very Long Overcoating maximums) to prevent Inter-coat detachments
- 4) Surface Tolerance capability should be ideal for Sire applications
- 5) Per coat DFT above 75 Microns DFT to 150 Microns DFT without sagging
- 6) Each coat to have different colour code for Inter coat identification
- 7) Pot Life of Epoxy resin and Hardener shall be having higher period say 3 Hours
- 8) Good protections from Mild chemicals / and other corrosive external elements.

Finish final coat cum Coatings for Marine City Conditions and dry hot temperatures of 100- 120 C

- 1) Product shall be of reputed Brands with availability of product data sheets to support the performance and volume solids preferred over 54%
- 2) Good Build up properties and Good adhesion.
- 3) Re-coatability is an essential criteria to prevent (Unlimited or Very Long Over coating maximums) to prevent Inter-coat detachments
- 4) Good colour retention / Good colour retention / for site applications

- 5) Per coat DFT above 55 Microns DFT to 60 Microns DFT without sagging
- 6) Each coat to have different colour code for Inter coat identification
- 7) Pot Life of Epoxy resin and Hardener shall be having higher period say 3 Hours
- 8) Good protections from Ultra-Violet Radiations and Mild chemicals / and other corrosive external elements.

Low solid products should be avoided as to achieve the Total DFT within 3 – 4 Coats.

For all purposes it is prudent to obtain certificate for all skilled paint applicators from Paint Manufacture's Training program as to achieve expected performance criteria. They should be knowledgeable to execute the correct procedures and should be able to read understand and execute the product data sheets and manufacturer's recommended procedures as approved by the Engineer.

Procedure to check and measure the DFT (dry film thickness) on the metal of the paint thickness shall be submitted in advance for engineer's approval. Also the number of intermediate layers to be applied are to be verified by a method statement.

WOOD WORK

a. Timber usage

The purpose of timber shall be structural and furniture use.

b. Quality grades and compliance with structural adequacy

The timber shall be recognized based on the modules of elasticity and density at the specified moisture content at the service environment.

c. Service environment

Service environment and final exposure of timber shall be at a temperature of around 24°C and plus or minus 5°C and the relative humidity of the surrounding air between 55% to 60% and as such timber will attain an average moisture content not exceeding 12%

d. Standards

Timber shall be supplied in accordance with the standards grading rules applicable to the country of origin. The applicable standard shall be furnished by the contractor in writing along the sample **submission for testing**

e. General requirement

Timber for the structural purpose shall be in the density range of 800 to 900 kg/m³ and the same applicable to timber for furniture is 600 to 750 kg/m³ at moisture content at service condition.

f. Seasoning by preservative treatment

The timber should be made durable by preservative treatment. Thus low hazard and non poisonous timber protection shall be adopted to achieve the moisture content under service environment. Timber shall be seasoned to achieve the specified moisture content under service environment with a suitable drying method.

g. Rates shall include the Brass hinges, locks, handles & all necessary accessories which should equal to existing accessories and prior approval to be taken from the project Architect to finished the work.

h. Nailing of timber for the same material or with any other material shall be using the Braze scrow nails.

i. Testing of samples and certification

The test samples of timber to be forwarded to State Timber Corporation, 82, Rajamalwatta Road Battaramulla, University of Sri Jayawardanapura or University of Moratuwa and the test certificate shall carry the following information.

- Sample dimensions
- Type of Seasoning
- Density
- Modules of Elasticity
- Moisture content

In case of import

j. Finishes and size for timber

All timber sizes mentioned should be finished sizes. It is the responsibility of the contractor to workout the sections of the market available timber and select suitable sections to achieve the required sectional dimensions.

The nail head at all fixing shall be covered by a material of same timber and finish with same appearance after surface application.

A prerequisite of all painting and decorative finishing systems is that they shall be compatible not only to each of the constituent layers of the systems, but also to the 'delivery' finish of the material to be decorated. The contractor is advised to consult the manufacturers of painting materials before using the same.

Prior approval should be taken from the Engineer for this paintings and colours.

Painting system shall consist of seven-coat-work that is, three coats of Harmonizing polyurethane base coats for all timber work, Solvent based stain and 3 coat of clear polyurethane top coat (Sayerlack or equivalent) with matt finish for all timber work.

Manufactures specifications shall be followed in application method. All timber members shall contain minimum number of knots that must be treated prior to priming.

Paintable preservatives are a prerequisite of all successful painting, and where pre-treated timber is supplied, the actual type must be ascertained before painting is commenced.

Rate shall include with all Ironmongery and locks for new timber works and shall be in high quality Union/yank or equivalent.

ROOF COVERING & ROOF PLUMBING

Rates for Roof Covering shall include laps, straight cutting and waste, nails, screws, clips rivets, straps and the like including hoisting and fixing complete.

Zinc Alum roofing:

- 1.Zinc Alum profile sheet (minimum base metal thickness 0.4mm and minimum thickness of 0.47mm.)
- 2.Zinc Alum gutter (minimum base metal thickness 0.4mm and minimum thickness of 0.47mm.)
- 3.Zinc Alum down pipes (minimum base metal thickness 0.4mm and minimum thickness of 0.47mm.)
- 4.Zinc Alum cladding (minimum base metal thickness 0.4mm thick)
- 5.Up channel, 'C' channel and purling galvanized iron
- 6.material : 55% Aluminum zinc

Al: Aloycoated Az 150, Hitensile (Grade 560) sheet.

Purling - Hitensile - Hitensile strength - 400 mpa (minimum)

Rates for Roof Plumbing shall include solder, rivets, screws, nails, clips, straps, straight cutting and waste for patterns mould or templates and for all hoisting and fixing complete with type 400 PVC fittings.

PLUMBING & SANITARY INSTALLATION

- The whole of the sanitary works shall be carried out by a licensed sanitary plumber according to the layout and as specified and as directed at site. It should be noted that the positions shown on plans are approximate. Exact positions would be indicated at site.
- All plumbing fixtures and fittings should be approved by the Architect, prior to ordering same for installation.
- All sanitary fittings shall be "American Standard" or equivalent brands and make to the approval of the Engineer.
- All control valves shall be genuine Pegler or equivalent and make to the approval of the Engineer.
- Unless otherwise stated, PVC piping for water service and waste water etc. shall be rated to Type 1000 PVC and Type 600 PVC such piping and fittings shall comply with the SLS 147 or latest BSS.

Rate for Sanitary Plumbing shall include:

- a. Screws, nails, pipe hooks, saddles, brackets, sockets, connections, short lengths, back nuts, nipples, all laps, straight cutting and waste.
- d. All excavations, supports to sides of trenches, if necessary keeping trenches free from water, back filling, disposal of surplus soil, all jointing and other incidental materials and testing upon completion.

Rates for sanitary fittings shall include for:

- a. Fittings such as taps, waste water outlets, and flush valves, internal overflows etc., the supporting brackets and incidental materials for fixing.
- b. Assembling, joining together, fixing component and jointing to pipes inclusive for necessary couplings and for leaving perfectly clean undamaged and perfect working order as on completion.
- c. Jointing and connecting pipes to sanitary fittings.
- d. Testing and commissioning of installation.

- e. Making good the work disturbed

WATER SUPPLY

The Bidder is to pressure test pipes after fixing taps and stop cocks and fittings prior to concealing, under the supervision of the Engineer or his representative.

The contractor shall provide the manufacturers' certificates of the standards, quality of the materials before commencing the works

All water pumps should be mounted on inertia bases fitted with anti-vibration mountings. Flexible connections should be provided on connections between pump units and pipe work.

Where pipes pass through walls or slabs these shall be wrapped with a layer of insert material. For pipes exceeding 50mm dia. sleeve pipes shall be used for the full thickness of the slab walls, beams, retaining walls through which the pipe passes.

Rates for Water Supply Plumbing work shall include:

- a. Cutting and waste of pipes etc., and jointing of pipes.
 - b. All specials such as elbows, bends, tees, junctions, plugs, reducers and similar pipe fittings except for valves which would be measured separately.
- c. Connecting pipes to sanitary fixtures and appliances.
- d. Chasing to brick or concrete walls, columns, beams etc., and making good all works disturbed.
- h. Necessary screws, nails, sockets, connection back nuts, standard pipe fixing or supporting clips, saddles, brackets, racks, straps etc.
- f. Connecting different type of pipes.
- g. Testing and disinfecting after completion.
- h. Preparing and making applications and giving notice to the relevant authorities to obtain service connections to the building inclusive of any statutory payments to relevant statutory authorities.
- i. All cold water piping should be provided with flexible connections in pipe work and provided with the required pipe supports & anchoring as per the manufacturer's specifications.

DRAINAGE WORK

Unless otherwise specified, pipes in Drainage shall be Type 600 PVC.

Rate for Drainage Work shall include for:

- a. Laying of pipe to falls and gradient and all jointing and other incidental materials.
- c. All pipe specials such as bends, tees, junctions, elbows, etc.
- d. Connection to sides of manholes etc.
- e. Providing sleeves etc., when pipes pass through walls, foundations etc.
- f. Giving notices, obtaining permits, paying fees etc.
- g. Testing installation as Sri Lankan standards.

- h. All the sanitary fittings have a 10 year manufacturer's warranty issued by the agent.
- i. Rate shall include for easy cleaning for maintenance provide a clean out at every 15m intervals.

DUPLICATE

ELECTRICAL

General

If not specifically mentioned in the BOQ items following specifications would apply to the Electrical Installation

Work shall be done in accordance with specifications for electrical and mechanical works - ICTAD Publication No.SCA/8 of Aug.2000 (2nd Edition -Revised)

The whole installation shall be carried out according to CEB/IEE wiring regulations.

All electrical constructions should be according to IEE regulations (17th edition or later) and subject to the instructions of the electrical officer concerned. Jobs attend beyond condition will not be approved please.

All the equipment shall be prior approved by the Engineer.

All switches and socket outlets shall be plated type make "Clipsal", "Orange ", "Krypton" or any other approved equivalent complying with SLS1000:1993 for switches & SLS 1998: 1991 for socket outlets.

MCCB:- Schneider, ABB, Siemens, Hager, LS or approved equivalent.

MCB'S & RCCB'S:- Schneider , Siemens, Hager, ETN or approved equivalent.

Cable :- ACL, Kelani or approved equivalent.

Ceiling Fan:- K.D.K. or Japanese origins

Exhaust Fan:- K.D.K. or Japanese origins

LED Fittings/ Tube:-

LED luminaires shall be Philips or equivalent and the other lamps and fittings shall be orange or equivalent if not specifically mentioned at the BOQ item

LED Luminaires Minimum efficacy at scotopic condition should be above 100 lumen/W Correlate colour temperature (CCT) should be above 4000K, (Cool White). Colour rendering index (CRI) should be above 70. Rated life time should be above 50,000 hrs.

All CFL bulbs shall be "Energy star 5" or above

All Fluorescent fittings shall be zinc coated steel sheet finished with powder coated to 0.45mm thickness complete with electronic choke (Make:-"Atco","BG" original or - Equivalent) starter and the tube should be Thron, Philips, or Osram.

Rate to include switch boxes, Rowl plugs, square pin plug base, Chromium plated M.S. chains, brass hooks, ceiling roses, holders and any other item necessary.

Distribution Board:- Shall be in surface mount metal enclosure fabricated With Zinc coated sheet metal of gauge not less than 1.5 mm total enclosed, with hinged door with protective cover plate for terminals, finished with powder coating of approved colour and components

All the M.C.C.B.'s, MCB's and RCCB's for the distribution boards should be purchased from the authorized agents or from their dealers and a certificate or invoice along with their Company seal and Part No., numbers and warranty should be produced at the time of payment.

Recommended Fabricators of Switch boards and Enclosures;

Elsteel, K.I.K. Lanka (Pvt) Ltd, Pubudu Engineering (pvt) Ltd, Richardsons Projects (pvt) Ltd, OS Project (Pvt) Ltd. (Orange), Or similar product

Warranty

If in case not specified separately Minimum 2 year warranty from the building handed over date shall be given for all electrical equipment. Warranty cards shall be submitted by the contractor to the Projects Engineer.

All light fittings shall be approved by the project architect/ electrical engineer prior to the installation

Cabling

Internal light wiring shall comply with the drawings and shall be in 230/440 volt single core PVC insulated copper cables

The 2 compartment trunking shall be used in the cases where both data and power lines are routed and the cost shall be distributed and included in the relevant point wiring item.

The contractor is also responsible for the coordination work for ELV installation with different parties when required.

The cable paths/trunking/conduits/casing shall be well matched to the interior arrangement and shall be hidden.

The all metal surfaces shall be bonded and earthed

Underground cabling

"Minimum depth of underground cable trenches shall be 600mm. Cable inside trench shall be covered with LT cable tiles of size 450mmx 200mm x 50mm (should be of grade 25)

50mm quarry dust layer should be laid inside the bottom of the trench and the cable should be placed over the top of it.

Another 50mm of quarry dust has to be laid covering the cable before placing the concrete tile.

Warning tape should be placed after filling the excavated soil layer on top of the concrete tile."

Earthing

Number of rods required to obtain the necessary earth resistance shall be determined by the contractor. Testing of earth resistance after installation shall be done by the contractor in the presence of the project Electrical Engineer/Technical officer. All costs for testing shall be borne by the contractor.

CEB supply

The contractor shall coordinate with the CEB throughout the work to avoid the delays in getting the power connection.

Air conditioning system specifications

Country of origin of the AC system shall be Japan, European. York or equivalent brand shall be provided.

The AC supplier shall be the authorized local agent in sri lanka and shall have 10 years or more in HVAC industry (Evidence shall be submitted).

The bidder shall include the copper and drain piping total cost (**not the 5 meter standard cost**) to the AC unit item cost and it shall cover the total supply and installation cost.

Inverter **type** shall be installed

Warranty

Warranty for the Compressor shall be Five years comprehensive or more and other equipment shall have one year comprehensive warranty

Maintenance

Free services in the first year and Service agreement after the first year shall be submitted

FLOOR WALL CEILING FINISHES

PLASTERING

- a. Rates for Plastering shall include for all temporary rules, screeds, grounds etc. for raking out joints of new brick work, or hacking new concrete for key, internal and coved angles, joints between different surfaces and between new and old plastering, arises, quicks intersection between curved or irregular surfaces etc. and making good around pipes, sanitary fittings and similar fixtures.
- b. Unless otherwise stated internal wall plaster shall be 15mm thick in cement, lime and sand 1:1:5 finished smooth with lime putty.
- c. Unless otherwise stated external wall plaster shall be 15mm thick in cement, lime and sand 1:1:5 finished semi-rough.
- d. Unless otherwise stated plinth plaster shall be 15mm thick in cement and sand 1:3 finished smooth with neat cement floating.
- e. Unless otherwise stated Soffit plaster shall be 10mm thick in cement and sand 1:3 finished smooth with lime putty.

PAVING

- a. Rates for paving shall include all temporary rules, screeds, ground etc. all normal cutting arisers, rounded angles and the like bedding and point making good between different surfaces and around pipes, sanitary fittings and other fixtures and cleaning down upon completion including curing.
- a. Unless otherwise stated Cement rendering shall be 12mm thick in cement and sand 1:3 finished smooth with thick coat of colored pigment mixed neat cement floating and smooth with Caberendum stone.
- b. Unless otherwise stated skirting shall be 100mm high 12mm thick in cement and sand 1:3 laid with the floor rendering, finished smooth with a sunk bed of junction of the skirting with the plaster above the angle between the floor and the skirting to be rounded off to a radius of one Inch.

TILING

Tile should comply with European standard specification EN 177.

Ceramic Floor Tiles

The ceramic floor tiles shall have following Mechanical properties and assurance of the same is a pre requisite. A design qualifying certificate shall be submitted from an institution accepted to the client.

No	Description/Property	Unit	Value
1	Water Absorption % by mass	Less than 0.5%	
2	Modules of Rupture and Breaking Strength	27N/mm ²	
3	Abrasion Resistance	Compatible with ISO Standard	

4	Crazing Resistance	Compatible with ISO Standard	
5	Resistance to Chemicals	Compatible with ISO Standard	
6	Interval for Structural Movement Joint	Contractor shall submit the proposed structural joint arrangement which shall be valid for floor concrete and layout of tiling.	
7	Surface Quality	Tiles shall be free from visible defects	

D. Granite and Marble

The Marble and Granite shall be made out of natural sources and to be tested for density, porosity and hardness and produce a certificate from an acceptable institution to the client

Rates for tile work shall include the cost of cement and sand 1:3 screed, cutting and grinding edges of tile/granite as necessary and pointing joints with neat cement of tile grout to match the color of tiles.

Unless otherwise stated floor tile paving shall be any size non-skid pattern ceramic floor tiles of approved local manufacture, bedded with cement and sand 1:3 12 mm thick screed. Unless otherwise stated wall tiling shall be any size glazed ceramic wall tiles of approved local manufacture fixed on cement and sand 1:3 backing 10 mm thick.

Approval of floor and wall tiles colour to be obtained from the Architect/Engineer.

All floor tiles shall be locally produced ceramic tiles and shall agree in colour, dimensions, tolerances, finishes, and quality with samples provided by the consultant. All tiles to be true to shape, uniform in size and free from blemishes.

The recommendations of C.P.202 and BS 5385: part 3, shall be complied with, subject to any qualifications hereunder.

Preparation

The sub –floors to be cleaned of cement film, mortar spills, paint and other impurities, oil sports to be chiseled. The sub-floor is to be well wetted with water

Everything necessary shall be done to obtain a satisfactory bond between concrete, screeds, beddings and finishes. The cleaned sub-floor shall be grouted with a 1:1 cement/water mixture by broom application, prior to placing the mortar bed.

Setting-out

Corrected floor levels shall be established and finished levels of tiling controlled by a series of spot levels.

Movement joint in sub-floors and screeds shall be carried up into tiling.

Generally the tiles shall be divided symmetrically over the areas, so that pieces smaller than half a tile will not occur; the layout of the tiling and width of joints to be determined with the consultant.

The tiling to be laid to falls, towards floor gullies as shown on the drawings, and/or in co-ordination with the consultant.

At joints to walls, skirtings, pits, passages etc., the to be cut, sawn or ground to size.

Bedding of Tiles

Care shall be taken that tiles are well soaked in clean water and are free of dust before laying.

A mortar bed of 1:3 cement sand, of thickness as specified in the Bill Of Quantity to be spread by means of a float in beds of a width of approx. 700 and allowed to stiffen.

The back of the tiles shall be buttered with a coat of cement slurry and the tiles laid with straight joints 3mm wide, on the mortar bed.

Grouting shall take place at any time after tiles are firmly fixed but before any dirt or contamination can enter the joints.

Dampen the joints and grout with cement: fine sand(1:1). Do not use more water than necessary to avoid subsequent joint shrinkage work the grout well into the joint until flush and remove surplus grout. At the discretion of the consultant, tinted grout shall be used.

If a depression or bump in surface level in excess of 6mm in any 2 meter length is found, then the floor shall be taken up and re-laid, at the contractor's expense, to the satisfaction of the Consultant.

Protection

Finished tiled floors are completely covered with sheets of hardboard; walls and skirting to be washed with soap and water, the floor to be similarly treated after removal of temporary floor coverings.

GLAZZING

- Rate shall including with 12mm thick clear tempered glasses
- The gap between two glasses should be 3mm and it should be fill with clear silicon sealant.
- The Stainless steel (A 304) 25x25U channel frame shall be fixed to the ends of the glasses.
- Height above 2.7mm shall be provided with stainless steel bracket and pinned.

A.Glass panels with Aluminum Frame

A.1 Deflection Criteria for Glass Panel

The contractor shall design the panels for wind analysis based on Australian code and prove that the deflections are within the limits.

A.2 Glass Properties, Strengths and Stresses

The glass panels shall have the following equivalent material properties.

Elastic Modulus	$E =$	70000 MPa
Torsional Elastic Modulus	$G =$	28700 MPa
Poisson ratio	$\nu =$	0.22
Density	$P =$	2500 kg/m ³

A.3 Properties of Aluminum

The aluminum shall have the following equivalent material properties.

Yield tensile strength	$f_y =$	145MPa
Ultimate tensile strength	$f_u =$	185MPa
Elastic Modulus	$E =$	70000MPa
Density	$P =$	2700 kg/m ³

PAINTING

- a. Rates for Painting shall include preparation of surfaces, cleaning down, smoothing, knotting, stopping etc., protection of floors and fittings, removing and replacing door and window furniture and cleaning doors and windows upon completion.
- b. Unless otherwise specified internal wall paint shall be one coat of Alkali Resistant Primer and two coats of Emulsion paint of approved make and colour.
- c. Unless otherwise specified external wall paint shall be one coat of Alkali Resistant Primer and two coats of Weather shield Emulsion paint of approved make and colour.
- d. Unless otherwise specified paint for wooden surfaces shall be one coat of aluminum primer and two coats of Enamel paint of approved make and colour.

STAINLESS STEEL

Type and Quality

All stainless steel for external applications shall be type 316S16 (18% chromium/ 10% nickel alloy/ 2.5% molybdenum) austenitic stainless steel cold formed, flat rolled plate, sheet and strip to BS 1449: Part 2: 1983, and shall agree with requirements of BS 970: Part 1: 1983.

For internal applications type 304S16 (18% chromium/ 10% nickel alloy) may be considered as an alternative, at the discretion of the Engineer.

Bars and strips shall be 'brushed finish'.

All bolted or screwed fixing shall be of stainless steel, or if of other metals to be fully isolated from the stainless steel by use of nylon or neoprene washers, sheet, etc.

Welding

Where stainless steels are welded, this shall be carried out using chromium nickel austenitic or other compatible electrodes for manual metal arc welding to BS 2926: 1984

Care shall be taken to avoid distortion during welding or damage to or discoloration of surrounding finished surfaces.

All welds shall be carefully ground and polished as required to blend the weld in the surrounding metal

EXTERNAL WORK

SOFT LANDSCAPING

Contractor shall read ICTAD " specifications for landscape work in Sri Lanka" Volume 01, and following soft landscape specifications applicable to this project.

Contractor shall include the maintenance cost of turf and plants for period of six month from practical completion of planting and to completion of the contract.

1. Soft landscape sub- contractors

Contractor shall appoint a reputed sub- contractors for soft landscape work. Approval for them is compulsory. Their performance in the field and their ability of providing the services and number of staff and their qualifications and experience in the landscaping field may considered, when giving the approval.

2. Preparatory Operations

2.1 Protection, Site enclosure / temporary fencing

The Contractor shall protect the newly done Landscape, until the project is completed and handed over. Temporary fence using timber shall be installed to avoid damage. Especially for shrubs, ground cover plants and turf. Necessary signage (in all three languages) shall be displayed at the site. Particular attention shall be given to the protection of hard landscaping specially paving, underground services and other structures in the planting process.

Temporary fencing may also be used for avoid trespassing and to ensure the safety of public during the construction.

Temporary fencing should not be removed unless otherwise instructed. The good condition of the fencing should be maintained throughout the construction period as well as in the maintenance period after handover the site. Contractor shall re do or replace the fence when instructed.

2.2 Water supply at site and facility for watering the turf

Irrigation system may not be installed or may not function properly at the time that the soft landscaping work is commenced. Contractor shall supply water for turf until the pproper functioning of the sprinkler system.

Existing and imported top soil

The contractor is responsible for submission of a soil analysis report certified by a soil scientist and,lands cape architect based on the fertility condition, water retention capacity and final recommendation on the soil justifying wether the existing top soil is usable for the selected turf and if not the contractor shall make recomondation for soil improvements or otherwise the replacement without using. Top soil depth is 150 mm minimum. The following Soil testing are compulsory for existing top soil and shall be incorporate to the recomondation report.

- A. Particle size analysis using hydrometer test and sieve analysis
- B. Soil pH
- C. Soil fertility analysis

In case of existing top soil is not reusable that shall be replaced by an imported top soil supported by a same type of recomondation report based on the necessary testing including above test.

Existing and imported Subsoil

The contractor shall submit sub soil grading analysis (particle size distribution) and the recommendations on passage of water through the subsoil and the fertility condition and suitability of the soil for both existing and imported soil in case of replacement or additional filling as an assurance of the soil property prior to commencement of work . So that during the rain the water may not be stagnated on the ground also the retain of sufficient water for growing of grass. Sub soil depth is approximately 600mm from the under neeth of top soil layer. The following Soil testing are compulsory for existing sub soil and shall be incorporate to the recommendation report.

- A. Particle Size Analysis – sand, silt, and clay content using Hydrometer Method.



- B. Bulk Density – bulk density of the soil after compaction.
- C. Water Movement – saturated hydraulic conductivity
- D. Plant Available Water – soil moisture content
- E. Soil Organic Matter – organic matter content.
- F. Fertility – soil pH, Cation Exchange Capacity, Base Saturation, nutrients, and salinity of fine earth fraction of the soil.
- G. Soil tests for existing or imported compacted sub soils to ascertain the fertility and drainage condition at site prior to laying the turf to assure that the required soil properties are achieved.
 - G.1. Infiltration rates of surface horizon
 - G.2 Saturated hydraulic conductivity using constant head permeameter
 - G.3 Particle size analysis of sand and fragments using a sieve test
 - G.4 Bulk density of each horizon using undisturbed soil core testing,
 - G.5 Saturated hydraulic conductivity using undisturbed soil core testing.
 - G.6 Cation exchange capacity
 - G.7 Soil Tests for Alkaline (high pH) Soils and low pH soils
 - G.8 Soil salinity

2.3 Rubbish

The Contractor shall remove all the rubbish including debris from the proposed soft landscape areas and carried away from the site. Temporary storage shall be done only in the given location inside the site. Storage time shall not remain in the temporary site more than 3 days.

2.4 Accessibility

To avoid heavy vehicles circulation in an ad-hoc manner at the site damaging the natural topography of the site and protected vegetation, Contractor shall propose a circulation route inside the site and shall be submitted to the Engineer for approval. Approved map shall be displayed at the site office as well as in the entrance and most important positions of the site. Directions for heavy vehicular movement shall be physically displayed at the site in the form of signage. This route shall mark on the ground. Contractor shall take necessary arrangement to educate his workers

on the vehicular movement route. Contractor shall be responsible for any damages due to vehicular movement outside the approved route and damages shall be rectified at his cost.

3 Turfing

3.1 Turfing material

Planting material shall be planted in a nursery before planted at the site.

Any turf (pidali) removed from the wild natural areas shall not be used for the planting. It is important to take this measure to stop spreading invasive weeds in the site.

All turfing material shall be Japonica.

3.2 75mm thick Planting medium

The content of the planting medium is approximate and the required contents shall be recommended by the soil scientist.

- a) 30 % River Sand
- b) 40 % selected and verified top soil or compost free of stones (Bigger than 15mm.), roots, debris, non organic materials etc.
- c) 30% Coco Peat(Coir dust)
- d) To a cubic meter of above mixture, add:
 - 1Kg/m³ Compound fertilizer N.P.K + S Mg + Te (12, 12, 16, 6, 2 Te) and
 - 0.5Kg/m³ Super Phosphate(N.P.K +Magnisium+Treat element+ Super Phosphate)
- f) Suitable additive for maintenance of green grass

3.3 Planting methodology

3.3.1 Preparation

The soil (a minimum 150 mm depth of planting medium free of vegetation) shall be turned over, levelled, lightly consolidated and free from surface stone, other debris and perennial weeds. Soil shall not be compacted more than 50%. (Compacted soil inhibits drainage of surface water which leads to permanent turf damage).

Apply a general base fertilizer (compost is acceptable) and rake into the soil surface using a rake, obtain a fine tilt to ensure thorough contact between soil and turf roots when laid. Turf shall always be inspected upon receipt laid or rolled out on a holding bed immediately and, within 24 hours. If more than 3 loads of pallet are on site, turf will be drawn equally from each load as work progresses. Do not work to the end of one pallet before starting the next. Any turf, which shows

signs of deterioration, will be used immediately. If storage for periods longer than 24 hours, turf shall be packed on to a holding bed and thoroughly watered.

Sufficient operatives should be available to lay the turf immediately when it arrives on site. Do not lay turf when ground is waterlogged.

Water Retention Material – Coir dust/husk of rice/ straw chopped to pieces and mix evenly in to the soil for 60mm depth for satisfactory growth

3.3.2 Laying Turf

Turf will be laid, preferably along a straight side in a row, butting closely end to end. On subsequent rows, stagger the joints in brickwork fashion. Gaps will not be left between the turfs. Timber Planks will be placed on newly-laid turf for walking along and working from. Never use rollers or wrecker plates on newly –laid turf.

Complete contact between soil and the underside of each turf shall be ensured, if necessary a flat plywood board fixed to a pole shall be used for firming down the turf pallet lightly. Any remaining cracks shall be filled with planting medium and tamped down.

The turf shall be laid up to the edge and trim with edging shears, knife or a half moon to a true line. Levels shall be adjust and consolidate by raking out or in-filling with planting medium underneath the turf.

Preferably turf laying should be commenced in the evening after 4 pm.

3.3.3 Watering

Immediately after laying Watering shall be carried out. On hot days, Contractor may need to commence watering large lawns prior to laying all the turf.

Ensure that the new lawn is never short of water. Lift corners of the turf to confirm water has percolated through to the underlying soil. Water repeatedly until the turf is well established.

If rainfall is experienced, Contractor still need to check that the lawn is receiving sufficient water.

It is best to water turf in the early morning or during the evening so that less water is lost to evaporation. Once established, occasional watering during dry periods should be adequate.

4 Watering and maintenance

4.1 General Requirement

Maintenance of plants shall include potable watering, fertilizing, weeding, cultivating, repairing adjusting stakes and ties, replacing dead, diseased or ill plants, resetting plant, controlling pests and diseases, trimming and all other necessary operations to maintain the planting in a healthy

thriving condition. The Contractor shall provide sufficient personnel and equipment to perform all work in a professional and neat manner and in keeping with generally accepted horticultural practices and techniques. As Planting operations proceed, the contractor shall remove all rope, wire, burlap, litter, empty containers, rocks, clods and all other debris daily and keep the site neat at all times. Any excess planting medium, excess materials etc. shall be removed and disposed as directed. After planting operations are completed, all paved areas and roads which have become strewn with soil or other material shall be cleaned by sweeping and washing if necessary.

4.2 Maintenance up to taking over.

Landscape maintenance shall begin immediately after each plant is planted. The Contractor shall maintain all trees, shrubs, plants, groundcover to the satisfaction of the Engineer. Planting areas and plants shall be protected at all times against trespassing and damage of all kinds. Any trees, shrubs, climbers and lawn areas those found to be missing or defective shall be replaced by the Contractor entirely at his own cost unless instructed otherwise by the Engineer.

4.3 Maintenance during defects liability period.

The maintenance of trees, shrubs, plants, groundcover etc. shall be carried out by the Contractor during the defects liability period as mentioned above under general requirements. Any plant found to be defective or dead during this period shall be replaced and maintained by the Contractor at his own cost. A final inspection of all plants will be held at the end of the defects liability period. The maintenance of trees, shrubs, plant, groundcover etc. will be undertaken by the Employer/Client at the end of defects liability period.

4.4 Programme

Prior to starting the work, the contractor shall submit a detail report for approval containing the following items

- a. Application of fertilizer for short term and in long term
- b. Application of micronutrients
- c. Irrigation control
- d. Basic plant care
- e. Methodology of Plant replacement
- f. Maintenance Equipment

The report must describe two main approaches to the provision of maintenance resources; to either employ staff and purchase own equipment or to engage a turf maintenance contractor. It is possible to hire specialist machinery used occasionally to supplement the basic equipment. Hiring equipment and engaging contractors will save on the initial capital

cost. It will also reduce problems associated with maintaining the machinery in a safe and efficient condition. The appropriateness of this method will depend on the size of the facility and the availability of skilled local contractors with the appropriate equipment control by maintenance resource check list. It may be possible to purchase some maintenance materials and achieve savings but this will depend on the purchasing power. Appropriate timing of maintenance operations in relation to the weather and ground conditions is important for the effective maintenance of the turf. Where contractors are appointed for maintenance, it is essential they are contracted to achieve the performance standards with all operations carried out at the appropriate times and under the right conditions.

Facilities required be provided for the secure storage of equipment on site with space for materials that are used for maintenance such as top dressing sand or cricket loam. Provision must be made for the safe storage of pesticides, all other chemicals and fuels conforming to current legislation. The report provided by the contractor shall recommend a suitable method for maintenance, associated cost involvement for different maintenance options with the consultation of the client department on the existing maintenance capacity and proposal for required improvement.

4.5 Water/ irrigation

Water shall be potable or from an approved source having no salt or acid or other toxics or harmful substance to plant life. Watering to plants and lawns is to be carried out twice per day (morning and evening) in the morning turn watering should be completed before 9.30am and watering in the evening should be started after 4.30

Sprinklers

Reduce direct evaporation during irrigation by avoiding midday sprinkling.

Surface irrigation

a. Plants or ground covers/ grass should not be removed or damaged while using a hose or any other tool for irrigating. If trees are in a lawn, water the trees separately from the grass. Deep watering promotes deep rooting of trees and shrubs. If not, tree roots may grow on the soil surface. The most active water absorption area is not close to the trunk but beyond. This is where should be watered. Most of the roots spread 1 ½ to 4 times as wide as the plant's canopy.

b. Six (6) Liters per one (1) sq. meter for lawn/ grass

- c. Ground covers – If a hose will be used, fix a spraying jet to spread water to prevent damages to the plant and soil eruption and disordering.

4.6 Fertilizing

Compound Fertilizers

Compound Fertilizers shall consist of nitrogen (N); phosphorus (P) and potassium (K) with sulphur, magnesium & micro elements, composition ratios of 12,12,16,6,2, Te, unless otherwise approved.

Fertilizer shall be applied for twice a week for first three months, once a month for second three months and once in three months for remaining period as instructed.

Organic fertilizer .Contractor shall apply organic fertilizer as instructed.

4.7Cultivation

Areas around trees, shrubs, and ground covers shall be cultivated and loosen the soil to achieve a porous surface every time before applying fertilizer. Contactor shall maintain all planted area with loose soil every time

4.8 Removing of weeds

All planted areas shall be free of weeds and invasive plants all the time. Removing of weeds shall be done during every day watering time.

4.9Trimming and shaping of the trees shrubs and ground covers.

Contractor shall deploy a trained experience gardener to carry out the trimming. Trimming shall be started when plants are grown enough to start trimming as directed by the Engineer.

5 Removing of existing trees/ shrubs

5.1 Cutting of existing trees

Contractor shall not cut any trees existing on the site unless otherwise instructed by the Engineer in writing. Contractor shall not damage any hard landscape, building, artifacts or vegetation during the process of tree cutting. In any damage as mention above Contractor shall replace rebuild or compensate with his own cost.

Contractor shall remove the roots of the tree by digging and cutting.

Contractor shall remove and cart away all the parts of the cut tree from the site to ensure the cleanliness of the site.

Depression created by the removed tree shall be filled with good quality red earth or sand as instructed.

Contractor shall avoid filling these by using debris collected at the beach of disposing materials of demolishing items.

GENERALLY - ALL TRADES

- a. Should the contractor wish to use alternative materials to those specified, etc. To utilize local stocks and suppliers instead of importing goods, he shall first obtain the approval of the Engineer. Any alternative materials shall not be of lesser standard than those stipulated herein.

GENERAL SPECIFICATIONS

The general Specifications are the specifications given in the following documents issued by the Institute for Construction Training And Development (ICTAD).

Publication No.	Description
SCA/4(Vol. I)	Specification for Building Works Vol. I
SCA/4(Vol. II)	Specification for Building Works Vol. II
SCA/8	Specification for Electrical & Mechanical works associated with Building and Civil Engineering
SCA/3/2	Specifications for Water Supply, Sewerage and Storm water Drainage work.

6. Testing and Commissioning Procedure for Pool and Equipment

The objectives of the Testing and Commissioning works

- 1.1 To verify proper functioning of the equipment and the system after installation
- 1.2 To verify that the performance of the installed equipment and systems meet with the specified design intent through a tests and adjustments.
- 1.3 To capture and record performance data of the whole installation as the baseline for future operation and maintenance works

2. Scope of Testing and commissioning works

The contractor submits a testing and commissioning procedure for following in association with the swimming pool

- 2.1 The Pool for the assurance of water retaining ability which will involve the filling and emptying of the pool with water for full capacity for number of times
- 2.2 The Pumps
- 2.3 The valves
- 2.4 Chemical Dosage pumps
- 2.5 Filter
- 2.6 For the system of pool operation as a whole

3. The Contractor is required to carry out a full Testing and Commissioning procedure for the equipment and the complete system to ascertain that the equipment and the system are operating in accordance with the design objectives. This shall include but not limited to

- 3.1 The balancing of water distribution;
- 3.2 Adjustment of total system flow to provide designed quantities;
- 3.3 Electrical measurements;
- 3.4 Verification of performance of all equipment and automatic controls;
- 3.5 Sound and vibration measurement

The contractor shall submit a Testing and Commissioning report covering above scope certified by a qualified building services engineer who shall recommend the performance ratings of each.

DUPLICATE